

Stand Alone Solar (SAS)

MARKET UPDATE

Nigeria

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Africa Clean Energy
Catalysing Africa's Solar Markets



TETRA TECH
International Development





Foreign, Commonwealth and Development Office (FCDO) Africa Clean Energy Technical Assistance Facility

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The Nigeria Stand-alone solar Market Update is one of a series of 14 national briefings published by the Africa Clean Energy (ACE) Technical Assistance Facility (TAF) to give stakeholders a snapshot of recent developments in the stand-alone solar sector, including those arising from the COVID-19 pandemic.

The Africa Clean Energy (ACE) Technical Assistance Facility (TAF) is a 4-year programme aiming to catalyse a market-based approach for private sector delivery of renewable energy electrification technologies, with a focus on high-quality stand-alone solar (SAS) systems. Funded by the UK Government through the Foreign, Commonwealth and Development Office (FCDO), and implemented by Tetra Tech International Development, ACE TAF is working in 14 African countries:

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
A2EI	Access to Energy Institute
ACE TAF	African Clean Energy Technical Assistance Facility
AFDB	African Development Bank
AMDA	African Mini-Grid Developers Association
ANED	The Association of Nigerian Electricity Distributors
ATM	Automated Telling Machine
BDCs	Bureau de Changes
CAC	Corporate Affairs Commission
CAMA	Companies and Allied Matters Act
CBN	Central Bank of Nigeria
CET	Common External Tariff
CFAL	Climate Finance Advisory Ltd.
COVID 19	Corona Virus Disease 2019
CTH	Clean Technology Hub
DFI	Development Finance Institution
DFC	US International Development Finance Corporation
DISCOS	Electricity Distribution Companies
EAE	Energy Access Explorer
ECOWAS	Economic Community of West African States
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
EMRC	Energy Market and Regulatory Consultants
ESP	Economic Sustainability Plan
EPR	Extended Producer Responsibility
FBN	First Bank of Nigeria
FCMB	First City Monument Bank
FIRSC	Federal Inland Revenue Service
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOGLA	Global Off-Grid Lighting Association
GW	Giga Watt
IFC	International Finance Corporation
IMF	International Monetary Fund
KW/kWh	Kilowatt/ Kilowatt per hour
MNOSs	Mobile Money Operators



Acronym	Definition
MPR	Monetary Policy Rate
MSMEs	Micro, Small and Medium Enterprises
MYTO	Multi Year Tariff Order
NCEEC	National Centre for Energy Efficiency and Conservation
NCIC	Nigeria Climate Innovation Centre
NDC	Nationally Determined Contribution
NEMSA	Nigeria Electricity Management Services Agency
NEP	Nigeria Electrification Project
NERC	National Electricity Regulatory Commission
NESP	Nigeria Energy Support Programme
NESREA	National Environmental Standards and Regulations Enforcement Agency
NIBSS	Nigerian Inter-Bank Settlement Scheme
NOMAP	Nigeria Off-Grid Market Acceleration Programme
NREAP	National Renewable Energy Action Plan
NREEEP	National Renewable Energy and Energy Efficiency Policy
PA NPSP	Power Africa Nigeria Power Sector Programme
PAYG	Pay As You Go
PSB	Payment Service Bank
REA	Rural Electrification Agency
REAN	Renewable Energy Association of Nigeria
REEP	Renewable Energy and Energy Efficiency Partnership
REF	Rural Electrification Fund
RESIP	Rural Electrification Strategy Implementation Plan
RETTI	Renewable Energy Technology Training Institute
REUCS	Rural Electricity Users Cooperative Society
SAS	Stand-alone solar
SACCOs	Savings and Credit Cooperatives
SERC	Sokoto Energy Research Centre
SHS	Solar Home System
SIGMAT	Regional Customs Network for Transit Trade
SONCAP	Standard Organisation of Nigeria Conformity Assessment Programme
SPOI	Special Point of Integration
SUNREF	Sustainable Use of National Resources and Energy Finance
UKNIAF	United Kingdom Nigeria Infrastructure Advisory Facility
ULAB	Used Lead Acid Battery
UNECA	United Nations Economic Commission for Africa
USAID	United States Agency for International Development
VSLA	Village Savings and Loans Association
WRI	World Resources Institute



EXECUTIVE SUMMARY

Nigeria has witnessed major political and economic changes in the last year. Volatility in the oil markets, an unstable foreign exchange rate, and rising inflation have led to dwindling national revenues and increased costs of living across the country. These problems have been exacerbated by the COVID-19 pandemic that has crippled the world's economy and impacted Nigeria's revenue, leading to the recent admission by the Nigerian government that the country is officially in a recession.¹

Since the conclusion of the 2019 general elections, and more particularly between June 2019 and December 2020, the Nigerian power sector has seen changes that include the unbundling of the Federal Ministry of Power from the Federal Ministry of Works and Housing, as well as major leadership changes in the Federal Ministry of Power, the Rural Electrification Agency (REA) and the National Electricity Regulatory Commission (NERC).

Nigeria's first case of COVID-19 was announced on February 27, 2020 by the National Centre for Disease Control (NCDC).² With numbers growing, the country initiated a lockdown in March that led to the shutdown of all but essential activities between March and June 2020.³ **The lockdown led to a significant reduction in electricity demand** from industrial and commercial customers,⁴ and an increased recognition of the role of stand-alone solar in powering healthcare facilities, as well as homes and small businesses.⁵ The addressable market for SAS in the country remains one of the largest in the world, with approximately 77 million people currently without access to electricity.⁶ Over 17 million more Nigerians have fallen below the poverty line⁷, mostly in rural areas which has led to interventions such as the Central Bank of Nigeria's Stimulus Package and the Nigeria Economic Sustainability Plan to curb the effects of COVID-9 in the country.

GOGLA reports that **the SAS sector saw a 28% drop in sales** between January and June 2020 compared to the second half of 2019, and this adversely affected the cash flow of most stand-alone solar companies. Most of this decrease came from direct cash sales, whilst pay-as-you-go (PAYG) remained unchanged,⁸ though there was an increase in the number of defaults. Solar companies have been forced to adopt strict cash management control to reduce their overheads, including laying off some staff and instituting pay cuts.

The Nigerian stand-alone solar market has seen the exit of Mobisol following its acquisition by ENGIE in September 2019.⁹ There has also been an increased focus on productive use by companies such as Consistent Energy, Sosai Renewables, Cold Hubs and Arnergy who are meeting growing consumer demand for larger systems.

Membership in the **Renewable Energy Association of Nigeria (REAN) has grown**. From an original membership of 20 in 2016 it now consists of 125 stakeholders, and has set up internal committees on both SHS and mini-grids to address challenges affecting the sub-sectors. REAN has developed a used lead acid battery (ULAB) policy for its members, a research document on driving local content in the renewable energy sector, and an assessment report on unlocking access to local funding channels.

Government agencies such as the REA, the Central Bank of Nigeria (CBN), and the Federal Ministry of Finance through REA have promoted stand-alone solar related initiatives such as the addition of a COVID-19 component in the Nigeria Electrification Project (NEP) that involves powering healthcare centres around the country using SAS¹⁰, and development of the 5 Million Solar Connections Facility, now called the Solar Power Naija Programme,¹¹ and deployment by REA of over 120,000 Solar Home Systems under the SHS components of the Nigeria Electrification Programme (NEP) and the Rural Electrification Fund (REF).

