Africa Clean Energy
Catalysing Africa's Solar Markets

TETRA TECH
International Development

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January 2021

Stand-Alone Off-Grid Solar NIGERIA

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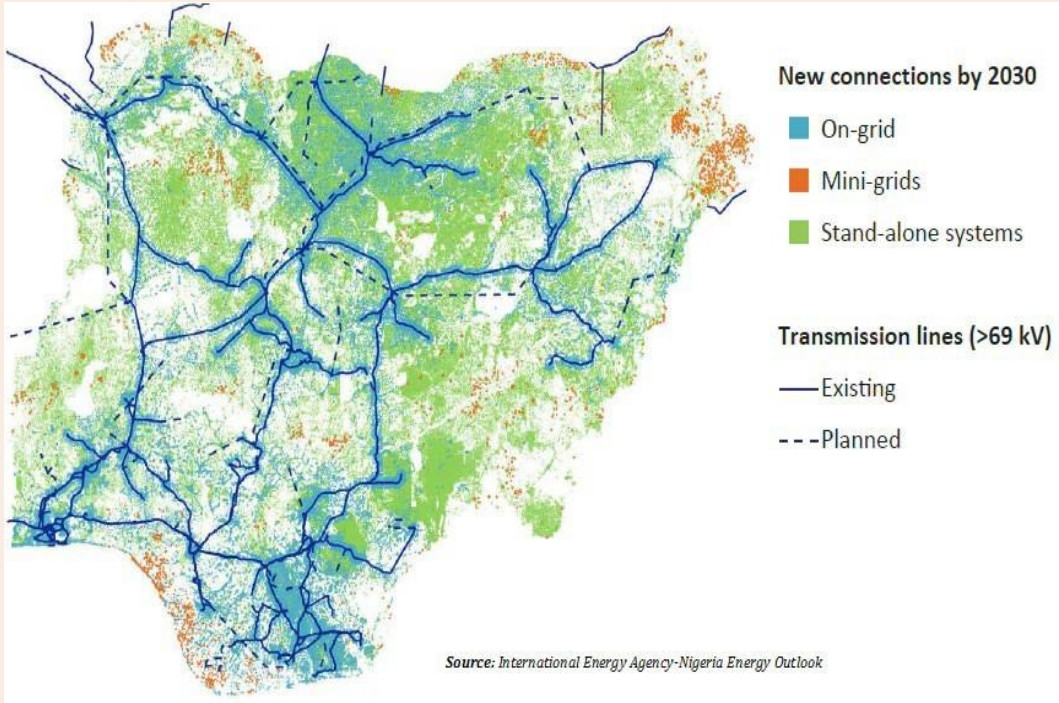
Nigeria OGS Opportunity



Source: International Energy Agency-Nigeria Energy Outlook

77 Million are unelectrified.

By **2030,** the national grid will be unable to reach all Nigerians.

The government plans to achieve **100% electrification** by **2040**, with **5%** via **stand-alone solar (SAS).**

The SAS sector has witnessed significant growth - **324,000 SAS units** sold in 2019,up from negligible sales five years earlier.

The OGS market opportunity is estimated at USD **9.2 billion** per year,

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Introduction Objective and Methodology

Objective

This research provides industry stakeholders with an **insightful and up to date overview on the development of the SAS market** with specific consideration for if, and how, communities have gained access.

Methodology

Quantitative and qualitative data collection in rural, peri-urban, and urban areas across 10 states – Oyo, Ekiti, Abia, Ebonyi, Edo, Plateau, Cross River, Kogi, Bauchi, and Kano

Quantitative

Census of all trade outlets within mapped out areas, followed by 'deep dives' of sampled SAS-dealing outlets, specialised technician shops, and consumers (households and MSMEs).

Qualitative

In-depth interviews with SAS traders, solar companies, MFIs, local cooperatives, NGOs, and government.

