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Feasibility Study on Business Opportunities for Women in a Changing Energy Value Chain

NIGERIA PROJECT

DEVELOPMENT OF LIQUEFIED PETROLEUM GAS DISTRIBUTION (LPG) BUSINESSES IN NIGERIA

ESEF 2019 - 24th Oct

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- ✓ Business and entrepreneur profile
- ✓ Market data and opportunity analysis
- ✓ Funding needs and financial potential

Projects specific description (1/3)

- Cooking gas (LPG) refilling and distribution business is a very lucrative business to venture into. Liquefied Petroleum Gas is environmental-friendly, much cheaper and cooks meal faster. The market for this product is growing constantly as even rural areas are shifting from using kerosene and firewood.
- The LPG distribution value chain in Nigeria starts either from the Gas Processing Plant/Crude Oil Refineries or the LPG Carrier (cargo ship) that imports LPG into the country
- Wholesale and retail buyers purchase LPG from the Refill/Bottling Plant to sell to both commercial and domestic end users. The end-users can also buy LPG directly from the LPG Refill/Bottling Plant.
- Plans to develop a marketer cylinder owned model instead of the current consumer cylinder owned model to eliminate the consumers' up-front purchase of LPG cylinders which, in some cases, are substandard, replacing it with a cylinder exchange, whereby the consumer only pays for the content. This policy will improve LPG adoption and penetration
- The Federal Government has announced plans to buy 600,000 cylinders and distribute to gas stations and Micro Distribution Centres (MDCs) and, the government is encouraging more people to open/own MDCs

Projects specific description (2/3)

- The proposed project is to build a market focused on LPG, especially for domestic use (cooking), driven by female entrepreneurs
- A female entrepreneur is in fact expected to start the setting up of an **LPG Refill/Bottling Plant (40MT Storage Capacity) around Port Harcourt and** their environs and build the distribution chain around it, accordingly.
- The LPG Refill/Bottling Plant (40MT Storage Capacity) will serve as a mini depot for LPG retailers within the vicinity of the Plants thus creating job opportunities for other women interested in venturing into retailing of LPG.
- Besides selling LPG, the new plant is expected also to sell LPG cookers, cylinders and accessories and to provide technical services e.g. gas cooker repair and servicing workshop, maintenance of cylinder valves etc.

Example of an LPG Refill/Bottling Plant

Projects specific description (3/3)

- LPG Market: Investment in infrastructural development will aid effective LPG distribution and penetration in Port Harcourt
- Female Empowerment: Empowerment of other female entrepreneurs (rural or urban women) through collaboration with the main investment champion in the aspect of retail supply of LPG;
- Employment: Job creation especially for females interested in working in the LPG sector;
- Reduction in energy poverty: it is assured for women, girls and children, who will be freed more time by their cooking with LPG, which time they will channel towards more productive wealth creation activities, which will generally improve national productivity, grow Gross Domestic Product, GDP and improve tax revenue collections;
- Environment: Reduction in tree felling for purposes of making fire wood used in cooking, and with more efforts, desertification can be reversed for good, with attendant benefit in reduction of human animal migration with related communal clashes;

Business and entrepreneur profile

Satlatena Nigeria Limited (Satlatena Gas)
SATLATENA GAS is a distributor of Liquefied Petroleum Gas (LPG); for residential and commercial purposes to rural communities in Port Harcourt, Rivers State, Nigeria; as well as sales, maintenance and installation of gas cylinders and accessories. They also provide free tips and trainings on the use and management of LPG

70% Female Share

3 Years in the market

7 Staff

Satlatena is a player in the market that masters the technology, the value chain, the process and the market of LPG Sector

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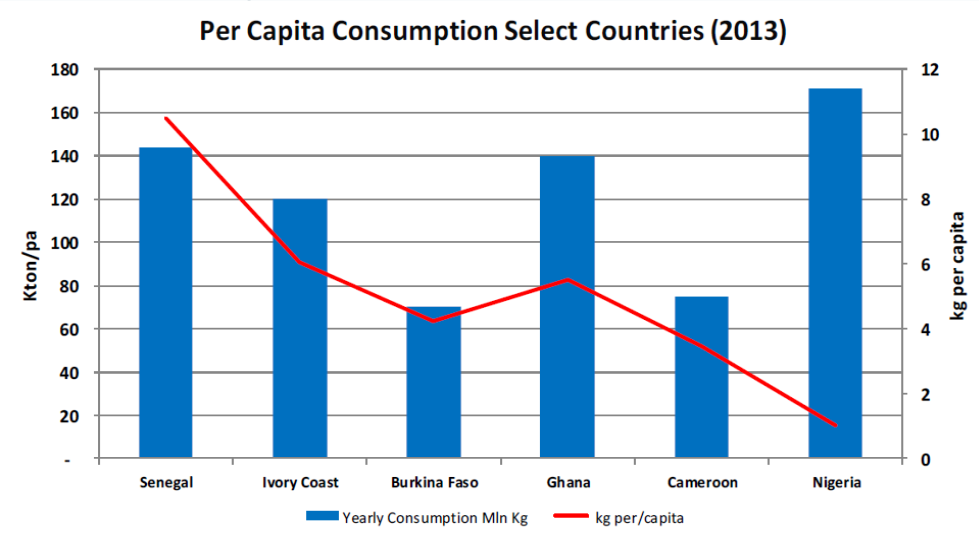
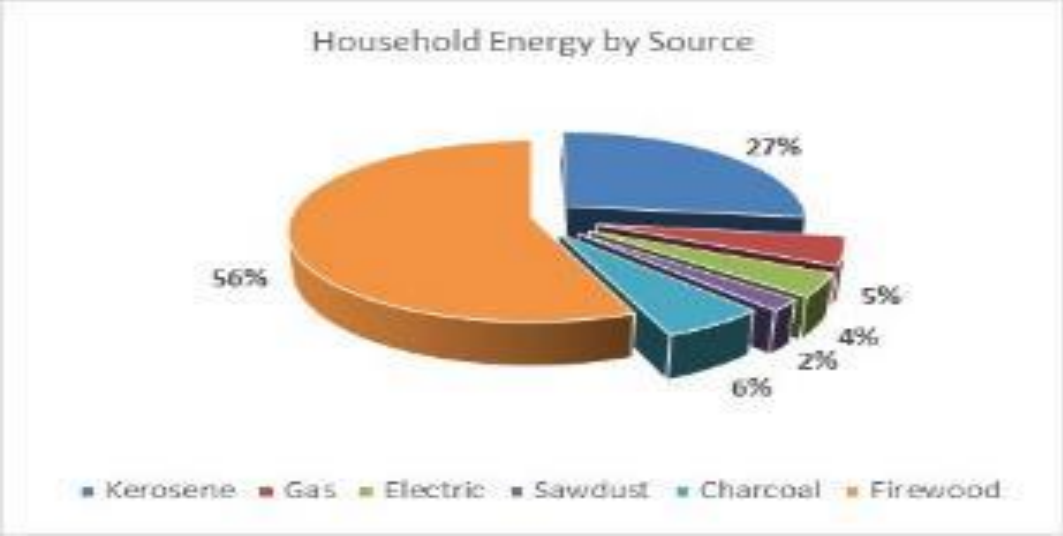
Market data and opportunity analysis (1/3)