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In the financing space, the sector still remains largely driven by foreign investments, though there has been a gradual increase in domestic funding by commercial banks.¹² To meet significant market need, **the stand-alone solar market has attracted approximately USD 227 million** from a range of investors between 2015-2020.¹³ The Sustainable Use of Natural Resources and Energy Finance (SUNREF) programme was launched in September 2020,¹⁴ while All On (investment company) set up a N180 million (USD 382,980)¹⁵ COVID-19 solar relief fund distributed as grants to four SAS companies (Auxano, Arnergy, GVE and Lumos) to power emergency healthcare centres across the country.¹⁶

In terms of consumer financing, **several microfinance banks are offering end-user solar loans** for household or commercial use.¹⁷ The Nigerian Off-Grid Market Access Program (NOMAP) and Swifta are working to expand the application of PAYG with the development of a single point of integration (SPOI) for PAYG collection from last mile unbanked customers.¹⁸ Currently, telco super agents and payment service banks (PSBs) are being integrated into the SPOI system.¹⁹ There has also been a noted increase in mobile payments between May 2019 and January 2020.²⁰ However, since the initial release of the PSBs guidelines in 2019, only three companies have been licensed.²¹

Barriers still hinder growth of the SAS market in Nigeria, especially in light of the pandemic. Some of these challenges include: limited consumer awareness; limited access to finance; low female participation throughout the value chain; foreign exchange volatility risks; lack of verifiable, accurate data; and insufficient skilled personnel to assemble, install and maintain solar products. To address some of these barriers, development partners including the Foreign, Commonwealth & Development Office (FCDO), United States Agency for International Development (USAID)/Power Africa, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the World Bank and the African Development Bank (AFDB), and Heinrich Böll Foundation are providing financial and technical assistance to the sector. The country also managed to move up 15 places (to position 131) on the World Bank's Ease of Doing Business Ranking.

Several training and educational institutions have been established by government agencies and private companies such as National Power Training Institute of Nigeria (NAPTIN) Renewable Energy Training, Rubitec Solar Academy, Greco Academy, Renewable Energy Technology Training Institute (RETTI) amongst others.²² Clean Technology Hub (CTH) and the Nigerian Climate Innovation Centre (NCIC) under the All On and United States African Development Foundation (USADF) supported Off-grid Renewable Energy Enterprise Development Programme have **successfully incubated over 40 off-grid renewable energy start-ups** independently. All On is currently investing in 15 of them over two cohorts.²³

With the continued implementation of various stand-alone solar initiatives by the Federal Government of Nigeria, including the recently launched Solar Power Naija programme and increased financial inclusion of the unbanked population through the availability of more PSBs in the country, **the SAS sector has the potential for significant growth** in the next three to five years.

12. Access and WEMA Banks are teaming up with the Ministry of Environment to domesticate the NDC with the assistance of the UK Government – where the Africa Green Funds Partial Risk Guarantee for green and renewable projects will be disbursed through them and will be administered by CFA and Vetiva Capital. The programme is being warehoused by the NESG, Sustainability Policy Commission.

13. ACE TAF (2021) Nigeria Stand-alone Solar Investment Map (not yet published)

14.

15. Exchange rate: 1 USD/N470 as at the mid-year point in July 2020. This is the parallel market rate; the official bank rate was around N360/USD 1.

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18. NOMAP (2020). Off-grid donor stakeholder meeting. Unpublished.

19. *ibid.*

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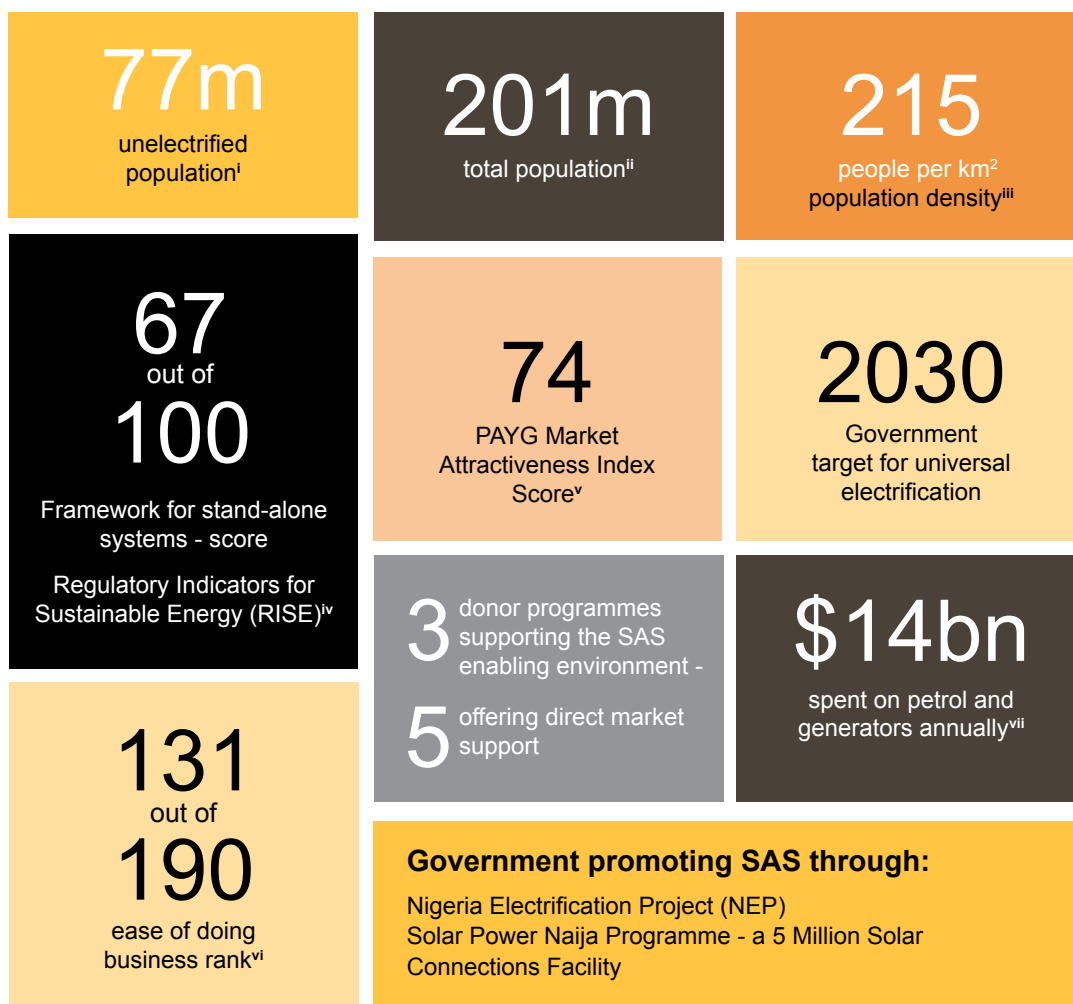


Figure 1: Nigeria at a glance

- i. International Energy Agency (2019)
ii. World Bank (2018)
iii. World Bank (2019)
iv. ESMAP (2019)
v. Lighting Global (2019)
vi. World Bank (2020)
vii. Nairametrics (2020). Nigerians spend \$14 billion on generators, fuel.

1 NATIONAL OVERVIEW

1.1 Current Context

The Nigerian political and economic landscape has undergone major changes since the last quarter of 2019, mainly as a result of the volatility in the oil markets caused by fluctuations in crude oil prices and production. This has led to dwindling revenues for Nigeria and has increased the cost of living. These events have been exacerbated by the COVID-19 pandemic, which has caused shocks to global and local markets. In 2019, Nigeria recorded an economic growth of 2.2 per cent.²⁴ World Bank forecasts suggest that due to COVID-19, the country's GDP was projected to shrink 4 per cent by the end of 2020 and pick up to 1.1 per cent in 2021, subject to post-pandemic global economic recovery.²⁵

The Nigerian power sector, like all other sectors, has been negatively impacted. The government's COVID-19 response shut down of all but essential activities across the country between March and June 2020. As a result, electricity demand from industrial and commercial customers declined significantly, while residential and healthcare sectors saw an increase in demand.²⁶

There have also been changes across major government agencies in the power sector, particularly after the February 2019 general elections. In a significant reorganisation in August 2019, the Federal Ministry of Power was unbundled from the Federal Ministry of Works and Housing. New Ministers of Power and State Power were appointed.²⁷ The leadership of

REA, the National Electricity Regulatory Commission (NERC), and Nigerian Bulk Electricity Trading Plc (NBET) all changed in 2020.

