Achieving Economies of Scale in the Nigerian Solar Value Chain

Opportunities and Benefits of Upstream Localization

February 2021
Executive Summary
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Analysis shows focused implementation of key enablers in existing policies, access to data, low-cost finance and capital investments provide the best pathway to increased electrification and localization of the upstream value chain

1. **Objectives**

   **Sharpen Policy Focus**
   - **Strengthen**
     - Ease of doing business
     - Industry attractiveness
     - Sustainability

   **Support The Solar Power Naija Programme Delivery**
   - **Enhance**
     - Deployment execution
     - Private sector portfolio performance

   **Galvanize The Industry To Increase Local Content**
   - **Develop**
     - In-country capacity for assembly/manufacturing of solar system components

2. **Recommendation Theme**

3. **Key Initiatives**

4. **Key Performance Areas**

   1. Tariff waivers for all solar system components
   2. Optimization of the implementation process for (1)
   3. Access to finance, subsidies and grants
   4. Monitoring and reporting of local content in alignment with the National Content Development (NCD) for the power sector

2. **Workstreams**

   1. Develop baseline economic model for private and public sector use to assess the viability of localizing key components of SHS and mini-grids
   2. Connect willing industry players by identifying interdependencies in localization plans
1. Sharpen Policy Focus: The Federal Government of Nigeria (FGN) has done a remarkable job thus far establishing the policies for the enhancement of the renewable energy sector; a laser focus on key enablers is the next step in energizing the solar sector

1. National Renewable and Energy Efficiency Policy (NREEEP)
   - Policy that serves as the blueprint for sustained development, supply and utilization of renewable energy resources within the economy for on-grid and off-grid
   - **Key Recommendation**
     - Complete tariff waivers for all solar use components (panels, TV, batteries, bulbs) to attract investments, create downstream jobs and build scale
     - Institute priority clearance at the ports for the above as observed with Kenya and Ghana to promote ease of doing business

2. NERC Mini-grid Regulations 2016
   - Regulation guiding the operations of mini-grids in Nigeria with the objective to increase unserved electricity access and encourage the use of renewables on a small scale
   - **Key Recommendation**
     - Prioritize solar mini-grid applications at the regulator NERC
     - Tracking and reporting of all applications to the 30-day upper limit as stipulated in the regulations

3. National Content Development for Power Sector
   - Regulation that aims to promote the deliberate utilization of local human workforce and material resources across the value chain of the Nigerian Electricity Supply Industry (NESI)
   - **Key Recommendation**
     - Empower the NESI Nigerian Content Consultative Forum (NNCCF) to carry out periodic surveys to determine the national content participation in the sector
     - Specific inclusion of women's participation in the local content regulation quota for jobs across NESI
The Nigeria Electrification Project (NEP) & The Solar Power Naija programme are two FGN initiatives in support of the off-grid and renewable energy industry in Nigeria.

**The Nigerian Electrification Project**

Nigeria Electrification Project (NEP) is a Federal Government credit facility and initiative that is private sector driven and seeks to provide electricity access to households, micro, small and medium enterprises in off grid communities across the country through renewable power sources. NEP is being implemented by the Rural Electrification Agency (REA) in collaboration with the World Bank, AfDB and other partners.

**Objectives**

- Increase electricity access to households and micro small and medium enterprises (MSMEs).
- Provide clean, safe, reliable and affordable electricity through renewable power sources to unserved and underserved rural communities.
- Develop a data driven off-grid model for Nigeria that will become an exemplar for Sub-Saharan Africa.
- Provide reliable power supply for 250,000 (MSMEs) and 1 million households.

**Solar Power Naija**

To support the economic recovery in response to the COVID-19 pandemic, the FGN has launched an initiative as part of the Economic Sustainability Plan (ESP) to achieve the roll out of 5 million new solar-based connections in off-grid communities. The Solar Connection Intervention Facility will complement FGN’s efforts in providing affordable electricity through the provision of long term low interest credit facilities to the Nigeria Electrification Project (NEP) pre-qualified home solar value chain players.

**Objectives**

- Expand energy access to 25 million individuals (5 million new connections) through the provision of solar home systems (SHS) or connection to a mini grid.
- Increase local content in the off-grid solar value chain and facilitating the growth of the local manufacturing industry.
- Incentivize the creation of 250,000 new jobs in the energy sector.

**Key Objectives**

- Increase Energy Access
- Provide Reliable Electricity through Renewable Power Sources
- Promote the use of Solar – Solar Home Systems (SHS) and Solar Minigrids
- Increase Local Content in the Off-Grid Solar Value Chain
- Create 250,000 new jobs in the Energy Sector

Source: www.rea.gov.ng
2. Access to Data: With support of the REA, a holistic supply and demand-side approach using geospatial data was used to determine the best operators and sites for solar systems deployment in support of the Solar Power Naija Programme.

Supply Side:
ESTABLISH OPERATOR CAPABILITIES TO DEPLOY

Surveys and Interviews were carried out to determine:

1. NEP Fund Eligibility: A measure of an operator's competency and capability
2. Portfolio Coverage: A measure of an operator's ability to supply Tier 2 electricity
3. Scalability: A measure of an operator's ability to scale operations quickly
4. Local Content Plans: Measure an organization's intentions to localize its value chain

Demand Side:
DETERMINE THE BEST AREAS FOR DEPLOYMENT USING GEOSPATIAL DATA I.E. TARGET HOUSEHOLDS APPROACH

EXECUTIVE SUMMARY

Ability to Pay:
- Ability to Pay Tier 2 Electrification (modelled off 50Wp Solar Home System) based on discretionary spending and income analysis

Living in unelectrified communities:
- Communities where at least 30% of homes have no form of electrification (including generators, batteries etc.).
- At least 5 km away from an existing or planned mini-grid

Communities with good credit potential:
- Communities with at least 50% of households determined as High or Moderate repayers as per Nithio’s Credit Scoring assessment

RESULTS (% of companies that fulfil criteria 1 – 4)

1. 75%
2. 92%
3. 100%
4. 100%

Note 1: NEP involves a best-in-class eligibility assessment process designed in collaboration with the World Bank to measure Regulatory Compliance, E & S Compliance, Technical Capacity, Financial Capacity, Local Content Inclusion etc.

