

# EmPower Nigeria

Improving Nigeria's electricity supply industry through public education

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Supported by John D. and Catherine T. MacArthur Foundation

A Weekly Publication of

## Nextier

Advisory · Investment · Services

Vol. 1 Issue 14  
Oct. 11, 2017

Nextier Power is a consulting firm that provides policy advisory, investment advisory, and support services to the electricity supply industry. The firm aims to use this weekly publication to educate Nigerians on the intricacies of the Nigeria electricity supply industry on the assumption that a more informed public would advocate for the right policies and programmes which, in turn, would lead to a robust market that delivers the electricity needs of Nigerians. This column will cover everything from the basics of the industry to the more intricate, sometimes, complex policies and programmes.

# Solar Power 101: The Basics You Should Know

### Introduction

In the last two decades, solar energy has emerged as a globally sought-after source of power generation to complement power supply from non-renewable sources. Nigeria is specially placed at an advantage to benefit from solar energy as it receives about 6 hours of sunshine per day. According to a report by the European Union, Nigeria can theoretically achieve 42,700 MW of solar power from just 5 percent of suitable land in the Central and Northern.

### From Sunlight to Electric Current

In converting solar energy to electricity, specially designed solar panels with are positioned to receive direct exposure to sunrays. The rays trapped by the panels produce direct current. This direct current passes through a power inverter system to become electricity that is in turn used to power electrical appliances.

### Solar Market Segments

The solar market comes in all shapes and sizes which makes solar extremely adaptable to current needs. The two major segments are Off-Grid (renewables) and On-grid (national grid supply).

### Solar Off-Grid Market Segments

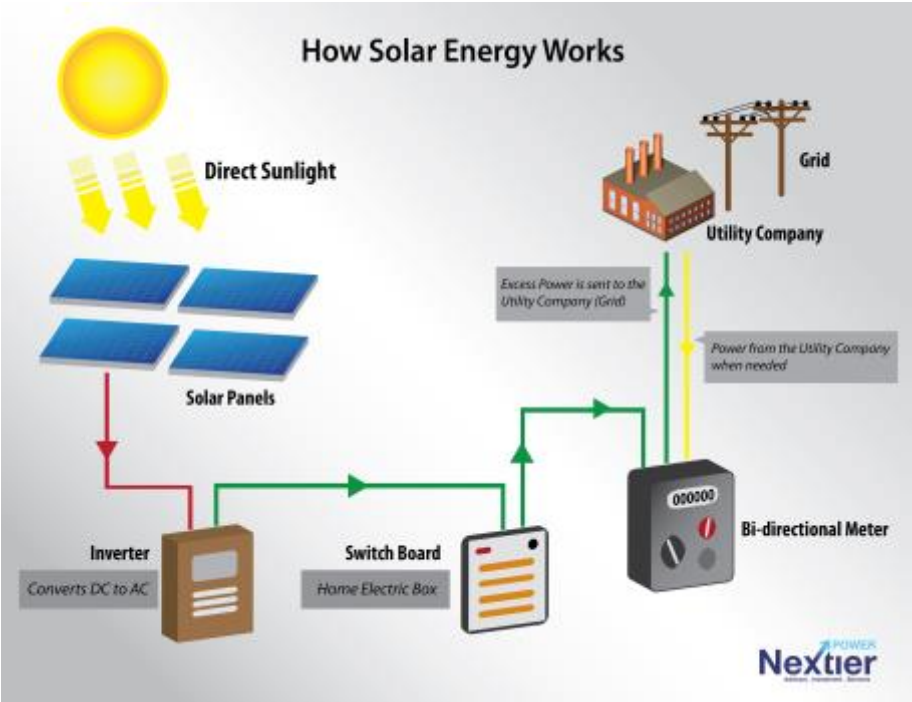
There is a growing demand for solar in comparison to the on-grid connection. The extent of demand has made Nigeria one of the largest emerging markets for small-scale solar power.

There are several types of renewable off-grid solutions:

**Pico-Solar:** Pico-solar solutions are made up of small capacity solar panels that can power lamps and light bulbs. Panels, batteries and charge controllers are usually inbuilt or attached to the devices to be powered.

**Stand-alone Solar Home Systems (SHS):** SHS are typically small technologies in the forms of solar panels mounted on the roof tops of houses in regions with the abundance of sunshine. The advantage of this technology is that the panels can be built in different sizes to satisfy different needs. Typically, these panels range from 5-volts to 15.5-volts or higher. The system could be modified to satisfy different energy requirements for off-grid communities.