LGP Consumption





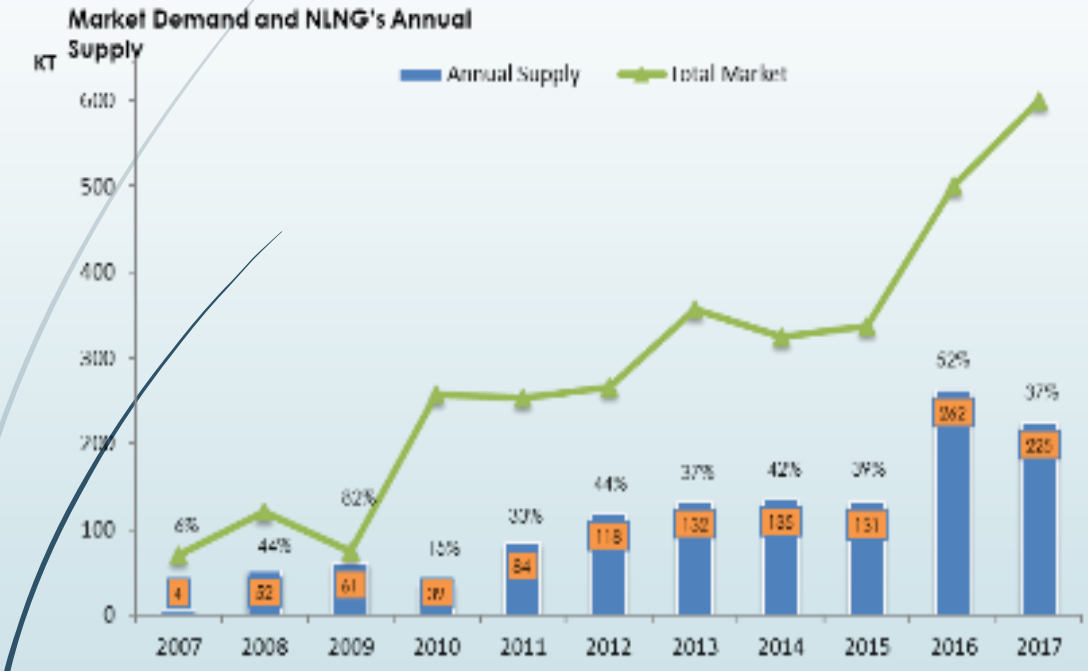
The per capita consumption of LPG in Nigeria is just above 1 kg per annum, much lower than other West African countries

Although households may use more than one cooking fuel (primary/secondary), the gas utilization is modest and do not exceed 5%

Cooking habits have to change from wood and kerosene to cooking gas, with kerosene considered as the competitive fuel to LPG, prices being at the same level

Market data and opportunity analysis (2/3)

LGP Supply in Nigeria



Demand vs LPG Supply in Nigeria
source: LPG Supply Strategies to Stimulate Market Growth, NLPGA Conference, 2018

More than 47% of the LPG demand in Nigeria is covered by imports in 2019, mainly from USA

As per recent information (December 2018) the LPG demand reached **600,000 MT per annum**, displaying an increase of 1,000% in just a decade.

In the next 10 years the LPG demand is expected to reach **5,000,000 MT**

In early 2017 Nigeria has about **350 filling Plants** across the country

Market data and opportunity analysis (3/3)

Targeted Market in Port Harcourt

In the area of Port Harcourt where the filling unit will be built, lives more than 6% of Nigeria's population

With approximately **2 million people living** in the area of Port-Harcourt, it could be assumed that approximately **50.000 MT are sold in Port-Harcourt** per year (considering the yearly consumption of 600.000 MT in the country)

With a filling potential of **550 MT per year**, the targeted market share in the Port-Harcourt area is approximately **1%** in terms of sales volume.

Funding needs and financial potential (1/2)

Budget : ≈ 0.45 M USD
+ 60 k USD
Working Capital

Budget includes
- Licensing & implementation
of an LPG filling plant
30 000 USD first filling
30 000 USD running

Project costs

CAPEX for investment	USD	NAIRA
Licensing / Development Costs etc	42 300	12 900 000
Land Purchase	50 000	15 300 000
Filling Plant	333 900	102 171 000
Office Equipment	1 600	500 000
Truck for delivery of bottles	11 400	3 500 000
Display / Training Room	4 900	1 500 000
Other	1 600	500 000
Total Investment Cost	**445 700**	**136 371 000**
Working Capital	**60 000**	**18 000 000**

Financing Assumptions:

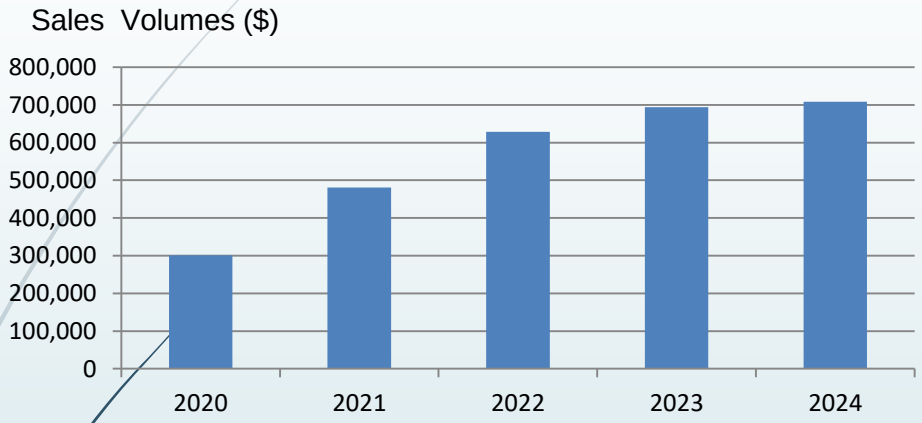
Financial support requested: 30% equity, 70% debit

Interest Rate on LT Debt: 25%

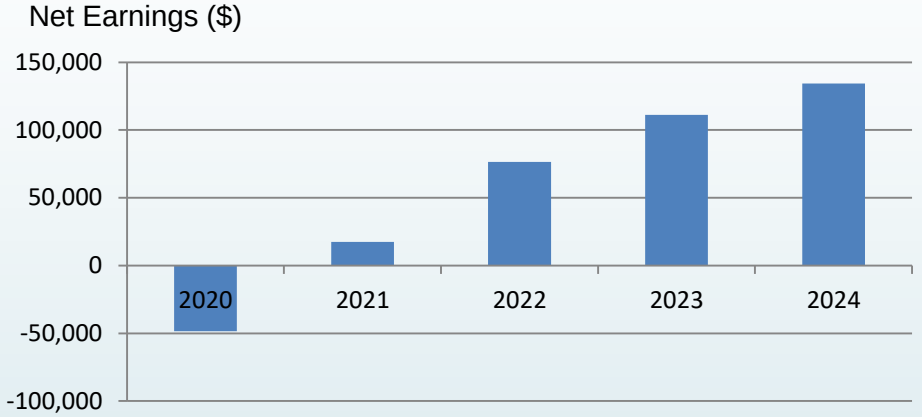
Duration of LT Debt: 5 years

Funding needs and financial potential (2/2)

Sales ($)



Net Revenues ($)



Actual Cash flows from operations

Internal Rate Of Return And Net Present Value (15yrs)

	On Equity	On Equity & Debt
Net Present Value	82.000 USD	78.000 USD
Internal Rate of Return	≈ 35%	≈ 30 %

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Feasibility Study on Business Opportunities for Women in a Changing Energy Value Chain

GHANA PROJECT

DEVELOPMENT OF A SOLAR HOME SYSTEM (SHS) BUSINESS TO SERVE RURAL AND SUBURBAN OFFGRID USERS

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Topics to be discussed

- ✓ Project specific description
- ✓ Business and entrepreneur profile
- ✓ Market data and opportunity analysis
- ✓ Funding needs and financial potential

Project description – policy background

- Ghana's abundant solar power potential has been identified as a key resource for matching the increasing demand for electricity
- The Government of Ghana has introduced a number of regulatory frameworks over time to improve the supply and availability of electricity
- The renewable energy goal in the National Energy Policy is to "increase the proportion of renewable energy in the total national energy mix and ensure its efficient production and use"
- The policy objective is to be achieved by the Government ensuring that renewable energy constitutes 10% of the national energy mix by 2030, and by imposing a mandatory purchase obligation on off-takers
- These policy objectives were given legal basis through the Renewable Energy Act, 2011 (Act 832)

Project description – proposed business

- The Project involves the creation of a Solar Home Systems (SHS) business serving **rural** and **sub-urban** areas of Ghana
- Off-grid SHS components to suit different system sizes (from 50W to ~1kW) will be imported into Ghana, with assembly and packaging to take place locally
- Components will be stored at local warehouses, before being distributed to the target regions in the north and in the east of the country (Northern and Volta regions)
- In-country manufacturing of some components may be considered at a later stage, as soon as adequate market volume has been established

Project specific description (3/4)