In the early stages of the pandemic, Nigeria entered a partial lockdown in three states (Lagos, Ogun and Abuja FCT), and this extended to other states in different phases. The lockdowns, initially for six weeks, were extended by an additional two weeks.²⁸ The Central Bank of Nigeria (CBN) launched an intervention fund to help SMEs cope during this time. In addition, the Federal Government included off-grid energy companies in the country's Post-COVID Economic Recovery Plan²⁹ through the 5 Million New Solar Connection (Solar Power Naija) Facility.³⁰ A phased increase of the electricity tariff by the electricity distribution companies (DisCos) that was to come into effect in January 2020 was delayed several times (for public and stakeholder consultations, and also as a result of COVID-19 to avoid placing additional burden on electricity consumers) before finally being implemented on November 1, 2020.³¹

Nigeria moved up 15 places (to position 131) on the World Bank Ease of Doing Business Ranking largely due to reforms by the Federal Government, including some that impact the SAS sector such as reduction of time needed to register a company, and reduction of export and import time through an upgraded electronic system and e-payment for fees.³²



Naira fell 32% against
the USD between
Jan-Dec 2020



After shrinking in 2020,
GDP forecasted to pick up
1.1% in 2021

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29. Olisah Chike (May 2, 2020).

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Impact of Covid-19 on the Nigerian economy and the SAS sector



Revenue: There was a significant drop in energy demand by commercial and industrial customers whose tariffs are usually higher than those for households. This put a strain on the sector revenue and lowered the cost of power in the wholesale electricity market.³³



Liquidity/collection: Lack of funds to settle electricity bills due to dwindling household and business income.³⁴



Foreign exchange: Dwindling government revenue from crude oil and gas sales impacted foreign exchange reserves. This may impact the power sector's ability to meet its foreign denominated obligations.³⁵ The foreign exchange rate fell to N477/USD1 in December 2020 in the parallel market from N362/USD1 in January 2020.³⁶ The CBN has attempted to remedy the situation by resuming dollar sales to Bureau de Changes (BDCs) and business travellers as well as placing restrictions on forex transfers between third parties.³⁷ This situation affected the availability of foreign exchange to SAS providers.



Interest rate: The Monetary Policy Rate (MPR), which refers to the rate at which the CBN lends to commercial banks, was adjusted further downward to 11.5 per cent in September 2020 to help stabilise the economy.³⁸ The MPR had been pegged at 14 per cent for over 31 months from July 2016 and revised downward periodically starting in March 2019.³⁹



Delays in SAS deployment: During the lockdowns SAS companies were severely constrained in product distribution due to increased difficulties in accessing imported equipment and project sites.⁴⁰



Inflation rate: The inflation rate increased from 12.13 per cent in January to 15.75 per cent in December 2020. This led to an increase in the price of consumer goods as trade borders were closed and interstate travel banned.⁴¹



Poverty rate: The national rate of poverty increased 8.7 percentage points from a base of 43.5 per cent, which equates to 17 million more people falling below the poverty line during lockdown.⁴² Although the percentage increase in poverty is higher for urban areas, rural households account for a larger share of the population, and as such the majority of people that fell into poverty during this period.

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34. *ibid.*

35. *ibid.*

36. *Nairametrics (2020), Exchange rate gains at black market, as Naira is to stabilize this week*

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39. . See also

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Mobile money: Mobile payments increased as a result of the use of paper money being viewed as a health risk.⁴³



Increased demand for SAS products: There was an increased demand for SAS products as households stayed inside during the lockdown, but most solar companies could only distribute existing inventory due to import restrictions.⁴⁴



Healthcare electrification: There has been increased recognition of the role of solar in powering healthcare facilities, with several projects supported by the government⁴⁵ and All On.⁴⁶

1.2 Energy Access

Despite an installed capacity of 13,000MW, a range of challenges constrains available power output to 5,500MW, a slight improvement from 4,500MW in 2015.⁴⁷ This does not meet the country's demand for electricity.

The government has shown commitment to improve the country's electricity access through increased use of SAS products in rural electrification projects. However, the total installed capacity for solar in the country

remains negligible and there is still no harmonised way of calculating how much electricity is generated from solar as renewable energy projects are largely carried out independently by developers under varying grant-based projects, humanitarian schemes, and a few commercial projects. As of December 2020, the REA, in tracking its progress on the Nigeria Electrification Project (NEP), had deployed 105,161 SHS systems across the country.⁴⁸



"Unelectrified population of 77 million (15.4 million households)⁴⁹



Grid tariff per kWh
Average N62 (USD0.13).
Prior to November 2020 it was N30 (USD0.06)⁵⁰



Average grid usage
150 kWh per capita⁵¹

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2 DEMAND-SIDE: CONSUMER INSIGHTS

There are an estimated 201 million people in Nigeria,⁵² out of which about 77 million are currently without access to reliable power (grid or otherwise) – thus making the country one of the largest potential markets for SAS globally.⁵³ There remains a big market among grid-connected customers as only 25 per cent of them receive at least four hours of daily power.⁵⁴ These off-grid and underserved markets exist all over the country, across economic status and geographic area. For example, the south-west, which has the highest grid connection rate at over 80 per cent, still has as high a demand for SAS products as the north-east, which has the lowest connection rate at 25 per cent.⁵⁵ SAS users can be found in both rural and urban areas.

2.1 Willingness and Ability to Pay

Nigerians pay high costs on self-generation of lighting and power. Both urban and rural consumers pay as much as N62-94 per kWh (USD0.13-0.20) for petrol generators and N370 (USD 0.80) per litre of kerosene compared to the average grid-based cost of N62 per kWh (USD0.13).⁵⁶

An estimated 80 per cent of grid users in Nigeria supplement unreliable electricity,⁵⁷ and Nigeria's economy depends heavily on small petrol generators – their collective capacity (10-15GW) is eight times more than the national grid,⁵⁸ costing consumers about USD14 billion annually.⁵⁹ As both grid and petrol prices

rise, solar becomes more affordable, and concerns about air pollution grow, these generators are the most likely to be displaced by SAS solutions.⁶⁰ Additionally, Nigerians spend a cumulative USD6.5 billion on battery-powered torches and other energy substitutes, and an average of USD1.50 per week on mobile phone charging, torches and kerosene.⁶¹

2.2 Impact of COVID-19

As mentioned above, the pandemic has driven nearly 17 million people into poverty.⁶² According to a June 2020 survey by McKinsey, about 14 per cent decreased their spending on fuels, 25 per cent increased their spending, while 61 per cent of Nigerians surveyed did not see any considerable change.⁶³ This implies that despite a reduction in income, savings and spending for most Nigerians due to the pandemic,⁶⁴ the demand for fuels for electricity self-generation largely remained constant.⁶⁵

A survey by the United Nations Economic Commission for Africa (UNECA) estimated that 75 per cent of slum residents in Africa had to skip meals or eat less due to partial or total loss of income/employment and left their homes despite lockdown measures.⁶⁶ The GOGLA Market Report 2020, using the 60 Decibels Vulnerability Index, indicates that 20 per cent of Nigerian SAS customers were either extremely or very vulnerable to shocks from the pandemic and had to implement survival measures such as using savings (46 per

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July 2020 (Parallel Market Rate)

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58. *ibid*

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Exchange rate used USD 1/470 as at

cent), decreasing food consumption (29 per cent), reducing household or business investment (20 per cent), and borrowing money (11 per cent)⁶⁷.

