



# GE Power

## Market Analysis, Market Strategies and Investor Business Models, Software Strategy

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Sponsor - Ricky Buch, Strategic Marketing Leader

### Project Team

Faisal Seraj (SF)

Peipei Qiu (MSMS)

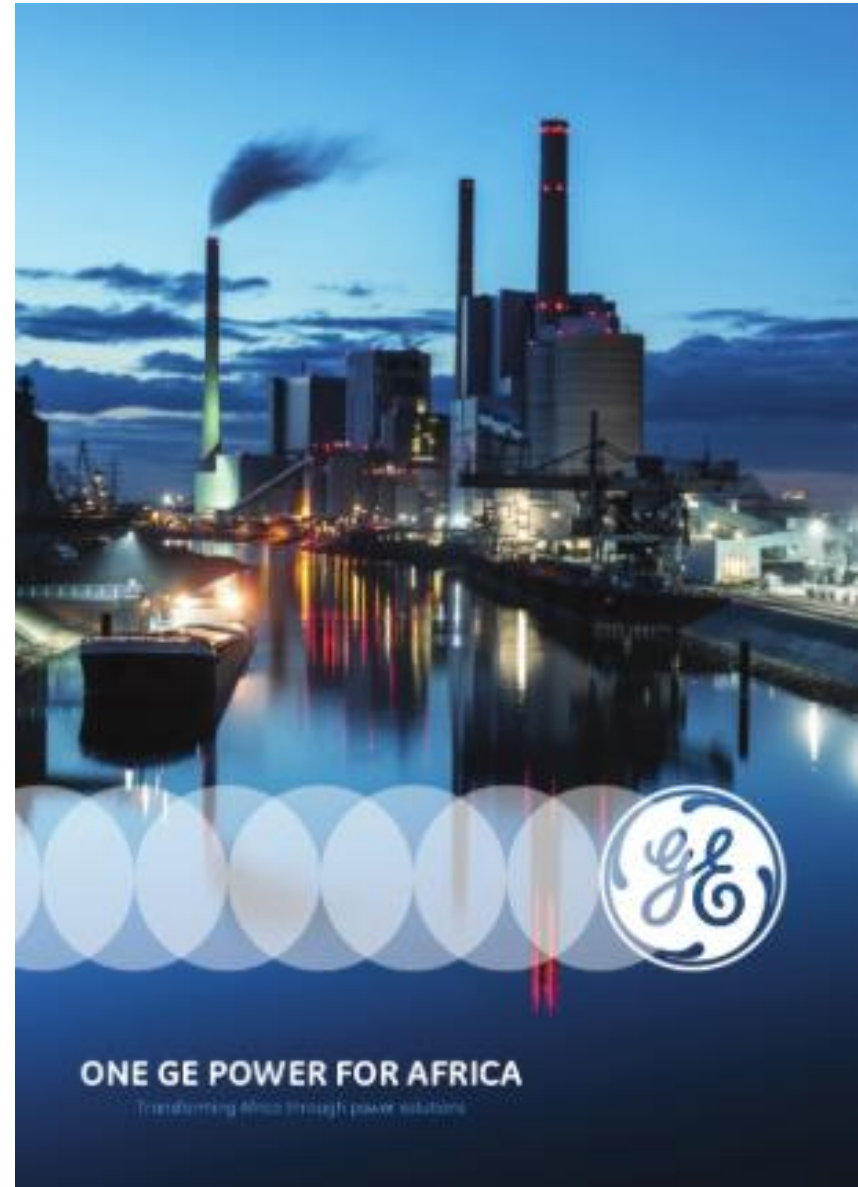
Jean-Jerome Peytavi (EMBA)

Prasad Savarapu (SF)

# AGENDA

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5/17/2018



# Team Overview



Faisal Seraj



- **Sloan Fellow'18**
- International Development practitioner with work experience in Africa and Asia.
- Focuses on holistic approach towards poverty reduction
- Have experience combining for-profit and not-for-profit activities for greater inclusiveness and impact

Prasad Savarapu



- **Sloan Fellow'18**
- Technology Strategist, Thought Leader, and Client Partner focuses on significant process changes, operational improvements and improved ROI to large corporations through enterprise transformation, cloud and data solutions.

Peipei Qiu



- **MSMS'18**
- Bachelor in Finance & Spanish
- Former Program officer in National Development and Reform Commission

Jean-Jerome Peytavi



- **EMBA'19**
- Skilled in developing integrated marketing strategies, business strategy plans, optimizing budgets, and effective communications. Financially savvy, results-oriented leader possessing strong analytical and interpersonal skills.