- The size of the systems will be tailored to different users and needs, ranging from very low income people living in rural areas to slightly higher income groups in rural or suburban areas
- The developer will manage the import of the equipment into Ghana, including assembly and packaging, storage, distribution, marketing, sale, maintenance and after sales support
- There is an emphasis on female empowerment and entrepreneurship and the creation of local employment. This would be done through:
  - Teaching system users basic maintenance skills
  - Training of local technicians, with a focus on women, for the installation, servicing and maintenance of the SHS

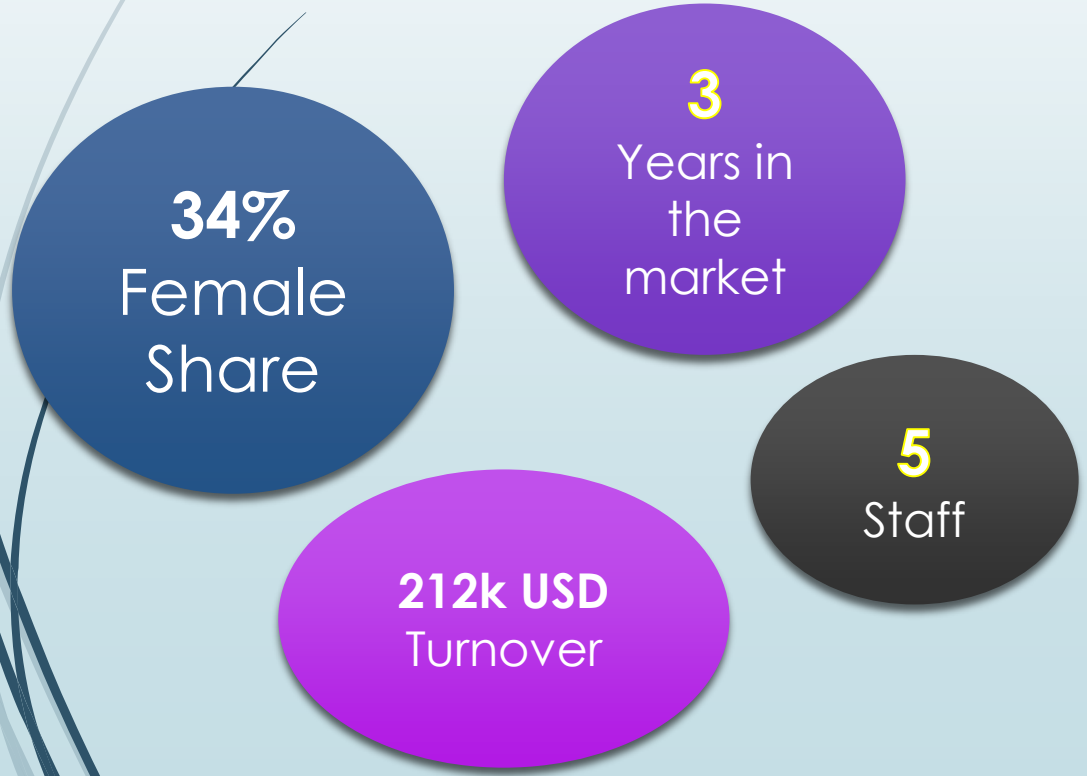
Project specific description (4/4)

The solar business to be established in Ghana will provide several products and services.

- Solar PV panels, range of sizes, together with balance of system components, including inverters, battery, switches, wiring.
- Civil work components, such as mountings.
- Technical consultancy, to evaluate the energy needs for a given location
- Financial and administrative consultancy, to help customers to understand the financing mechanisms on offer to them so that they can select the right one for their situation and apply for it.
- Training of trainers and technicians in the maintenance and operation of SHS

Business and entrepreneur profile – EcoSolar

EcoSolar is a developer of small solar and infrastructure projects with a focus on Ghana and West Africa. Solar experience includes SHS projects (up to 3kW) as well as large scale commercial projects (up to 1.2MW). Ecosolar works in collaboration with two installation companies: **ABBA Energy** and **SunPower Innovations** which provide technical and execution capabilities.



EcoSolar has competitive advantages:

- Team with international experience
- Partnership with larger companies, combined team of 50 direct employees
- Relatively large equity contribution of 250k USD resulting in high impact

Contact Person: Mrs Ifeyinwa Ikeonu
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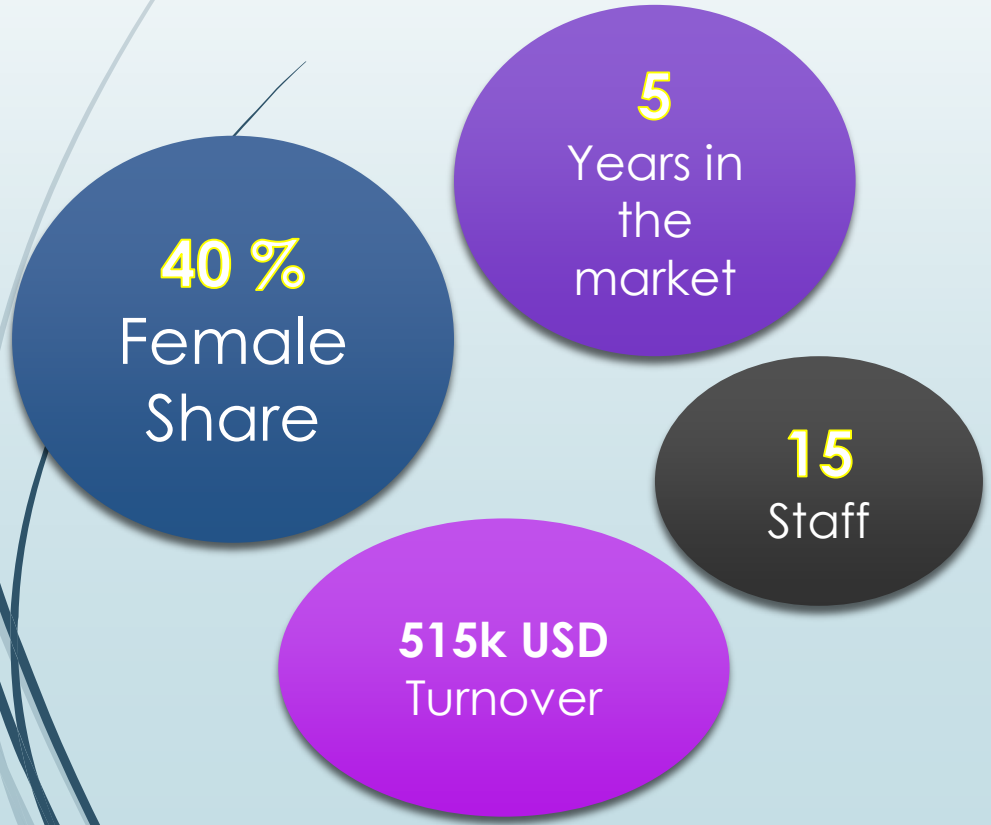
Business and entrepreneur profile – GN Power

GN Power is an electrical and mechanical building Engineering Service Provider. The company undertakes energy audits, providing recommendations for energy savings, as well as supply, installation and maintenance of solar systems with projects ranging between 0.5 to 63 kW.

GN Power has so far served the B2B market, but is now looking at expanding into the smaller scale residential sector of SHS, with system size of 100 to 1000 W.