Women and vulnerable groups were also affected by the pandemic as they are particularly over-represented across MSMEs that form the majority of insecure, lower paying and survivalist types of jobs mainly found in the informal sector.⁶⁸ In addition, the restrictions imposed on the physical movement of citizens, coupled with school closures, increased the burden of care on women especially in rural communities.

Several interventions have been undertaken to help ease the impacts of the pandemic on low income earners. These include the CBN stimulus package,⁶⁹ which offers a cash loan of up to N3 million (USD6,383) to poor families impacted by the virus, as well as N20,000 (USD43) to poor and vulnerable households listed on the National Social Register.⁷⁰

2.3 Consumer Awareness

Over the years, consumer awareness of solar products such as off-grid lighting and SHS as alternatives to the use of petrol and kerosene has grown substantially. Solar products are often preferred as many end users view them as cheap to maintain since they do not require fuelling, are risk-free, noiseless, fashionable, and usage can be controlled. However, there are still complaints around the upfront costs as well as the fact that routine charging is expensive and ineffective during periods of low / no sunlight. There is also a high awareness of the uses of OGS, especially for household use. However, there is low awareness on where to purchase products, both in terms of reputable sellers/installers and their locations.

Between the second quarter of 2019 and the third quarter of 2020, awareness building activities have been undertaken by government agencies, donors, private companies and industry associations. REAN, for example, has partnered with several foreign and local organisations including the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), Manufacturers Association of Nigeria (MAN), Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture (NACCIMA) and Bank of Industry (BOI).⁷¹ REA has developed a new implementation framework for the Rural Electricity Users Cooperative Society (REUCS) to expand its sensitisation activities, and All On has an off-grid renewable energy column on Business Day. Clean Technology Hub has also carried out solar demonstration workshops targeted at MSMEs, students and women across several states in the country.

“

An estimated **75% of slum residents** in Africa had to skip meals or eat less due to loss of income, and left their homes despite lockdown measures.

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70. *Ibid.* Exchange rate used USD 1/N470 as at July 2020 (Parallel Market Rate)

71 Interview with REAN Executive Secretary Ms Lande Abudu and Lead Programmes and Partnerships Ms Teina Teibowei. Held on December 9, 2020 via WhatsApp.

3 SUPPLY-SIDE: STAND-ALONE SOLAR COMPANIES

3.1 Pico-solar and Solar Home Systems (SHS)

According to GOGLA,⁷² the first half of 2020 saw a 28 per cent decrease compared to the second half of 2019. The slump was mainly on the cash sales side, while PAYG sales remained stable though with an increased rate of default. This may be attributed to a reduction in consumer earnings due to the lockdown, making instalment payments a more affordable option than outright cash purchase. Figure 1 illustrates certified SAS products sales in Nigeria from 2016 to 2020.

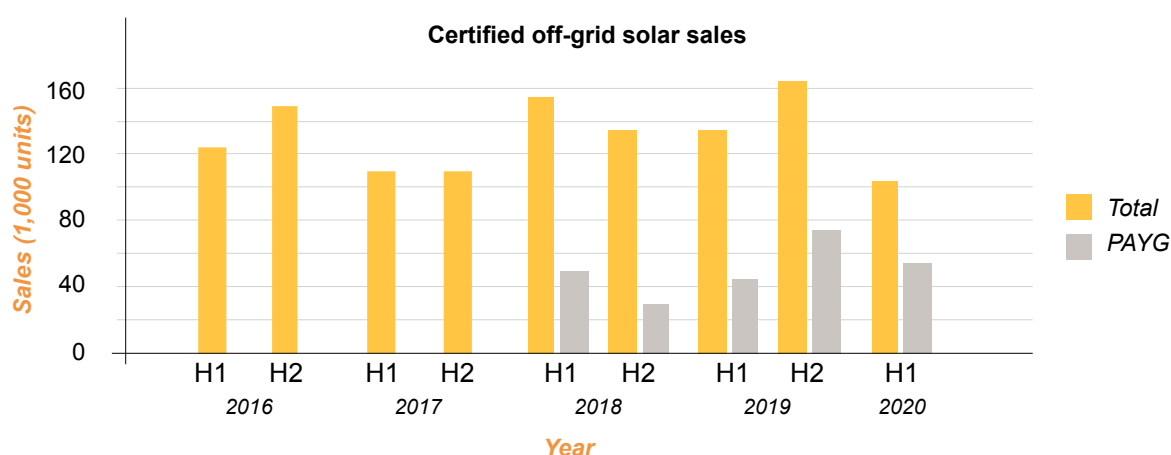


Figure 2: Certified total OGS sales
(Source: GOGLA 2020)

On the retail side, where both certified and non-certified product is sold, preliminary findings from a new national study on the SAS retail market in Nigeria⁷³ indicate:

- ♦ Retail penetration of SAS products is highest in urban areas (such as state capitals) and lowest in rural areas.
- ♦ Pico-solar and larger component-based systems are more heavily stocked than mid-sized SHS.
- ♦ Only 25% of retailers provide after-sales service, as most lack technical expertise.
- ♦ There is poor management of SAS end-of-life and

broken products (e-waste), and high presence of poor-quality products in the market.

- ♦ Women account for only 4% of SAS retailers, and are underrepresented as employees in retail outlets.
- ♦ On average, retailers reported that women accounted for only 25% of their customers.

This observation of a slight preference for small and larger systems seems to be supported by just-released GOGLA analysis of sales by system size – see Figure 2.

⁷² GOGLA (2020) stand-alone solar market report.

⁷³ ACE TAF (2021) Deep Dive – Nigeria market research - stand-alone (not yet published)

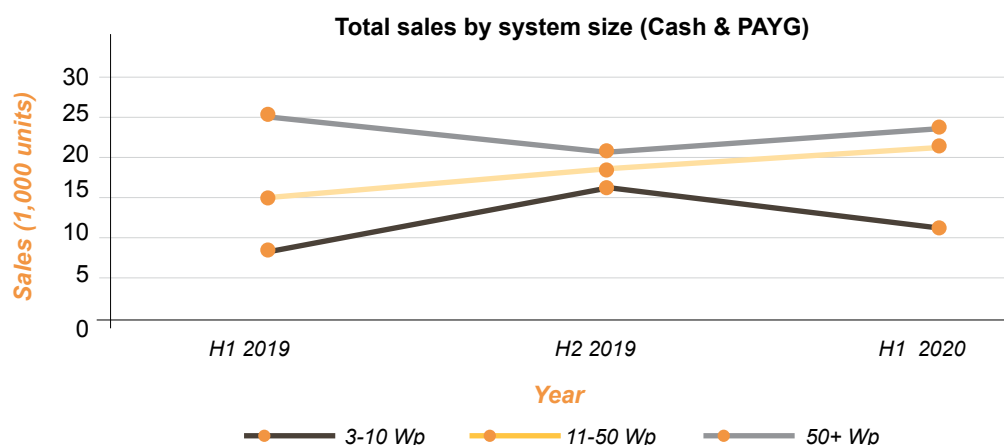


Figure 3: Cash and PAYG sales by system size, 2019-2020
(Source: GOGLA 2020)

The larger SAS companies in Nigeria are adapting their market approaches as they grow. Greenlight Planet and d.light are developing their own sales and distribution networks;⁷⁴ Lumos in early 2020 reviewed its revenue-sharing model under their partnership with MTN; and Zola Electric has developed a hybrid system for integration with existing generators and is building

its own distribution network. Cloud Energy has also expanded their services to include mini-grid installation and in November 2020, in partnership with the REA commissioned a 100KWp solar hybrid mini-grid in Ebonyi State.⁷⁵ Additionally there has been a market exit, strategic partnerships, funds raised, COVID-19 initiatives and more – see Table 1.