Note 2: Tier 2 access provides a minimum of 50Wp for at least 4 hours of electricity per day, including at least 2 hours per evening with capacity sufficient to power low-load appliances – such as multiple lights, a television, or a fan as needed during that time.

Note 3: Homes that can pay at least N5,250 per month are considered potential customers.

Note 4: Access to electricity includes electricity from any source such as PHCN/NEPA, local mini-grids, generators, SHS, batteries, and other sources.

Note 5: See Nithio methodology note on credit scoring.

Source: Company Interviews, Fraym, Nithio.
2.1. Access to Data: Preliminary results show ~7 million Nigerian households ready for immediate deployment of SHS in the 6 geo-political zones.

**Ability to Pay**

Tier 2 Electricity

\( \geq 50Wp \)

~26 million

**Electrification**

>5km from mini-grid and > 30% unelectrified

~17 million

**Credit Risk**

Community with >50% fast or moderate re-payers

~7 million

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**Note 1:** Homes that can pay at least NGN 5,250 per month, assuming households can transfer 50% of discretionary spending to cover monthly payments.

**Note 2:** Access to electricity includes electricity from any source such as PHCN/NEPA, local mini-grids, generators, SHS, batteries, and other sources.

**Source:** Fraym, Nithio.
Executive Summary

2.2. Access to Finance: Market assessments show single digit local currency financing and access to FX at the Central Bank of Nigeria’s (CBN) rate is required urgently to scale the market.

Reserved access to FX at CBN to companies deploying solar solutions
To address some of the cost challenges due to increasing material costs as a result of the naira devaluation.

Access to low-cost naira financing
High cost of capital and availability of capital is an encumbrance to the growth of the industry.

Access to grants and subsidies
Customers’ ability to pay in rural households is observed to diminish for PAYGO systems after the first 6 months; access to grants and subsidies will alleviate some of the revenue challenges.

- SEforALL is supporting the Solar Power Naija Programme by engaging with international funders and vendor financiers.
3. The cumulative effect of the identified enablers on the local assembly of key solar system components will make Nigerian pricing competitive, increase its export potential and have positive effects for the ECOWAS region.

**Executive Summary**

**SHS PRODUCT PRICE**

- Assembly Price: $50.0
- Import Tariff Reduction: -$7.0
- Cost of Debt Reduction: -$69.0
- Investment in Plant Capacity: -$140.0
- Product Subsidy (20%): $56.0
- Final Assembly Price: $56.0

**Mini-Grid Tariff**

- Assembly Tariff: $0.78
- Tariff Reduction Applied: $0.63
- Increase in Connections: $0.57
- Reduce Cost of Debt: $0.48

**Savings in Metric Tons**

- 356,486

**Number of Jobs Created**

- 193,053

**Number of locally assembled SHS required to be price competitive against imports with 4 enablers applied.**

- 333,105

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Modelled Assembly Price: price of a 50Wp SHS (battery and PV assembled in Nigeria) with table fan, TV and bulbs from a 20MW capacity plant; locally assembled components – battery & PV

- Import tariff reduction: 0% on all SHS system components; cost of finance reduction: from 12% to 5%; CapEx investments: assumes investment in plant capacity from 20M to 100MW; product subsidy: 20% of cost of SHS; 20% sales margin.

- Jobs created over 5 years for SHS and 10 years for mini-grid.
SEforALL with the support of All On is seeking to create a sustainable framework for the solar systems industry in Nigeria through increased electrification and localization of the upstream value chain

**Objective:**
- Increase electrification rate by accelerating the distribution and improving the affordability of high-quality solar components for off-grid electrification
- Identify an incentive framework that attracts high-quality component suppliers/manufacturers for export and local production
- Support the Federal Government of Nigeria’s Solar Power Naija target
- Develop best in class data to identify off-grid households and ability to pay
- Create an economic model for localization that can be used by the public and private sector

**Methodology:**
- Desktop research
- Stakeholder engagements
- Economic modelling
- Geospatial analysis
- Recommendations

**Expected Outcome:**
Solar off-grid enterprises in Nigeria:
- Scale-up delivery and installation operations
- Build local capacity upstream in the value chain
- Leverage efficiencies to address affordability of high-quality solar systems to the end consumer
- Provide customer data for both public and private sector

**Sponsors:**
- SEforALL
- All On
Nigeria's electrification rate is ~57%, leaving 85 million Nigerians without access to electricity, mostly in rural areas.

The Nigerian Power Value Chain:

- Installed Capacity: 12.5 GW
- Generated: 3.9 GW
- Transmitted: 3.6 GW
- Distributed: 3.1 GW

Urban Population Without Electricity Access: 16% (18 Million People)

Rural Population Without Electricity Access: 66% (67 Million People)

Source: ESMAP Tracking SDG7 Database, 2018, World Bank
Evidence shows that the least-cost approach for achieving universal access in Nigeria involves an integrated mix of grid, mini-grid and solar home systems (SHS).

**Solar Home Systems (SHS)**
- **7.5 – 7.8 Million**
- Connections best served using solar home systems

**Solar Mini-grid**
- **1.3 – 4.7 Million**
- Mini-grid connections in densely populated areas far from the grid

**Grid**
- **0 – 3.6 Million**
- Grid connections in densely populated areas within 10 km of existing grid infrastructure

Source: Adapted from McKinsey and Company’s least cost electrification analysis
The FGN has recognized these opportunities and developed an energy for all solar power strategy, a key component of its economic sustainability plan to be implemented by the Rural Electrification Agency.

**Focus Themes**

- **Increase energy access through 5 million solar connections**
- **Increase local content in the off-grid solar value chain**
- **Create new jobs in the energy sector**

**Background**

- 5 Million Households
- 25 Million Individuals
- Upstream Local Assembly/Local Manufacturing
- Create 250,000 in the Energy Sector
Strategically placed in ECOWAS, a solar-enabled Nigeria presents enormous benefits and opportunities for export and for the region’s electrification objectives.