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Introduction | Objective and Methodology

SAS Products Evaluated

Solar Lanterns:
Single-piece solar lantern with an integrated solar panel or connected solar panel. Typically with capacity of 10W or less.

Solar Home System:
A complete integrated unit including a solar panel, multiple lighting points, control unit, and associated DC appliances. Typically, between 10W – 350W.

Solar Panels:
A solar panel that is independently sourced and coupled with other components such as batteries, charge controllers, inverters, and wiring into a solar power solution. Capacity varies with design.

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Key Findings SAS Distribution Channels

Trade Vs Non-trade

Trade channels - trader shops, electronic stores, and general stores that stock solar products - and non-trade channels - solar companies, SAS brand representatives/agents, last mile distributors, alternative channels such as MFIs - **are largely parallel markets.**

Just 13.6% of potential trade outlets for SAS products are actually stocking SAS, pointing to an **86.4% opportunity to expand the SAS market.**

Trade channels seem to be the main source of SAS distribution, however **non-trade channels are increasing penetration** particularly through agent networks.

Solar lanterns have higher sales in trade channels than SHS and panels. **The SHS market remains largely untapped.**

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Key Findings SAS Distribution Channels

Product Penetration

High SAS penetration tends to correlate with low grid connection rates, but not always.

SAS use is higher in peri-urban areas (72%) than rural areas (22%) by both households and MSMEs despite more demand in the latter. **Imbalanced access means the rural poor pay more** to access SAS products and after- sales services.

27% of households use SAS products. Nearly a third of them also have generators, and others use kerosene lamps, candles, or firewood for lighting. **Solar is playing a backup role for households.**

Consumer Preference

66% of consumers surveyed have **multiple uses of SAS** mainly phone charging, lighting, and powering television and radio.

Affordability, safety, trust, availability, and **quality drive consumer product choice.** Consumers rely on trader recommendations as well.

Trader's choice of SAS products to stock are **driven by customer preference, profit margin, and supplier recommendation.**

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Key Findings Product Characteristics

Product Penetration

Most traders believe there is moderate to **high presence of SAS product counterfeits**, mainly in urban areas.

Less than 50% of traders can identify a quality product, with 44% of **traders having no knowledge of any solar product quality standards.**

Traders judge quality by **assessing certain product features** including the availability of a warranty, or performance.

Consumers are largely unable to identify a quality product. Those that did judged a product's quality product by the presence of a warranty.

Quality and pricing vary widely presenting a confusing market for customers. Major price discrepancies for what appears to be the same product point to the prevalence of counterfeits.

Lack of quality verification can either mean a product is poor quality or has not (yet) been tested. The popularity of some non-quality verified brands may warrant the need for quality testing.

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Key Findings Financing the SAS Trade

Supply Financing

Financing within the trade supply chain is **available at low levels**.

Just 17% of traders have received supply credit and only **4% have secured any form of financing** – mainly from MFIs and commercial banks. Most traders are not aware of financial institutions that offer financing.

Loan amounts vary between 50,000 - 1,000,000 Naira (GBP 87 -1,757) with short repayment periods. Traders tend to use their land title deed or product stock as collateral.

Consumer Financing

SAS sales are almost exclusively in cash, not credit, with the full cost paid upfront in most cases.

Where credit or consumer finance is available, **repayment periods vary** dependent on the source – If credit from traders, typically 1 month. If from MFIs, typically 6, 9, or 12-month period with average monthly interest of 3.2% plus a 10% processing fee.

In instances of default, traders cited loss of income as the primary reason. Other reasons include competing priorities (37%), poor product performance (24%), and interest rate (16%).

PAYG is gaining traction for consumer financing of SHS products.

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Key Findings | Financing the SAS Trade

After-Sale Service

| Technical Support / Repairs

After-sales service for SAS is low which could potentially be impacting the perception of their value.

Consumers rely on independent technicians for installation and repairs.