# Company Overview



- In FY'17, GE generated \$117.4 billion of total revenues.
  - Of these, GE Power generated \$26.8 billion revenues, 29% of the total GE revenue
  - With 85,000 employees, GE Power generates 31% of industrial segment revenues
  - Fairly new-entrant to the Africa market for renewable energy
- **GE Power** - Offers a wide spectrum of:
  - Heavy-duty and aero-derivative gas turbines, steam power systems including boilers, generators, steam turbines, and air quality control systems.
  - Advanced nuclear reactor technologies solutions, including reactors, fuels and support services for boiling water reactor.
  - Water treatment, wastewater treatment and process system solutions and power services.

# Company Overview

## Global GE Business Model - Present State



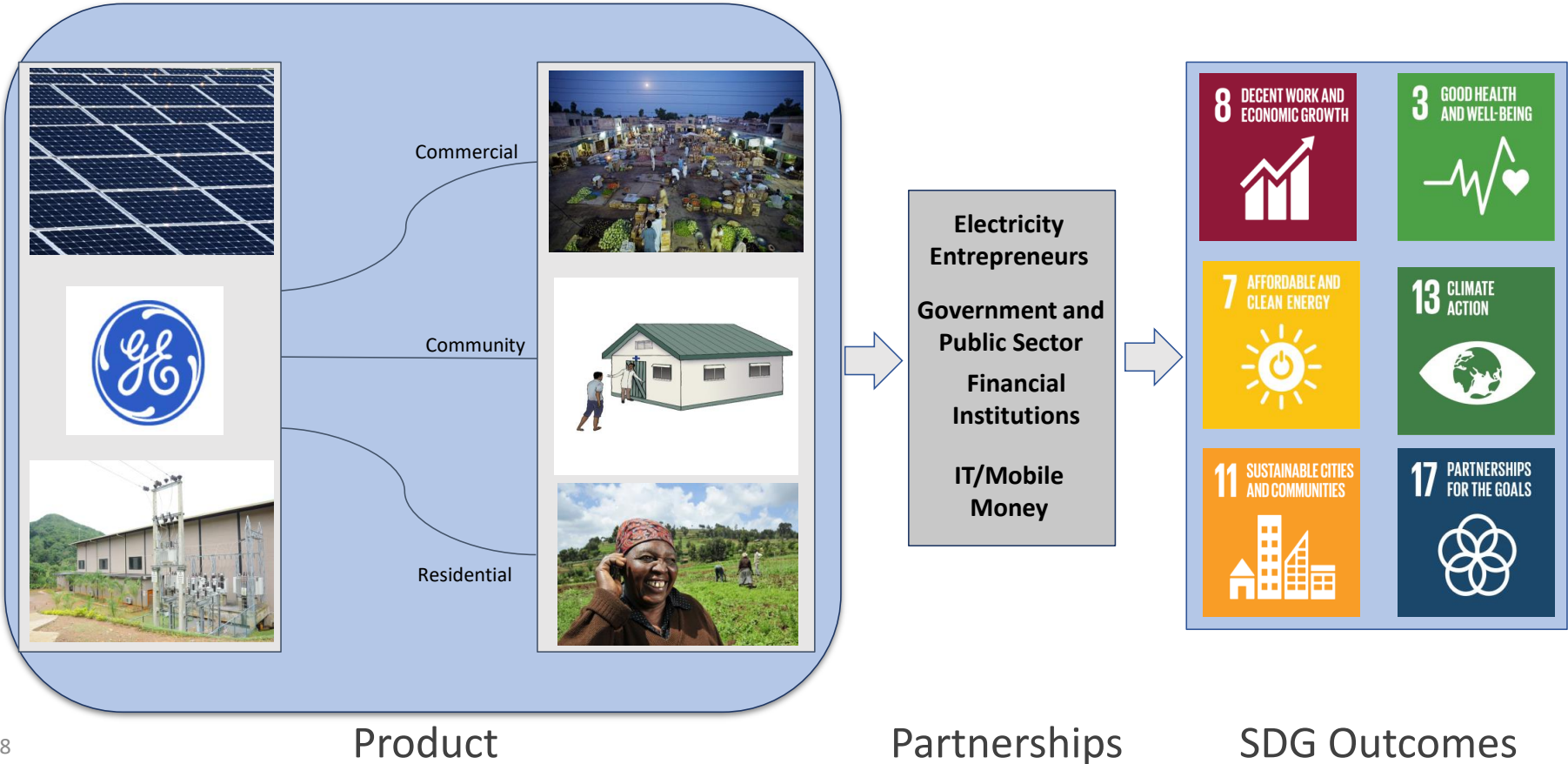
GE Power

### How GE Industrial Business Makes Money?



# Company Overview

## Business Landscape



# Problem Statement - Background



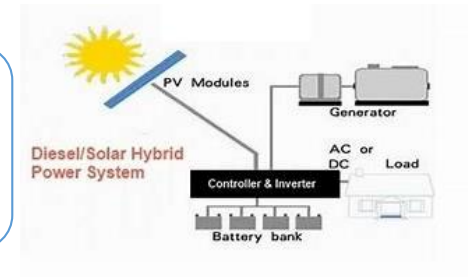
- For years, GE has struggled to innovate and diversify its key revenue streams of conventional power generation and grid
- Resulted in extremely small "new energy" divisions compared to peers (i.e. Tesla, First Solar).
- This threatens the company with low performances and negative impacts of the company's shares.
- Meanwhile, global society has created an uncertain future for our environment, including climate change, air pollution, and habitat destruction. Therefore, compelling business creation within GE is critical for its competitive relevance in the future the energy market.



