THE UNITED REPUBLIC OF TANZANIA

RURAL ENERGY AGENCY (REA)

ANNEX 4

BUSINESS PLAN FOR KAMASI ISLAND 100KWp MINI-GRID.

VOLTAFRICA™

Developer: Volt Africa Limited,
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2023

About the Template Business Plan

A business plan may be developed for several reasons. It is useful for any business or operation as a tool for planning ahead, not only when starting a new business but also for ongoing businesses. Commonly a business plan is required when applying for loans or grants from external financiers.

This template business plan is developed to support project developers in developing a bankable business plan in the process of applying for loans or grants, with a particular focus on the requirements and information needed by the REA in order to assess a grant application. It is also expected that the business plan will be used for loan application to banks and for regulatory purposes.

It is important that claims made in the business plan, e.g. on demand, production forecasts etc., are supported by data or other type of verification.

It is important to remember that a template should be seen as a good way to start developing your business plan. However, every project or business plan is unique and the business plan should reflect that.

Cover page

Solar hybrid mini-grid for Kamasi villages in Lake Victoria.

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Upon request, this document is to be immediately returned to Volt Africa Ltd.

Table of Contents

Executive summary

*The Executive Summary should be **a few pages** with highlights conveying the key message.*

The content should be taken from the analysis contained in the respective chapters of the business plan.

The business model has been designed in local context to ensure long-term sustainability after conducting field research determining local economics, logistical and technical feasibility, demographics, willingness and ability to pay, potential for employment of productive use and security. In the first phase two villages of Kamasi will be electrified connecting 800 clients in just 2 years time. The RBF grant will enable to reduce the tariffs and unlock private funding that will facilitate the project scaling up in the next 3 years to 20 mini-grids equivalent to approximately 60,000 people. After gaining the proof of concept of the containerized Lithium-ion technology application in rural electrification projects and learning about local conditions, we will adapt the model accordingly and replicate it to planned mini-grid projects.

The business model is based on a stable and affordable energy supply to rural population in Tanzania. The whole projects activities will be closely coordinated by the developer and owner of the minigrid Volt Africa. Local community will be closely consulted in the project development phase to enhance the trust of the community. Volt Africa will establish loan for generation assets and O&M contract with the investors –at this stage- which will ensure the financing of the system and its proper functioning. Contractual relationship between Volt Africa and our investors ensures not only delivery of the system but also supervision and maintenance. Volt Africa will be the owner of all generation and distribution assets.

Volt Africa ´s main role lies in:

- Ensuring the daily operation of the system
- Recruiting local staff
- Negotiating land permits and right of way for distribution
- Communicating with the community on sales/ customer-oriented activities
- Negotiating with the community tariff amount
- Conflict resolution
- Providing operation and maintenance of both generation and distribution assets
- Ensuring security of generation and distribution assets
- Securing revenue collection via mobile payment

Investors will help cover the lack of technical and managerial capacities in the area providing knowledge transfer and technical backup to Volt Africa's management team with continuous training to gain needed mini-grid business qualification.

Use of electronically prepaid readable smart meters will help customers to better manage their electricity expenses and gain a better idea on their electricity needs. At the same time, smart meters are used for demand management limiting power and energy supply by setting variable tariffs depending on pre-paid amount. Revenue collection will be enabled also through mobile payments going directly to Volt Africa . Planned collection system will include remote data collection and billing, electronic disconnect in case the customer does not pay, automatic detection of energy theft.

Revenues will be used for reinvestment, extension of services such as extension of street lights and upscaling of the system. System will be designed to be easily scalable to adapt to growth thereafter.

Financing structure

The estimated total investment costs for mini-grid project at Kamasi villages amount to US$ 714,628.0 (Tshs 1,822,301.4). 56% of the CAPEX costs will be financed by REA through Result Based Financing for Private Sector Renewable Energy Investments in Green Mini and Micro Grids (GMMGs), which will be used to partly cover generation costs. The remaining costs will be covered from private funds with following distribution: 30% by equity funds and 70% by loan. Volt Africa will use both its own funds and investors' money to finance the project. The Average project IRR expectation of Volt Africa is 12% for project lifetime foreseen for at least 25 years. Bankability of the system is assured by 10 years guarantee on the main system components by manufacturers (batteries manufactured by Samsung SDI, battery inverters by Bluesun Company (our manufacture) and PV modules by internationally renowned manufacturers SolarWorld/Heckert Solar/CSI or similar).

Targeted market

80% of Tanzanian population lives in rural areas. With an increased electrification projects by REA, reports show still about 60% of rural community in Tanzania live in off grid environment. The number of people with access to electricity increased from 7% in in 2011 to 36% in 2014. Because Tanzania is a huge country, electrifying different regions quickly at the same time is impossible due to financial position of the country due to the fact that transmission line projects need high investment cost. To respond to this, private sector has a big responsibility in partnering with the government to achieve higher electrification rates though the use of isolated power grids.

According to Ministry of Energy 2019 data announced in the Parliament by Minister of Energy Hon Dr. Medard Kalemani, the rate of national access to electricity was 73.4% in April 2020. The figures clearly indicate that so far 9,001 villages have access to affordable and reliable power, up from only 2018 villages in 2015.Therefore, there is no doubt that the market potential for mini-grids is still available.

As of June 2016, 4,395 villages in Tanzania were connected to electricity during REA Phase I and II of the electrification project. This represents 36% of the 12,268 villages in mainland Tanzania. The goal of the Tanzanian Government is to electrify all Tanzanian villages by 2021.

Volt Africa responds to the need of electrification and will build and operate the village of Kamasi.

The village being an island is also the main obstacle that has led to the government not been able to electrify the area by the national Grid as it sounds impractical and beyond doubts very expensive.

Customers, clients and beneficiaries

Currently, there is no central electricity distribution in both villages. Households pay about 3.5 - 5 USD per month for alternative energy source such as kerosene, diesel for small genset and candles. Proposed hybrid PV/battery/diesel system allows renewable penetration of up to 89% and will ensure reliable and stable energy supply 24/7. The diesel generator is foreseen only as a back-up significantly limiting fuel consumption to minimum, which serves as a security against fluctuation of diesel price. Using a hybrid power solution in fact reduces the end-user tariffs because besides limiting the fuel consumption, oversizing of the PV and batteries can be avoided.

Smart metering limiting the maximum allowable demand and measuring the night and day consumption will be applied to all customer segments – households, commercial users and public users. From our initial discussions with residents, it was determined that on average, households of Kamasi and Kamasi are willing to pay between 8 - 20 USD (TZS 20,400 – TZS 51,000) per month under the provision of stable electric supply 24/7. Under the assumption that average household consumes 8-15 kWh/month, customers willingness to pay would be around 1 $/kWh. Tariff amount is set below willingness to pay and affordability. As this number seems relatively high, our proposed tariffs were brought down to 0.5 USD/kWh. With the RBF incentive, the capital investment costs will be reduced, which in turn will lead to a better tariff to the end client. At the same time, no further subsidy is required. As seen from the table below, productive users will have lower tariff as an incentive for development of commercial activities in the area.

Table 1. Tariff structure

Customer segment	Example of Client type	Tariff in USD/ Tsh with RBF subsidy	Tariff in USD/ Tsh without RBF subsidy
Household	Homes	0.54 USD/ 1,377 Tsh	0.75 USD/ 1,912.5 Tsh
Commercial	Shops, Bars, restaurants	0.50 USD/ 1,377 Tsh	0.75 USD/ 1,912.5 Tsh
Public	Schools, Administrative buildings, Dispensaries	0.50 USD/ 1,377 Tsh	0.75 USD/ 1,912.5 Tsh
Industrial Use	Water pumps, Milling machines, Telecom tower	0.33 USD/ 841.5Tsh	0.50 USD/ 1,275 Tsh
Project IRR		**8% (year 10)**	**4.0% (year 10)**
NPV		**$131,445.10**	**$87,352.33**

Installing mini-grid brings many benefits to the community in a form of increased income-generating opportunities and therefore promotes activities and fosters productive use. Load management was applied for water pump, which will operate during sunshine hours, which will substantially decrease its costs of production.

1.1. Proposed business

Describe the proposed business/investment briefly and in a clear and concise way.

Generally, our proposed business is to bring minigrids onto the ground at a reasonable business scale. For that purpose Volt Africa and its investors complement each other with technological knowhow, financial strength and local competences and networks, constitute a very special partnership.

Some of these investors are leading technology developers and manufacturer of energy storage solutions. The partnership in the project in Tanzania provides a good basis to further develop systems and fine tune design lay-outs with the objective to come to significant cost reductions, and thus, to reach an upscaling of bankable minigrids.

Kamasi village is our first pilot project and through mini-grids Volt Africa and investors will improve the access to energy, in the 3 years of RBF contract, Volt Africa plans to connect all 725 households and 69 commercial & industrial clients (Productive Use of Energy (PUEs)) and 6 public institutions. Volt Africa plans to electrify about 60,000 more customers through additional 20 minigrids. The overall target is 40 villages to be electrified in the size of at least 20-100 kW minigrids.

The power from the Solar PV minigrids will be cheaper for the energy users than the conventional energy sources, they currently use: A household in both Kamasi spends around 2 liters of kersone/week at 20,000 Tsh/month (9 USD/month) only for lighting. Irrigation and any agro-processing such as milling or oil extraction are hampered because of lack of electricity; to run a hammer mill with a diesel engine costs around 60-70 cUSD/ kWh. The JV will target areas, where the connection to the national grid would be more expensive than through an isolated solar hybrid minigrid or where the national grid cannot come in the next years, as the national budget limits the speed and extent of national grid extension.

Table 1. Investment summary

Key Parameters		Units	References
Site capacity/Demand	Kamasi: 100	kWp	3.4. Generation assessment
Plant Size	Kamasi: PV: 100 ; Storage:300kWh Diesel genset: 30	kW PV KVA genset	
Annual Production	Kamasi Village: PV: 182,500 Genset: 18,166	kWh	
Total Investment			
Generation asset	314,000	USD	Business plan: 5.3. Cost analysis Feasibility study: 6.2 Summary of Capital Costs
Power distribution assets	166,275	USD	
Customer Connections	181,853	USD	
Project Development	52,500	USD	
Capital Structure			
Equity	94,628	USD	
Requested Loan Amount	220,000	USD	5.1. Describe the suggested financing structure
Debt: Equity Ratio	70:30		
Market			
Total Annual Demand	Kamasi: 181,656	kWh/ year 1	1.4 Project overview Production
# New Connections	800		
Annual Revenue			
Households	49,544	USD/year 1	5.4 Cash flow and financial

Businesses	12,864	USD/year 1	analysis
Institutions	4,695	USD/year 1	
Industrial	17,556		
Operating & Maintenance Cost	38,909	USD/year 1	5.4 Cash flow and financial analysis
Annual Free Cash flow	447,764	USD/year 1	5.4 Cash flow and financial analysis
	50,163	USD/year 10	

1.2. Financial overview

Describe the conclusion of the financial overview.

Include key indicators such as IRR, NPV, Cash flow.

The total investment costs for Kamasi island village together are 714,628 USD (. Of this amount, movable power generation assets are 314,000USD, which represent 44% of the total investment costs. Immovable assets account for 348,128 USD, which represent 48%. Project development costs 52,500 USD representing approximately 7%. All associated equipment is accounted for in these costs. The exchange rate between USD and Tanzanian shillings was used 1 USD = 2,551 Tsh (https://www.bot.go.tz/FinancialMarkets/IFEMsummaries/IFEMsummaries.asp from 11.03.2024).

Post-tax cumulated cashflows show increase from 47,764USD in year 1 to 63,651 USD in year 10 with project IRR of 8 % in year 10 as per table below) . For more details kindly refer the financial model document attached with this business plan and financial forecast at the end of this business plan.

Interest rates for the loan in foreign currency is set at 7% with 10 year tenor period and 1 year grace period.

Table2: Project Key Indicators (RBF Grant inclusive)

	YEAR-1	YEAR-2	YEAR-3	YEAR-4	YEAR-5	YEAR-6	YEAR-7	YEAR-8	YEAR-9	YEAR-10
	2023	2024	2025	2026	2027	2028	2029	2030	2029	**2030**
Project IRR	19%	-13%	-7%	-3%	-1%	3%	3%	6%	7%	**8%**
E-IRR	-35%	-18%	-10%	-10%	-14%	-7%	-25%	6%	10%	**12%**
NPV	($79,591.86)	($68,947.53)	($66,105.65)	($71,439.64)	($66,209.43)	($82,294.76)	($30,854.56)	$22,853.46	$73,016.30	**$131,445.10**
Free CF	447,763.72	51,784.38	52,900.26	45,097.81	36,921.94	47,486.13	26,170.60	51,440.20	53,708.02	**50,162.84**
Equity CF	5,507.79	9,528.45	10,644.33	2,841.88	(5,333.99)	5,230.20	(16,085.33)	51,440.20	53,708.02	**50,162.84**

1.3. Capital structure and loan requirements

Describe the proposed capital structure (equity from owners, equity from REA grants, loan).
Describe the basis for assumptions regarding e.g. amount of REA grants (if it is based on a standard amount/connection, preliminary decision from REA or other basis).
Include key assumptions such as assumed interest rates for loans.
Include the disbursement schedule for equity and loans and proposed repayment schedule for loans.
Clearly show the ability to repay loans.

Table below shows the proposed capital structure between equity from owners, equity from RBF financing and loan including assumed interest rate for international loan.