**Urban Rooftop:** For such solutions, large solar panels on the rooftops of houses to provide power for them. Despite the high cost of this technology, there is a growing demand for this solution by the public for either powering their homes and businesses. The advantage of this system lies in its ability to power more household appliances compared to the other solutions. In developed economies, it is possible for individuals to sell excess power from their home systems to the grid. This is known as net metering.



**Mini-grids:** Sometimes referred to as a micro-grid or isolated grid, a mini-grid involves small-scale electricity generation (10kW to 10MW) which serves a limited number of consumers via a distribution grid that operates in isolation from electricity transmission networks. Typically, it can be set up to power a community without access to electricity. According to a report by the African Development Bank, Mini-grids have been identified with the potential of electrifying 14.3% of the Nigerian populace and creation of about 360,000 jobs within 3 years.

### Solar On-Grid Market Segment

For on-grid solar power, electricity is generated either through solar thermal or solar panels/plants and injected into the grid.

Integrating on-grid solar power generation to Nigeria's national grid is feasible and currently being developed. Nigerian Bulk Electricity Trading (NBET) company signed 14 power purchase agreements with independent solar providers. The total power output for the project is over 1000 MW. The on grid solar sub-sector suffers challenges that are similar to the non-renewable grid infrastructure. These constraints are:

- a. Inadequate transmission infrastructure.
- b. Liquidity challenges as a result of foreign exchange shortages, financial viability of Distribution Companies, etc.
- c. Limited availability of local Operations & Maintenance (O&M) experts, as well as asset management skills for Utility scale solar PV plants.

### The Cost of Solar Power

Just like every other source of electricity generation, the cost of generating electricity from solar power is divided into capital cost and operating cost.

### Capital Cost

In order to access power from the sun, the capital cost usually makes up the bulk of the total cost. This covers purchase of components such as the panels, charge controllers, batteries, inverters, cables as well as installation. Because many Nigerians cannot afford the bulk cost of installing solar home systems, companies such as Lumos have introduced models which allow customers to pay in bits, while enjoying the full benefits of the home systems. For mini-grids, the project developer bears the capital cost, while consumers pay for what they consume.

### Operating cost

Maintenance cost of solar systems are relatively little and are not incurred often. For instance, batteries may only need to be changed once in two to five years depending on the quality and lifespan of the brand. Other forms of maintenance such as cleaning of panels and servicing of inverters require very little cost to be accomplished.

### Retail Tariffs

For pico-solar, solar stand alone or rooftop systems, tariffs are not paid by the consumer since the capital costs have already been covered. However, for minigrid systems, the 'Multi-Year Tariff Order (MYTO) 2.1' calculation is the basic method applied to determine consumer tariffs. This tariff system allows and expects developers to recover both capital and operating costs.

### Efforts towards Improving the Nigerian Power Sector: The solar perspective

**Policy:** According to feed-in-tariff regulations approved by Nigerian Electricity Regulatory Commission (NERC), a total of 2,000MW is expected to be generated through renewables sources in Nigeria by 2020. DisCos will be obliged to source at least 50% of their total procurement from renewables. The

remaining 50% will be sourced from NBET.

Part of the policy win in the Renewable energy sector is the Mini-Grid Regulation. The regulation covers:

- **Isolated Mini grids (less than 100kW):** Only registration with the NERC is required for such small projects.
- **Isolated Mini grids (100kW – 1MW):** For mini-grids within this capacity range, only one permit is needed per location. Installations are required to have a distribution network complying with national standards to ensure that it can still be used on the arrival of a main grid.

**Technical Solutions:** Besides the Payment Assurance guarantee and other renewable generation support policies put in place by the government, there are also other plans to expand Nigeria's transmission grid wheeling capacity from 7 Gigawatts (GW) to 10GW by the year 2019. This increment is expedient if the National Renewable Energy Action Plan (NREAP) of the government involving the diversification of the generation mix is to be achieved.

**Quality Assurance:** Bodies like the Standards Organisation of Nigeria (SON), Nigeria Customs and Renewable Energy Association of Nigeria (REAN) exist to address this issue of standardisation. The lack of local manufacturers means that most of the equipment are imported and face fluctuations in the macro-economy. Therefore, there is high risk of importing substandard products to increase their profit.

### Conclusion

Undeniably, in the past few years, there has been substantial achievement in Nigeria towards revitalising the Nigerian power sector through renewable energy, especially through solar power. The Nigerian power challenge is real and needs to be addressed quickly; therefore, employing solar energy still remains the fastest, cheapest and safest solution to power situation. However, the efforts of every stakeholder must be intensified to yield maximum results.

### Author

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### Editor

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### Next Topics

Oct. 18	Solar: Identifying Challenges and Offering solution
Oct. 25	Power to the People
Nov. 1	Practical steps in achieving targets

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