# Problem Statement - Focus



- GE Focus**
  - To generate \$1M in from emerging market small scale solar business o \$2M, with near-term scale to >\$100M and long-term scale to >\$1B
- Project Focus**
  - Our project focus is to help GE Power realize the market potential in Africa, by conducting a preliminary **market analysis** of Africa Microgrid development, proposing a **business model** and offering **recommendations of further market research, marketplace establishment and partnership strategy**.
- Product Focus**
  - Diesel/Solar Hybrid MicroGrid
  - Power System





# Problem Statement - Approach



- Our approach involved interviews, market analysis, market conditions of key players, competitors, entrepreneurs, economic conditions, institutional organizations, supporting policies and government incentives
- Our team interviewed -
  - GE Chief Data Officer that handles the strategy for business model,
  - Africa Market Leader that is involved in creating the business model and leading the to-be-proposed solutions; and
  - MIT Energy team that studied the landscape of access to electricity in Africa and the importance of micro-grids and off-grids market
- *Studied GE's present state business model as outlined in the slide to focus on developing a matured business model*



# Market Analysis - Africa

- 1.2 billion people around the world have no access to a power grid.[2]
- Lighting and phone charging alone costs about \$27B a year and some estimates put total annual energy costs at more than \$60B.
- Potential global solar energy market of \$422B by 2022 from \$86B in 2015 with CAGR of 24.2%
- Africa is lagging, with less than 40 % of African households connected. [3]
- Leading players include: Greenlight Planet, d.light, Off-Grid Electric, M-KOPE Solar, Fenix International, and BBOXX
- Major Entrants: Schneider, ABP, EDF and Engie[4]

Source:

[2] [International Energy Agency](#) Insights

[3] [International Energy Agency](#) and Reuters Data (link is available below)

[4] Joe Bavier. 2018, Feb 20. Off-grid power pioneers pour into West Africa.

Retrieved from <https://www.reuters.com/article/us-africa-power-insight/off-grid-power-pioneers-pour-into-west-africa-idUSKCN1G41PE>

# Market Analysis

## Kenya, Nigeria and Ethiopia



Based on conversations with GE, three countries are being particularly looked at: Kenya, Nigeria, and Ethiopia

### KENYA

#### Facts

- High insolation – 5 to 7 hours of sunshine per day
- Government cut solar tax to increase affordability
- Off grid market estimated at over 40MW **[5]**

#### Context

- Mainly seen for rural installation and off-grid market
- The government plans the installation of 300,000 new solar system by 2030 **[6]**
- The government invested 1.2B in solar and is partnering with private companies **[7]**
- Commercial and industrial demand is growing

#### Solution for GE

- Actively pursue this market through the government
- Acquire a local solar company for off grid markets

[5] Kenya Energy Situation. Energypedia. Retrieved from [https://energypedia.info/wiki/Kenya\\_Energy\\_Situation#Solar\\_Energy](https://energypedia.info/wiki/Kenya_Energy_Situation#Solar_Energy)  
 [6] Africa-EU Renewable Energy Cooperation Programme (RECP)  
 [7] Gitonga Njeru. Kenya to generate over half of its electricity through solar power by 2016. Retrieved from <https://www.theguardian.com/environment/2014/jan/17/kenya-solar-power-plants>

### NIGERIA

#### Facts

- Africa's most populated country – 2<sup>nd</sup> African economy behind South Africa
- 12.5GW of installed generation capacity **[8]**
- High potential – 6 hours of peak sunshine per day

#### Context

- Electricity distributed through the grid
- Many individuals have generators
- Solar products mainly distributed by local companies – low quality so quite inefficient

#### Solution for GE

- Convince the government and NGO's for preferential tariff on solar - National health is in danger
- Needs to target communities and individuals

**[8]** Africa-EU Renewable Energy Cooperation Programme (RECP)

**[9]** Nigeria: 'Off-Grid Solar Solutions Critical to Survival of Nigeria's Power Sector. Retrieved from <http://allafrica.com/stories/201805150960.html>

### ETHIOPIA

#### Facts

- One of the least developed country in Africa though the economy is fast growing at a rate of about 10% per year – Increasing electricity demand
- Ethiopian Telecom is a major user of solar system\*

#### Context

- Government wants the country to be a middle income country by 2025 – Aggressive energy plan to be able to fulfil this premise. \*\*
- Significant investment from developed country government, private firms and NGOs

#### Solution for GE

- Ethiopia has gained traction from private investors – GE should find a financial partner to invest and implement its products