Table 3. Capital structure and loan requirements

Financier	Amount [US$]	Proportion [%]	Interest rate [%]	Term [years]
Owners equity	94,628	13.2%		15
Equity through REA grants	400,000	56%		
Debt to /financier 1/	220,000	30.8%	7%	10
Debt to /financier 2/				
Debt to /financier 3/				
Other subsidies				
Total	714,628	100%		
Communal levy		1%		
Income tax		30%		
Import taxes	Solar equipment is tax exempted			
Payback period	Developer Equity Payback period is 8 years.			

The REA grant amount was calculated on a basis 500 USD per customer connection - Isolated GMGs (Tier 4). The anticipated disbursement schedule

Table 4. The debt ratio

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Debt Service Coverage Ratio	113%	123%	125%	126%	128%	137%	137%	-	-	-

1.4. Project overview

Briefly describe the project. The headlines below highlight some suggested areas to include, adapt according to what is relevant for the project.

Our proposed project focuses on provision of energy to users in the selected villages through minigrids. In consideration of the energy consumption pattern and demand of Kamasi village will be provided with 100 kW solar mini-grid system, which will cover 725 households, 62 commercial and 7-industrial clients (dispensary, milling machines, water pump and telecom tower as a key client) and 7 public institutions such as school, administrative office, equal to a total of 181,656 kWh/year 1 power consumed.

Volt Africa Ltd will be in charge of **installation supervision as well as of operation & maintenance of all projects to be rolled out in Tanzania**. Volt Africa will represent its investors and shareholders. The company will have the organisation structure described in detail in 6.1. Organizational structure.

In the mini-grids, power will be supplied on basis of a **differentiated tariff scheme**, which will be approved by REA and EWURA in collaboration with the community. Volt Africa assessed the current energy costs for different energy sources of both communities at Kamasi and converted into costs of between **4 USD to 12 USD for an equivalent kWh**, which has been incorporated in this business plan. In addition, the income situation and development of the energy users has been assessed. On that basis, our proposed business model came up with affordable tariffs/ KWh as well as reasonable connection fee. To avoid the risk of non-payment, **pre-payment meters** will be used.

In both mini-grids our proven business model includes to promote the use of appliances for productive users: That means, that **small machines** such as hammer mills, oil extraction machines, irrigation pumps as well as fridges and freezers might be provided to the users **through a rent-to-own scheme** after assessing needs of the community in detail. Our company plans to create new commercial and industrial activities that can initiate and give appetite for the Productive Use of Energy (PUE) that will focus on Kamasi main economic activities carried out in the Island. 69 initial PUE's are planned to be connected in year-1 via SACCOs. Together with CLASP NGO, ENERGY4IMPACT & SACCOs, our company is developing a micro-finance program that can be implemented to enable Customers to purchase PUE machines & appliances which are expected to be provided on a commercial basis. Already CLASP NGO has awarded Volt an RBF-Grant amounting $25,875.00 to promote 225 units- UNOCOOL-165 AC refrigerators by (GLOBAL ICE TEC AG) in off-grid areas to commercial and retail enterprises to foster productive use of energy in chilling business. Sale of power directly to customers using SMARTMITA the bespoke metering & payment control software solution or other PAYG system will include the ability to manage instalment sales activities.

To avoid that especially all loads from the productive users are running at the same time, a **load management system** will be introduced. Usually the machines such as the hammer mill and oil expeller are only running few hours/ day, so that the load can be balanced over the day. The system capacities can be better utilized in that way.

Production

Describe what is to be produced and sold.

Following table shows yearly total generation from renewable source (PV) and diesel genset and kWh sold to the customers for both Kamasi villages combined. The renewable fraction can go up to 91% in year 1.

Table 5. Production at Kamasi

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Yearly kWh generated	200,666	209,813	220,303	231,318	242,884	255,028	267,780	281,169	295,227	309,989
Yearly kWh sold	181,656	190,739	200,276	210,289	220,804	231,844	243,436	255,608	268,388	281,808
Renewable fraction in %	91%	87%	83%	79%	75%	72%	68%	78%	74%	71%

Resource availability

Describe the resource availability, e.g. hydrology, wind, biomass, showing that the proposed production is

From Solar and Wind Energy Resource Assessment (SWERA) tool, Mwanza is one of the regions in Tanzania that has the best average annual Direct Normal Irradiation (DNI) or sunshine resources of 6.1 kWh/m square, making the project suitable solution for solar PV technology.

Chart 1. Solar irradiation in Mwanza region

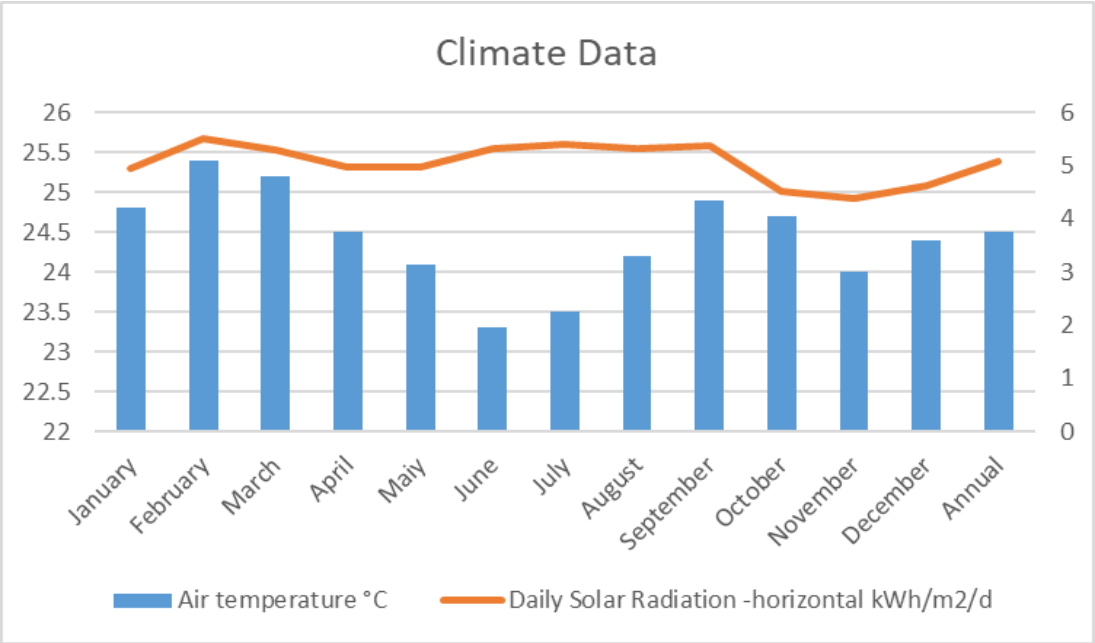


Table 6. Daily radiation and clearness index in Mwanza region

Month	Clearness Index Kt	Daily solar radiation - horizontal
		kWh/m²/d
January	0.546	4.95
February	0.522	5.52
March	0.564	5.3
April	0.562	4.98
May	0.592	4.98
June	0.630	5.33
July	0.629	5.41
August	0.597	5.33
September	0.562	5.37
October	0.559	4.53
November	0.525	4.39
December	0.520	4.63
Annual	0.555	5.07

Market analysis

Describe the expected demand and prices/tariffs per market or customer segment.

During the visit, the team tried to categorize projected consumers based on what the residents of listed down as electrical appliances that they currently have or would like to have once electricity is available. The assessment also focused on the time of use of the different appliances in a bid to establish the hourly demand of the village.

The figures used were conservative bearing in mind that a number of households already have SHS and some may not be easily reached by the initial grid network.

Kamasi village:

Table 7. Consumer catégorisation in Kamasi village

CONSUMER TYPES

Description	QTY	Appliances
Household A	475	2 Bulbs, Radio, and 1 Phones
Household B	250	4 Bulbs, Radio, TV and 3 Phones
Milling Machine	5	1 Bulb, Diesel Engine - 10 kW Nominal
Business A	40	1 light, 1 phone
Business B	20	2 Bulbs, Fridge, Music System, 1 phone
Bar	2	5 Bulb, TV, Fridge, Music System
Water Pump	1	Submersible Motor
Telecom BTS	2	2-3 Kw BTS Equipment
School - Primary	1	30 Bulbs, 2 Computer, 1 Printer
Admin. Office	1	4 Bulbs, 2 Computer, 1 Printer
Churches	2	30 Bulbs, 2 Computer, 1 Music System
Dispensary	1	6 Bulbs, 1 Computer, 1 Fridge
TOTAL CUSTOMERS	800	

Chart 2. Daily power consumption profile in Kamasi village

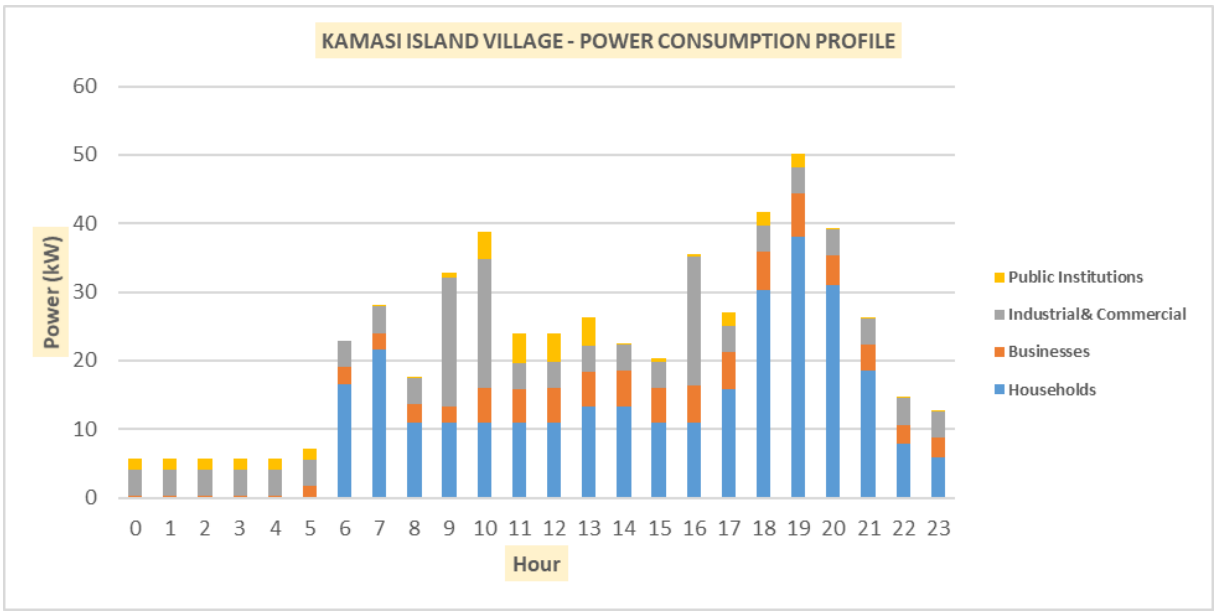


Chart 3. Energy consumption profile in % in Kamasi village

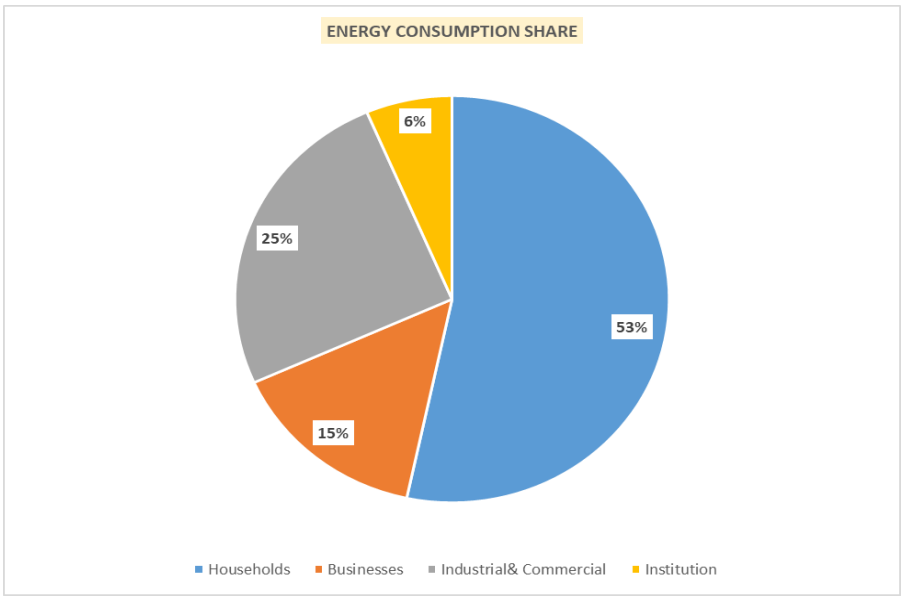
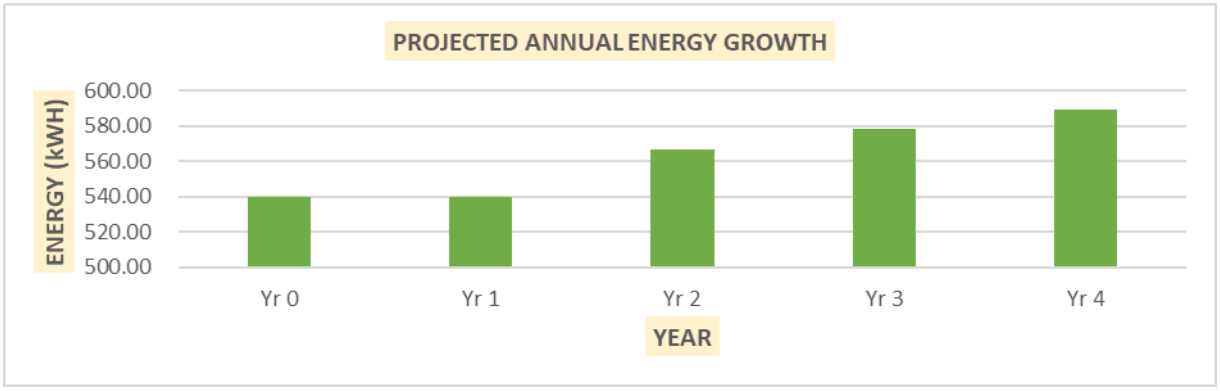


Chart 4. Projected annual energy growth in Kamasi village



Initial customer base

The proposed solar hybrid mini-grid targets to have residential, businesses and commercial use customers right from inception. Table 2 details all list of initial customer base at Kamasi and Kamasi.