**Background**

- **ECOWAS**
- **Non-ECOWAS**

**Potential Sales Calculation:**

Assumption 1: A Nigerian assembled 50Wp PV and SHS battery can be sold in the region

Assumption 2: PV and battery price take into account import tariff waivers, product subsidies, low cost financing and a 100MW plant capacity

Assumption 3: Target 10% of the rural unelectrified population in the listed ECOWAS countries

Assembly price of PV: $122

Assembly price of battery: $188

Potential sales = (10% of unelectrified rural) x (price of solar component)

Source: ESMAP Tracking SDG7 Database, 2018, World Bank for Unelectrified Population Data

**Nigeria’s Potential Sales Export to the ECOWAS Region**

<table>
<thead>
<tr>
<th>Country</th>
<th>Potential PV Sales</th>
<th>Potential Battery Sales</th>
<th>Unelectrified Rural Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>$2.5 Billion</td>
<td>$79.6 Million</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: ESMAP Tracking SDG7 Database, 2018, World Bank for Unelectrified Population Data
2
Nigerian (Local)
Solar Systems
Industry Analysis
The local solar industry cuts across various segments of the electrification spectrum with Tier 2 systems being the minimum threshold required to deliver impactful socio-economic value.

- SHS and mini-grids are the target product segments
- Tier 2: > 50Wp <= 200Wp. Minimum 4hrs per day and 2hrs per evening. Electrical lighting, air-circulation, television and phone charging are possible

<table>
<thead>
<tr>
<th>Product Segments</th>
<th>Characteristics</th>
<th>Installed Capacity</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small pico systems: lamps &amp; chargers</td>
<td>Lighting and charging of batteries and mobile phones</td>
<td>1 – 10 Wp</td>
<td>Private, over the counter consumer devices</td>
</tr>
<tr>
<td>Solar home systems (SHS)</td>
<td>Off-grid electricity demand in private homes in settlements far from existing distribution lines</td>
<td>10 – 500 Wp</td>
<td>Private households and small productive use businesses</td>
</tr>
<tr>
<td>Stand-alone PV systems</td>
<td>Single institutional deployments located in settlements without grid or mini-grid</td>
<td>500 W – 10 kWp</td>
<td>Government procurement for public institutions like schools, clinics etc., high-income households and SMEs</td>
</tr>
<tr>
<td>Mini-grids (e.g., hybrid PV-diesel)</td>
<td>Communities and settlements far from the existing grid</td>
<td>5 kW – 1 MWp</td>
<td>Utilities and community electrification projects</td>
</tr>
<tr>
<td>Large scale, grid-connected PV systems</td>
<td>Extension/expansion of production capacity in existing grid</td>
<td>1 – 50 MWp</td>
<td>Utilities and IPP’s</td>
</tr>
</tbody>
</table>
The off-grid SHS and mini-grid market has a number of challenges e.g., high tariffs, lack of economies of scale and limited private sector upstream investments.

**Import Dependent**
The solar off-grid market is highly dependent on imports from China.

**Tariff Discrepancies**
Component distributors and assemblers pay varied tariffs for the same products with confusion around charges for both port authority and distributors.

**High Costs & Low Adoption**
While the cost of solar photovoltaic (PV) modules have fallen dramatically, costs of solar systems remain high due to the reliance on foreign suppliers.

**Component Quality**
There is a proliferation of low-quality imports from China due to lack of strict regulations on quality products coming into Nigeria.

**Lack of Economies of Scale**
Solar system enterprises are often of small/medium scale with individual suppliers making it difficult for the market to achieve economies of scale.

**Key FGN Interventions**
- Nigeria Electrification Project (NEP)
- National Content Development for the power sector
- NERC Mini-grid Regulations 2016
- Nigerian Renewal Energy and Efficiency Policy (NREEEP)
- Nigerian Investment Promotion Commission’s Pioneer Status Incentive
- Import Waiver on Solar PVs
- Bank of Industry (BOI) N6B Solar Energy Fund
Despite these challenges, there is significant market appetite for local assembly/manufacturing among stakeholders (upstream and downstream) engaged along the value chain.

Companies that plan to set up local assembly if the scale to support exists

100%

Companies that plan to set up local manufacturing if the scale to support exists

33%
SEforALL is proposing a systematic approach to addressing the identified industry challenges in line with the FGN’s Solar Power Naija Programme.

<table>
<thead>
<tr>
<th>Nigerian Solar Value Chain</th>
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<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Short Term (~9 months)</strong></td>
<td>1. Accelerated Importation</td>
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<td></td>
<td>▪ This phase of the approach is characterized by imports of SKDs (semi-knocked-down kit) while status quo is maintained</td>
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<td></td>
<td>▪ Benefits can be derived from quick deployment of systems to target market and discounts attributed to large purchases from foreign manufacturer/assembler</td>
</tr>
<tr>
<td></td>
<td>▪ Precursor to local assembly and manufacturing</td>
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| **Short to Medium Term (~10–22 months)** | 2. Local Assembly |
| | ▪ This phase is characterized by local assembly of key solar systems components i.e., PV and batteries |
| | ▪ Extended opportunities to create an enabling environment for sustained employment and empowerment of women |
| | ▪ Increased upstream activity |
| | ▪ Lay the foundations for an export enabled Nigeria |

| **Long Term (~22-36 months)** | 3. Local Manufacturing |
| | ▪ This phase will be characterized by manufacturing of key components of a solar system i.e., silicon cells |
| | ▪ Investment in raw materials required for large scale production of components |
| | ▪ Investment in R&D through tertiary institutions |
| | ▪ Invest in re-use of petroleum by-products for PV production |
| | ▪ Export enabled Nigeria |
SEforALL’s systematic approach will support and be in lockstep with the REA and Power Africa designed implementation plan.

**Nigerian Solar Value Chain**

**Accelerated Importation (Phase 1)**
- **Phase 1**
  - ~9 months
  - Phase 1 deployment with NEP-pre-qualified companies
  - Expand programme beneficiary pool through additional pre-qualification

**Local Assembly Focus (Phase 2)**
- **Phase 2**
  - ~10-22 months
  - Use learnings from Phase 1 to review and update programme targets and LCR policy
  - Expand programme beneficiary pool

**Introduce minimum standards for Locally manufactured components (Phase 3)**
- **Phase 3**
  - ~22-36 months
  - Use learnings from Phase 2 to review and update programme targets and LCR policy
  - Expand programme beneficiary pool

Programme beneficiary pool in the local assembly and manufacturing stage could include the mandated use of locally-assembled solar components i.e., PV from Naseni and Auxano.