[10] Ethiopia Energy Situation. Energypedia. Retrieved from [https://energypedia.info/wiki/Ethiopia\\_Energy\\_Situation](https://energypedia.info/wiki/Ethiopia_Energy_Situation)

[11] Ethiopia power fact sheet. Retrieved from <https://www.usaid.gov/powerafrica/ethiopia>

# Market Analytics

## Dynamics and Inferences



### DRIVERS

- Increased Competition
- Demanding Market and Heavy Prices
- Demand is driven by Supplies and Customers
- No Marketplace Platform
- Low Customer Experience
- Commercial, Residential, Household Customers

### RESTRAINTS

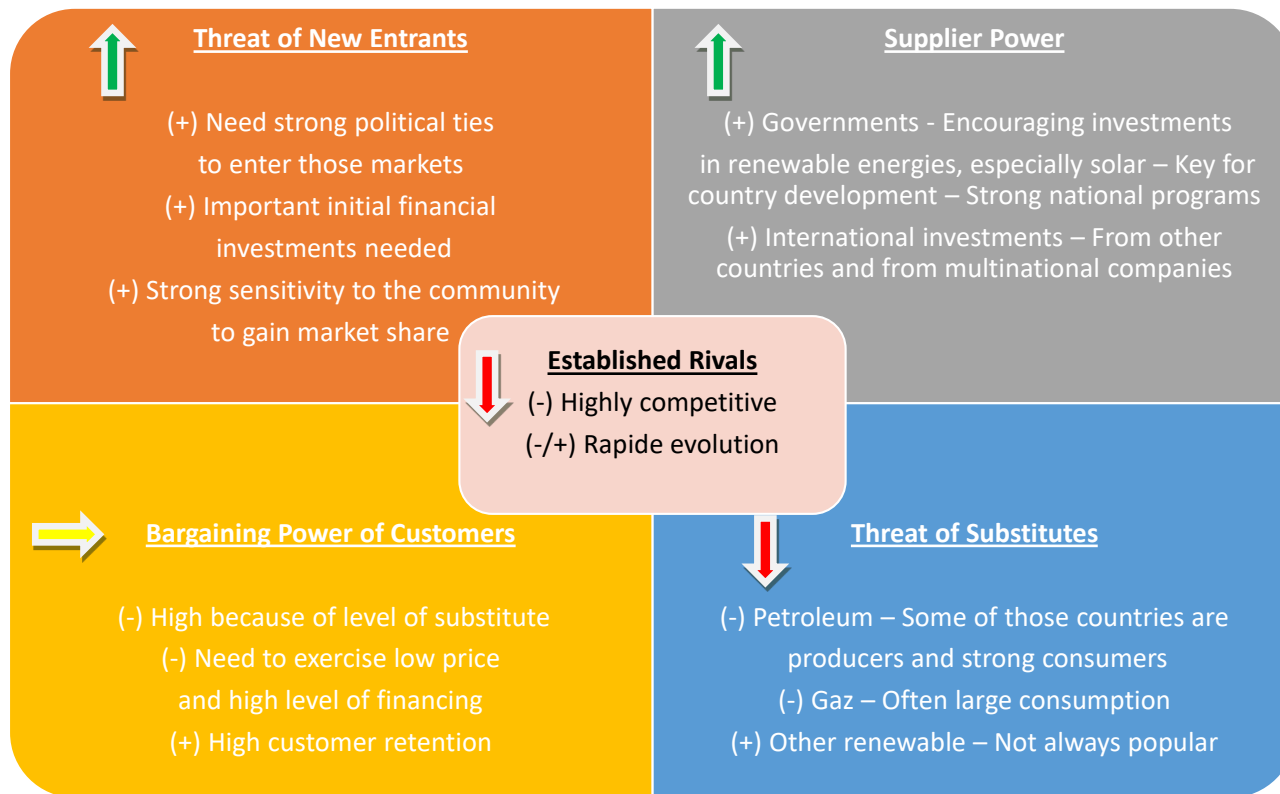
- Adoption is affected by reliability, total production, competitiveness
- Climatic Conditions due to non-sunny days
- Political Instability and Freedom to Market
- Low Innovation and Market Capital

### OPPORTUNITIES

- First-to-market-Platform Growth
- Innovation through Demand for High Efficient Batteries & Raw Material
- Cx thru Order to Deliver to Service Processes
- Public and Corporate Partnerships

- *The future of solar deployment in Africa will be driven more by immediate electricity demand than by global regulation around carbon reduction*
- *Global corporate 2018 funding in the solar sector, including VC/PE, debt financing, and public market financing raised, fell in Solar sector by 65% in Q1 2018 to \$2 billion from \$5.7 billion raised in Q4 2017*
- *Solar PV installations are expected to reach 107 GW in 2018 from 98 GW in 2017 with China leading and other countries becoming significant markets*