For both villages we target following number of customers in year 1.

Projected Growth in Number of Connections

Table 10. Projected Growth in Number of Connections in both Kamasi village

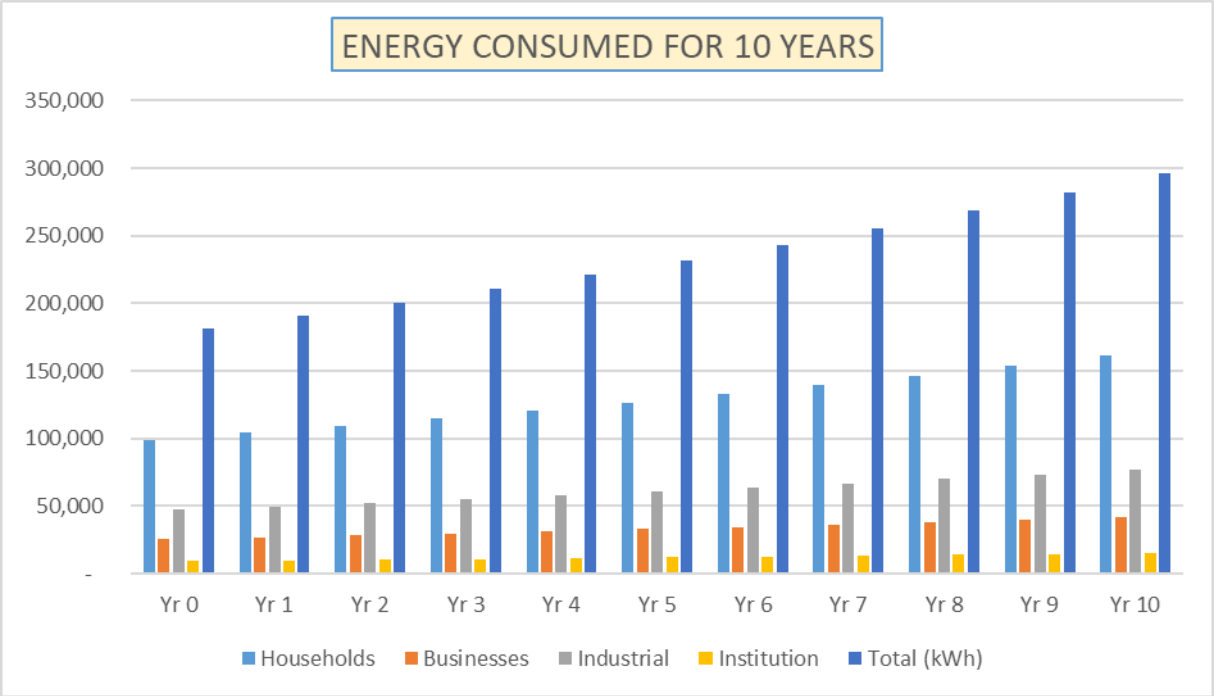
Projected Growth in Number of Connections										
	YR. 1	YR. 2	YR. 3	YR. 4	YR. 5	YR. 6	YR. 7	YR. 8	YR. 9	YR. 10
Households	725	761	784	808	832	857	882	909	936	964
Commercial	62	65	66	66	67	68	68	69	70	70

Industrial	7	7	7	7	8	8	8	8	8	8
Public Institutions	6	6	6	6	6	7	7	7	7	7
TOTAL	800	840	864	888	888	888	888	888	888	888

Projected Growth in Energy Consumption

Table 11. Projected Growth in energy consumption in both Kamasi village

	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10
Households (kWh	**99,088**	104,043	109,245	114,707	120,443	126,465	132,788	139,427	146,399	153,719	161,405
Businesses (kWh	**25,728**	27,015	28,366	29,784	31,273	32,837	34,479	36,203	38,013	39,913	41,909
Industrial (kWh	**47,448**	49,820	52,311	54,927	57,673	60,557	63,585	66,764	70,102	73,607	77,288
Institution (kWh	**9,391.1**	9,861	10,354	10,871	11,415	11,986	12,585	13,214	13,875	14,569	15,297
Total (kWh)	**181,656**	**190,739**	**200,276**	**210,289**	**220,804**	**231,844**	**243,436**	**255,608**	**268,388**	**281,808**	**295,898**



Willingness and capability to pay

From the data collected during the interviews in Kamasi it was apparent that most of the respondents (9/10) were ready and willing to pay for a service that is reliable. Only one respondent thought that the service should be free or paid by the government. Of those who were willing to pay, the minority (2/9) indicated the cost of service may be a major factor in determining whether to connect or not while the remaining respondents indicated quality and duration of supply as the important aspect for the service.

From the data collected on the stated ability to pay, the following table was deducted;

Table 12. Power Consumer Stated Ability to Pay for Kamasi village.

Power Consumer Stated Ability to Pay		
Respondent	TSH / MONTH	
	Low Season	High Season
1	100,000.00	200,000.00
2	150,000.00	250,000.00
3	100,000.00	150,000.00
4	300,000.00	400,000.00
5	300,000.00	500,000.00
6	200,000.00	250,000.00
7	150,000.00	200,000.00
8	150,000.00	200,000.00
9	100,000.00	300,000.00
10	20,000.00	50,000.00
Average	**157,000.00**	**250,000.00**

All (10) respondents were very fierce that several power developers showed up in the village to deliver their expression of interest to provide them power however they never turned up to implement the project. They insisted that Volt Africa shouldn't make same Fake promise and that we must fulfil it.

1.5. Implementation

Briefly outline the current status and main steps ahead. It can be sufficient to summarise the information in a table. This should also include the status regarding sector clearances and licenses.

The JV team has worked most of the critical milestones of the project as per SPPs guidelines under EWURA. Below is the snapshot of the current status and main steps ahead of the project development.

Table 13. Implementation milestones

SN	Milestone	Description	Status
1.	Project identification;	Kamasi villages in Ukerewe district in Mwanza region	Completed
2.	Securing rights to the project resource;	- Unconditional Village Government project approval letter - Conditional DED project approval letter -Ministry Support letter.	Completed:

3.	Acquiring necessary permits and licenses;	-Generation and Distribution permits required -Environmental Clearance-Received	Not Applicable for projects less than 1 Megawatts
4.	Financing;	-Volt Africa will contribute 30% equity from the total project costs; and -70% debt financing -Co-financing commitment concluded	Finalized
5.	Construction;	-Estimated to commence in September-2024 after the award	Ongoing
6.	Testing and Commissioning; and	-Estimated to commence in September-2024	Ongoing
7.	Operation and reporting,	-Estimated to commence in December -2024	Ongoing

To obtain the standard Licence for power generation and distribution the project must be larger than 1MW. However, for all projects under 1Mw these requirements have been removed. In accordance with the policy of light-handed regulation for SPPs, EWURA will apply a streamlined application and approval process when:

(1) an SPP applicant has received a written approval from REA for a subsidy to connect rural customers;
(2) the SPP's proposed tariff is at or below the tariff levels used by REA in calculating the subsidy that it will provide to the SPP;
(3) the SPP applicant submits to EWURA this REA-reviewed tariff and evidence that its potential customers and local governmental authorities have been notified of this proposed tariff;

1.6. Management

Briefly describe how the business will be organized and that there is sufficient technical, managerial, financial and procurement capability.

This project will be managed by a locally hired staff to be operated under the JV. We will have a team of 10 staff. This is a standard number of team to fully take care of all mini-grid activities which includes full provision of service to our clients.

The local technical manager and technicians under his department will be trained by VOLT AFRICA GmbH to gain proper understanding of the technology and the system configuration. The JV will be composed of the following staff members, qualifications required and a few roles to be assigned:

Table 14. Organization and role assignment of the business

2. Company description

This section should include an overview of the project owner/developer with information on e.g.

- *Legal establishment*
- *History or start-up plans (as applicable)*
- *Ownership*

Volt Africa Ltd Limited is a registered renewable energy products trader, electrical materials trader and a projects developer in Tanzania. Since 2013, Volt Africa Ltd has sold thousands of solar kits across the country's off-grid areas. As a big stake-holder of renewable energy sector in Tanzania, we are taking another avenue in developing photovoltaic mini grid generations across the least electrified regions in Tanzania (All company legal documents attached).

Volt Africa also has established collaborations with local and international strong solar companies and investors.

Volt Africa and its partners will be the owner of all project assets and will be in charge of selling energy directly to customers. Each project will have separate accounting. Volt Africa will establish loan for generation assets and O&M contract with the investors - which will ensure the financing of the system and its proper functioning.

3. Project description

3.1. Project overview

Describe the key elements of the project as an introduction

The proposed project comprises the design, supply, installation and operation of two solar hybrid mini-grids at Kamasi and Kamasi villages in Ilangala and Irugwa wards consecutively, Ukerewe District, Mwanza region in Tanzania.

The project will be aimed at delivering a reliable, cost effective and green energy to the people of Kamasi and Kamasi villages, connecting 1,105 customers. Proposed solar hybrid mini-grids integrate containerized lithium-ion energy storage to ensure stable and affordable energy supply with only low O&M over the whole project period. As all main components are modular, system can be easily scaled up with increasing power demand. The project will include a generation plant as well as a grid network comprising of LV power lines. All equipment will be installed according to the provided regulatory standards. Business model includes prepaid smart meters and load management for productive users to improve demand profile. Fostering productive use is an important aspect of our model and access to energy will enable further economic development. The RBF grant will enable to facilitate the project scaling up in the next 3 years to 20 mini-grids equivalent to approximately 60,000 people.

Once installed, the project is expected to improve the livelihood of the people of Kamasi and Kamasi by providing them with reliable and stable 24 hour energy supply, connecting 530. With reliable power there is great potential for new businesses and also more economic gains to be harnessed from the current businesses.

3.2. Site overview

Describe the proposed site for the project.

The chosen sites are considered ideal for the installation of the proposed solar hybrid mini grids due to several factors including:

- The two communities (Kamasi) are on very remote islands in Lake Victoria and it is impossible to extend connection from the National Grid by TANESCO via under water power cable which is heavily costly.
- Clustered settlement patterns – Both villages exhibit a fairly dense and clustered settlement providing the advantage of having a low distribution cost per household.
- Good solar radiation - Like many locations in Tanzania, Kamasi and Kamasi villages enjoy a substantial amount of solar radiation throughout the year. Previous research data from GeoSun Africa indicate that areas around Mwanza have daily solar radiation in excess of 6 kWh/ day (Annual - 2,200 kWh/m²). This make the sites viable locations for solar power utilization.
- Appetite for electricity – The presence of small solar home systems that provide lighting is a good indication that the population in the two villages have a good understanding of the advantages of electricity. The project will therefore not need to start popularising the need for electricity.

SN	EMPLOYEE DESIGNATION	KEY ROLES TO BE ASSIGNED	QUALIFICATIONS REQUIRED
1.	Operational Manager	1. The General Manager has to be interested and strongly willing to go into the field, together with the technicians. 2. Developing strategic plans for the business 3. Controlling Finance 4. Building and maintain effective management team 5. Generates new businesses and gives approvals of new projects 6. Drives profitability of the business. 7. Assuming full accountability of the company business 8. Identifies risks and ensures appropriate strategies are in place 9. General coordination and strategy development in close cooperation with the shareholding parties 10. Continuous dialogue with the key stakeholders, Department of Energy, ERB, REA etc. 11. Developing strategic partnerships with donors/NGOs etc. 12. Developing strategic partnerships	Bachelor in Finance or Economics or good background in Management

		with vendors of electrical equipments (hammermills, oil expellers, pumps, stand-alone solar pumps etc.) 13. Coordinating the mobilization of funds for the minigrid investments 14. Financial modelling of minigrids (in cooperation with shareholders)	
2.	Head of Technical Department (Technical Manager)	1. Understands the solar technology in detail and operation of the minigrids 2. Managing the technicians and monitors overall operation and performance of the minigrids 3. Understand the Sizing of minigrids 4. Managing and coordinating the construction of minigrids 5. Can recruit and train technicians and allocate responsibilities 6. Continuous screening and mapping of proper sites 7. Assessment of sites (current energy consumption and costs, income, dynamics etc.) 8. Development of tariff schemes in cooperation with communities 9. Continuous dialogue with network/ distribution partners (local governments, traditional leaders, donors/ NGOs, big corporates etc.)	Bachelor of science in Electrical or Solar Engineering
3.	Head of Financial Services and Procurement	1. Coordinating the mobilization of funds for the minigrid investments 2. Identifies financial risks and ensures appropriate strategies are in place 3. Manages purchases of new materials with the attention of budgetary constraints and procurement of the business 4. Monitor costs and expenses to assist in budget preparation 5. Oversees facilities services, maintenance activities and electricians 6. Monitors inventory of office supplies	Bachelor of Commerce or Bachelor of Arts in Finance
4.	Field Technicians	1. Attend all reported technical problems	Diploma in Electrical or

		reported by customer care centre 24/7 2. Manage and Monitor the PV systems on a 24/7 basis 3. Report all challenging issues to General Manager 4. Do routine maintenance of the mini-grid assets 5. Servicing and maintenance of the diesel generator	Electronics or solar Engineering
5.	Watchmen	1. Protecting the mini-grid assets from theft incidents 2. Report all security issues to management	Must have gone on some Military Training.
6.	Customer care Unit	1. Reporting to General manager on customer complaints 2. Escalate all technical problems to technical team 3. Respond to customers problems and educating them	Diploma or Bachelor in Arts or Marketing and sales or social sciences

3.3. Design overview

High level overview of the proposed technical design for the project.