Source: REA
1. Accelerated Importation: SEforALL is supporting this phase of the proposed approach by targeting stakeholder identified key success factors

Key Success Factors

- Create enabling environment for a sustainable solar systems industry:
  - Custom tariffs and exemptions
  - Port operations
  - Enforce quality standards

- Access to data
  - Access to lower cost / concessionary financing
  - Access to FX at CBN Rate

- Favourable down payment and payment plan
  - Access to customer service and repairs
  - Access to mobile money platforms at lower rates

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A. Operator Capability

- Identified experienced SHS/mini-grid operators

B. Data

- Use of geospatial data to identify viable clusters

C. Financing

- Identified key financiers with segment appetite

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Interviews to gauge ability to deploy i.e., current local inventory

Apply key metrics (i.e. ability to pay) to identified clusters

Develop financing structure and disbursement criteria

Conditional financing agreements with key institutions

Prioritized list of SHS/mini-grid operators

Prioritized list of locations for deployment

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SEforALL’s immediate focus
In the Accelerated Importation Phase, an opportunity exists to pilot an aggregate or “bulk” purchasing approach to decrease the price of off-grid and mini-grid components.

An **Aggregated Purchase** is a type of procurement mechanism which combines efforts across sourcing of suppliers, aggregating demand for goods and services, negotiating tender, and streamlining the payment in order to benefit from economies of scale.

Given the scale of the access challenge in Nigeria, several stakeholders are in the ideation phase to develop an aggregate purchase for off-grid solar products in Nigeria.

Both empirical evidence and analysis are limited. Examples in other countries or sister-sectors demonstrate variable results when it comes to price decreases due to bulk procurement, often coupled with gains in energy efficiency and sourcing higher-quality products than are typically sold on the market.

**Global Distributors Collective (GDC) pilot 2020/21**
In partnership with Sollatek is working to establish a bulk-purchase pilot for “last-mile” (typically >Tier2) solar products and appliances combined with favorable credit payment terms and 2-year warranty in East Africa.

**Rocky Mountain Institute (RMI) SHINE analysis 2018**
Based on US Market experience comparing cost benchmarks, the 1MW purchasing has been identified as the price break for solar panels.

**SEforALL interviews 2020**
One supplier in an interview responded bulk purchasing of units over 100k will typically receive a 10% discount, and it’s capped thereafter.

**Economies of Scale Price Effect**

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<tr>
<th></th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
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<tr>
<td>International Solar Alliance Solar Water Pumps (Multi-country)</td>
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<td>World Resources Institute Solar Rooftop PV (India)</td>
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<td>TREESPA Energy Efficient Bulbs for Street Lighting (Tanzania)</td>
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<td>SEforALL Stakeholder Interviews, SHS (Nigeria)</td>
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<td>Rockefeller Foundation Mini-grids (Nigeria)</td>
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</table>

**Qualitative Findings**

**Sources:** Finding the sweet spot: identifying affordable quality solar products for the last mile, 2020, GDC; 20cents by 20 Design Charrette, 2018, REA & RMI; SEforALL internal analysis; Dalberg 2021
The first step towards preparing the sector for success in alignment with the approach is to enhance existing policies by focusing on key enablers directed at increasing electrification and local content.

1. **National Renewable and Energy Efficiency Policy (NREEEP)**
   - Policy that serves as the blueprint for sustained development, supply and utilization of renewable energy resources within the economy for on-grid and off-grid.

2. **NERC Mini-grid Regulations 2016**
   - Regulations guiding the operations of mini-grids in Nigeria with the objective to increase unserved electricity access and encourage the use of renewables on a small scale.

3. **National Content Development for Power Sector**
   - Regulation that aims to promote the deliberate utilization of local human workforce and material resources across the value chain of the Nigerian Electricity Supply Industry (NESI).

### Key Strategies (Section 2, Subsection 2.7.2)
- Provide fiscal incentives, subsidies to alleviate up-front costs, tax and duty exemptions for prospective investors in the renewable energy sub-sector.
- Review the existing laws with respect to the operations of EPSR 2005 and simplification ('fast track procedure'), to increase private sector participation in the renewable energy sub-sector.

### Observed Implementation
- 0% import duty on solar panels under HS Code 8541, but when these panels are imported with other systems as is the case with SHS, they will be classified under 8502 and attract a 5% duty. All other solar components (bulbs, fans, TVs) can attract up to 20% import duty.
- Applications for permits have been observed to be pending for months with no accommodation for mini-grids >100kW.

### Recommendations
- Complete waivers for all solar use components (panels, TVs, batteries, bulbs) to attract investments, create downstream jobs and build scale.
- Institute priority clearance at the ports for the above as observed with Kenya and Ghana to promote ease of doing business.
- Prioritize solar mini-grid applications at the regulator NERC.
- Tracking and reporting of all applications to the 30-day upper limit as stipulated in the regulations.
- Empower the NNCCF to carry out periodic surveys to determine the national content participation in the sector.
- Specific inclusion of women's participation in the local content regulation quota for jobs across the NESI.

### Relevant Strategy
- **NERC**
  - Mini-grid Regulations 2016
  - Regulations guiding the operations of mini-grids in Nigeria.

### National Content Development for Power Sector
- Regulation that aims to promote the deliberate utilization of local human workforce and material resources across the value chain of the Nigerian Electricity Supply Industry (NESI).
- Applications for permits have been observed to be pending for months with no accommodation for mini-grids >100kW.
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- Empower the NNCCF to carry out periodic surveys to determine the national content participation in the sector.
- Specific inclusion of women's participation in the local content regulation quota for jobs across the NESI.
A. SHS/mini-grid operators were measured against 4 main criteria to assess their capabilities for the Accelerated Importation (AI) Phase