GN Power has many competitive advantages:

- Very good market knowledge, with an existing network of agents and distributors
- Focus on after sales services and maintenance
- Focus on innovation – e.g. Solar Van



Contact Person: Mrs Yvonne Nduom
Designation: Shareholder
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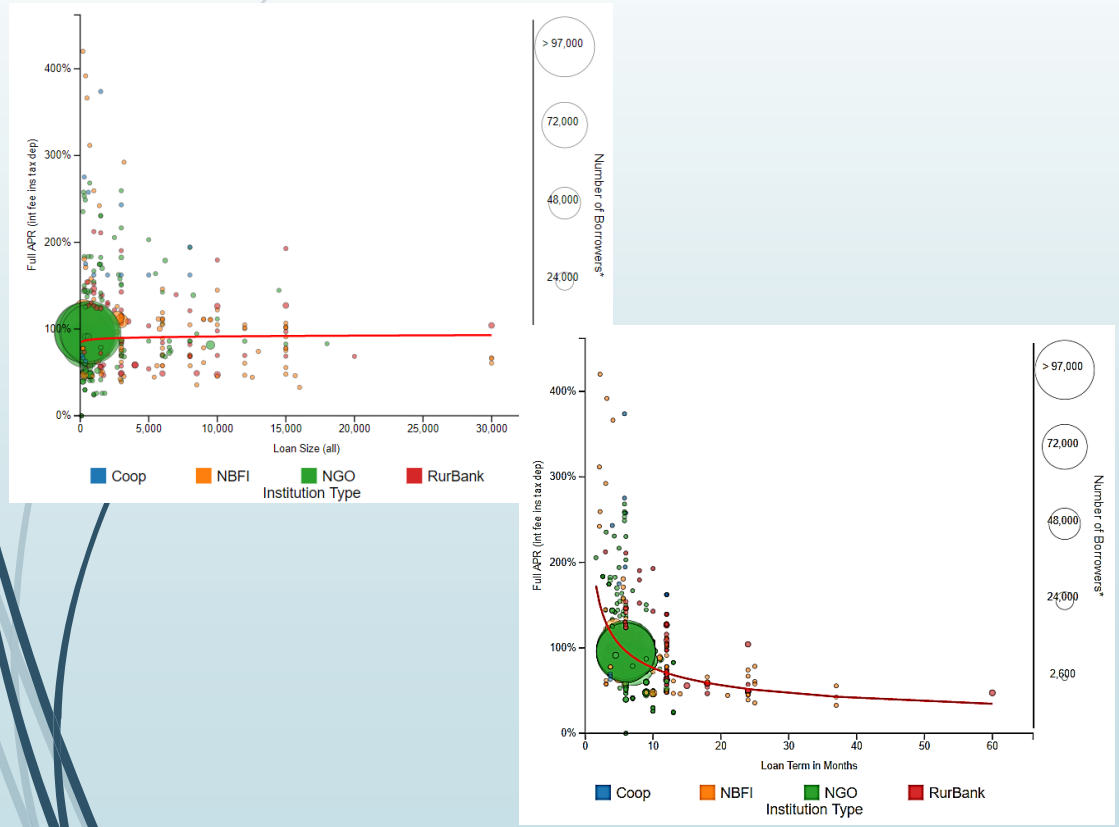
Market data and opportunity analysis - background

- Roughly half of the 29M population of Ghana live in rural areas
- Around 30% of this rural population (~10M), does not have access to electricity. The situation improves in urban areas with 10% not having access to electricity
- Given the remoteness of many of these underserved areas as well as their rural nature, extending and connecting to the national electricity grid is not viable. Solar energy is the cheapest (and fastest) option for electrification, also being cheaper than diesel generators
- However, in spite of their decreasing costs, **SHS are not affordable by a significant part of the population** due to the high upfront investment required

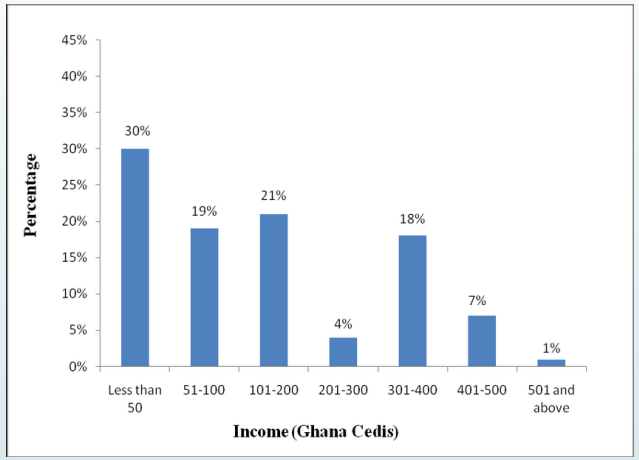
Market data and opportunity analysis – the problem

- Microfinance can almost double the cost of a product even if one year's credit is used.



APR: Annual Percentage rate
http://www.mftransparency.org/microfinance-pricing/ghana/

- Approximately 70% had been recorded to have a monthly income of less than ≈200$ (2010 exch. Rate)



Typical income Distribution in rural areas of Ghana (2010)

https://www.researchgate.net/figure/Monthly-income-distribution-of-respondents-N217-Source-Fieldwork-2010_fig2_258297376

Upfront cost & financing cost of small SHS.

Size	USD/unit	MF@ 50%	MF@ 100%
50W	500	750	1 000
100W	900	1 350	1 800
200W	1.600	2 400	3 200

- **Significant portion of annual income is required to buy a SHS**

Market data and opportunity analysis - solution

- Financing from grants not ideal as it does not encourage a sustainable business model that generates a return
- Current Microfinance loan terms do not enable market sustainability

Gap:	**Proposal:**
High interest rates	Innovative Financing Options

- Innovative financing options can be the solution to make SHS affordable to a larger percentage of the population
  - Rent to buy (Hire Purchase)
  - Pay as You Go
- High quality systems with ongoing maintenance for system lifetime = satisfied customers = referrals to additional customers

Market data and opportunity analysis - solution

- Innovative financing options could unlock a large and untapped market for SHS
- Rural electrification would result in socio-economic development of the regions, having a knock on effect and increasing overall demand

The programme will initially cover 60 communities in 4 districts in the initial 5-year period
It has been calculated that over 95,000 households will directly benefit from SHS solutions in the programme, i.e. over 500,000 people

Funding needs and financial potential

Overall Budget : ≈ 5 M USD

Budget includes
- 0.6 M USD development costs (i.e. establishment of the business, sales points, development of infrastructures, training, procurement of necessary installation equipment/tools,
as well as
- 4.5 M USD, i.e. the cost of goods which is considered to be debt financed

Project Budget

	TOTAL COST ($US)	TOTAL COST (G. Cedis)
Initial Costs		
Establishment Costs	15 000	82 050
Buildings and Infrastructure	200 000	1 094 000
Regional offices	200 000	1 094 000
Office equipment + Vehicles	130 000	711 100
Tools and other Equipment	30 000	164 100
Training	40 000	218 800
ASSETS TOTAL	615 000	3 364 050
Cost of Goods		
Year 1	378 000	2 068 000
Year 2	649 740	3 554 000
Year 3	1 368 180	7 484 000
Year 4	1 974 300	10 799 000
TOTAL	4 370 220	23 905 000

Financing Assumptions:

Financial support requested: 30% equity, 70% debit (on the initial investment cost)

Debt in 4 yearly tranches to cover cost of sales of the first 4 years

Interest Rate on LT Debt: 10 %

Duration of LT Debt: 5 years

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Feasibility Study on Business Opportunities for Women in a Changing Energy Value Chain

COTE D'IVOIRE PROJECT

IDENTIFICATION AND DEVELOPMENT OF SMART APPLICATIONS FOR ENERGY CONSUMERS

ESEF 2019 - 24th Oct

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Projects specific description (1/3)

- Abidjan has gradually positioned itself as the new catalyst of innovation across Francophone Africa and has seen its number of active tech hubs double between 2016 and 2017
- Several relevant initiatives in the field of energy management are underway. The "Audit project of lighting and air conditioning systems in administrative buildings", aims to carry out:
  - the audit of 10 energy-intensive public buildings and to implement the recommendations of the audits for energy and financial savings in these buildings,
  - the supply and installation of capacitor banks in administrative to monitor and control public sector electricity subscription expenditure,
  - the distribution of 5 million compact fluorescent energy-saving lamps co-financed by the State and its financial partners.
  - The implementation of the GEF/UNEP project to promote energy efficiency in public sector lighting.