The system for the hybrid mini-grids consists of a solar-PV-plant which is generating the energy, a battery storage unit which establishes the grid voltage and makes the energy available when needed and a diesel generator unit when the supply of the sun is lower than the demand.

Proposed hybrid PV/battery/diesel mini-grid system is an AC- coupled generating unit. It consists of containerized ESS (Energy Storage System), which enables high renewable penetration of up to 90%. Renewable energy will be generated by commercially available grid-connected PV system. The battery system will establish stable voltage and frequency and balance the difference between generation and consumption. If there is a lack of energy, the battery will synchronize also the existing genset as an energy-generating unit to the grid. This will guarantee stable 24/7 electricity supply. Moreover, in the proposed mini-grid system the distribution and metering infrastructure will be built.

The ESS is the heart of the mini-grid system. It consists of the latest generation of utility grade Lithium-ion battery cells manufactured by Samsung. Cells are organized in 19-inch modules, which are connected in series in a rack with a system voltage of up to 800V. BMS system monitors each cell voltage, string current and temperature. Safe operation of the system is guaranteed through several levels of hardware and software features. Samsung offers performance guarantee of 6,000 cycles with the remaining capacity above 75% of the initial capacity. DC energy of batteries is converted into grid-compliant AC voltage via modular inverter system manufactured by Maschinenfabrik Reinhausen. Each module can supply up to 30 KVA and can be extended up to 90 KVA in one cabinet. Due to modular structure the repair or service can be easily made on site by a trained person. The manufacturer offers the guarantee up to 10 years. In the container is also switchgear, which

combines the different energy sources and provides three phase and single phase AC supply to the grid. All these components are housed in a 8ft. thermally insulated container, which guarantees optimal conditions for long lasting electronics under harsh ambient conditions. The temperature is controlled to 23°C +- 5°C via military grade air-conditioning unit.

The control of the energy flow is managed by the Energy Management System. It controls the power supply from the PV and manages existing diesel genset to connect to the mini-grid through interface. Additional SCADA functionality such as system monitoring, data collection, alarm management are offered on a web-based HMI. This provides local and remote control via open VPN access. Proposed system is at the cutting edge of technology.

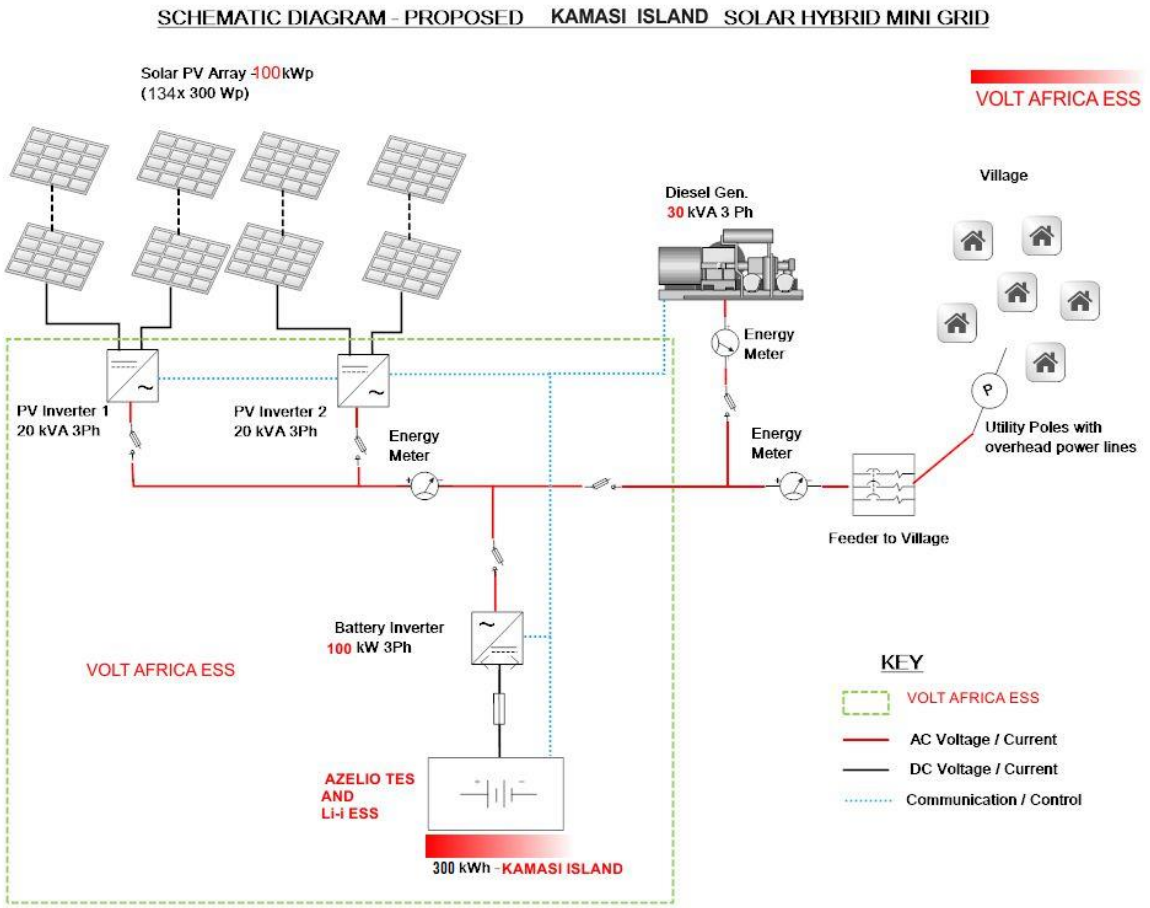
For more details on used technology, please refer to the attached technical datasheet for Volt Africa Mini in the annex.

A straight forward overview of the designs are tabulated below:

Table 15. Design overview for Kamasi site

Village	PV (kW)	Battery (kWh)	Inverter (kW)	Genset (Kw)	Grid (km)
Kamasi	100	300	100	30	6Km (3 Phase); 1km(1 Phase)

Chart 8. Schematic diagram for solar hybrid mini-grid in Kamasi



3.4. Generation assessment

Describe what and how much will be produced, including e.g. production profile.

Include a resource assessment clearly showing that there are sufficient resources available for the production (water, wind, biomass). It is important to show the risks related to the resource availability and how the risks can be mitigated. Show variations within and between years. The assessment should be based on data/measurements as outlined in the REA pre-feasibility template.

Briefly describe environmental aspects of the project, showing that the sufficient/required environmental considerations are taken. Refer to EIA.

The proposed solar hybrid mini-grids are intended to provide for the entire projected electrical needs for the two villages. The designed generation is sufficient to adequately cover the projected load growth for the next ten years while still maintaining a large renewable energy share. The intended design is to have energy generation to be predominately from solar PV modules. The renewable fraction of the generation for the project is targeted at > 88% for the first year of operation and >75 % at year 10.

A summary of the generation assessment for the first year and tenth year of operation are given in the tables below;

Table 16. and 17. Annual load and annual generated energy in each site

Village	Annual Load – Year 1 (kWh)	Annual Energy Generated - Year 1 (kWh)	Renewable Share – Year 1 (%)
Kamasi Island	181,656	200,666	91

4. Market analysis/assessment

Describe where and who the customers are. Include a brief description of demography.

Demography

According to the data obtained from the village government by our experts, Kamasi and its satellite Islands has an estimated population of 6,972 persons in 1,177 households. Women account for 3,142 while male population is 3,830. Our visit to Kamasi and its satellite Islands revealed an estimated population of 9,259 persons in 1,824 households where by Women account for 4,392 while male population is 4,867. A large percentage of the houses in both villages are built from soil bricks joined with cement. Nearly all houses and buildings in the both villages have corrugated iron sheet roofing. Below is a table showing both villages public institutional data.

KAMASI VILLAGE ISLANDS	**Primary School**		**Secondary School**		**Health Centre**	
Hamlet Island Name	***Teachers***	***Students***	***Teachers***	***Students***	***Nurses***	***Clinical Officers***
Kamasi	12	1,004	00	00	01	05
Gana	08	560	00	00	00	00
Siza	00	00	00	00	00	00
Bulubi	07	440	00	00	00	00
Izinga	00	00	00	00	00	01

Zeru	00	00	00	00	00	00

Settlement Patterns

Kamasi village settlement patterns can be described as both nucleated and dispersed settlements at the same time.

For nucleated settlement pattern, it comprises of concentrated settlements with many village centers that are close to the lake beaches. The centers comprises of both beach for landing and parking fishing and passenger boats, fish sales centers, fish drying marts, sardines drying platforms, both commercial and residential houses with most businesses found along the beach. This centers also have both permanent buildings made of concrete bricks and temporary houses made of timber. Most of these wooden houses are temporary houses hired by fishermen who have settled camps to easy them move to the lake for fishing and come back. Households are equally close together behind the businesses premises. The centres are composed of a mixture of concrete brick houses and wooden houses all merged together and form streets.

Finally for the dispersed settlement pattern, these are mainly permanent residential houses surrounded by tracts of land that has been set aside for agriculture (cultivation) and animal keeping. These dispersed settlements are also comprised of business premises such as shops, small open markets bars, video centres, milling machines and hotels. Generally, it was observed that both villages are fairly densely concentrated with highest concentration being of mainly fish business centers along the beach. Though the village governments are in charge of allocation of land for both households and business there is no proper planning and there are no well-defined roads inside the villages.

Socio-economic information

Almost all residents of Kamasi villages engage mainly in fishing. The main types of fish are the famous Nile perch and sardines that are always in high demand throughout the year. No one will ever go hungry around here because food is very abundant. Apart from fishing activities dominating, villagers are also engaged in one form or another of agricultural activity.

The majority of households conduct rain fed crop farming with mainly Cassava, Sorghum, maize, and sweet potatoes as main crops planted in Kamasi. The farming fields are nearby the settlement areas with individuals owning as much land as 1 to 3 acres. The crops are cultivated between February and July. Due to the small pieces of farmland, cultivation is done mainly by hand. There are no tractors available in this village to do cultivation. Due to challenge of shipping boats being undersized, cars have not been able to be shipped there to do transportation business. Whether small or big cargos on the land is done by three wheeled motorbikes and transportation of cargo out or in the island is done by cargo boats. Children who grow up without getting out of the island will only see cars in either movies or on national televisions.

Some sections of the residents closer to the lake beaches also practice indiginous small scale irrigation farming by fetching water from the lake nearby to their farms close-by. Crops grown include table vegetables, cassava and sweet potatoes. Some residents of these villages also keep very few animals including cows, goats, Ducks and chicken either for own consumption or for sell. However selling of animals is not done as a business rather as a means to raise income for pressing

financial needs. Some persons also keep animals as a sign of affluence and status and not necessary for their economic value.

Kamasi villages are both highly vibrant economically with a significant number of small business including small shops, barber shops, road side eateries (migahawa), chemist, bars, butcheries, cereal shops, posho-mills and boutiques. There is several hardware shops which also sells bicycle and motor-bicycle spare parts. Most of these hardware owners also run moto-bicycle repair workshops.

Our pilot projects in these villages is a first step towards a sustainable power supply for many of the remote communities in Tanzania that are still without access to electricity. By powering homes, our mini-grid enables villagers to improve their standard of living while powering businesses and productive enterprises, we enable economic development by generating employment and revenue. Welding, hair dressing, tailoring, egg incubation and maize milling are just some of the businesses which are set to take advantage of a new solar mini-grid, set up by our JV companies in the islands. Our JV companies anticipates to build demand for the electricity and engage potential users because by doing this we are more likely to recover our costs and remain profitable. We plan to work with village the power committee to promote the opportunities our mini-grid offers to increase productivity and profitability for existing – as well as start-up – businesses and services such as welding, tailoring, phone charging, and food and drinks refrigeration.

Both Kamasi and Kamasi has no market days as mostly done in many areas in mainland Tanzania. The only market days that villages from Kamasi participate are the once happening in the nearby Kaberega and Kitale in Ukerewe. During high season of nile perch fishing, many fish traders come to the islandS to buy fish. During this time businesses in the village experiences high revenues due to the high influx of people who come to the village to trade fish and sardines. It was also noted that there are no banks but only banking agents who operates on behalf to provide banking services such as NMB banking agents. There is also lots of mobile money outlets in the villages such as M-PESA, AIRTEL-MONEY and HALO-PESA, probably due to the fact that there is good coverage of 2G networks from Vodacom and Airtel and 3G network coverage from Halotel who provide good mobile money services.