Table 1: Major suppliers of pico-solar and SHS

Company	Business model	Comments
Asteven	PAYG	Deployed 1,000 SHS units to Ogun State as part of REA partnership to deploy 650,000 SHS units across the country. ⁷⁶
Mobisol	PAYG	Acquired by ENGIE in September 2019, now operational in Kenya, Tanzania and Rwanda. ⁷⁷ It no longer operates in Nigeria.
Lumos	PAYG	Recently launched the Lumos Eco and Lumos Prime in partnership with MTN Nigeria. ⁷⁸ Beneficiary of the \$180 million COVID-19 relief fund by All On. Received \$35 million investment from US International Development Finance Corporation (DFC). Worked with the Young Professionals Organisation (YPO) to power a COVID-19 isolation centre in Lagos State. ⁷⁹

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Company	Business model	Comments
Cloud Energy	PAYG	Donated 1,000 Sunboxes and hybrid solar systems to a hospital in Lagos to support COVID-19 response. ⁸⁰ Signed an agreement with the REA under the Output Based Fund sub-component of the SHS component of the Nigeria Electrification Project (NEP) in December 2020.
Greenlight Planet	PAYG	Secured \$90m from CDC Group, FMO, Norfund. ⁸¹
Creeds Energy	PAYG	Partnership with AE2I.
Solar Sister	Agent distribution	Trains women to become solar entrepreneurs.
d.light	Cash sales/PAYG	Has a partnership with LAPO Microfinance Bank.
Arnergy	PAYG	Raised \$9m in 2019 during its Series A funding round. ⁸² Signed an agreement with the REA under the Output Based Fund sub-component of the SHS component of the NEP in December 2020.
Sosai Renewables	PAYG	Set up solar drying plants in several northern communities. Signed an agreement with the REA under the Output Based Fund sub-component of the SHS component of the NEP in December 2020.
Azuri Technologies	PAYG	Partnership with the Niger Delta Power Holding Company.
M-KOPA	PAYG	Partnership with Paystack and Interswitch to enable electronic transfers.
Oolu Solar	PAYG	Due to COVID-19, senior executives opted for a pay cut against laying off staff. Recently closed an \$8.5 million Series B investment round led by RP Global. ⁸³
Fenix	PAYG	Subsidiary of ENGIE.
Zola Electric	Cash sales/PAYG	Has a special loan facility in collaboration with Page Financials called "Zola Power Loans." Signed an agreement with the REA under the Output Based Fund sub-component of the SHS component of the NEP in December 2020. ⁸⁴
BBoxx	PAYG	Raised \$50m in August 2019 during its Series D funding round led by the Mitsubishi Group. Beneficiary of the output-based funds of the SAS component of the NEP.
Baobab+	PAYG	Recently launched in Nigeria.

3.2 Productive Use Systems

The productive use of SAS has become more pronounced in the last few years. Though productive-use solar is primarily via mini-grids, a number of companies are now selling productive use stand-alone systems directly to individual customers or aggregated consumers such as members of industry associations, community and women groups.

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Table 2: Companies in the productive use space

Company	Activities
Consistent Energy	Partnership with the Lagos State Barbers Association enabling members to pay for SHS through their cooperatives.
Sosai Renewables	Deploys solar dryers to farming communities in the north. Works with female farmers' cooperatives.
Cold Hubs, Food Hubs	Distribute large plug-and-play solar powered cold rooms.

3.3 Workforce capacity

During the COVID-19 lockdown, SHS and pico-solar distributors had a hard time reaching their customers due to movement restrictions, import difficulties, absence of transportation and closure of fuel stations. Some had to halt their operations due to limited manpower. This greatly affected cash flows and led some to adopt stricter management controls to reduce overheads, such as laying off staff or instituting pay cuts. For example, executives of Oolu Solar, Astevens and Sosai Renewables opted to take pay cuts instead of laying off employees.⁸⁵ Astevens, Arnergy, Solar Sisters and Rensource had to furlough staff.

The SAS sector is labour intensive and involves collaboration among stakeholders across the value chain. Several efforts are underway to build capacity across the value chain and ensure that quality and standards in installation, repairs and service are a core part of the offering in the industry.⁸⁶ The ACE TAF deep dive study found only 21% of surveyed solar technicians across the country had any formal training on repair of solar products.⁸⁷ While there is no national certification for solar technicians, REAN and other stakeholders are working together to develop one for the SAS sector.

3.4 Importation and Local Manufacture

Local solar assembling and manufacturing is nascent and insufficient to meet local demand. Most suppliers import their products, and continue to face challenges in doing so. A formal notice from the Nigeria Customs Service dated March 6, 2020, and aligning with the Economic Community of West African States (ECOWAS) Common External Tariff (CET), established a 10 per cent duty and 7.5 per cent VAT on solar panels, and 20 per cent duty and 7.5 per cent VAT for batteries.⁸⁸ This is despite official documentation as recently as the last quarter of 2019 from the Minister of Finance setting the duty for solar at 5 per cent.

This inconsistency, along with a general lack of clarity and consistency on solar taxation at customs, makes it difficult for developers and distributors to effectively plan or make projections in their businesses, and can result in huge demurrage costs for importers. REAN, through a committee, continues to liaise with the government (Ministry of Finance and Customs) towards eliminating the VAT and reducing the duty to 5 per cent.⁸⁹ In addition, with component production greatly affected in China, United States and Europe due to the



REAN is actively
advocating for the sector



New solar assembly and
manufacturing capacity
coming online

⁸⁷ ACE TAF (2021) Nigeria Stand-alone Solar Market Research Deep Dive (not yet published)

⁸⁸ Interview with REAN members on the cost of importation – December 8, 2020.

⁸⁹ Interview with REAN president (Segun Adaju) – December 8, 2020.

pandemic, most solar providers are experiencing delays receiving their goods.

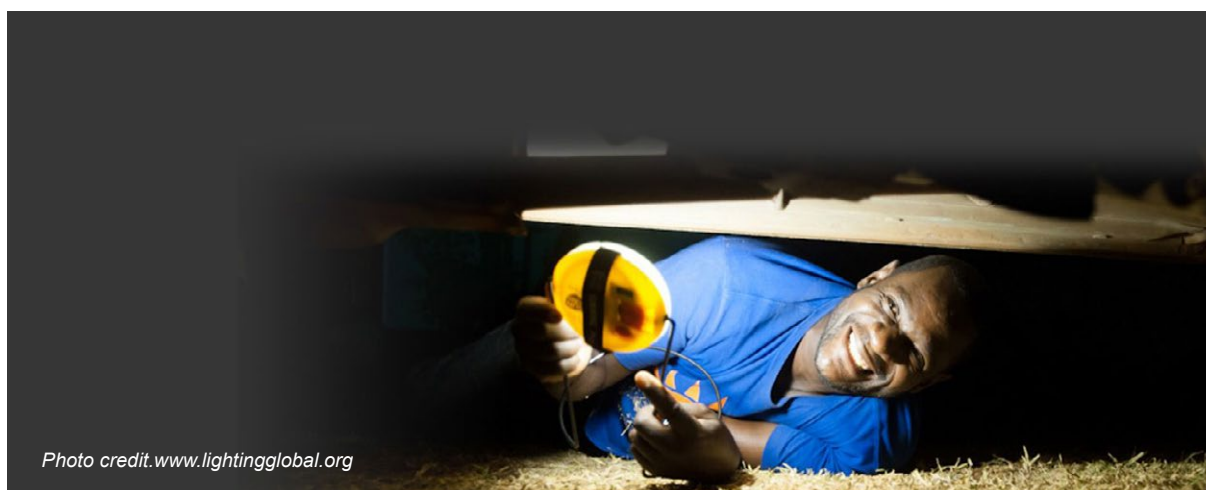
The private sector is beginning to play a more active role in local production.⁹⁰ For instance, Blue Camel Energy has assembled about 2,500 solar components.⁹¹ Asteven launched its first phase of SHS production and assembly in the country in June 2020.⁹² On December 10, 2020, Auxano Power broke ground on its 100MW Auto Factory Solar Panel Assembly in Ibeju-Lekki, Lagos State. This was made possible through a USD1.5 million investment by All On to scale up local assembly and manufacture of solar panels in Nigeria within the next five years.⁹³ Tax exemptions to be given to selected local solar assemblers and manufacturers under the Solar Power Naija programme will further boost the sector⁹⁴.