Projects specific description (2/3)

- The project will deliver **a smart application**, in its different versions (Basic, Advanced, PRO) and for different platforms (e.g. Android, IoS) and a kit **for** smart management of energy, composed by smart meters, sensors for collecting energy consumption data
- This smart application enables users to manage their energy in an efficient way via a web-based (mobile) platform
- In partnership with the local electricity company and an IT consulting firm, the sponsor will coordinate the development of the smart application, its deployment, its promotion, and maintain the relationship with the B2B (Businesses) and B2C (Residential users) customers

Projects specific description (3/3)

The aim of the app is to provide:

- **User classification and profiling**
- **Monitoring and visualization of energy consumption:** real time data; historical data; set targets achievement;
- **Control** all the devices/equipment on the network and switch them on and off when possible;
- **Recommendations** on how to improve energy consumption based on users' habits and set targets;
- **Notifications** when consumption is higher than expected or close to target;
- **User data driven consumption prediction**
- **gamification**: will keep the users engaged with the application;
- **comparison of the level of energy consumption** with the average of the same user segment;
- **comparison of the level of energy consumption** with that of most efficient users.
- **Access** to further external services on the web

Business and entrepreneur profile

NACH SARL
Is an Ivoirian company specialised in Renewable Energies, particularly solar energy and energy efficiency. Its main goal is to offer Ivorian companies and households innovative services relating to new technologies and energy saving

10 Years in the market

100% Female Share

9 Staff

167,000 USD Turnover

NACH SARL previously **HICOM**

Technology is a player in the market since 2009 aiming to reach a turnover about 250 K$ in 2020

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Market data and opportunity analysis (1/5)

Country Facts

- Over 26 million inhabitants in July 2018 with 2.3% growth rate (CIA, The World Factbook, 2019)
- Over 2.2 million subscribers at Ivorian electricity company (CIE) in 2018 => +16 % more subscribers than in 2017 (CIE, 2019)
- 3 Mobile Network Operators covering the majority of the country (ARTCI, 2019)
- New Internet operator, "Konnect Africa", since January 2019 offering Internet via Satellite. Currently covers 60% of the territory and intends to cover over 99% in 2020
- About half of the population uses Internet via mobile; One of the highest in West Africa (GSMA Intelligence)
- Number of active tech hubs in Abidjan has doubled between 2016 and 2017
- New generation of entrepreneurs materializing opportunities on the energy sector by utilizing ICT and impacting businesses

Market data and opportunity analysis (2/5)

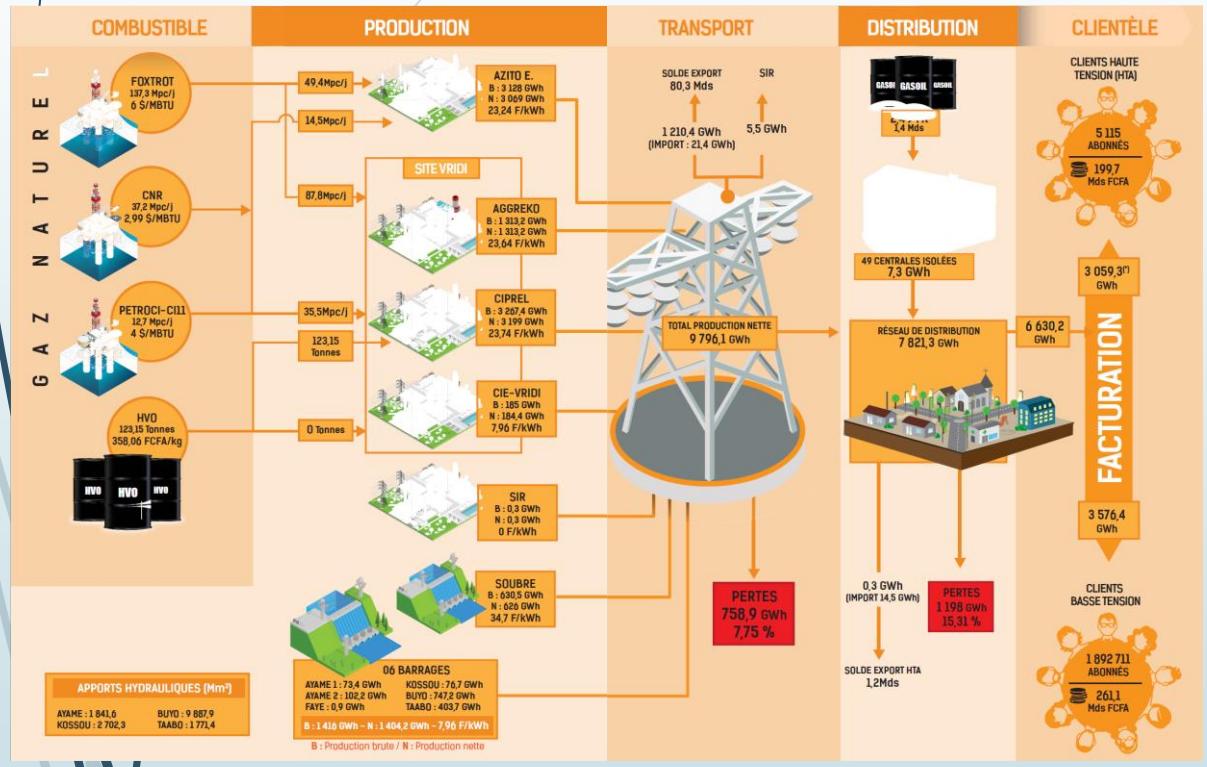
Why this smart application?

- App pro-actively remind/suggest energy saving tips to its users, giving them better control over their energy consumption;
- App helps lower energy consumption => Lower power bill;
- "Smart" way to raise Awareness about energy saving habits;
- Possibility to reach a large number of customers, thanks to CIV's high accessibility to the Internet and monopoly on energy distribution;
- Business opportunity for women who will pioneer smart applications in the Energy Sector

Potential Competition

- **SMART ENERGY**: Subsidiary of CIE
  - Promoting EE and assisting Enterprises to take relevant measures
  - Promoting Renewable Energy Sources and Distributing EE equipment
  - Helps to reduce energy consumption between 5% to 60%
- **LYNAYS**: Helps to reduce 15% to 45% power consumption
  - Uses **Field Commander Management Technology** to manage energy movement
  - Design a mobile application to control devices (ON/OFF)

Market data and opportunity analysis (3/5)



Electricity "value chain" in Cote d'Ivoire

http://www.anare.ci

"CIE Annual Report, 2018"

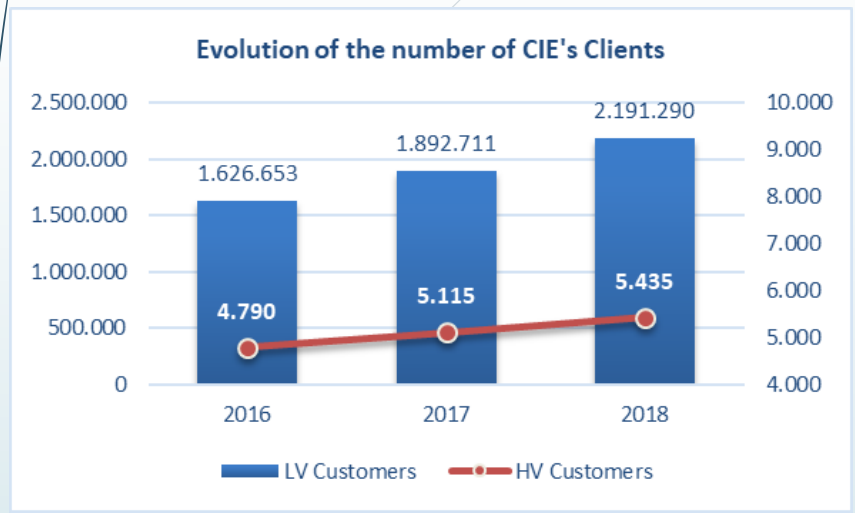
Total number of CIE's clients reached **2.196.725**