<table>
<thead>
<tr>
<th>NEP Fund Eligibility</th>
<th>Power Output Capacity</th>
<th>Scalability</th>
<th>Sales, Operations &amp; Coverage</th>
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<tbody>
<tr>
<td>• Nigeria Electrification Project (NEP) is a federal government initiative that is private sector driven and seeks to provide electricity access communities across the country through renewable power sources</td>
<td>• Given the targeted segment of the population, the World Bank’s Energy Sector Management Assistance Programme’s Multi-Tier Framework (MTF) has been adopted as the guideline for determining the appropriate tier of electricity access in alignment with SDG7 and FGN objectives</td>
<td>• The FGN’s Solar Power Naija Programme will require operators to have huge deployment capabilities as part of a proposed phase 1 of the programme (i.e., =&gt; 500K SHS Connections)</td>
<td>• Similarly, an operator’s local footprint, gender inclusion and operations capabilities were assessed</td>
</tr>
<tr>
<td>• T2 of its major components, the solar hybrid mini-grid and SHS eligibility criteria, employs a best-in-class assessment process designed by the REA and World Bank</td>
<td>• Operators were measured against their ability to offer Tier 2 access which provides at least 4 hours of electricity per day, including at least 2 hours per evening with capacity sufficient to power low-load appliances such as multiple lights, a television, or a fan as needed during that time</td>
<td>• As such, industry operators were measured against experience deploying huge numbers of SHS, current inventory levels, portfolio planning and logistics expertise</td>
<td>• Specific assessments included whether an operator offers dedicated after-sales services, call-centre and in-person technical support, diversified payment channels that include at least 2 mobile money offerings and number of states previously covered in Nigeria</td>
</tr>
<tr>
<td>• Technical capacity, financial capacity, local content integration plans, regulatory compliance, environmental and safety compliance amongst others are key elements of the assessment process</td>
<td>• Successful applicants are considered eligible for the AI phase</td>
<td>• Measure operators’ risk</td>
<td>• Measure of an operator’s ability to scale its operations and deployment within a short period of time</td>
</tr>
</tbody>
</table>

See Appendix 1 for list of upstream and downstream players engaged
A. Results show a shortlist of 12 operators with proven capacity across the 4 assessed criteria that have the highest potential for success in the Accelerated Importation (AI) Phase.

- NEP Fund Eligibility: 75% of operators engaged that met this criteria.
- Power Output Capacity: 92% of operators engaged that have met this criteria.
- Scalability: 100% of operators engaged that have met this criteria.
- Sales, Operations & Coverage: 100% of operators engaged that have met this criteria.
B. Access to Data: SEforALL- and REA-developed data platform was used to identify target households for the FGN’s Solar Power Naija Programme

- Using public data, satellite imagery, and artificial intelligence, the platform produces population and consumer data with a 1km² resolution at national, state, and local government authority (LGA) level

- Objective to identify target households with the ability to pay for min. Tier 2 electrification under the Solar Power Naija Programme

- Distribute 1km² granular community-level data to off-grid developers, financiers and end-user payment providers to optimize operations and reduce project development and cost of finance

Source: Nithio, Fraym, REA, SEforALL
B1. Based on target household criteria, 7 million Nigerian households are ready for immediate deployment

- Ability to pay for Tier 2 electrification modelled after a 50 Wp SHS (financing terms of a 10% down payment and 15% per annum simple margins) based off analysis of discretionary household spending
- >5KM from existing mini-grid
- >30% of households without access to electricity
- Community with >50% fast or medium repayors as per Nithio credit-scoring analysis which segments customers’ repayment behaviours into 3 categories: fast, moderate, and slow, and describe the most common repayment trajectories across the lifetime of a loan. The credit risk layers in.

Source: Nithio, Fraym, REA, SEforALL
B. In readiness for field deployment, the 7 million target households were then clustered into 69 “allotments” of ca. 100,000 target households in each to be provided to private operators.

Clustering based on geographic continuity for ease of distribution channels – “contiguous local government authorities (LGAs)”

Data along critical indicators to be provided to private sector companies:
- **Target households** and **Ability to Pay** (Granular, 1 km² – delivered via dataFraym® to participating SHS companies)
- **Credit** risk data
- **Electrification**, generator ownership
- **Financial inclusion** (incl. access to bank agent networks)
- Latent **demand gap** / SHS penetration
- Access to **infrastructure** (roads, mobile coverage, electrical grid)
- **Productive uses** of energy – e.g., farming
- **Non-commercial demand** i.e., health centres, businesses and schools

Allotments are collections of contiguous LGAs that comprise approximately 100,000 target households. The average is 98,000 and the range of the allotments is between 76,000 and 118,000. The allotments cover all 774 LGAs in the country.

*Different colours indicate different LGAs*
Localization of the Value Chain
Market assessments show little upstream value chain activity as compared to downstream, leaving short and long-term opportunities to localize (Nigerian Assembly) in the upstream value chain.
Localization (assembly/manufacturing) of key components of the solar value chain can yield social, environmental and economic benefits.

01. Job Creation
Investment in upstream localization can result in skilled and semi-skilled job creation throughout the value chain from manufacturing, assembly and distribution.

02. Female Empowerment
Off-grid solutions offer diverse opportunities for women to work in the solar value chain, since most of the skills needed can be developed locally. Availability of high-quality lighting provides women with income-generating activities and education for children.

03. Reduced Pricing
Localization of key components of the value chain have the potential to reduce product prices and increase adoption rates in a very price sensitive market.

04. GHG Reduction
Localizing the value chain is a key enabler to increase energy efficiency, reduce the use of generators and attract international support.

05. Export Potential
Nigeria is strategically positioned to cater to the wider ECOWAS market, with also significant off-grid market potentials (see slide 15).

06. Increased Rural Electrification
Due to its off-grid potential and ability to create rural jobs, localization of the value chain will increase adoption rates.

07. Reduced Supply Chain Risk
Having locally available high-quality solar components will alleviate potential time lost in the development cycle for the solar electrification sector.

Components of Interest
- Solar PV
- Charge Controllers
- Battery Pack
- Inverters
- Mounting Accessories
- Appliances

Nigeria is strategically positioned to cater to the wider ECOWAS market, with also significant off-grid market potentials (see slide 15).
To assess the localization potential of key upstream solar components, an economic model was developed to measure the viability of various localization scenarios.

Scenarios Modelled

<table>
<thead>
<tr>
<th>Components</th>
<th>Import</th>
<th>Assemble</th>
<th>Manufacture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Battery Pack</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Inverters</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Charge Controllers</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>DC Cables</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Mounting Accessories</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Appliances (TVs, fans, bulbs, radios)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

Enablers Modelled

- Importation Tariffs
- Capital Structure (includes Cost of Financing)
- Product Subsidy
- Installed Plant Capacity
- Pioneer Status

The impact of a combination of component scenarios & enablers was used to assess the socio-economic indicators below:

- **PRICE OF SHS**
- **MINI-GRID TARIFF**
- **JOBS CREATED**
- **GHG SAVINGS**
- **NIGERIA’S EXPORT POTENTIAL**
- **No. OF SHS UNITS REQUIRED TO MAKE LOCALIZATION VIABLE**

The economic model captures other metrics including Sales, Revenue, Profit etc. It provides a universe of opportunity for analytical assessments to be used by the private and public sector as they deem fit.