4.1. Target markets

Market segmentation/target markets, e.g.:

Supply to TANESCO

Local business

Local retail distribution

Target market segment strategy

Market needs, trends, growth

The pilot project focuses on Kamasi villages. The proposed solar hybrid mini-grid targets to have residential, businesses and commercial use customers right from inception. Table below details all list of initial customer base at Kamasi and Kamasi.

For both villages we target following number of customers in year 1.

Table 18. Consumer classification

CONSUMER GROUPS	
Description	QTY
Households	725
Commercial	62
Industrial	7
Public Institutions	6
TOTAL CONNECTIONS	800

Currently there are no industrial consumers targeted with this initial pilot project.

4.2. Demand assessment

Demand

Total, load curves

Show the willingness and ability to pay for the services. Suitable to include a description of current energy use and the current cost of energy that can be replaced by energy supplied from the project.

Following a site visit conducted in the two villages of Kamasi and Kamasi, prospective consumers were characterized based on what they listed down as electrical appliances that they currently have or would like to have once electricity is available. The assessment also focused on the time of use of the different appliances in a bid to establish the hourly power demand (kW) of the villages as well as the daily power consumption (kWh).

The figures used were conservative bearing in mind that a number of households already have solar home systems installed and some may not be easily reached by the initial grid network.

It was estimated that out of the total 1,824 households in Kamasi 445 will connect to the planned mini-grid in the first year of operation. We also estimate that close to 64 business will also connect to the grid as well as 4 commercial users. In Kamasi, it was estimated that 600 households will be connected to the grid together with approximately 95 businesses and 8 commercial users.

Table 19. Initial customer base in Kamasi village

CONSUMER TYPES		
Description	**QTY**	**Appliances**
Household A	475	2 Bulbs, Radio, and 1 Phones
Household B	250	4 Bulbs, Radio, TV and 3 Phones
Milling Machine	5	1 Bulb, Diesel Engine - 10 kW Nominal
Business A	40	1 light, 1 phone

Business B	20	2 Bulbs, Fridge, Music System, 1 phone
Bar	2	5 Bulb, TV, Fridge, Music System
Water Pump	1	Submersible Motor
Telecom BTS	2	2-3 Kw BTS Equipment
School - Primary	1	30 Bulbs, 2 Computer, 1 Printer
Admin. Office	1	4 Bulbs, 2 Computer, 1 Printer
Churches	2	30 Bulbs, 2 Computer, 1 Music System
Dispensary	1	6 Bulbs, 1 Computer, 1 Fridge
TOTAL CUSTOMERS	**800**	

After a comprehensive assessment of the projected present and future electricity needs for the two villages, the estimated maximum/peak demand for the first year for Kamasi village is 50 kW. The daily power consumption averaged on an annually for Kamasi Village was projected at 539.95 kWh.

Captured below are tabulated and graphical representations for the projected daily load profiles as well.

Table 21. Projected Daily Load Profile, Kamasi village

Projected Daily Load Profile					
Hour	**Households**	**Commercial**	**Industrial**	**Public Institutions**	**Total (kW)**
0	0	0.216	3.816	1.648	5.68
1	0	0.216	3.816	1.648	5.68
2	0	0.2	3.816	1.648	5.664
3	0	0.2	3.816	1.648	5.664
4	0	0.2	3.816	1.648	5.664
5	0	1.7	3.816	1.648	7.164
6	16.475	2.6	3.8	0	22.875
7	21.55	2.5	3.8	0.35	28.2
8	10.875	2.8	3.8	0.25	17.725
9	10.875	2.5	18.8	0.55	32.725
10	10.875	5.1	18.8	4	38.775
11	10.875	4.9	3.8	4.35	23.925
12	10.875	5.2	3.8	4	23.875
13	13.375	4.9	3.8	4.25	26.325
14	13.375	5.2	3.8	0.1	22.475
15	10.875	5.2	3.8	0.5	20.375
16	10.875	5.52	18.84	0.25	35.485
17	15.75	5.52	3.84	1.958	27.068
18	30.3	5.604	3.856	1.824	41.584
19	38.1	6.224	3.856	1.974	50.154
20	30.975	4.424	3.816	0.104	39.319
21	18.475	3.824	3.816	0.214	26.329
22	7.8	2.868	3.816	0.064	14.548
23	5.8	2.992	3.816	0.064	12.672

	Households	Businesses	Industrial	Institution	Total (kWh)
Daily Power Consumption	288.10	80.61	136.55	34.69	539.95

Households	Businesses	Industrial	Institution	Total (kWh)
53%	15%	25%	6%	100%

Table 22. Projected Daily Load Profile, Kamasi village

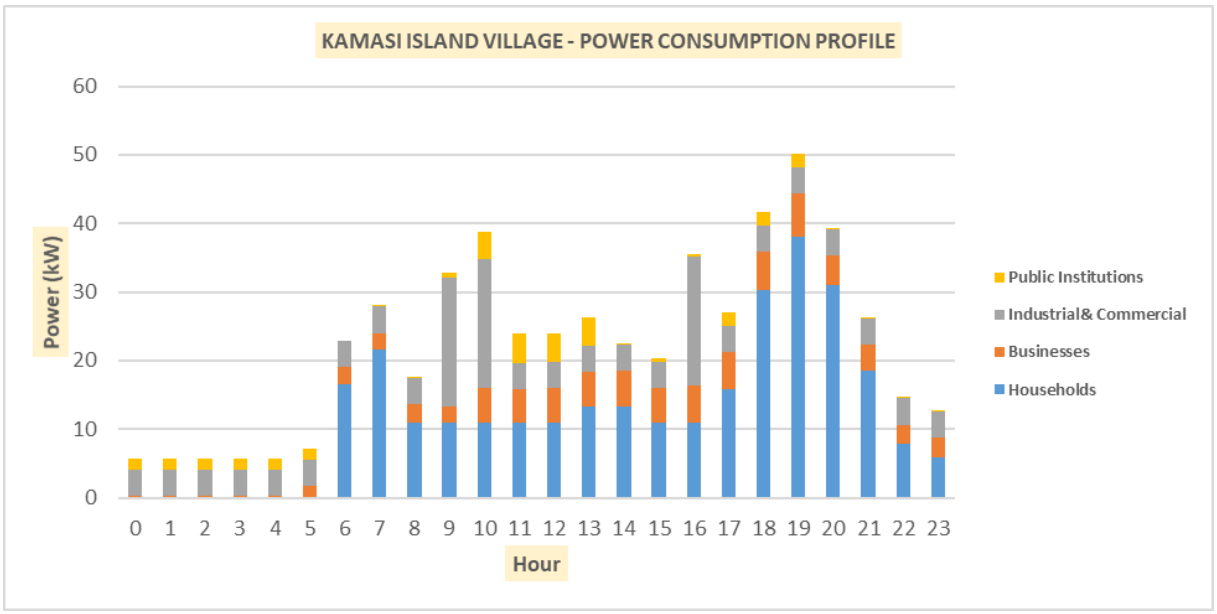


Chart 9. Power consumption profile in Kamasi and Kamasi

Willingness to Pay

From the data collected during the interviews in Kamasi it was apparent that most of the respondents (9/10) were ready and willing to pay for a service that is reliable. Only one respondent thought that the service should be free or paid by the government. Of those who were willing to pay, the minority (2/10) indicated the cost of service may be a major factor in determining whether to connect or not while the remaining respondents indicated quality and duration of supply as the important aspect for the service.

From the data collected on the stated ability to pay, the following table was deducted;

Table 23. Power Consumer Stated Ability to Pay

Power Consumer Stated Ability to Pay		
Respondent	TSH / MONTH	
	Low Season	High Season
1	100,000.00	200,000.00

2	150,000.00	250,000.00
3	100,000.00	150,000.00
4	300,000.00	400,000.00
5	300,000.00	500,000.00
6	200,000.00	250,000.00
7	150,000.00	200,000.00
8	150,000.00	200,000.00
9	100,000.00	300,000.00
10	20,000.00	50,000.00
Average	157,000.00	250,000.00

Present Energy needs and Ability to Pay

Table 24. Assessment of present energy costs

ASSESMENT OF PRESENT ENERGY COSTS						
User Description	**Energy Source / Supply**	**Monthly Usage**	**Monthly Cost (TSH)**	**Monthly Cost (USD)**	**Monthly Energy Equivalent (kWh)**	**Present Cost of Energy (usd/kWh)**
Family with two hurricane lamps each operating for 5 hours a day	Kerosene	9 Litres	20,700.00	9.26	0.75	**12.34**
Family with PAYG Solar Home system running two bulbs of 5 Watts for 4 Hrs	Pay as you Go Solar Home System	120 Hours	12,000.00	5.37	1.20	**4.47**
Business Premises using one bulb of 5 watts for four hours a day	Supplied by Neighbour with Solar System	96 Hours	15,000.00	6.71	0.77	**8.73**

4.3. Tariff

Clearly describe the impact on tariff of a REA grant being provided.

Describe the status regarding regulatory approval of the tariffs.

The following table shows proposed tariff structure for different customer segments showing results with RBF subsidy and without subsidy. These were divided into two groups – single phase users and three phase users. In order to incentivize productive users to connect to the mini-grid, and to foster the productive use in both villages, tariffs for three-phase users were set at 35 cUSD per kWh.

Table 25. Tariff structure for each customer segment with effects of RBF subsidy

Customer segment	Example of Client type	Tariff in USD/ Tsh with RBF subsidy	Tariff in USD/ Tsh without RBF subsidy
Household	Homes	0.50 USD/ 1,153 Tsh	0.75 USD/ 1,730 Tsh
Commercial	Shops, Bars, restaurants	0.50 USD/ 1,153 Tsh	0.75 USD/ 1,730 Tsh
Public	Schools, Administrative buildings, Dispensaries	0.50 USD/ 1,153 Tsh	0.75 USD/ 1,730 Tsh
Industrial Use	Water pumps, Milling	0.37 USD/ 853 Tsh	0.50 USD/ 1,153 Tsh

	machines, Telecom tower		
Project IRR		8% (year 10)	4.0% (year 10)
NPV		$131,445.10	$87,352.33

After annual accounting closure, tariffs might be subject to inflation and fuel adjustment.

According to SPP2 rules, designed by EWURA, projects below 1 MW do not require a license but need to register with the regulator, while projects below 100 kW are not only exempt from licensing but also from tariff approval – the case of small power producers that supply customers in the mini-grid. Tariffs are calculated to be cost-reflective at a reasonable and affordable price for rural customers.

5. Financial plan

Important assumptions underlying the analysis should be clearly stated.

5.1. Describe the suggested financing structure

Show the financing structure (equity from owners, equity through REA grants, debt) and disbursement schedule of the funds.

Table below shows the proposed capital structure between equity from owners, equity from RBF financing and loan including assumed interest rate for international loan.

Table 26. Project financing structure

FINANCIER	AMOUNT [US$]	PROPORTION [%]	INTEREST RATE [%]	TERM [YEARS]
Owners equity	94,628	13.2%		15
Equity through REA grants	400,000	56%		
Debt to /financier 1/	220,000	30.8%	7%	10
Debt to /financier 2/				
Total	714,628	100%		
Communal levy		1%		
Income tax		30%		
Import taxes	Solar equipment is tax exempted			
Payback period	Developer Equity Payback period is 8 years.			

Projected disbursement schedule for the RBF grant and private financing. The milestones are prepared with clear and measurable deliverables:

Table 27. Disbursement schedule of funds and milestones

Date of report submission	Milestones	Outputs/ Deliverables	Payment [USD], Percentage of RBF Contribution [%]	Payment [USD], Percentage of Project Developer Contribution [%]
Due date for Milestone 1 - 6 month after project start	**Milestone 1**	1. Progress report with the following deliverables:	[140,000]	[94,628]
		a. Bank guarantee or other payment security	[35%]	[13.2%]
		b. EIA		
		c. BoQ for procurement and		

		detailed technical plans		
		d. Financial and Economic Analysis		
		e. Tariff agreement		
		f. EIA Report		
		g. NEMA License		
		2. Financial Report		
		3. Initial Project Brief		
		4. Plan and budget for the remaining period		
		5. Signed RBF Agreement		
		6. Contracting of long lasting purchase		
		7. Request for payment		
Due date for Milestone 2 - 12 months after project start	**Milestone 2**	1. Progress report with the following deliverables	[140,000]	[220,000]
		a. Purchase order	[35%]	[30.8%]
		b. Delivery notes		
		c. Sub-contractor contracts		
		d. Interim Commissioning Report		
		2. Financial Report		
		4. Plan and budget for the remaining period		
		6. Request for payment		
Due date for Milestone 3 - 15 months after project start	**Milestone 3**	1. Final report by Trust Agent with the following deliverables:	[120,000]	[0]
		a. Commissioning Report	[30%]	[0%]
		b. IVA Protocol on the physical delivery at pre-agreed standards of service of contractual outputs (new connections) and validation of the total grant funding request		
		3. Final Project Brief		
		4. Audit report		
		5. Request for final payment		
		Total contribution	**[400,000] 56%**	**[314,628] 44%**
		Total Project Costs	**[714,628] 100%**	

5.2. Revenue projections

Describe the projected revenues based on the previous sections

Following revenue projection was assessed on the basis of the verified results from the field study, weighted with the consumers ability to pay. The yearly estimated demand and its future increase as a basis for revenue projection is described in more detail in the Chapter 4.2. Demand assessment, local operation costs are shown in the following Chapter 5.3. Cost analysis.