Most technicians that offer solar services are self-taught or have learned through apprenticeship. There are **few specialised solar technicians.**

E-Waste

| E-Waste

Few consumers have an e-waste disposal plan for their end-of-life products – pointing to a possible glut of e-waste.

Nearly **half of all traders have experienced faulty products**. Disposal plans include return to supplier, sale as scrap, or disposal as general waste.

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Key Findings Gender and Social Inclusion

SAS products are not reaching the most vulnerable – the rural poor, women and persons with disabilities (PWDs) – at scale. It remains a largely middle-class product with higher rates of usage among the youth, showing nascent opportunity for PAYG.

Both the trade and consumer side of the SAS market are male-dominated. Women and PWDs constitute just 30% of SAS consumers. In the trade, women account for only 4% of SAS traders and 20% of trade employees surveyed. PWDs are severely underrepresented.

There is preference in giving credit to male consumers (22%) versus female (5%) consumers by traders.

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General Recommendations

Government:

Collaborate with both trade and non-trade businesses to reach rural areas,

- Provide end user subsidies or tax waivers to incentivise quality SAS products particularly in rural areas.
- Develop localised policies and strategies that promote SAS electrification.
- Enforce quality standards for solar products at the point of import and in the market.
- Public awareness and education on electrification through SAS and its socio-economic benefits.

Improve SAS affordability through,

- Allocate subsidies and fiscal privileges for SAS as with the grid and fossil-fuel sectors including import tariff waivers.
- Improve PAYG and alternative consumer finance models, and scale Payment Service Banks which benefit SAS.
- Provide soft low-interest loans to traders and end users for SAS.

Facilitate workforce development particularly in the trade, through,

- Allocate subsidies and fiscal privileges for SAS as with the grid and fossil-fuel sectors including import tariff waivers.
- Improve PAYG and alternative consumer finance models, and scale Payment Service Banks which benefit SAS.
- Provide soft low-interest loans to traders and end users for SAS.

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General Recommendations

Private Sector

There is substantial untapped market opportunity for SAS companies to distribute through **mainstream trade channels** as these **offer** an under-utilised, **high-potential opportunity** for the private sector coupled with latent demand in rural areas. Exploring opportunities with trade channels can increase SAS delivery, and presence of quality products in the trade channels. The industry association, the Renewable Energy Association of Nigeria (REAN), can facilitate engagements with trade associations across the country.

Market development organisations and geospatial data providers can provide granular trade data to help solar companies **identify potential expansion opportunities.**

Donor partners and multilateral finance institutions should **design results-based financing (RBF) or other grant funding tools that specifically incentivises development of trade relationships** alongside targeted technical assistance programmes to improve awareness of quality or investor readiness support.

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Stakeholder Action

The following are areas for action and support, and the actors who could lead such efforts, to build the SAS market and improve the value and experience of solar for vulnerable populations:

1 A multi-faceted effort to boost the prevalence and awareness of quality products: Technical Support / Repairs

Area	Action	Led by	Secondary Support
Quality standards	Enforce quality standards at points of import and the retail chain	Standards Organisation of Nigeria; Nigeria Customs Service	Rural Electrification Agency; Industry association
	Expand quality testing to popular non-LG QV products to access quality and potentially certify them for the market	Standards Organisation of Nigeria	VeraSol; Donor / Development partners
Capacity building	Training and guidance to traders alongside product demonstration to build capacity on identifying quality, financing, consumer education and providing after-sales service	Standards Organisation of Nigeria	VeraSol, development partners, industry association
	Provide ongoing vocational training as well as free remote modules, possibly through e-learning or other media, to disseminate brand-agnostic guidance	Standards Organisation of Nigeria, Vocational training centres,	Development partners, industry association, NGOs
Consumer awareness	Consumer awareness campaigns to sensitise on the benefits of SAS products including identifying quality products, financing options, productive uses, e-waste management, and other benefits	Industry Association; Donor / Development Partners	VeraSol; Rural Electrification Agency; Consumer Protection Council
GESI	Target women, youth and vulnerable groups to sensitise on SAS products, encourage utilisation, and highlight empowerment opportunities	Donor / Development partners; Rural Electrification Agency; Federal and state government MDAs on gender and social inclusion	Industry Association; relevant NGOs