Full version of the model can be downloaded on [www.seforall.org](http://www.seforall.org)
### Key Model Assumptions and Parameters

#### Key Items

<table>
<thead>
<tr>
<th>Key Items</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Scenarios</strong></td>
<td>- Importation: status quo where solar system products are predominantly imported into the country SKD or fully assembled</td>
</tr>
<tr>
<td></td>
<td>- Assembly: local assembly of key components of a solar system (e.g. PVs, batteries, etc.)</td>
</tr>
<tr>
<td></td>
<td>- Manufacturing: local manufacturing of key components of a solar system (i.e. local manufacturing of the solar cells)</td>
</tr>
<tr>
<td><strong>Model Assumptions</strong></td>
<td>- Components of interest: solar PVs, batteries, inverters, DC cables, mounting accessories, appliances</td>
</tr>
<tr>
<td></td>
<td>- Tier 2 solar systems: 50Wp, 80Wp, 150Wp</td>
</tr>
<tr>
<td></td>
<td>- Payment structure: 90% PAYGO, 10% outright purchase</td>
</tr>
<tr>
<td></td>
<td>- 0.04% drop in cost per MW produced (IRENA) – assembly/manufacturing</td>
</tr>
<tr>
<td><strong>Operating Assumptions</strong></td>
<td>- SG&amp;A : 2% of revenue</td>
</tr>
<tr>
<td></td>
<td>- Warranty: 0.01% of product cost</td>
</tr>
<tr>
<td><strong>Financing Assumptions</strong></td>
<td>- Debt finance is 12%, tenor: 5 years, moratorium: 1 year</td>
</tr>
<tr>
<td></td>
<td>- Debt – 70%, Equity 30%</td>
</tr>
<tr>
<td></td>
<td>- Tax rate – 32%</td>
</tr>
<tr>
<td><strong>Port Assumptions (Duties and VAT)</strong></td>
<td>- WACC – 16%</td>
</tr>
<tr>
<td></td>
<td>- Pioneer status (tax break) - 5 years</td>
</tr>
<tr>
<td></td>
<td>- Solar panels: 5%</td>
</tr>
<tr>
<td></td>
<td>- Batteries: 20.5%</td>
</tr>
<tr>
<td></td>
<td>- Inverters: 20.5%</td>
</tr>
<tr>
<td></td>
<td>- Charge controllers: 16.5%</td>
</tr>
<tr>
<td></td>
<td>- DC cables: 12.5%</td>
</tr>
<tr>
<td></td>
<td>- Mounting accessories: 12.5%</td>
</tr>
<tr>
<td></td>
<td>- Appliances: 15.5% – 20.5%</td>
</tr>
</tbody>
</table>
Localization of the Value Chain

Results show lowering tariffs and providing product subsidies have the largest impact on Nigeria’s ability to localize (assemble) key components of the upstream value chain.

**Import Tariff Waiver**
- **Import Price**: $577
- **Assembly Price**: $850
- **Assembly Price (with waivers)**: $776

**20% Product Cost Subsidy**
- **Import Price**: $577
- **Assembly Price**: $850
- **Assembly Price (with subsidy)**: $708

**Results & Impact**
- **Action**: Full import waiver on all solar components
  - **Product price** of SHS decreases by 9%
  - **Number of households** able to afford system increases by 73%
  - **Number of units required** for localization decreases from 505K to 461K units

- **Action**: 20% subsidy on product costs
  - **Product price** of SHS decreases by 17%
  - **Number of households** able to afford system increases by 140%
  - **Number of units required** for localization decreases from 505K to 421K units

*Modelled assembly price: price of a 50Wp SHS (battery and PV assembled in Nigeria) with table fan, TV and bulbs from a 20MW capacity plant; locally assembled components – battery & PV
- import tariff reduction: 0% on all SHS system components; cost of finance reduction: from 12% to 5%; CapEx investments: assumes investment in plant capacity from 20M to 100MW; product subsidy: 20% of cost of SHS; 20% sales margin
- Jobs created over 5 years for SHS and 10 years for mini-grids
- Number of households able to afford is based on Nithio/Fraym geospatial data for homes that can pay at least NGN 5,000 per month, assuming households can transfer 50% of discretionary spending to cover monthly payments
- Impact of localized manufacturing and other scenarios can be assessed from the economic model*
Localization of the Value Chain

Access to lower cost of financing and capital investments in plant capacity are also key enablers to the growth of a local upstream solar sector.

### Cost of Debt Reduction

<table>
<thead>
<tr>
<th>Action</th>
<th>Reduce the cost of debt from double digit 12% to 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results &amp; Impact</td>
<td>Product price of SHS decreases by 1%</td>
</tr>
<tr>
<td></td>
<td>Number of households able to afford system increases by 8%</td>
</tr>
<tr>
<td></td>
<td>Number of units required for localization decreases from 505K to 502K units</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Import Price</th>
<th>Assembly Price</th>
<th>Assembly Price (with lowered cost of debt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$577</td>
<td>$850</td>
<td>$842</td>
</tr>
</tbody>
</table>

### Increase in Plant Capacity

<table>
<thead>
<tr>
<th>Action</th>
<th>Increase in plant capacity from 20MW to 100MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results &amp; Impact</td>
<td>Product price of SHS decreases by 9%</td>
</tr>
<tr>
<td></td>
<td>Number of households able to afford system increases by 77%</td>
</tr>
<tr>
<td></td>
<td>Number of units required for localization decreases from 505K to 459K units</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Import Price</th>
<th>Assembly Price</th>
<th>Assembly Price (with increased plant capacity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$577</td>
<td>$850</td>
<td>$772</td>
</tr>
</tbody>
</table>

Modelled assembly price: price of a 50Wp SHS (battery and PV assembled in Nigeria) with table fan, TV and bulbs from a 20MW capacity plant; locally assembled components – battery & PV import tariff reduction: 0% on all SHS system components; cost of finance reduction: from 12% to 5%; CapEx Investments: assumes investment in plant capacity from 20M to 100M; product subsidy: 20% of cost of SHS; 20% sales margin Jobs created over 5 years for SHS and 10 years for mini-grids Number of households able to afford is based on Nithio/Fraym geospatial data for homes that can pay at least NGN 5,000 per month, assuming households can transfer 50% of discretionary spending to cover monthly payments. Please note the impact of cost of debt on SHS product price will be more pronounced on any one single distributor. The reason for the minimal impact here is because we have assumed one distributor for the whole country for the purpose of modelling; as such they are able to spread their interest costs over much larger units of SHS assembled.
The combined effect of the identified enablers on the local assembly of key solar systems components will make Nigerian pricing competitive, increase its export potential and reduce the time it takes to localize.