Table 28. Projected revenues over the period of 10 years

PROFIT & LOSS in USD											
Year	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Regular Users (from load profiles)- Yearly Comsumption (kWh)		134,208	140,918	147,964	155,362	163,131	171,287	179,851	188,844	198,286	208,200
Total Sales		**86,673**	**89,222**	**91,846**	**94,548**	**97,328**	**100,191**	**105,201**	**108,295**	**111,480**	**114,759**
OPEX											
Total OPEX		**38,909**	**35,206**	**35,323**	**36,655**	**36,773**	**36,897**	**36,939**	**36,986**	**37,037**	**37,092**
EBITDA		**47,764**	**54,016**	**56,524**	**57,893**	**60,555**	**63,294**	**68,261**	**71,309**	**74,443**	**77,667**
D&A		30,949	30,949	30,949	30,949	30,949	30,949	30,949	30,949	30,949	30,949
EBIT		**16,815**	**23,068**	**25,575**	**26,944**	**29,607**	**32,345**	**37,312**	**40,360**	**43,495**	**46,718**
Financial result		17,600	15,628	13,497	11,197	8,712	6,028	3,130	0	0	0
EBT		**-785**	**7,440**	**12,078**	**15,747**	**20,895**	**26,317**	**34,182**	**40,360**	**43,495**	**46,718**
Corporate tax		0	2,232	3,623	4,724	6,268	7,895	10,255	12,108	13,048	14,015
Net income		**-785**	**5,208**	**8,454**	**11,023**	**14,626**	**18,422**	**23,928**	**28,252**	**30,446**	**32,703**

5.3. Cost analysis

Describe the projected costs including CAPEX and OPEX, clearly split into main cost elements.

- *Important assumptions*
- *Investment size*
- *Include relevant cost benchmarks*

For detailed description of CAPEX and OPEX costs, please refer to the Feasibility study, chapter 6 FINANCIAL ASSESSMENT. Connection costs will be

CAPEX costs

Table 29. CAPEX costs

CAPEX Description	Costs in USD
Total Generation asset	314,000
Total Power distribution assets	166,275
Total Customer Connections	181,853
Total Project Development	52,500
TOTAL Investment Expenditure [USD]	**714,628**

OPEX costs

The local price per liter of fuel is currently 2,400 Tsh (1.01 USD) in Kamasi. Fuel price was indexed in the financial model with 3,9% as estimated future price evolution for diesel fuel, published by the U.S. Energy Information Administration (Annual Energy Outlook 2017, Table: Total Energy Supply, Disposition, and Price Summary, available at www.eia.gov).

Inflation rate was considered at 5,8% taken as an average value from inflation forecast for Tanzania, Tradingeconomics.com.

Diesel generator maintenance was calculated by following formula: number of running hours x 0.3 USD.

PV maintenance such as cleaning of modules and inverter visible control is part of the tasks of local technician and therefore such costs are not reflected separately (routine PV cleaning and maintenance is part of the job description).

Maintenance of Energy storage system (ESS) requires besides visible check also thermo camera check of electrical joints and switchgear, air filter replacement converters, cleaning of air-conditioning and control of cooling circuit pressure. All related costs are reflected in the tables below for each site.

The following tables shows number of units sold in kWh/year up to year 10 together with the O&M overview costs. The estimated load increase is shown in Chapter 2.4 Specific growth assumptions and load forecast.

Table 30. OPEX costs

OPEX in USD	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Fuel price (per liter)		1.00	1.02	1.04	1.06	1.08	1.10	1.10	1.10	1.10	1.10
Payments for diesel fuel		3,986	4,066	4,147	4,230	4,315	4,401	4,401	4,401	4,401	4,401
O&M PV		707	700	693	686	680	673	666	660	653	647
O&M ESS		139	139	140	141	142	142	143	144	144	145
O&M Diesel		251	616	610	1,812	1,794	1,777	1,759	1,742	1,725	1,708
Local operational manager		7,853	7,776	7,700	7,624	7,550	7,476	7,402	7,330	7,258	7,187
Guards		1,309	1,296	1,283	1,271	1,258	1,246	1,234	1,222	1,210	1,198
Onsite Technicians		4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188
Admin/support staff		4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188
Project Manager		4,147	4,217	4,289	4,362	4,436	4,512	4,588	4,666	4,746	4,826
Miscellaneous		2,000	2,034	2,069	2,104	2,140	2,176	2,213	2,250	2,289	2,328
Metering License		300	305	310	316	321	326	332	338	343	349
Vendors		4,188	2	0	0	0	0	0	0	0	0
Mobile payment fee		3,034	3,085	3,138	3,191	3,245	3,300	3,356	3,413	3,472	3,531
Accountability / Administrative costs		2,618	2,592	2,567	2,541	2,517	2,492	2,467	2,443	2,419	2,396
Total OPEX		**38,909**	**35,206**	**35,323**	**36,655**	**36,773**	**36,897**	**36,939**	**36,986**	**37,037**	**37,092**

Replacement schedule for generation assets:

PV System

PV inverters, fuses and combiner boxes to be replaced after 12 years.

Battery System

Converter fan to be replaced after 3 years.
A/C fans to be replaced after 6 years.
Circuit breakers to be replaced after 8 years.
A/C chiller and general overhaul of converter to be replaced after 10 years.

Battery capacity fading compensation – after 6,000 cycles there is 75% remaining capacity left. The annual aging is 1% (calendar life degradation).

Diesel genset

Diesel genset to be replaced after 20,000 running hours years.

5.4. Cash flow and financial analysis

- *Projected profit & loss, break-even analysis*
- *Projected cash flow and free cash flow*
  - *By year (equity, debt, investment, operating costs, revenues)*
- *Ability to repay debt (e.g. Debt Service Coverage Ratio, DSCR)*

The chapter below shows the key results from the financial analysis. For detailed analysis, please see the financial model attached to the proposal.

Profit & loss statement

Table 31. Profit and loss statement over the period of 10 years

PROFIT & LOSS in USD											
Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Exchange rate		2,315	2,361	2,409	2,457	2,506	2,556	2,607	2,659	2,712	2,767
Regular Users connected that year		97%	3%	0%	100	100	100	100	100	100	100
Regular Users connected		767	791	791	891	905	931	958	985	1,013	1,042
Regular Users (from load profiles)- Yearly Comsumption (kWh)		134,208	140,918	147,964	155,362	163,131	171,287	179,851	188,844	198,286	208,200
Yearly increase in comsumption (linear)		4,026	4,228	4,439	4,661	4,894	5,139	5,396	5,665	5,949	6,246
Regular Users Tariff (TZH / kWh)		1,158	1,158	1,158	1,158	1,158	1,158	1,181	1,181	1,181	1,181
Customer VAT (TZH / kWh)		0	0	0	0	0	0	0	0	0	0
Fixed Fee (TZS/Year/HH)		0	0	0	0	0	0	0	0	0	0
Regular Users Sales		**69,117**	**71,150**	**73,243**	**75,397**	**77,614**	**79,897**	**83,892**	**86,359**	**88,899**	**91,514**
Industrial users connected that year		100%	0%	0%	0	0	0	0	0	0	0
Industrial users connected		7	7	7	7	7	7	7	7	7	7
Industrial Users (From Load Profiles) - Yearly Comsumption (kWh)		47,448	49,820	52,311	54,927	57,673	60,557	63,585	66,764	70,102	73,607
Yearly increase in comsumption (linear)		1,423	1,423	1,423	1,423	1,423	1,423	1,423	1,423	1,423	1,423
Industrial user Tariff (TZH / kWh)		857	857	857	857	857	857	874	874	874	874
Customer VAT (TZH / kWh)		0	0	0	0	0	0	0	0	0	0
Fixed Fee (TZS/Year)		0	0	0	0	0	0	0	0	0	0
Industrial users Sales		**17,556**	**18,072**	**18,604**	**19,151**	**19,714**	**20,294**	**21,309**	**21,935**	**22,580**	**23,245**
One-time connexion fee		9,081	0	0	0	0	0	0	0	0	0
Total number of connections		*774*	*798*	*798*	*898*	*912*	*938*	*965*	*992*	*1,020*	*1,049*
Total Sales		**86,673**	**89,222**	**91,846**	**94,548**	**97,328**	**100,191**	**105,201**	**108,295**	**111,480**	**114,759**
OPEX											

Fuel price (per liter)		1.00	1.02	1.04	1.06	1.08	1.10	1.10	1.10	1.10	1.10
Payments for diesel fuel		3,986	4,066	4,147	4,230	4,315	4,401	4,401	4,401	4,401	4,401
O&M PV [TZS/year]		707	700	693	686	680	673	666	660	653	647
O&M ESS [EUR/year]		139	139	140	141	142	142	143	144	144	145
O&M Diesel [TZS/year]		251	616	610	1,812	1,794	1,777	1,759	1,742	1,725	1,708
Local operational manager [TZS/year]		7,853	7,776	7,700	7,624	7,550	7,476	7,402	7,330	7,258	7,187
Guards [TZS/year]		1,309	1,296	1,283	1,271	1,258	1,246	1,234	1,222	1,210	1,198
Onsite Technicians [TZS/year]		4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188
Admin/support staff [TZS/year]		4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188	4,188
Project Manager [TZS/year]		4,147	4,217	4,289	4,362	4,436	4,512	4,588	4,666	4,746	4,826
Miscellaneous [EUR/year]		2,000	2,034	2,069	2,104	2,140	2,176	2,213	2,250	2,289	2,328
Metering License [USD/year]		300	305	310	316	321	326	332	338	343	349
Vendors [TZS/year]		4,188	2	0	0	0	0	0	0	0	0
Mobile payment fee [USD/year]		3,034	3,085	3,138	3,191	3,245	3,300	3,356	3,413	3,472	3,531
Accountability / Administrative costs [TZS/year]		2,618	2,592	2,567	2,541	2,517	2,492	2,467	2,443	2,419	2,396
Total OPEX		**38,909**	**35,206**	**35,323**	**36,655**	**36,773**	**36,897**	**36,939**	**36,986**	**37,037**	**37,092**
EBITDA		**47,764**	**54,016**	**56,524**	**57,893**	**60,555**	**63,294**	**68,261**	**71,309**	**74,443**	**77,667**
D&A		30,949	30,949	30,949	30,949	30,949	30,949	30,949	30,949	30,949	30,949
EBIT		**16,815**	**23,068**	**25,575**	**26,944**	**29,607**	**32,345**	**37,312**	**40,360**	**43,495**	**46,718**
Financial result		17,600	15,628	13,497	11,197	8,712	6,028	3,130	0	0	0
EBT		**-785**	**7,440**	**12,078**	**15,747**	**20,895**	**26,317**	**34,182**	**40,360**	**43,495**	**46,718**
Corporate tax		0	2,232	3,623	4,724	6,268	7,895	10,255	12,108	13,048	14,015
Net income		**-785**	**5,208**	**8,454**	**11,023**	**14,626**	**18,422**	**23,928**	**28,252**	**30,446**	**32,703**

Projected cashflow and free cashflow

Table 32. Projected cashflow and free cashflow over the period of 10 years

Cashflows in USD											
Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
EBITDA		**47,764**	**54,016**	**56,524**	**57,893**	**60,555**	**63,294**	**68,261**	**71,309**	**74,443**	**77,667**
Corporate tax		-	(2,232)	(3,623)	(4,724)	(6,268)	(7,895)	(10,255)	(12,108)	(13,048)	(14,015)
Operating CF		**47,764**	**51,784**	**52,900**	**53,168**	**54,287**	**55,399**	**58,006**	**59,201**	**61,395**	**63,651**
Components replacement		-	-	-	(8,071)	(17,365)	(7,912)	(31,836)	(7,761)	(7,687)	(13,489)
Replace PV		-	-	-	-	-	-	-	-	-	-
Replace Battery		-	-	-	-	-	-	-	-	-	-
Replace PV Inverter		-	-	-	-	-	-	-	-	-	-
Replace Battery Inverter		-	-	-	-	-	-	-	-	-	-
Replace Meters		-	-	-	-	(5,874)	-	-	-	-	(5,874)
Overhaul Diesel generator		-	-	-	-	-	-	-	-	-	-
Regular users - New Connections		-	-	-	(8,071)	(7,991)	(7,912)	(7,836)	(7,761)	(7,687)	(7,614)
Productive users - New Connections		-	-	-	-	-	-	-	-	-	-