3.5 Renewable Energy Association of Nigeria (REAN)

REAN is an independent, non-profit industry association. Currently its membership stands at 125, including a few non-profit organisations, up from 20 in just the last four years. REAN's membership still does not constitute the majority of renewable energy companies in the country, as many operate under the radar or their business models are not exclusively focused on renewables. The association is headed by an advisory board and a six-

person executive committee, and is receiving ACE TAF support to improve advocacy and operational capacity. Some activities carried out by REAN in the last year include:

- ♦ Biennial Executive Committee elections in July 2020 where the Mr Segun Adaju was re-elected as the President for a second term;
- ♦ Internal committees on both SHS and mini-grids set up to address sector challenges and take advantage of government initiatives on SAS.
- ♦ Developed policy to guide members on proper management and disposal of used lead acid batteries.
- ♦ Study on expanding the scope of local content for the renewable energy sector in Nigeria.
- ♦ Assessment on the accessibility of Government Social Interventions Funds in the renewable energy sector.
- ♦ Working with seven other national renewable energy associations in partnership with GOGLA to set up the West African Renewable Energy Association.
- ♦ Partnered with the Sustainable Use of Natural Resources and Energy Finance (SUNREF) to enable REAN members to access funds from SUNREF to provide renewable energy solutions to businesses within the Manufacturers Association of Nigeria (MAN).



90 ACE TAF is carrying out a study to evaluate the preparedness and viability of five countries in SSA including Nigeria for local manufacturing and assembly of solar components.

94 ACE TAF is currently carrying out a study of opportunities and challenges of local manufacturing or assembly of solar components in Ethiopia, Tanzania, Rwanda, Zambia and Nigeria.

4 POLITICAL FRAMEWORK

4.1 Government Institutions

In the last 18 months there has been a range of activity in the government agencies – both federal and state level – overseeing the energy sector. The unbundling of the Ministry of Power from the Ministry of Power, Works and Housing, changes in leadership across several major agencies, a doubling of grid tariffs in an effort to attain cost-reflective levels, and successful advocacy by REA and the Ministry to the Central Bank on including the SAS sector in COVID-19 relief stimuli have all shaped the sector. At state level, the Lagos, Oyo, Kaduna, River and Enugu state governments facilitated deployment of SAS to power health facilities during the COVID-19 lockdown under the All On Solar Relief Fund Initiative.⁹⁵ Table 3 offers highlights of new developments.

Table 3: Government bodies related to OGS

Institution	Recent activity
Rural Electrification Agency (REA)	New Managing Director Ahmad Salihijo, appointed in January 2020, ⁹⁶ engaged CBN through the Federal Ministry of Power for inclusion of energy access companies and off-grid power developers under the COVID-19 intervention programme of the bank. Inclusion of a COVID-19 component to the World Bank NEP project. ⁹⁷ Deployed over 120,000 SHS systems across the country under the Nigeria Electrification Project (NEP) and the Rural Electrification Fund Call 1.
Federal Ministry of Power	Appointment of the current Minister of Power, Eng. Sale Mamman, in June 2019, and the split of the Ministry of Power, Works and Housing into two separate ministries: Ministry of Power and the Ministry of Works and Housing. ⁹⁸
Central Bank of Nigeria (CBN)	Developed a framework for the implementation of the Solar Power Naija programme in September 2020. ⁹⁹
Nigeria Electricity Regulatory Commission (NERC)	The President nominated Eng. Sanusi Garba as the next chairman to replace Prof. James Momoh who was set to retire. He also nominated Dr Musiliu Oseni, Commissioner, Planning, Research and Strategy, as Vice Chairman. These appointments were confirmed on December 3, 2020. New tariffs were introduced in a bid to attain cost-reflective tariffs for the sector.
Nigeria Customs Service	Closure of Nigeria's land borders, affecting new product imports. ¹⁰⁰
Corporate Affairs Commission (CAC)	Companies and Allied Matters Act, 2020. ¹⁰¹ Free registration for 250,000 new businesses. ¹⁰²
Federal Inland Revenue Service (FIRS)	Increase in VAT to 7.5% from 5%. ¹⁰³
National Environmental Standards and Regulations Enforcement Agency (NESREA)	Developing national used battery regulations and guidelines for the implementation of an Extended Producer Responsibility (EPR) programme. A Guidance on E-Waste for Stand-Alone Solar in Nigeria" document was developed by ACE TAF in collaboration with NESREA.

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4.2 Energy Policy and Regulation

There have been positive recent developments in the energy sector as a result of an improved enabling environment, such as the introduction of green bonds and increased private investment. Through its anchor policies the Federal Government continues to include SAS in rural electrification efforts, encourage domestic investment, and offer incentives to local entrepreneurs, among other efforts.

In December 2020, the Solar Power Naija Programme was launched. Its goals are: energy access for five million households, increased local content in the off-

grid value chain, and creation of 250,000 new jobs in the energy sector. The Heinrich Böll Foundation is supporting the Localizing Renewable Energy Project to drive domestication of renewable energy policies at the state level. ACE TAF is supporting state governments to improve the enabling environment for SAS through regulatory reform and technical assistance. Challenges to do with political will, changes in key personnel, and technical capacity all affect implementation of this framework. Table 4 summarises relevant energy policies and regulations.



New investor protection, data protection, and mobile money regulations in the past 2 years



VAT up from 5% to 7.5%



Solar Power Naija launched, targeting 5m households

Table 4: Energy policies and regulations

Policy / regulation	Description & relevance to the SAS sector
National Renewable Energy and Energy Efficiency Policy (NREEEP)	Policy guiding the renewable energy sector. Addresses renewable energy supply, utilisation and financing, capacity building, gender and environmental issues, etc. Recommends increasing local investment in renewable energy via the Nigerian capital markets.
National Renewable Energy Action Plan (NREAP)	Implementation framework for the NREEEP. Includes baseline data on renewable energy sources including stand-alone solar, and a total off-grid renewable energy target of 5,545MW by 2030. Provides for development of professional & technical courses on renewable energy, and increased investments for SAS projects.
National Energy Efficiency Action Plan (NEEAP)	Rollout of the Minimum Energy Performance Standards (MEPS) for Refrigerators and Air Conditioners in September 2019. Includes baseline data and information on energy efficiency activities as well as energy efficiency targets.
Rural Electrification Strategy and Implementation (RESIP)	Continued inclusion of mini-grids and stand-alone solar systems in rural electrification efforts. The Rural Electrification Fund (REF) provides grants to mini-grid and SHS providers. REF Call 2 is currently underway.
ECOWAS Common External Tariff (CET)	In March 2020, Nigeria Customs Service aligned to the regional CET that fixes 10% duty for inputs and intermediate goods, which SAS components fall under. ¹⁰⁴ A stand-alone solar importation guide was developed by ACE TAF in 2019.