**Combined Impact of 4 Identified Enablers on SHS Price**

- **Import Price**: $577
- **Assembly Price**: $850
- **Import Tariff Waiver**: $776
- **Cost of Debt Reduction**: $769
- **Increase in Plant Capacity**: $700
- **Product Subsidy (20%)**: $560

**Results & Impact**

- **Product price** of SHS decreases by 34%
- **Number of households** able to afford system increases by 288%
- **Number of units required** for localization decreases from 505K to 333K units

Modelled assembly price: price of a 60Wp SHS (battery and PV assembled in Nigeria) with a table fan, TV and bulbs from a 20MW capacity plant; locally assembled components – battery & PV
import tariff reduction: 0% on all SHS system components; cost of finance reduction: from 12% to 5%; CapEx Investments: assumes investment in plant capacity from 20M to 100MW; product subsidy: 20% of cost of SHS; 20% sales margin

Jobs created over 5 years for SHS and 10 years for mini-grids

**Impact of localized manufacturing and other scenarios can be assessed from the economic model.**
The combined effect of the identified enablers on mini-grid tariffs will reduce the levelized costs of energy and promote investments in the sector.

### Combined Impact of 4 Identified Enablers on Minigrid Tariff

- **Assembly Tariff**: $0.78
- **Tariff Reduction Applied**: $0.63
- **Increase in Connections**: $0.57
- **Reduce Cost of Debt**: $0.48

Average Market off-grid solar hybrid Minigrid Tariff: $0.66

**Locally assembled components – battery & PV**

- Import tariff reduction: 0% on all system components
- Cost of finance reduction: from 12% to 5%
- CapEx investments: Increase in demand from 500K to 600K connections

*Impact of localized manufacturing and other scenarios can be assessed from the economic model.*
A small subset of local businesses have shown that localization is viable and are actively pursuing different pathways by investing in PV plant capacity, battery assembly and PCBs to increase scale, local content and business efficiency.

### Localization of the Value Chain

<table>
<thead>
<tr>
<th>Charge Controller and Solar PV</th>
<th>Solar PV</th>
<th>Printed Circuit Board (PCB)</th>
<th>Cables</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Charge Controller and Solar PV" /></td>
<td><img src="image" alt="Solar PV" /></td>
<td><img src="image" alt="Printed Circuit Board (PCB)" /></td>
<td><img src="image" alt="Cables" /></td>
</tr>
</tbody>
</table>

- Local battery recycling with short-term assembly plans
- Local assembly of a SHS
Recommendations
To successfully deliver on the objectives of the Solar Power Naija Programme and increase local participation in the upstream value chain, SEforALL is proposing a 4-focus theme:

**1. Focus on sharpening key enablers in existing policies to strengthen ease of doing business and industry attractiveness**

- Waivers for all solar system components
- Optimization of the implementation process for (1)**
- Access to finance, subsidies and grants
- Monitoring and reporting of local content in alignment with the National Content Development (NCD) for the power sector

**2. Provide access to data (energy audits & geospatial data) to enhance deployment execution, improve operator portfolio performance and reduce development costs**

- Access to geospatial data that capture consumers’ ability to pay in rural areas to improve operators' portfolio performances and increase willingness to continue to invest
- Access to energy demand studies to allow for accurate business planning for mini-grid developers

**3. Provide access to financing, subsidies & grants to scale the industry**

- Reserved access to FX at CBN to companies deploying solar solutions
- Access to low-cost naira financing
- Access to grants and subsidies to reduce product costs to the end consumer, improve portfolio performance and encourage investments

**4. Galvanize the private sector to make its counterpart investment especially in PV and battery assembly to reduce product costs and create jobs**

- Invest in quality PV assembly plants with tailored sizes to meet industry demand and specifications for both mini-grids and SHS i.e., lower wattage peak panels for SHS
- Promote the work of Auxano and Naseni to encourage new entrants and investors
- Encourage battery recyclers and assemblers to meet the demand of the rural segment

**Recommendations**

**Optimisation of the implementation process for waivers starts at the ports. Customs are generally observed to be one of the major bottlenecks in industry; a re-training, re-focused and accountable customs officials and processes must be put in place and monitored to make any progress in the industry.**
To successfully deliver on the proposed recommendations, the FGN must mitigate these potential risks:

### Quality Assurance

**Verification of Localized Products:**
Changing location or process of any component of the value chain requires recertification by major accreditation providers.

**Mitigation Measures for Consideration**
- Prioritize local verification lab in collaboration with internationally recognized certification accreditors i.e., Lighting Global
- Collaborate with accreditation providers to develop a fast-track recertification procedure

### Inconsistent application of import duties at port:

**Given the limited availability and competitiveness of raw materials for solar components, the port authority must be able to differentiate between input components and fully assembled systems.**

**Mitigation Measures for Consideration**
- Standardized manuals and trainings for the port officers
- Institute priority clearance at the ports to promote ease of doing business
- Tax exemptions specifically for local assembly or manufacturing capacity
- Solar Power Naija Programme secondment at the port to provide clear guidelines and instructions

### Local content “washing” and misrepresentation:

The FGN must be very clear at each “stage” of localization on the definition of local content in order to ensure systems are indeed creating value and jobs in Nigeria.

**Mitigation Measures for Consideration**
- Develop tailored monitoring and tracking framework tools for each stage
- Develop a specific goal and target for each stage
- Create an official communication channel for the government and private sector

### Local content requirements outpace sector’s ability to scale:

Overly stringent local content criteria could threaten the acceleration of off-grid solar electrification in the country.