# Market Analysis - Five Forces



Market sizes:

- East Africa: 236MM (Kenya, Tanzania, Ethiopia, Mozambique)
- West Africa: 229MM (Ghana, Nigeria, Mali)



Positive for the industry



Neutral



Negative for the industry

# Market Analysis

## Customer Segments and Analysis



- Off-Grid – **Communities** where there is no electricity[13]
  - i.e.: Nigeria = 40.2%, Ethiopia = 57.3%, Kenya = 44%, Ghana = 20.7%
  - Develop mini grids, individual or telecommunication solar solutions
  - Cost key factor of decision – Positive as prices decrease for solar systems
- Isolated grids – **Villages** where electricity is distributed mostly from diesel generators
  - Building blocks for the future national grids
  - i.e.: Nigeria – Cost of extending the current grid is a losing proposition for communities – However, mini grids are booming. One of the main issues is the lack of expertise.[14]
- **Private Organizations** and Power of **Governments**
  - Today, they embrace green and cheaper solutions that can attract funding and have a positive impact on the economy. They are a key actors and customers.

Source:

[13] The World Bank Data

[14] In Nigeria, a Template for Solar-Powered Mini-grids emerges. Retrieved

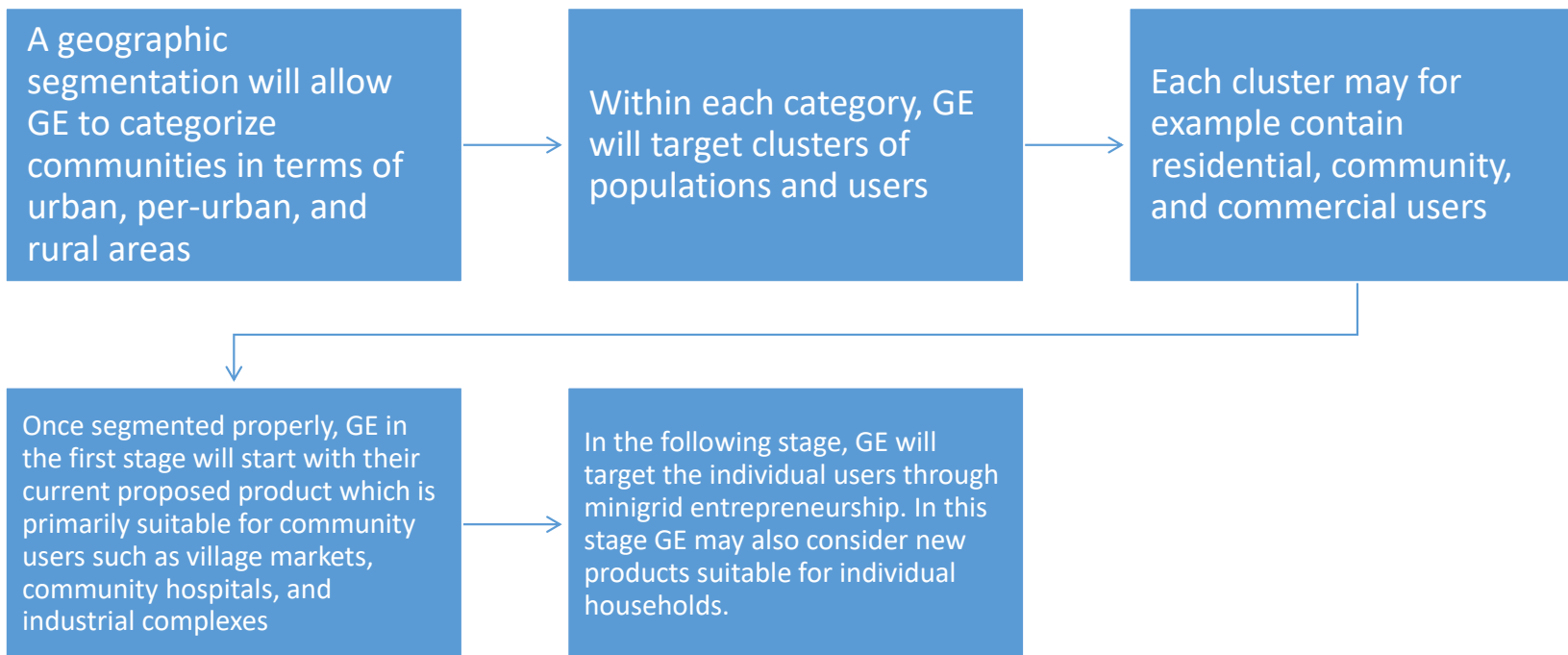
from <https://www.greentechmedia.com/articles/read/nigeria-solar-powered-minigrids#gs.1SzMcM>