Policy / regulation	Description & relevance to the SAS sector
The Finance Act 2020	FIRS increased VAT to 7.5% from 5% in early 2020. Company income tax is currently 0% for small companies, 20% for medium-sized companies, and 30% for large companies. Under the Solar Power Naija programme, qualified solar assemblers will be given tax waivers.
Nationally Determined Contribution (NDC)	An Inter-Ministerial Committee on Climate Change has been set up to coordinate line ministries and agencies on Nigeria's actions to mitigate climate change. NDC Sectoral Action Plan developed. Promotes adoption of SAS products to combat climate change.
Standards Organisation of Nigeria Conformity Assessment Programme (SONCAP)	The Standards Organisation of Nigeria (SON), in July 2020, released the first ever Nigerian National Standardisation Strategy (NNSS) for 2020–2022 and approved 168 standards, including for “renewable energy and hybrid systems for rural electrification.” ¹⁰⁵ SON, with support from ACE TAF, approved quality standards for SAS products ≤350W. With technical assistance from GLZ / Nigerian Energy Support Programme (NESP), they are now developing standards for components such as PV panels, batteries, charge controllers, energy meters and inverters. SONCAP is a pre-shipment verification of conformity to standards process used to verify that SAS products for import into Nigeria conform to the applicable Nigerian industrial standards and technical regulations before shipment. This will help to provide the technical quality assurance needed for components that are deployed in the Nigerian market.
Sustainable Energy for All – Action Agenda (SE4ALL AA)	Launch in 2020 of the Nigerian SE4ALL Platform to provide access to digital, ground-truthed data to support electrification efforts. ¹⁰⁶ The AA promotes sustainable energy and energy access. Includes a target to increase total off-grid renewable energy capacity to 8,000MW ¹⁰⁷ by 2030.

4.3 E-waste Regulation

There has been increased political recognition of the problem of e-waste. The Federal Ministry of Environment and NESREA currently are developing a national e-waste policy, to include guidelines for an EPR programme and a national used batteries regulation. In collaboration with NESREA, ACE TAF has developed E-Waste Guidance for the SAS sector. REAN recently developed a Used Lead Acid Battery (ULAB) policy, which guides environmentally-sound management of ULABs. It plans to expand the scope of the policy to include other e-waste generated by the renewable energy sector.

4.4 Financial and Mobile Payment Regulation

A number of developments in financial and mobile payment regulations are worth noting.

Investor protection

The Companies and Allied Matter Act (CAMA) (2020) eliminates the requirement for companies to denominate their authorized share capital in Naira and will enable foreign investors preserve value in their Nigerian subsidiaries and shield their imported capital from local inflation.^{108,109} In 2019, a bill to amend the Investment and Securities Act (2007) passed second reading in the House of Representatives thought it is yet to be adopted.¹¹⁰ This law covers all issues related to the

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¹⁰⁷ The discrepancy in targets may be due to the SE4ALL AA aligning to Nigeria's Vision 30:30:30 plan, while the NREAP did not.

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Securities and Exchange Commission, investments in the capital markets, and robust legal protection for foreign investment.¹¹¹

Consumer financing / credit protection

CBN is currently developing guidelines for the regulation of microfinance banks, which will revise the Regulatory and Supervisory Guidelines for Microfinance Banks in Nigeria, 2013. The objective is to strengthen microfinance banks and enhance the safety and soundness of the microfinance sub-sector,¹¹² including by requiring MFIs to better monitor and mitigate risk exposure and disclose information on clients to at least two licensed Credit Bureaux.¹¹³

Data protection

The Consumer Protection Regulations were approved by CBN in December 2019.¹¹⁴ They provide minimum standards on fair treatment of consumers, disclosure and transparency, business conduct, complaints handling and redress. Financial institutions are required to protect the privacy and confidentiality of consumer information and their digital assets against unauthorised access. Transfer of consumers' personal data to third parties without their express consent is prohibited.

Mobile money

The guidelines for licensing and regulation of Payment Service Banks (PSBs) in Nigeria were revised in August 2020. PSBs enhance access to deposit products and payment/remittance services for small businesses, low-income households and other financially excluded

entities through high volume, low-value transactions in a secured technology driven environment. The guidelines give PSBs the authority to operate in rural areas and unbanked locations, enter into direct partnership with card scheme operators, deploy ATMs in some of these areas, and more.¹¹⁵

ACE TAF is working with the REA and CBN to review and correlate the national policies on financial inclusion and energy access so as to harness their natural synergies, particularly in driving successful delivery of SAS solutions in rural communities.

4.5 Gender and Social Inclusion Mainstreaming Regulation

Efforts have been made to mainstream gender and inclusion in energy planning, decision-making and utilisation (see table below), including a gender focal point at the Ministry of Power to promote women's participation in the sector.¹¹⁶ Despite these actions, there is still a large gender gap in the SAS sector.

In collaboration with the Power Africa Nigeria Power Sector Program (PA NPSP), the REA organised an "amplifying gender in the energy sector" workshop in 2019, which brought together nearly 70 female energy sector professionals to discuss challenges, identify opportunities and offer recommendations towards increasing female participation in the sector.¹¹⁷ ACE TAF is also supporting gender and social inclusion (GESI) in the SAS sector.

Table 5: Institutions and policies mainstreaming gender in the energy sector

Policy / Institution / Programme	Inclusion activities
National Renewable Energy Action Plan (NREAP)	Sets the target of providing energy access to over 60 million rural women by 2030, out of which over seven million are to be provided with renewable energy services including stand-alone solar.
Rural Electrification Agency (REA)	REA has a Gender Department. ACE TAF is supporting implementation of their Gender Strategy, as well as gender and social inclusion (GESI) for SAS electrification. Under the Energizing Education Programme, over 700 female students are undergoing technical training at federal universities.
ECOWAS Policy on Gender Mainstreaming in Energy Access	Provides human rights-based indicators to align energy interventions with principles of gender equality. Encourages leveraging women's roles as energy users, community members, business owners, and policymakers.

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¹¹³ *Ibid*

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5 FINANCING

5.1 Supply Chain Financing

The emerging SAS market in Nigeria remains largely driven by foreign investments – grants by donor institutions and equity or debt from impact funds and private investors. However, there has been some increase in local options: commercial banks such as Sterling Bank and FCMB are now providing finance for the SAS market. Access Bank and WEMA Bank are teaming up with the Ministry of Environment to domesticate the NDC with the assistance of the UK government. The Green Energy Fund under the African Guarantee Fund West Africa (AGF) will be disbursed through the two banks and administered by Climate Finance Advisory Limited (CFAL) and Vetiva Capital.¹¹⁸ That said, most local investors are not familiar with the credit-risk analysis appropriate for SAS projects. They remain sceptical that meaningful cash flow can be generated to repay loans.

The Nigerian stand-alone solar market has attracted ~USD 227 million from a wide range of investors between 2015-2020.¹¹⁹ Development partners and government programs were the main financiers, contributing 54% of investment within this period. Debt finance was the main instrument, accounting for ~54% of total inflows, primarily to larger international companies. Debt accounted for 18% of the deal count due to larger ticket sizes such as Development Finance Corporation's USD35 million debt investment into Lumos in 2020. On the other hand, grant financing comprised only 7% of funding but accounts for 64% of the known transactions due to small ticket sizes in the USD20,000-520,000 range. Mixed instruments combining equity, grant or debt comprised 19%.

Several companies have been able to raise equity in the last couple of years. In 2019, Arnergy¹²⁰ and Rensource¹²¹ raised USD9 million and USD20 million,

respectively, in Series A funding, whilst BBoxx raised USD50 million in August 2019 during its Series D round. In December 2020, Oolu Solar closed a USD8.5 million Series B investment round from RP Global, Persistent Energy Capital, All On, Gaia Impact Fund and DPI Energy Ventures.¹²² In January 2021, Daystar Power raised a Series B investment of USD 38 million from Investment Fund for Developing Countries (IFU), and the Danish Development Finance Institution (DFI).¹²³

These big-ticket investments notwithstanding, the average solar supply business in Nigeria has little access to credit. A recent estimate suggests over 80% of solar retailers have no credit terms with their suppliers, and just 4% have been able to access loans from microfinance and commercial banks.¹²⁴

The Nigerian government has introduced several interventions including loans to small businesses to cushion them against the impact of the pandemic.¹²⁵ Many of these are accessible to SAS companies, including two from the CBN: a USD136.6 million initiative¹²⁶ to help businesses during COVID-19, and a N50 billion (USD106.4 million) targeted line of credit facility, out of which N49 billion had already been disbursed by June 2020.¹²⁷

The Federal Government's Solar Power Naija programme¹²⁸ will enable solar component manufacturers and assemblers to access funding through commercial banks at 10 per cent interest for up to 10 years. Banks will be allowed to draw on their minimum cash reserves with CBN to provide loans backed by an off-taker agreement with SHS distributors. In addition, SHS distributors will be able to access loans through a CBN special purpose vehicle (SPV) at 10 per cent interest for up to three years.