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Stakeholder Action

2 Recognition of the important role of both trade and non-trade distribution channels in reaching the last mile / under-served populations, and the various pros and cons of each vis-à-vis consumer trust, financing, and after-sales services:

Area	Action	Led by	Secondary Support
Retail Penetration	Facilitate partnerships between solar companies, brand owners, and traders (distributors and retailers) to increase delivery of SAS products particularly in rural communities, as well as the inflow of quality products in the trade channel.	Industry association	Donor / Development Partners
	Build out non-trade distribution options - such as MFIs, cooperatives and social groups - that have closer access to rural communities. They can be explored as partners / representatives / franchises for solar companies and brand owners	Industry association	Donor / Development Partners
Supply chain & consumer financing	Facilitate partnerships between investors, financiers, and MFIs to increase supply finance for traders and consumer finance for consumers in order to scale delivery and improve affordability	Industry association	VeraSol, development partners, industry association
	Provide incentives, such as results-based financing, end-user subsidy, or tax waivers, to encourage solar companies, brand owners, and traders expand to rural and more vulnerable areas	Rural Electrification Agency, relevant federal and state government MDAs	Donor / Development partners; Industry Association
Policy & regulatory reform	Improve digital payment solutions such as PAYG, for SAS products, and alternative consumer financing models	Central Bank of Nigeria, Rural Electrification Agency	Donor / Development partners, Industry association

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Impact Of Covid-19 On SAS Trade

Most traders (87%) were negatively impacted by the covid-19 pandemic between March and May 2020. Impact included the higher cost of stock (52%), business closure due to curfew and lockdowns (46%), reduced patronage (41%), reduced training hours (38%), and challenges in restocking (38%).

Similarly on the consumer side, **72% of households and 58% of MSMEs reported a "slight to significantly worse" impact of covid-19 on energy costs** and access to SAS products.

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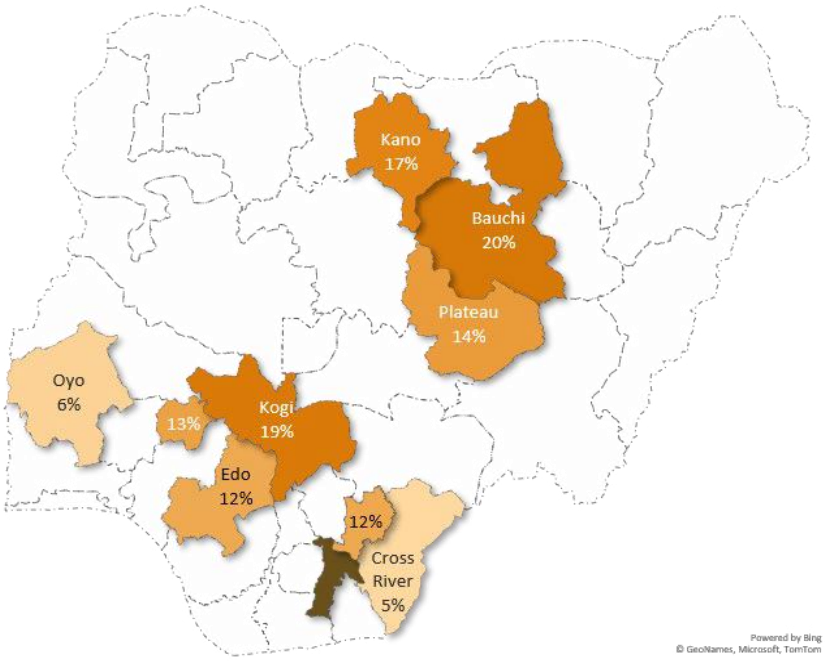
Supply Penetration Geographic Trends