# Market Analysis

## Steps to Market Segmentation



GE Power





# Business Model Canvas - Proposed



The business model that we derived provides the baseline of

- Key 'partners', 'activities' and 'sources' - that GE could rely on to build an efficient hybrid business model to achieve success
- GE 'value proposition' driven by revenue goals aligned with SDGs and the needed touch points such as key 'customers', 'channels' and 'segments' are taken into consideration to improve the focus on building a strengthening model
- 'Cost Structure' defines what GE should focus on to build this hybrid business model that could have significant positive growth under the mentioned 'Revenue Streams'
- While all the activities may not be needed to build a unique model, it is important for GE to further study which initiatives are necessary to move towards success

# Business Model Canvas - Proposed



GE Power

<b>1 PARTNERS</b> <ul style="list-style-type: none"> <li>• Entrepreneurs</li> <li>• Government and Public Sector</li> <li>• Financial and Educational Institutions</li> <li>• IT /Mobile Money Platforms</li> <li>• Innovative Centers</li> <li>• Suppliers &amp; OEMs</li> <li>• Distributors</li> </ul>	<b>2 ACTIVITIES</b> <ul style="list-style-type: none"> <li>• Produce and Support Efficient Off-Grid / Micro-Grid Devices for African Countries</li> <li>• Build a Digital Platform and Strategize Efficiencies to Reach Millions of Customers</li> <li>• Acquire funding for advanced research and innovation</li> </ul>	<b>4 VALUE PROPOSITION</b> <ul style="list-style-type: none"> <li>• Integrated Solutions for Africa Rural Outreach</li> <li>• Renewable Energy at Prices Below Utility Rates</li> <li>• Advanced R &amp; D to leap into Renewable Energy through High Efficient Batteries</li> <li>• Sustainable Solidarity through products and Empower Economy</li> </ul>	<b>5 CUSTOMER RELATIONSHIPS</b> <ul style="list-style-type: none"> <li>• Long-term Customer Agreements</li> <li>• Financing Facilities</li> <li>• On-going Service and additional Efficient Solutions over time</li> <li>• Cost Savings based on Spending</li> </ul>	<b>7 CUSTOMER SEGMENTS</b> <ul style="list-style-type: none"> <li>• Government and Public Sector</li> <li>• Institutes such as Private Universities and Innovation Centers</li> <li>• Commercial Customers</li> <li>• Residential Customers</li> </ul>
<b>3 RESOURCES</b> <ul style="list-style-type: none"> <li>• GE Power Capital and Off (Micro) Grid Transformation Fund</li> <li>• Design Innovators and New Ideas</li> <li>• In-House Research</li> <li>• GE Global Network</li> </ul>			<b>6 CHANNELS</b> <ul style="list-style-type: none"> <li>• Efficient Marketing</li> <li>• Partner Network turning into Platform Network</li> <li>• Direct Platform Sales</li> <li>• Customer Loyalty Programs</li> </ul>	
<b>8 COST STRUCTURE</b> <ul style="list-style-type: none"> <li>• Manufacturing and Distribution Costs</li> <li>• Customer Acquisition Costs</li> <li>• Installation and Operations Costs</li> <li>• Research &amp; Development of Energy Efficient Solutions</li> </ul>			<b>9 REVENUE STREAMS</b> <ul style="list-style-type: none"> <li>• Platform Charges and Customer Analytics</li> <li>• Customer Loyalty &amp; Long-term Margin</li> <li>• Customer Lifetime Value</li> <li>• Target Growth &amp; Flexible Terms such as Pay-As-You-Go Services</li> <li>• Additional from Innovation and Economic Growth</li> </ul>	

Business Model Canvas.; Osterwalder, Pigneur & al. 2010

# Marketplace Recommendations

## Proposed Solutions



"Go Big" Non-Conventional	Conventional	Innovation EpiCenter
<p>A digital platform of GE products and Competitor products with sources from GE Power, Competition, Partners and Customers.</p>	<p>A platform to create a unique experience to customers - serve customers with the help of impact partners (US Power Africa / EC of Nigeria)</p>	<p>An epicenter of innovation with entrepreneurs, small business owners and distributing partners come together.</p>
<ul style="list-style-type: none"> <li>• Sell Products of GE Power, Partners, Competitors</li> </ul>	<ul style="list-style-type: none"> <li>• Sell GE products to customers through institute funding</li> </ul>	<ul style="list-style-type: none"> <li>• Sell GE Products only with advancement of research</li> </ul>
<ul style="list-style-type: none"> <li>• Broaden with a mobile app for buyers and sellers</li> </ul>	<ul style="list-style-type: none"> <li>• GE becomes the command center with efficient financing</li> </ul>	<ul style="list-style-type: none"> <li>• Loyalty Partnerships, Scalable Products, Innovation Hub</li> </ul>
<ul style="list-style-type: none"> <li>• SaaS Model, Competitor Dependency, Customer Loyalty</li> </ul>	<ul style="list-style-type: none"> <li>• Customer Loyalty, Product Affordability, Partnerships</li> </ul>	<ul style="list-style-type: none"> <li>• Loyalty, Effective Partnerships, Community Leader</li> </ul>
<ul style="list-style-type: none"> <li>• Customer Analytics through "data network effects"</li> </ul>	<ul style="list-style-type: none"> <li>• Cross-side Sales through New and Resale of Products</li> </ul>	<ul style="list-style-type: none"> <li>• R &amp; D Focused Approach</li> </ul>
<ul style="list-style-type: none"> <li>• DisAdv: Tech Investment, Higher Customer Acquisition Costs</li> </ul>	<ul style="list-style-type: none"> <li>• DisAdv: Tech and Customer Acquisition Costs, Tenured Partnerships</li> </ul>	<ul style="list-style-type: none"> <li>• DisAdv: R &amp; D, Tech and Customer Acquisition Investment</li> </ul>
<p><b>Platform - First to the Market</b></p>	<p><b>Improved Cx through Service</b></p>	<p><b>Growth Partnerships</b></p>