PV increase		-	-	-	-	-	-	(24,000)	-	-	-
Inverter increase		-	-	-	-	(3,500)	-	-	-	-	-
Investing CF		**-**	**-**	**-**	**(8,071)**	**(17,365)**	**(7,912)**	**(31,836)**	**(7,761)**	**(7,687)**	**(13,489)**
Subsidy (REA)		**400,000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Conditions honoured	-	*1*	-	-	-	-	-	-	-	-	-
Free CF	**(714,628)**	**447,764**	**51,784**	**52,900**	**45,098**	**36,922**	**47,486**	**26,171**	**51,440**	**53,708**	**50,163**
Cumulated CF		**(266,864)**	**(215,080)**	**(162,180)**	**(117,082)**	**(80,160)**	**(32,674)**	**(6,503)**	**44,937**	**98,645**	**148,808**
EQUITY											
EBITDA		**47,764**	**54,016**	**56,524**	**57,893**	**60,555**	**63,294**	**68,261**	**71,309**	**74,443**	**77,667**
Corporate tax		**-**	**(2,232)**	**(3,623)**	**(4,724)**	**(6,268)**	**(7,895)**	**(10,255)**	**(12,108)**	**(13,048)**	**(14,015)**
Operating CF		**47,764**	**51,784**	**52,900**	**53,168**	**54,287**	**55,399**	**58,006**	**59,201**	**61,395**	**63,651**
Investing CF		**-**	**-**	**-**	**(8,071)**	**(17,365)**	**(7,912)**	**(31,836)**	**(7,761)**	**(7,687)**	**(13,489)**
Interest debt		**(17,600)**	**(15,628)**	**(13,497)**	**(11,197)**	**(8,712)**	**(6,028)**	**(3,130)**	**-**	**-**	**-**
Principal repayment		**(24,656)**	**(26,628)**	**(28,759)**	**(31,059)**	**(33,544)**	**(36,228)**	**(39,126)**	**-**	**-**	**-**
Debt service		**(42,256)**	**(42,256)**	**(42,256)**	**(42,256)**	**(42,256)**	**(42,256)**	**(42,256)**	**-**	**-**	**-**
Cash available for equity repayment		**5,508**	**9,528**	**10,644**	**2,842**	**(5,334)**	**5,230**	**(16,085)**	**51,440**	**53,708**	**50,163**
Equity CF	**(94,628)**	**5,508**	**9,528**	**10,644**	**2,842**	**(5,334)**	**5,230**	**(16,085)**	**51,440**	**53,708**	**50,163**
Cumulated CF		**(89,120)**	**(79,592)**	**(68,948)**	**(66,106)**	**(71,440)**	**(66,209)**	**(82,295)**	**(30,855)**	**22,853**	**73,016**
DEBT											
CFADS		**47,764**	**51,784**	**52,900**	**53,168**	**54,287**	**55,399**	**58,006**	**59,201**	**61,395**	**63,651**
Debt BoP		**220,000**	**195,344**	**168,716**	**139,957**	**108,898**	**75,354**	**39,126**	**-**	**-**	**-**
Interests		**17,600**	**15,628**	**13,497**	**11,197**	**8,712**	**6,028**	**3,130**	**-**	**-**	**-**
Principal repayments		**24,656**	**26,628**	**28,759**	**31,059**	**33,544**	**36,228**	**39,126**	**-**	**-**	**-**
Annuity		**42,256**	**42,256**	**42,256**	**42,256**	**42,256**	**42,256**	**42,256**	**-**	**-**	**-**
DSCR		**1.13**	**1.23**	**1.25**	**1.26**	**1.28**	**1.31**	**1.37**	**-**	**-**	**-**

Debt Service Coverage Ratio

Table 33. Debt Service Coverage Ratio

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Debt Service Coverage Ratio	113%	123%	125%	126%	128%	137%	137%	-	-	-

5.5. Financial risk analysis

- *Identify major risks and uncertainties. Key categories of risks related to investment cost, operating/running costs, and revenue.*
- *Quantify the risks wherever possible. Implications on cash-flow, IRR, ability to repay debt (e.g. DSCR)*
- *Describe mitigating measures to handle the risks, both preventive and adaptive measures can be included.*

Below table details how mitigation of the financial risks stated above can be done to avoid the project failure and increase project success rate.

Table 34. Risk factors

Risk factor	Base assumption	Sensitivity	Comment/mitigation

Interest rate changes		• Low	Depending on the internal strategy for interest cash flows, interest rate protection in form of a fixed rate loan will be created. Balancing by tariff change is possible after refinancing or at the end of fixed rate period.
Delays in getting REA grant	Due to the fact that debt and equity funding is not closed yet, a change of the share of financing is possible.	• Low	50% of the total investment costs are covered by own contribution, allowing to start the project. Additional sources can be seek through "crowd financing".
Delays in construction		• Medium	Properly defined procurement plan and clearly defined contracts with subcontractors. Financial risk is low due to small portion of IR of the bank loan during the period of construction.
Construction cost overruns		• Low	The JV companies are experienced in on-site construction, in case of delays, they are able to do construction work with their own personal and equipment. Minimizing design errors allows avoiding unnecessary increase in construction costs together with properly defined procurement plan and clearly defined contracts with subcontractors.
Connection schedule	Lower number of connected clients to the mini-grid than anticipated	• High	An affordable connection fee-scheme will be developed. The idea is that the consumers pay a small amount of down-payment and repay the rest of the costs over the period of 1 year.
Risk of lower power consumption than expected		• High	Lowering the power consumption leads to lower usage of the diesel genset and reduced liters of fuel purchased per year and increase of the renewable share in the system.
			The revenue risk will be prevented by fostering productive use (mills, irrigation to foster agriculture) to serve as an income source and to diversify income sources over the time.
			To ensure that the power consumption develops in the assumed manner, external consultants (especially for Productive use of Energy activities) will accompany and strengthen the communities in the first years of operation to run the anchor consumers (i.e posho mills, welding workshops e.t.c) properly, so that income is generated and the people are dedicated to make the scheme run.
			In this context, the locally operating NGOs are very important to support the communities to introduce and run the productive users such as the fish refrigeration business schemes in a sustainable way.

Risk of non-payment of the customer	A typical problem of customers who have no regular income is to fall behind their payment obligations	• Low	A prepaid metering system will be introduced, without payment the power supply will be shut down automatically.
			Costs for alternative systems (torches, kerosene lamps, running own diesel system, etc.) are higher than the electricity costs from our mini-grid.
Tariffs	Tariff amount is not affordable for customers	• Medium	Proper demand assessment and strong involvement of the communities in the project implementation.
			Information campaign on the proper use of electricity explaining the rationale behind kWh equivalent and its pricing compared to traditional energy sources will be launched.
Inflation	Inflation affects negatively the cashflow	• Medium	Increasing the cashflow through tariffs after a proper assessment and prior notification of clients. Inflation adjustment of tariffs can be done after the first year and on a yearly basis.

6. Implementation

This section should show what the implementation plan is and indicate how the developer should ensure that the implementation plan is met.
The implementation plan should be specific with timetables/dates and include a description of the management responsibilities.
The current status regarding implementation should be stated.

- *Relevant sector clearance and licenses, e.g.:*
  - *Land acquisition*
  - *Water rights*
  - *Right of line way*
  - *Community no-objection*
  - *EWURA Distribution license*
  - *TANESCO LI for mini-grid supply*
  - *REA LOI for connection subsidies*
  - *NEMC EIA report for environmental clearances*
  - *TIC certificate for excise tax exemption*
  - *SPPA with TANESCO*
  - *EWURA tariff clearances*
  - *Other(?)*
- *Project status, e.g.:*
  - *Preliminary engineering design,*
  - *Building permit*
  - *Site accessibility*
  - *Other (?)*

The project implementation has been subdivided into four main activities. An explanation of each of the project activity is given below. A detailed project implementation Gantt chart has been attached

Project Development

Project feasibility studies (technical and economic) will be conducted by Volt Africa and its hired consulting teams and the results will be used to generate the technical and financial designs. The generation and distribution permits and NEMC clearance already acquired. Tariff proposal and setting will be conducted at this stage after which the project will now enter into a financial closure with commitments from funding partners and Volt Africa will finally then start operating the project.

Project Procurement

Procurement and delivery of all material (off-shore and on-shore), machinery and human resources for the project to be undertaken at this stage. Coordination of all procurement will be done by Volt Africa in coordination with its investors with assistance from contracted clearing and forwarding agents. Procurement procedures for the main components can be found attached in the annex.

Project Construction

Vetting and Selection of sub-contractors to be done by Volt Africa and its investors. Key activities will include site clearing and preparation and excavations. Solar PV Civil works and panel mounting structures, Battery Storage Civil Works and foundations, Installation of distribution poles and lines, Solar Panel Installation and Cabling, Battery Installation and Cabling, Inverters (Solar PV and Batteries) Installation, Installation of metering devices, Testing and commissioning, Training and Operation manuals.

Project Operation

This will include day to day project activities such as metering and billing, customer service, client management and periodic maintenance of the system and will be done by Volt Africa. The company will also be in charge of the continuous monitoring and evaluation of the project both on the technical and economic aspects. The company will also ensure that the operations of the project are in accordance with the laid out regulatory requirements both from the central and regional governments.

Below is a milestone achieved snapshot in tabular form:-

PROJECT MILESTONES SCHEDULE - KAMASI SOLAR HYBRID MINI-GRID																	
Activities	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	**Deliverables**	**Status**
Project Management																	
Project management, coordination and financial																Progress and financial	On-going

and progress reporting																reports	
Monitoring and Evaluation																Monitoring and evaluation report	On-going
Communication and Visibility																Billboard	On-going
Project Development																	
Detailed Feasibility Study and Resource Assessment																Detailed Feasibility study	Completed
Technical Studies including Grid Studies																BoQ for procurement and detailed technical plans	Completed
Plant and distribution design																BoQ for procurement and detailed technical plans	Completed
Financial and Economic Analyses																Financial and Economic Analysis Report	Completed
Tariff reviews and setting with stakeholders involvement																Tariff agreement	On-going
Techno-financial Proposal Submission and Approval by EWURA																EWURA Proposal	Completed
EWURA Generation and Distribution Permits																EWURA License	Completed
Field Visits and EIA Study Report Preparation																EIA Site visit report	Completed
Submission to NEMC for Approval																	
NEMC License																NEMC License	Completed
Sourcing for Project Finance																Financing agreements	On-going
Allocation for Financing - Power plant and Distribution Infrastructure																	On-going
Financial Agreements and Closure																	
Clients/end-user sourcing and contractual agreements on agreed tariffs																Signed customer contracts	On-going
Project Procurement																	
Procurement of project infrastructure including Solar PV, Storage, Power Distribution Material, Switchgears and Metering																RFP / Purchase order	Sept- Dec-2024

Equipment																
Procurement of locally sourced material including construction material															RFP / Purchase order	Sept- Dec-2024
Shipping and Transportation															Delivery notes	Sept- Dec-2024
Materials and Equipments on site															Delivery notes	Sept- Dec-2024
Project Construction																
Vetting and Selection of sub-contractors															Sub-contractor contracts	Done
Site Clearing and preperation and excavations															Interim Commissioning Report	Jan-Mar-2025
Solar PV Civil works and panel mounting structures															Interim Commissioning Report	Jan-Mar-2025
Battery Storage Civil Works and foundations															Interim Commissioning Report	Jan-Mar-2025
Installation of distribution poles and lines															Interim Commissioning Report	Jan-Mar-2025
Solar Panel Installation and Cabling															Interim Commissioning Report	Jan-Mar-2025
Battery Installation and Cabling															Interim Commissioning Report	Jan-Mar-2025
Inverters (Solar PV and Batteries) Installation															Commissioning Report	Jan-Mar-2025
Installation of metering devices															Commissioning Report	Jan-Mar-2025
Testing and commissioning															Commissioning Report	Jan-Mar-2025
Training and Operation manuals															Training and operational manual	Jan-Mar-2025
Project handover to VOLT AFRICA															Hand over protocol	Jan-Mar-2025
VOLT AFRICA Project Operation																
Operation & maintenance of Mini-Grid and Meters																Apr-25
Billing and Accounting																Apr-25
Customer Service																Apr-25
Periodic Monitoring and Evaluation																Apr-25

Table 35. **PROJECT IMPLEMENTATION SCHEDULE – KAMASI ISLAND SOLAR HYBRID MINI-GRID**

Company Name:	*Volt Africa Limited*
Project Title:	*Implentaion Schedule for Kamasi Island Project(1-Minigrid)*
Programme Name:	*"Results Based Financing (RBF) For Renewable Energy Investments in Green Mini and Micro Grids" by REA*

KAMASI MINI-GRID PROJECT IMPLEMENTATION SCHEDULE

	Q2 2024			Q3 2024				2025								
Shovel Ready Villages	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Q2	Q3	Q4
Kamasi Island Project				***Materials Order and Shipping to site.***				***Construction and Commissioning & Handover***			***Project Full Operation & maintenac Connections***					
Ancillary Initiatives																
Productive Use of Energy programs				***Planning***								***Launch & Roll Out***				
Portable Water Solutions				***Planning***												
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Q2	Q3	Q4
	Q2 2024			Q3 2024				2025								

Total Program Summery

Target Number of C'nnectns	Estimated Construction Time	Estimated Generation Size

Kamasi Island Project	800	(months)	3	(KW)	100														

Management

(This section should include a description showing that the project owner has the necessary capability to successfully develop and operate the project.)

As detailed in chapter 1.6. Management, Volt Africa and its investors will hire a competent management Team with different managerial skills and experience in business specifically manage the minigrid Company. The developer will recruit experienced people to fill any gaps on a needs basis. Our management will work together as a team to create a successful business.