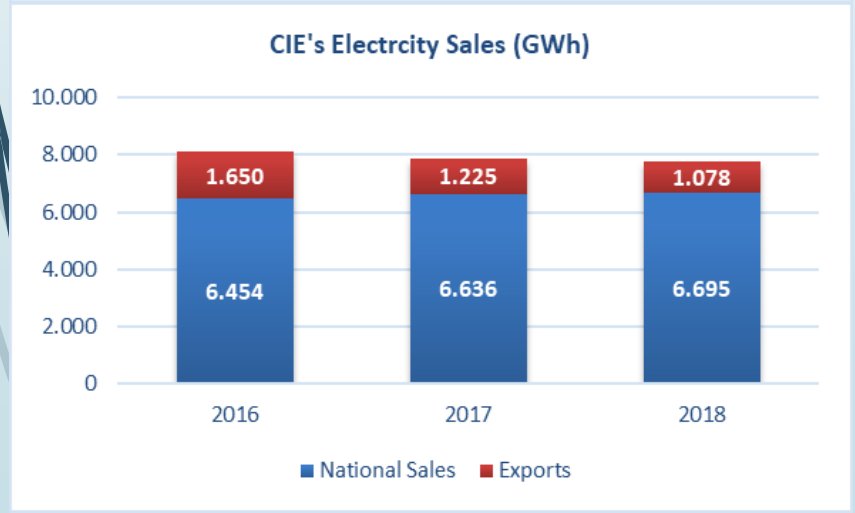
2.191.290 were LV clients and **5.435** were HV clients.
Year to year increase of CIE's clients was **16%**
(i.e. 298.899 mew clients in a year (LV = 298.579 and HV = 320)
At the same time **overall sales of electricity in the domestic market** have been virtually at the same levels, with an increase of approximately **1%** from 2017 to 2018.

Target Consumers

- Residential and non-residential users.

Market data and opportunity analysis (4/5)



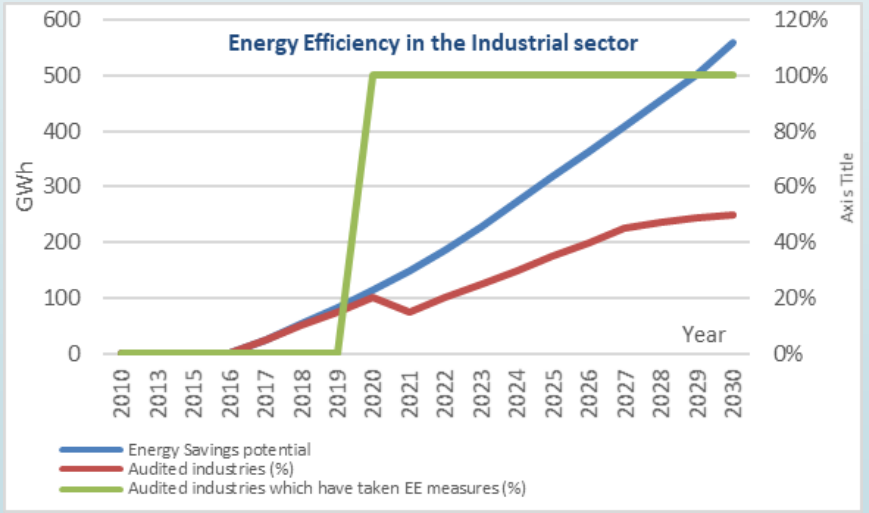


Evolution od CIE's Sales

http://www.anare.ci

EE initiatives

- Implementation of the NEEAP in accordance with the ECOWAS Energy Efficiency Policies
- Energy audits for lighting and Air-Conditioning in administrative buildings
- Energy audits in public buildings
- Promotion of Efficient lighting
- Establishment of Energy Efficiency standards for large public and private buildings
- 20% of the industries audited by 2020 and 50% by 2030. The target is 100% of the audited industries to have energy efficiency measures implemented by 2030.



Energy Efficiency in the Industrial Sector

Market data and opportunity analysis (5/5)

Target Consumers

- Residential and non-residential users.
- Construction and Smart home automation companies.
- Energy Service Companies (ESCOs).
- Social housing association/Municipalities.

Target Market

- The company will cover the whole country, where electricity network exists.
- The project targets to reach approximately
  - ✓ 30000 clients in 4-5 years, including residential / commercial / productive users;
  - ✓ up to 500 in 4-5 years big customers (4 % of the market)

Funding needs and financial potential (1/2)

Budget : ≈ 2.6 M USD

Budget includes
- development costs (i.e. establishment of the business, development of the Application, Infrastructures, etc.),
as well as
- 1st year's running costs

Project costs

	TOTAL COST ($US)	TOTAL COST (FCFA)
FIXED ASSETS		
Purchase and installation of equipments (technical Equipments)	242 200	145 320 000
Design & Implementation of the application	85 000	51 000 000
Administrative Spendings (Permits and official documents, insrances)	70 000	42 000 000
Office equipments + Vehicules	327 500	196 500 000
Costs of land	420 000	252 000 000
Costs of buildings	252 000	151 200 000
ASSETS TOTAL	1 396 700	838 020 000
1rst Year Running Costs		
5. Facilitation of local project activities	186 000	111 600 000
6. Distribution and management	1 052 800	631 680 000
OPERATING TOTAL	1 238 800	743 280 000

Financing Assumptions:

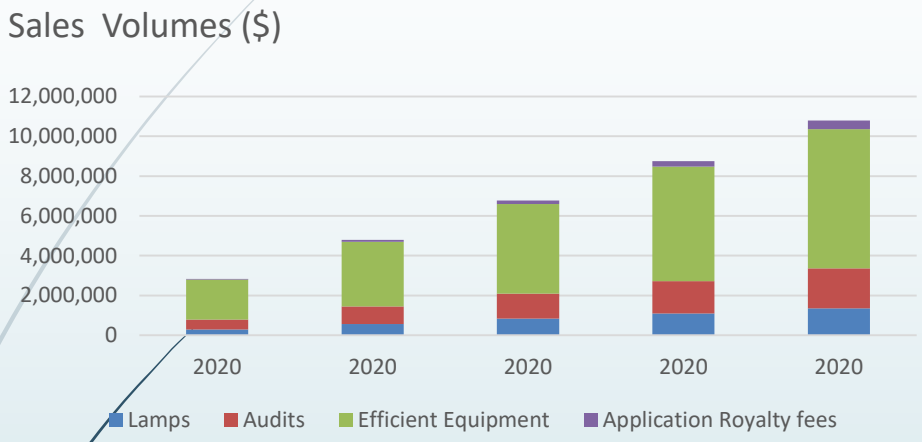
Financing: 30% equity, 70% debt

Interest Rate on LT Debt: 7%

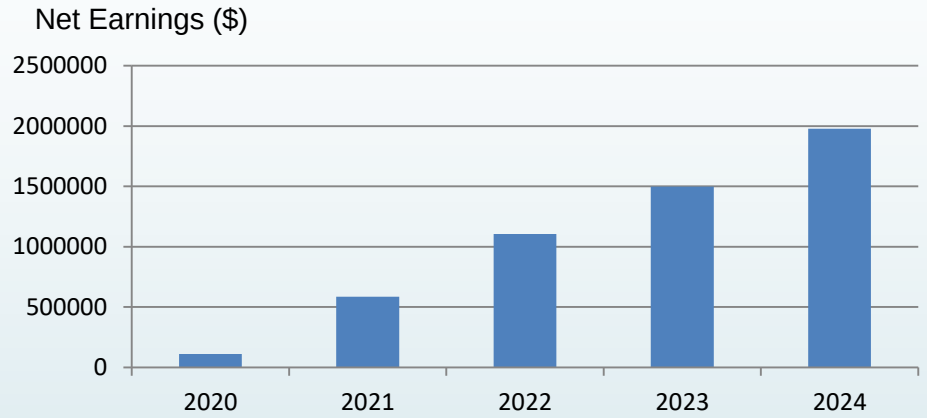
Duration of LT Debt: 5 years

Funding needs and financial potential (2/2)

Sales ($)



Net Revenues ($)



Actual Cash flows from operations

Internal Rate Of Return And Net Present Value

	On Equity	On Equity & Debt
Net Present Value	2.2 million USD	2.1 million USD
Internal Rate of Return	≈ 50%	≈ 30 %

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Feasibility Study on Business Opportunities for Women in a Changing Energy Value Chain

SENEGAL PROJECT

DEVELOPMENT OF CLEAN ENERGY POWERED MINI AND MICRO GRID ELECTRICITY GENERATION AND DISTRIBUTION BUSINESSES

ESEF 2019 - 24th Oct

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Projects specific description (1/4)

- Since 2014, Senegal's economic and social development policy has been based on the Plan for the Emerging Senegal (PSE). The (PSE) is based on three priorities:
  - promote a transformation of the economic structure through a strong and sustainable economic growth dynamic;
  - expanding social services, social security and conserve sustainable development conditions;
  - meeting good governance requirements through institutions strengthening and promoting peace, transparency and African integration
- The (PSE) identified Energy as a key pillar to impact economic development and reduce social and territorial inequalities.
- Due to the high cost of grid extension to remote areas and limited state/utility budgets for electrification, the extension of the central grid should be done only where it is economically feasible.
- Mini-grids are a valuable option where grid extension is not economically attractive.