# Marketplace Proposal - “Go Big”



- Non-conventional platform with the combination of products from GE, Competitors, Partners and Customers.
- Platform becomes central from Order Management to Delivery and later Customer Service
- As opposed to attracting a single side of buyers or sellers, we propose GE to broaden the digital technology along with a mobile technology app. and open it for both buyers and sellers
- Due to the fact that the market is demanding, there are many local players. However, there is no single common platform in the region, which makes this option of GE-Power-Marketplace-Platform unique.
- Benefits:
  - GE Ownership and GE becomes the data master for the market
  - Households, institutes, government and private entities are captured by GE digital entity

Platform - First to the Market

Improved Cx through Service

Growth Partnerships

# Marketplace Proposal - Conventional



- Platform to sell GE Products Only by having supporting customers (B2B or B2C) through finance by impact investing or institutional partnerships
- Institutes customers fund where GE sells products and charges customers either on a fixed capacity basis or on pay-as-you-go basis
- The Off-Grid and Micro-Grid costs are usually high and customers pay high monthly installments, along with usage costs.
- Benefits:
  - GE becomes the central hub of partnership with public and private institutional entities
  - GE will have the advantage of unmatched power partnerships with no product cost risk
  - Improved Customer Loyalty and as needed, resale of products can be added activity
  - Product Affordability by Customers

Platform - First to the Market

Improved Cx through Service

Growth Partnerships

# Marketplace Proposal - Innovation



- While there is heavy competition, the market is growing with many entrepreneurs across the regions of Africa especially from East Africa
- GE becomes the epicenter of innovation where entrepreneurs, small business owners and distributing partners can come together to innovate.
- GE continues to sell products through the digital platform. GE gains advantage over crowd innovation and finds high scalable products. GE acquires / partners through the innovation center.
- This will make GE an innovation partner to the region to establish the much needed power for Rural Africa. GE will also become a key player in strengthening ties with the communities to bring bright products to the market.
- Benefits:
  - GE becomes Innovation Epi Center which is essential for the region's sustainable economic growth
  - GE becomes a powerful partnership organization
  - R&D focused approach leading into successful long term future
  - Innovation can bring affordable products to the market

Platform - First to the Market

Improved Cx through Service

Growth Partnerships

# Recommendations

## Market Research



- Our proposed solutions are based on the market data publicly available
- We recommend GE to perform a market research that would cover
  - Segments of importance – with customers in the categories of Commercial, Households, Public / Government entities
  - Total market value that could make GE aware of investment needed
  - Competitive landscape of existing major / minor players and new entrants
  - Evaluate other organizations and their market share
  - Thought-process to understand whether to enter the market as a new player or idealize the formation of a partnership with a much bigger player or validate the idea of acquiring an established organization
  - Finally come up with strategic initiatives that could have value of higher significance



# Recommendations Partnership Strategy



<b>Government</b>	Government is the primary investor of large scale power investment. They will be interested in a private-public ventures for cost sharing. This will reduce infrastructure cost for the project. Government will also have access to local resources to help GE scale-up.
<b>Entrepreneurship</b>	The financial sustainability of GE will depend on uptake of its product by electricity entrepreneurs. These entrepreneurs can purchase GE product for either providing pay-per-use electricity or to sell individual products to the communities.
<b>Financial Institutions</b>	A credit support will make the costly GE products viable for both entrepreneurs and consumers. SME and Micro-lending are two relevant standard products. They are widely offered in the countries of primary target by GE. We would not recommend exclusive partnership with any financial institution. Rather, GE should mobilize financial institutions available in each specific community.
<b>Technology/IT:</b>	Apart from the digital platform, this is required for the payment system. For this, we would recommend an exclusive contract with a reliable mobile money vendor. Mpesa in Kenya for example has the best outreach and already a system for consumer payment.