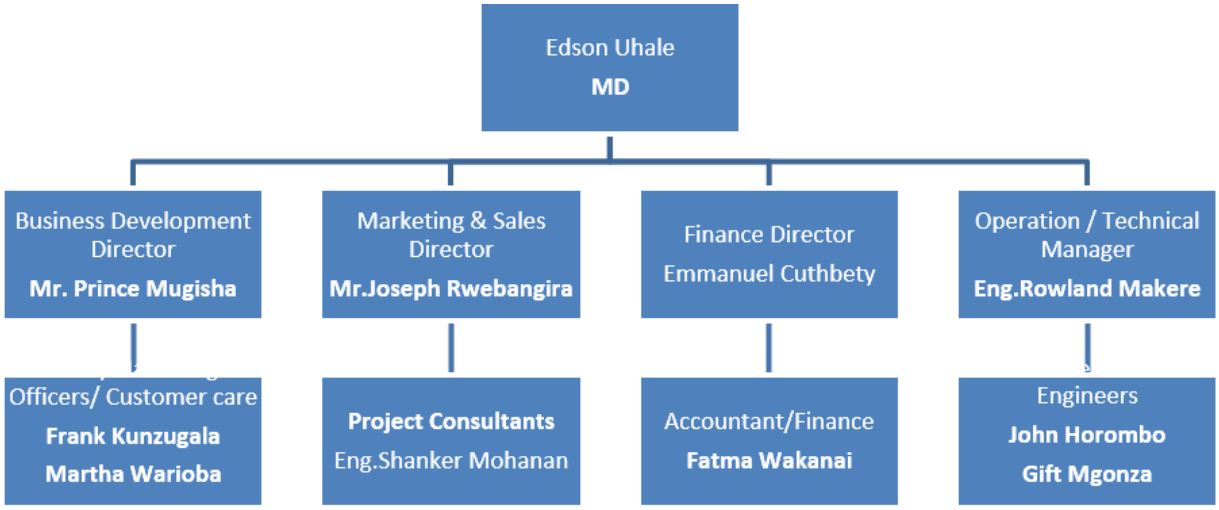
Apart from the minigrid management Team, our investors consortium will have at all times overseeing the operation and management of the minigrid and will be responsible to back-up Volt Africa management team. This will improve the efficiency and performance of the business because of double monitoring of the business from both the investors and the Volt Africa management team.

Volt Africa Ltd Management Team supported by highly skilled employees from different departments as per below chart.

Below is the consortium management teams competencies that will also have full time management and ownership of Volt Africa Company as follows:-.

Volt Africa Company is founded by Four Partners. Eng., Edson Uhale and Mr. Joseph Rwebangira and

Chart 11. Volt Africa Ltd. organisational structure



Volt Africa Company has the following key people:-

- **Mr. Edson Uhale** (**Managing Director)**. Mr. Uhale has a Hons degree in Electronics Science and telecommunication from Dar-es-salaam University and has spent 12 years' experience in the power sector. He has extensively researched on rural electrification projects and modern energy technologies, and is one of the innovation leaders at Volt Africa and familiar with the minigrids operation. Mr. Uhale has experience in the operation, fabrication and maintenance of electronic equipments. Eng Uhale has recently (May-2019) graduated from the Micro-Grid Academy in Kenya where he attended the East African Regional Training Course on Mini-Grids from Design to Integration of Productive Uses through the Water-Energy-Food Nexus. His ability will be critical to the success of the business. Other professional include:
    - Advanced Solar Batteries & Inverter Training (and received instruction on solar Water pumping system sizing, installing, and maintenance of renewable energy Systems from- Schneider Electric, African Energy and Deka Battery);
    - Ready4Finance Business Training- (By BiD Network (Business in Development Network from Netherlands) & SEED (Support for Entrepreneurship and Enterprise Development));
    - Access to Sustainable Energy Challenge Tanzania 2012-"A Ready for Finance (R4F) Program for Entrepreneurs in Tanzania that Deliver Access to Sustainable Energy";

  As founder and Chairman of the Board of Directors, he will be responsible for the entire operation of Volt Africa Company. Some of his duties will include overseeing the areas held by Volt Africa employees, as well as the output produced by them on the daily basis. He will also have the job of hiring dedicated people and ensuring employees put their best efforts into the minigrid business.

- **Shanker Mohanan (Project Support Lead)**- Shanker has BEng. Mechanical Engineering from Anna University, India; MEng. Power Engineering from Technical University of Munich, Germany and is a Certified Expert in Climate and Renewable Energy Finance. His past experiences include working with Redavia Rental Solar Power, Tanzania, Enerwhere

Sustainable Energy DMCC, United Arab Emirates, Inensus Integrated Energy Supply Systems, Germany and many others. His past duties includes:

- Preparing detailed load assessment of the villages
- Reviewing load data against proposed system size
- Reviewing electrical drawings of the generation and storage assets
- Preparing detailed cost break-down of the project
- Preparing detailed financial model based on tariff proposed by the developer to determine the financial success of the project and
- Revising tariff to de-risk investment

- **Russel Gisbert** (**Project Support Lead**)- Dr Gilbert is a successful director and a renewable energy engineer, having extensive experience working overseas and in both the private and public sectors. He will be used by Volt Africa as a support engineer for the system integration to commissioning of the mini-grid assets. He currently chairs two companies owned by the Royal Free Charity, of which he is a trustee and treasurer. After practicing as a professional engineer for 20 years, Dr Gilbert moved into general management and was a director of three Shell companies. He retired as Projects Director of Shell Nigeria, where in an extremely challenging financial and security environment he managed a £1.5 Billion per annum investment programme with 800 company staff and 11,000 contractor personnel. He has more recently mentored start-up companies for University College, being voted 'Mentor of the Year' for 2014. He is a director of Helios Social Enterprise, a Charity-owned organization working to improve access to clean energy in Sub-Saharan Africa, being personally responsible for developing renewable energy projects in rural Tanzania.

- **Mr. Prince Mugisha** (**Marketing and sales Director)**. Mr. Mugisha has a bachelor Degree from the University of Moscow in Project management. He has huge experience in renewable energy industry and specifically on biomass densification technologies and biogas production technologies. Prince will be one of the key people in the business. He is experienced in managing companies in fields beyond renewable energy, including – social integration, urban development, and real estate.

- **Carshia Benedict (Director Human Resource and Administration)**: He graduated from the University of Dar-es-salaam with Hons Political Science and Public administration. He has also done a research paper on "Investment and Entrepreneurship" on his MBA at the University of Mwanza-UDOM in Tanzania. Mr. Benedict has a background in business and management and will handle administrative details such as taxes, check writing and bookkeeping. Mr. Carshia Benedict will be responsible for Volt Africa's financial management operations including accounts payable, accounts receivables, and bookkeeping.

- **Rowland Makere**. (Field Engineer). Mr. Makere is the field engineer, responsible for the technical design and specifications of the charging systems in collaboration with the projects Department. He holds a Professional degree in Electrical Engineering from the University of Dar-es-salaam. Eng. Makere is a Registered Professional Engineer with Engineers Registration Board-Tanzania No. PE 3822, Registered Graduate Member with the Institute of Engineers Tanzania (IET) No. GIET 1644, Member of Tanzania Renewable Energy Association (TAREA). From 2011 to June 2017, he was working for Electriplan Company Limited; responsible for the Engineering and Design of Street lights in Zanzibar, a project funded by the World Bank. Responsible for planning and leading the daily activities of a team that is carrying out electrical maintenance, installations and modifications, To investigate and manage the introduction of new engineering equipment and products in the market and assess it

efficiency, Design, specification, installation supervision and commissioning of renewable energy, power distribution, lighting, telecommunications and security systems projects as per requirements.

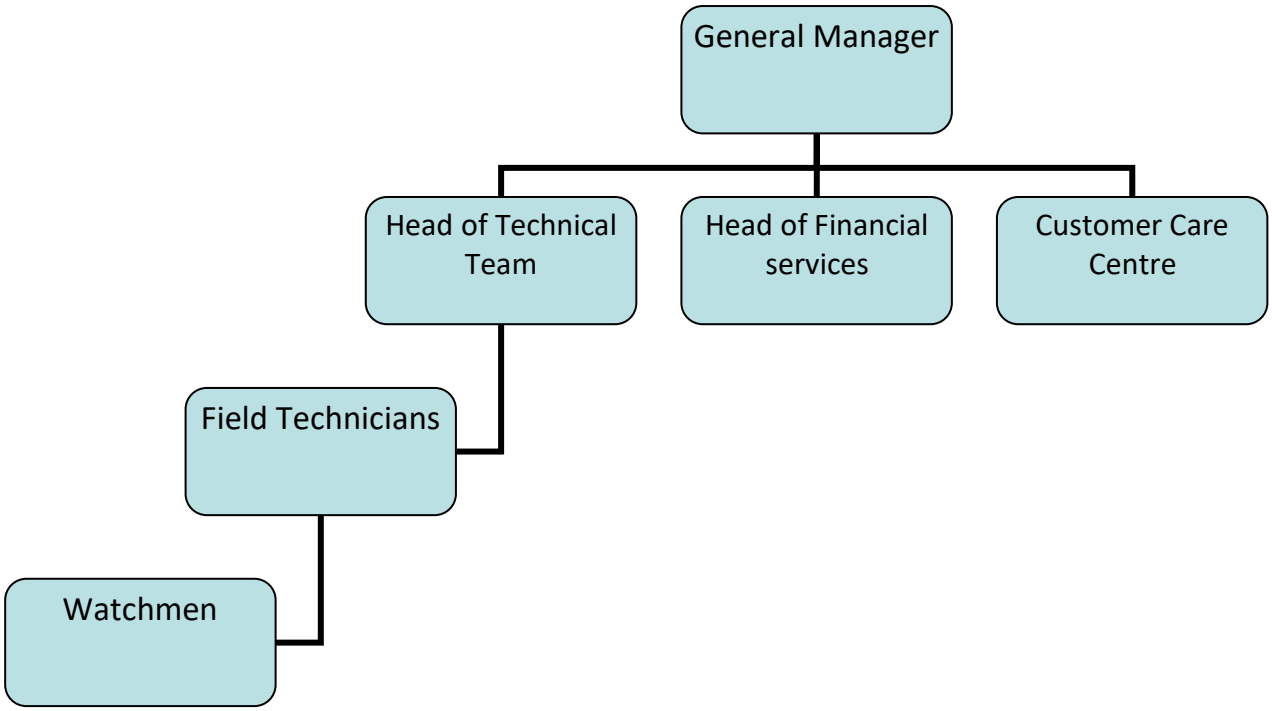
- **Raziah Quallatein Mwawanga** (**Consultant**-Assists on Company's administrative and advisory activities). Has MSc, Development Policy and Management of Civil Society organizations and highly Experienced and passionate driven programme management specialist professional with expertise in Grant Making and Management of Media, Gender, Governance, Development, Broadcasting, Communications and Monitoring and Evaluation Programmes. Raziah works for Volt Africa as a project consultant and will advise the management on all gender related issues needs to be taken care of in the minigrids business.

- **Eng.Frank Machumu. (**Field Engineer/Support**).** Eng. Machumu has B.Sc. Electrical Engineering and with background in Energy Engineering and worked as team leader in technical projects in Tanzania as a telecoms Engineer for big companies like Vodacom, Helios Towers and Airtel, becoming very experienced in the on-the-field teams management. Eng. Machumu will be responsible to manage the minigrids and take care of the technical issues under his department and lead a team of technicians taking care of the power plants and its assets.

6.1. Organizational structure

For all Tanzania minigrid operation, the Volt Africa will take charge of being an owner and project developer, which which will make the company in charge of operation and maintenance of all minigrids rolled out of the company and its investors. This Volt Africa structure will be reviewed from time to time and more employees will be hired to fill the gaps identified as the business expands. The start-up Volt Africa Company project operation team will have the following structure:

Chart 13. Volt Africa organizational structure



The following are Key Success Factor(s) for achieving the mini-grid business success at Kamasi Island and for the pipeline mini-grid projects to be rolled out by Volt Africa Company and its investors:-.

1. Development and implementation agreements with the REA and advice if all approval procedures can be achieved in a reasonable timeframe.
2. Network with key stakeholders (EWURA, REA etc.) as well as to local governments responsible for issuing permits and license and also make strategic partnerships with relevant donors/ NGOs as well as vendors of electrical equipment (including Productive use of Energy appliances and loan programs).
3. Trustful relationships to equity and debt financiers for future funding capitalization.
4. Confidence in the technical and financial feasibility has been built up by the Volt Africa Company.
5. Layout of minigrids is continuously being improved along the roll-out of minigrids well managed; procedures and processes of project development be more standardized
6. Volt Africa and its investors is a good mix of a well reputable international manufacturing, developer and financing company and a local trading and technology innovator Company in Tanzania. These all companies are composed of well qualified/ trained/motivated teams ready to handle any kind of challenges in the power industry.

6.2. Management and staffing

In general, both for the start-up and the scale-up phase of the mini-grids would require technical and, financial/commercial capacities and general management skills.

During the project **start-up phase general management** capacities are required for establishing up the company to the scale-up stage.

In the **scale-up phase**, general management and technicians will be more hired to hand the work load increased in the Volt Africa mini-grid business. Our strategy for identifying the key personnel above and with the required qualifications and tasks of the key personnel will be organized through public and media advertisement. Tanzania is a fast-developing nation and these skills and human resources would be available.

As detailed in chapter **1.6** of this document, this project will be managed by a locally hired staff to be operated by Volt Africa We will have a team **of 9 staff**. This is a standard number of team to fully take care of all mini-grid activities which includes full provision of service to our clients.

Table 36: Expected number of employments created.

SN	POSITION	MINIGRID PROJECT NAME
		KAMASI ISLAND
1.	General Manager	1
2.	Head of Technical Team	1
3.	Head of Financial services	1
4.	Customer Care Centre	2

5.	Field Technicians	2
6.	Watchmen	2
	TOTAL EMPLOYEES	**9**