**Mitigation Measures for Consideration**
- Establish a phased approach based on reassessment of the current market situation analysis
- Distributor-focused subsidy
- Purchase guarantees or quotas to reserve a share for local (manufactured/assemble) products in public procurements
- Carry out periodic surveys to determine the national content participation in the sector
## Immediate Next Steps

### Data Support
- Allotment of identified 7M homes ready for the Solar Power Naija Programme
- Provide data of homes’ ability to afford Tier 2
- Strategic support for REA and other private partners with data and intelligence from localization exercise

### Financing Support
- Continue to engage financiers and donors in support of the Solar Power Naija Programme
- Engage payment providers to ease after-sales operations

### “Broker Role”
- Delineate a dissemination strategy to ensure relevant stakeholders capture the learnings and recommendations from localization exercise
- Connect industry players with similar objectives who can benefit from already established industry enablers

### Integrated Energy Planning
- Develop integrated energy & COVID-19 vaccine distribution plan for Nigeria accessible online and usable by both public and private sectors
- Assist the government in evaluating the trade-offs of different approaches for rolling out a national COVID-19 vaccine, considering the constraints and opportunities around cold chain storage and transportation and their associated costs

### Continued and immediate support for the Solar Power Naija Programme

### General Support
## Annexure 1

List of companies engaged

<table>
<thead>
<tr>
<th>Category</th>
<th>Company</th>
<th>HQ</th>
<th>Market countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHS</td>
<td>Emel Solar Solutions</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
<tr>
<td>SHS</td>
<td>Smarter Grid International</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
<tr>
<td>SHS</td>
<td>Lumos</td>
<td>Netherlands</td>
<td>Nigeria, Cote D’Ivoire</td>
</tr>
<tr>
<td>SHS</td>
<td>D.Light Limited</td>
<td>USA</td>
<td>Nigeria, China, India, Kenya, Uganda</td>
</tr>
<tr>
<td>SHS</td>
<td>LightBox Solar</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
<tr>
<td>MG</td>
<td>NASENI</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
<tr>
<td>SHS</td>
<td>A4&amp;T Solutions</td>
<td>Nigeria</td>
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</tr>
<tr>
<td>SHS</td>
<td>Oolu Solar</td>
<td>Senegal</td>
<td>Nigeria, Senegal, Mali, Burkina Faso, Niger</td>
</tr>
<tr>
<td>SHS</td>
<td>Asolar</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
<tr>
<td>SHS</td>
<td>M-KOPA Solar</td>
<td>Kenya</td>
<td>Nigeria, Kenya, Uganda</td>
</tr>
<tr>
<td>SHS</td>
<td>Azuri Technologies Ltd</td>
<td>Nigeria</td>
<td>12 countries in Sub-Saharan Africa</td>
</tr>
<tr>
<td>SHS</td>
<td>Fenix International</td>
<td>Uganda</td>
<td>Nigeria, Uganda, Zambia, Mozambique, Cote D’Ivoire</td>
</tr>
<tr>
<td>SHS</td>
<td>Greenlight Planet</td>
<td>India</td>
<td>60+ countries</td>
</tr>
<tr>
<td>SHS</td>
<td>PAS Bboxx Ltd.</td>
<td>UK</td>
<td>9 countries in Africa</td>
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<tr>
<td>Assembly / Manufacture</td>
<td>Rural Spark</td>
<td>Netherlands</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td></td>
<td>Auxano Solar</td>
<td>Nigeria</td>
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<tr>
<td></td>
<td>Hirotec</td>
<td>Nigeria</td>
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<td>Spark Works</td>
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</thead>
<tbody>
<tr>
<td>SHS</td>
<td>Arnergy Solar Ltd.</td>
<td>Nigeria</td>
<td>West Africa</td>
</tr>
<tr>
<td>SHS</td>
<td>SOSAI Renewable Energies Company</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
<tr>
<td>MG</td>
<td>ACOB Lighting Technology Ltd.</td>
<td>Nigeria</td>
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<tr>
<td>MG</td>
<td>Community Energy Social Enterprise Ltd.</td>
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<td>Rubitec Nigeria Ltd.</td>
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<td>MG</td>
<td>PowerGen Renewable</td>
<td>Kenya</td>
<td>Nigeria, Tanzania, Sierra Leone</td>
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<tr>
<td>MG</td>
<td>Darway Coast</td>
<td>Nigeria</td>
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</tr>
<tr>
<td>MG</td>
<td>GVE Projects</td>
<td>Nigeria</td>
<td>Nigeria</td>
</tr>
</tbody>
</table>

### Description

- **Manufacturer**
  - LONGi Group: China
    - Chinese manufacturing companies that demonstrated interest in the Solar Power Naija project in Nigeria
  - Poly Solar: China
    - Multimodal manufacturing, assembly and service facility – Battery and Inverters

- **Other**
  - LADOL: Nigeria
    - Free Trade zone
  - Emerald Industrial CFZE: Nigeria

- **Government**
  - REA: Nigeria
    - Solar Power Naija implementing organization
  - FCDO (former DFID): UK
    - Potential international financing provider

- **Financier**
  - Interswitch: Nigeria
    - Payment company
  - Sterling Bank: Nigeria
    - End-user payment provider
About Auxano

Auxano Solar is a privately owned indigenous renewable energy solution provider with emphasis on solar energy. Dealing in the manufacture of solar panels, procurement, sales, design, installation and maintenance of solar inverter systems. Auxano began operations in 2016 with a 6.5MW annual capacity that was upgraded to 10MW with support from All On, USADF & BOI. With recent investment from All On, it plans to expand to 80MW installed capacity and is poised to supply at least 20% of the solar modules being used in Nigeria within the next 2-3 years.

Testimonials

“Before now I spent as much as N50,000 on a monthly basis for power but since I started using Auxano Solar, I've hardly spent N5,000, I make much saving using it.”
The Hirotec Solar Home System range seeks to enable a middle-income lifestyle at an affordable price point. Hirotec’s design philosophy of Affordable Prosperity ensures that all of its products could, for instance, power 12V cooling, or charge a laptop. Essential to Hirotec is that a product Made in Nigeria would also be Designed in Nigeria.

Hirotec has its own PAYG platform with both front-end and back-end software development run from Lagos and integrating with Nigeria’s fintech startups for payment processing. Thus, job creation and technical capacity building happen not just on the assembly floor but in engineering.

Hirotec’s cardboard packaging (retail and cartons) is also produced in Lagos and Hirotec is working with local injection moulding firms for its later phase.