# Appendix - References

1. [www.revenuesandprofits.com](http://www.revenuesandprofits.com)
2. International Energy Agency
3. IEA Data
4. Joe Bavier. 2018, Feb 20. Off-grid power pioneers pour into West Africa. Retrieved from <https://www.reuters.com/article/us-africa-power-insight/off-grid-power-pioneers-pour-into-west-africa-idUSKCN1G41PE>
5. Kenya Energy Situation. Energypedia. Retrieved from [https://energypedia.info/wiki/Kenya\\_Energy\\_Situation#Solar\\_Energy](https://energypedia.info/wiki/Kenya_Energy_Situation#Solar_Energy)
6. Africa-EU Renewable Energy Cooperation Programme (RECP)
7. Gitonga Njeru. Kenya to generate over half of its electricity through solar power by 2016. Retrived from <https://www.theguardian.com/environment/2014/jan/17/kenya-solar-power-plants>
8. Africa-EU Renewable Energy Cooperation Programme (RECP)
9. Nigeria: 'Off-Grid Solar Solutions Critical to Survival of Nigeria's Power Sector. Retrived from <http://allafrica.com/stories/201805150960.html>
10. Ethiopia Energy Situation. Energypedia. Retrived from [https://energypedia.info/wiki/Ethiopia\\_Energy\\_Situation](https://energypedia.info/wiki/Ethiopia_Energy_Situation)
11. Ethiopia power fact sheet. Retrieved from <https://www.usaid.gov/powerafrica/ethiopia>
12. Solar Builder 2018
13. The World Bank Data
14. In Nigeria, a Template for Solar-Powered Mini-grids emerges. Retireved from <https://www.greentechmedia.com/articles/read/nigeria-solar-powered-minigrids#gs.1SszMcM>
15. Sustainable Energy Marketplace. <http://africa.marketplace.irena.org>

# Case Study



Mission: to sustain and facilitate the spread of renewable energy technologies

## Input from stakeholders and IRENA

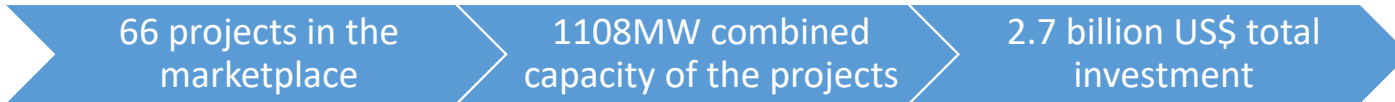
- Information of interest: projects with certain investment criteria, financing sources, advisors according to specific needs of a project
- Information of relevant entities, projects or financing instruments
- Project development tools and data on markets, regulations and incentives
- Expertise in developing renewable energy in Africa
- ...



- Project assessments
- Project development and matching
- Tools: Project Navigator+REsource

## Services for Stakeholders

- Efficient search for information such as projects by the specific criteria for an investor, by financing sources or by advisors according to specific needs of a project;
- Easy access to most relevant entities, projects or financing instruments and their contact information;
- Direct consulting service with IRENA on specific needs and interests;
- Easy access to project development tools and data on markets, regulations and incentives.

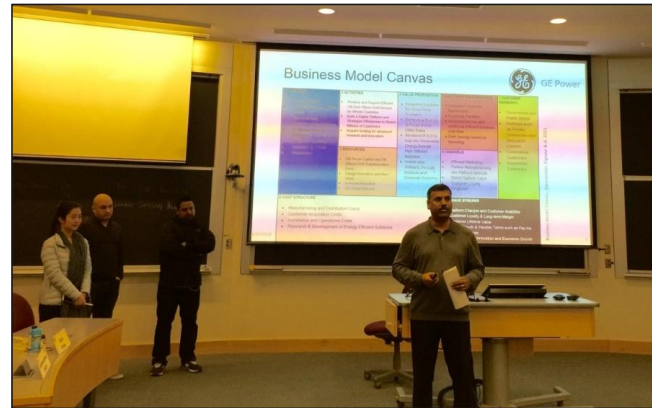


Source:  
[15] Sustainable Energy Marketplace. <http://africa.marketplace.irena.org/>

# Reflections



GE Power



Prasad: My primary goal to attend the courses is to deepen my knowledge of impact by innovation. MIT provides a action paced environment to understand the importance of sustainability. I have learned well from the Sustainability Initiative, System Dynamics Group and Students discussions in the classroom. Special thanks to the instructors and admin staff who have been very helpful.

Faisal: Coming from a non-corporate background, it was inspiring to see how big corporations are imbedding sustainability into their mission.

Jean-Jerome: I decided to embark in this project to learn and help a major company tackle a key issue for the African continent. My knowledge about renewable energy was limited and I learned a great deal from the team and the company. GE can be successful in this market if the company pushes its products strategically. I think the team contribution to this project is valuable for the company's future in the African market

Peipei: I learned a lot about energy market dynamics in Africa, technical knowledge and analysis approaches from both the sponsor and my team members. It will be more constructive if we could have built more organic and measurable connection between GE's business and Sustainability goals.