Opportunity to expand the SAS market across the country such as Oyo, Cross River., Bauchi and Plateau



SAS Penetration (%)

5% 40%

Zone	State	Trade outlets counted	Solar penetration	Grid	Population estimate
SW	**Oyo**	**2,973**	**5.7%**	**67%**	**7,840,864**
	Ekiti	887	13.0%	93%	3,270,798
SE	Abia	1,015	32.3%	82%	3,727,347
	Ebonyi	925	12.1%	39%	2,880,383
SS	Edo	1,267	11.8%	82%	4,235,595
	Plateau	**1,254**	**13.9%**	**36%**	**4,200,442**
NC	**Cross River**	**1,004**	**4.9%**	**57%**	**3,866,269**
	Kogi	820	19.4%	63%	4,473,490
NW	Kano	2,429	17.3%	52%	13,076,892
NE	**Bauchi**	**661**	**19.7%**	**29%**	**6,537,314**
	TOTAL	**13,235**	**13.6%**		

State by state comparison of SAS penetration, grid electricity and population estimates

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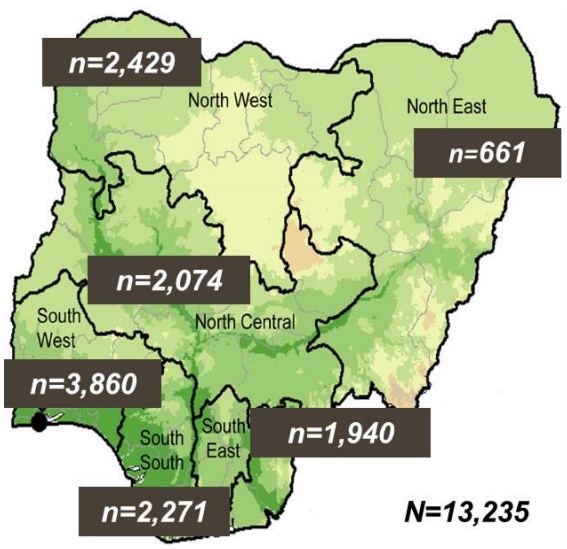
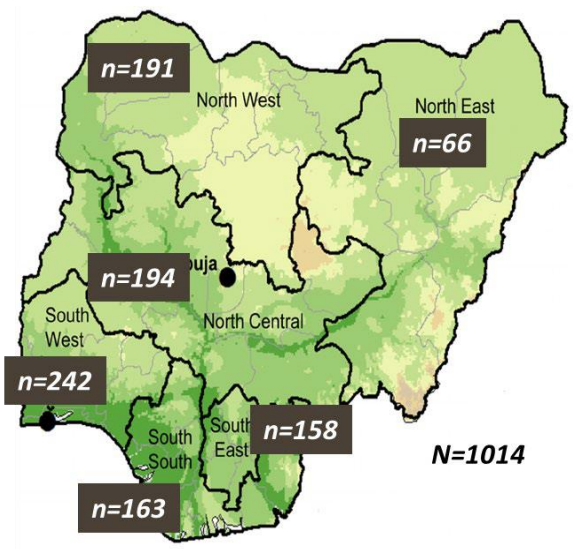
Summary Methodology Trade Census, Product Deep-dive & Consumer Survey

TRADE CENSUS



DEEP DIVE



CONSUMER SEGMENT

	Consumer	MSME
Total	665	222
Oyo	97	19
Ekiti	64	34
Abia	47	20
Ebonyi	71	21
Edo	38	20
Plateau	73	21
Cross River	73	18
Kogi	90	26
Kano	65	23
Bauchi	47	20

- Market potential
- Solar penetration
- Product incidence

- Product offering and source
- Brand penetration

- Product / brand usage
- Usage experience
- User profiles