Projects specific description (2/4)

- The project foresees the installation of mini-grids powered by PV-Diesel Hybrids, in areas located around 10 km from the national electrical Medium Voltage (MV) Transport-grid
- This solution involves implementation of several mini grids with a capacity between 40 and 100 kW
- These mini grids will provide electricity to villages with population between 500 and 1000 people including health centres and schools
- The idea is to start with 1-2 mini grids and to reach approximately 50 mini grids in the next years
- Electricity will be sold to residential/commercial/industrial customers and public facilities

Projects specific description (3/4)

- The first mini-grid is foreseen to be implemented in Dahra area, in the Louga Region
- Data on power demand for the area has indicated that the size of this first mini-grid will be 80 kW;
- Electricity will be supplied to **two local clinics & two schools**.
- Several activities will be served, such as: ice making, catering, hairdressing, cyber (photocopy and internet connection), metalworks, woodworks, tailors, battery/phone charging, mechanics, etc;
- The agricultural value chain will benefit from the supply of electricity at a cost lower than diesel generated electricity, e.g. two dairies will be served;
- Direct and indirect **employment** will be created. Around 10 people during construction and operation and more than 100 hundred indirectly through the improvement of electricity supply and increase of **productivity**;

Projects specific description (4/4)

Business and entrepreneur profile

SOLAR AFRICA ENERGY
Is an innovative company operating in the renewable energy sector. The company offers a complete range of renewable energy products (solar, wind, hydro, biomass, ...) in partnership with leading international companies

3 Years in the market

100 % Female Share

8 Staff

SOLAR AFRICA ENERGY is a player in the market with an international network

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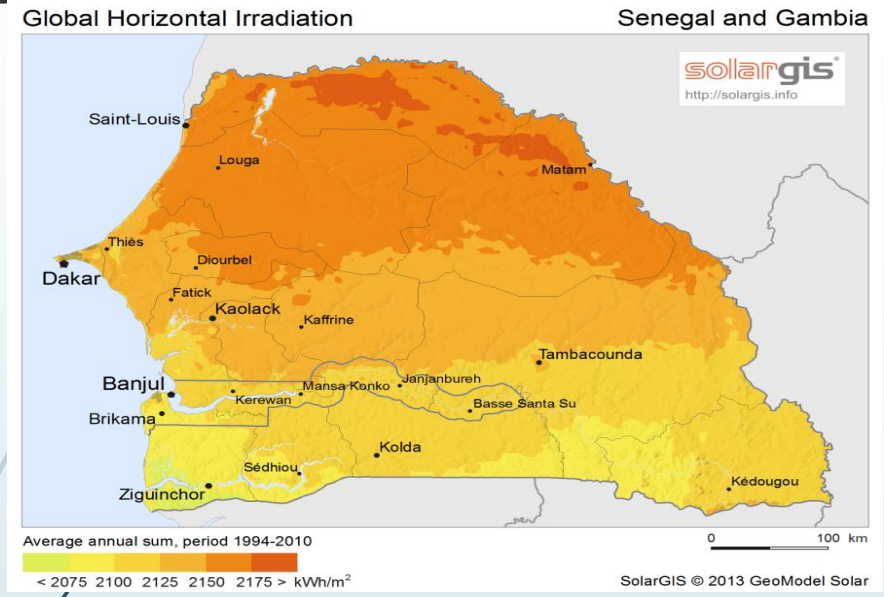
Market data and opportunity analysis (1/4)



Solar Horizontal irradiation of Senegal

Rural electrification rates by area (before 2012)

Solar potential in Senegal is significant with an average global daily irradiation of 5,43 kWh /m²/day which results in a yearly electricity production of more than **1600 kWh / year** per installed kWp.

A big electrification gap between central and remote area (in red), where the electrification rate is less than 10%, and the west coast and Senegal river (in green)

Due to the high cost of grid extension to remote areas and limited state/utility budgets for electrification, the extension of the central grid is considered as a solution that meets the energy needs of the population living and working inside the isolated areas

Market data and opportunity analysis (2/4)

Key Data Energy Sector in Senegal 2018

Electricity
Installed Capacity: 928 MW
Source:
- Thermal: 825 MW
- Renewable (non-hydro): 102 MW
- Hydropower (imported): 81 MW

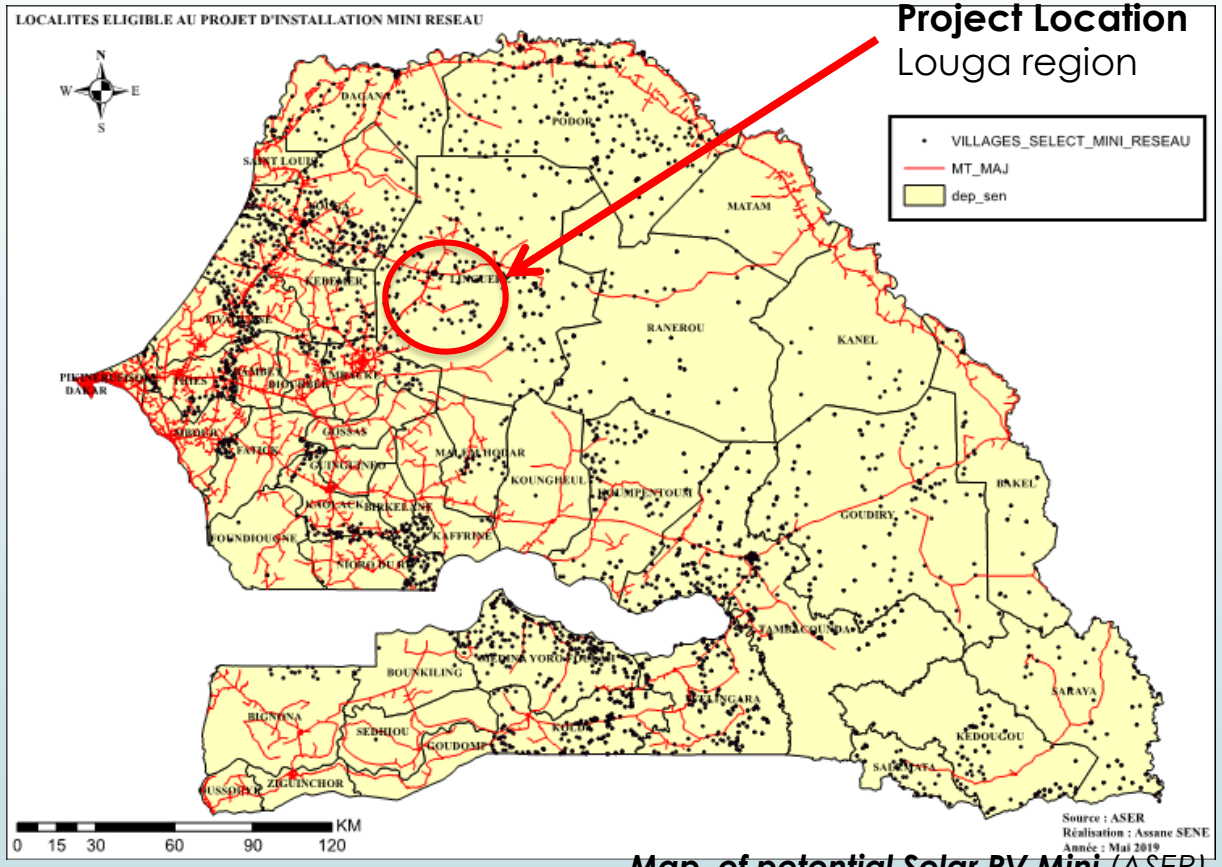
National electrification rate (2016): 64%
- Urban electrification rate: 90%
- Rural electrification rate: 43%

Population without access: 5,7 million
Households without access: 68,7000
Electrification target: Universal Access by 2025

Mini –grid systems/electrification with Donors
Number of mini centrals installed (2013): 25
Number of minigrid expected at end of 2019: 725

Sources: CEP/MPE-SENELEC

Senegalese Rural Electrification Agency (ASER) has already mapped areas that can be electrifiable by solar mini-grids



Map of potential Solar PV Mini *(ASER)*

Market data and opportunity analysis (3/4)

By 2025, **14.234 rural villages** and more than **1million rural clients** should be electrified mostly through **grid extension (12.556 villages and 95% of rural clients**), but also through **solar only or solar-diesel hybrid mini-grids (1.215 villages and 4% of rural clients)**.

Additional generation capacity requirement of **180 MW by 2025**

Rural electrification achievements 2012 - 2016

	2012	2015	2016	Evolution
Electrified villages	1,648	2,840	3173	+72%
Electrified rural households	170,000	216,000	-	+27%
Rural Electrification rate	24%	31,5%	-	+7,5%

The 2017's objective wasn't met (
Source: ECREEE - Expérience du Sénégal sur les Concessions d'Electrification Rurale – Abuja – July 19, 2017)

So far, the progress has been moderate, for instance, at the end of 2015, only **5 679 households** (**5% of the Target** compared to a target of end-2017) and **710 villages** (**49% of the Target** compared to a target of end-2017) were electrified. This is due to many factors.

- Mini-grid operators usually **struggle to secure loans** from commercial banks because they aren't contracted by the government
- Selling prices that **makes investments difficult to make profitable**
- A tariff model often **beyond the reach of poor households**;

Market data and opportunity analysis (4/4)

In **Louga region**, the women 's entrepreneurship support program (APEFE) supports the women entrepreneurs in agri-food processing (dairy, fruits, vegetables and fish farming) and helps these groups of female entrepreneurs in the dairy sector with milk processing equipment that has remained unused due of the lack of electricity.

With the implementation of the first mini grid project, the women entrepreneurs in the dairy sector will increase their capacity to collect, store and process milk with positive impact on their businesses.

The project will also enable other beneficiaries to have access to electricity such as:

- Primary industries (e.g. agriculture)
- Light Manufacturing (Welding, Tailoring and Ice making);
- Commercial and retail enterprises (Phone charging businesses, hair salons, restaurants and small freezers);
- Small villages

Funding needs and financial potential (1/2)

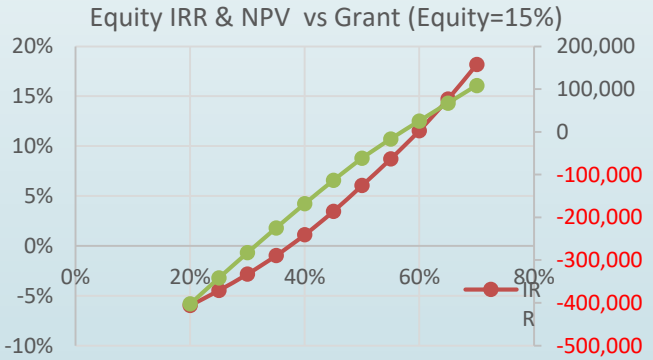
Budget : ≈ 1,4 M USD (10 minigrids for phase 1 / Target = 50 minigrids)

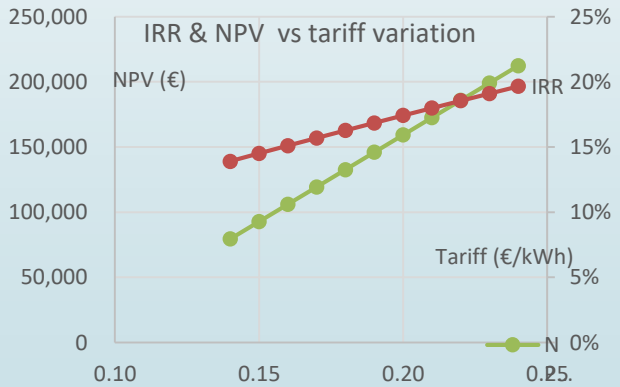
Budget includes
- Development of PV/battery/diesel mini-grid including distribution grid, to provide electricity to community, commercial/ productive uses, as well as diaries.

NB. Tariff in Senegal is currently fixed at 0,15 $/kWh. MG will become viable if project receives grant

Project costs for 10 mini-grids

Future System	USD	FCFA
PV Panels	320 000	190 200 000
Batteries	370 000	220 200 000
PV & battery Inverters	350 000	210 000 000
PV supports / wiring / fencing, etc.	150 000	90 000 000
Distribution Grid & other	170 000	100 200 000
INVESTMENT COST	**1 360 000**	**816 000 000**





Financing Assumptions:

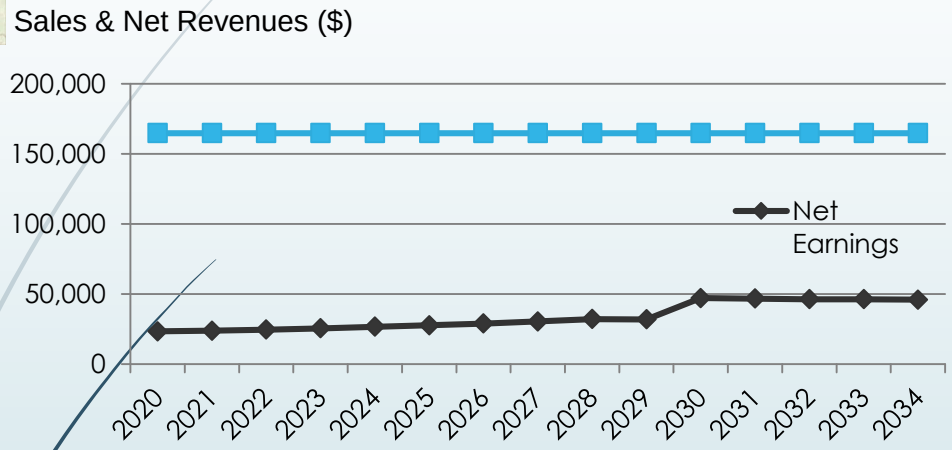
Financial support requested: 15% equity, 15% debt, 70% Grant

Interest Rate on LT Debt: 8%

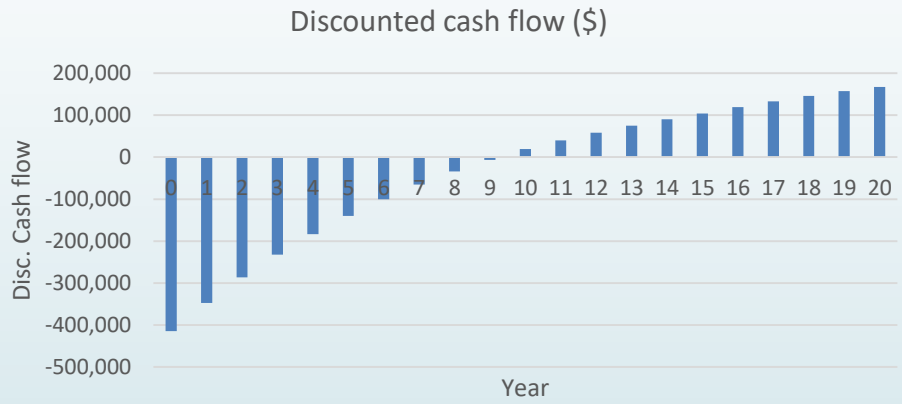
Duration of LT Debt: 8 years

Funding needs and financial potential (2/2)*

Sales & Net Revenues ($)



Discounted cash flow from operations ($)



Internal Rate Of Return And Net Present Value

	On Equity	On Equity & Debt
Net Present Value	≈90 000	≈75 000
Internal Rate of Return	17%	13,7%

NB. *Analysis has assumed a period of 15 years*

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