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119 ACE TAF (2021) Nigeria investment map for stand-alone solar (SAS) (not yet published)

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124 ACE TAF (2021) Deep Dive – Nigeria market research – stand-alone solar (not yet published)

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used USD 1/N470 as at July 2020 (Parallel Market Rate)

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Exchange rate

Table 6: Banks and other investors in the OGS space ¹²⁹

Type	Financier	Investments/available funding
Investor	Nithio	Debt facility to Winock Solar. ¹³⁰
Investor	SunFunder	Invested USD4 million in Daystar Power. ¹³¹
Development finance	Sustainable Use of Natural Resources and Energy Finance (SUNREF)	USD81 million investment fund launched in September 2020 that will also provide technical assistance to the Manufacturers Association of Nigeria (MAN), partner banks including Access Bank and the United Bank for Africa (UBA), and companies in Nigeria on energy efficiency and renewable energy projects. ¹³²
Investor	All On	USD1.5million investment in Auxano Solar plant expansion (local solar panel producer) in September 2020. In June 2020, All On provided a N180 million (USD382,980) COVID-19 Solar Relief Fund as grants to four local SAS companies (Auxano, Arnergy, GVE and Lumos) to power emergency healthcare in Nigeria, including testing and isolation centres. These companies were selected based on their preparedness to respond rapidly with products, inventory, and technical capabilities and their efficient delivery track record. ¹³³
Development finance	African Guarantee Fund – Green Energy Fund Programme	USD100 million partial risk guarantee programme to enable local currency concessional loans. ¹³⁴
Commercial bank	Sterling Bank	Provided a five-year N446 million (USD950,000) ¹³⁵ credit facility to Virtus, a decentralised energy consortium as part of the Energizing Economies Initiative component of NEP.
Fund	ElectriFI	A fund from the European Union for off-grid and captive projects in Nigeria, Benin Republic, Ivory Coast and Zambia.
Fund	Africa Infra Plus Fund	N30 billion (USD63.8 million) ¹³⁶ target infrastructure fund sponsored by Africa Plus Partners (Mauritius), an affiliate of DSC Group that has supported mini-grid projects in southwest Nigeria.

5.2 Consumer Financing

Nigeria is still largely a cash driven economy, though this is slowly changing. In 2020, 56 million Nigerian adults did not have a bank account, with four million people newly banked in the last two years.¹³⁷ Stand-alone solar products are becoming increasingly affordable, particularly with the adoption of PAYG solutions. Increased mobile phone ownership, rapidly growing mobile internet usage and extensive network coverage have led to a proliferation of mobile money services and platforms. However, the uptake of mobile money in rural and peri-urban communities has slowed due to the pandemic and economic recession.

Microfinance Institutions (MFIs)

A number of MFIs are providing loans for individuals and SMEs to purchase solar products. Village Savings and Loans Associations (VSLAs) and Savings and Credit Cooperatives (SACCOs) are yet to provide SAS lending. The Rural Electricity Users Cooperative Society (REUCS)¹³⁸ was established by REA to, among other things, ensure prompt payment of electricity bills by members and serve as a channel through which members can pay for electricity.

¹²⁹ This is not an exhaustive list.

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Exchange rate used USD 1/N470 as at July 2020 (Parallel Market Rate)

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¹³⁵ Exchange rate used USD 1/N470 as at July 2020 (Parallel Market Rate)

¹³⁶ Exchange rate used USD 1/N470 as at July 2020 (Parallel Market Rate)

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Table 7: Loan products available for OGS

Loan product	Microfinance Bank name	Description & coverage
Solar loan – individuals	LAPO Grooming Centre Loans, Olive, Ilishan, Susu, Forward, Custodian, Multivest	LAPO provides solar product loans in partnership with d.light. The others offer solar loans in partnership with IFC Lighting Africa. Coverage: Lagos, Ogun, Anambra, Oyo, Edo States.
Solar loan – business/SME	Grooming Centre Loans, Olive, Ilishan, Susu, Forward, Custodian, Multivest	Provide solar product loans to SMEs in partnership with IFC Lighting Africa. Coverage: Lagos, Ogun, Anambra, Oyo States.
No solar loan yet available	AB, Altitude, Fina Trust, Addoser, Rehoboth, FBN, Mutual Benefits	Provide financial services for individuals, entrepreneurs, SMEs, groups, etc. Coverage: FCT, Lagos, Ondo, Anambra, Ondo and Ogun.

Mobile money networks

There has been an increase in mobile money operators (MMOs) over the last few of years, with CBN approving 15 more in late 2019.¹³⁹ MTN Nigeria, the largest telecommunications company in the country, launched its “MoMo” mobile money transfer service that same year.¹⁴⁰ According to the Nigerian Inter-Bank Settlement Scheme (NIBSS), mobile payments increased a whopping tenfold between January 2019 and January 2020; the year on year increase to May 2020 was 391 per cent.¹⁴¹ This explosion could be related in part to the fact that the pandemic made the use of paper money a health issue, forcing people to switch to digital payments.¹⁴²

Since the release of the guidelines for PSBs in November 2020 by CBN, only three companies – Hope PSBs, 9 PSBs, Moneymaster PSBs – have been given licenses.¹⁴³ The guidelines allow licensees, including telecommunication companies’ subsidiaries, to offer small-scale banking operations such as current and savings accounts, payment and remittance services,

debit and prepaid cards, Automated Teller Machines (ATMs) and other technology-enabled banking services to the unbanked population. These low numbers could be due to the USD13 million capital base condition for securing the license.^{144,145} The Nigerian Off-Grid Acceleration Programme (NOMAP) is working with Swifta to build and manage a single point of integration (SPOI) for PAYG collection from last-mile unbanked customers, and is currently integrating telco super agents and PSBs.

Remittances

Remittances fell to USD3.3 billion in the second quarter of 2020 due to the COVID-19 pandemic, the lowest since 2008, well below the average remitted per quarter of USD5.8 billion. The pandemic has affected the income of many around the world as they have either lost their jobs or seen their earnings drop.¹⁴⁶ This drop impacted ability of many in the diaspora to send money to relatives in Nigeria for power and other essential needs.



\$227 million in supply chain financing raised in the last 5 years



8 MFIs offering solar product loans



Mobile money transactions up **10x** in 2020

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¹⁴² Ibid.

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6 MARKET SUPPORT

6.1 Development Partners

Several development partners are providing financial and technical assistance in the stand-alone solar sector – see Table 8. In January 2021 All On and the US African Development Foundation (USADF) have awarded USD100,000 each to nine indigenous off-grid energy enterprises through the Nigeria Off-Grid Energy Challenge. Each will receive a \$25,000 grant from USADF, \$25,000 grant from All On (via support from the Rockefeller Foundation) and \$50,000 in convertible debt from All On.¹⁴⁷ Since the pandemic began, the quarterly off-grid donor stakeholder meetings hosted by USAID NPSP, All On and REA were initially suspended and have been held virtually just once. These quarterly meetings

provide a platform for development partners to discuss areas of potential collaboration.

In COVID-19 related assistance, Havenhill Synergy benefited from a USAID Power Africa grant to electrify 21 rural healthcare centres in Oyo State.¹⁴⁸ The USAID/PA NPSP provided support to Lagos State for the deployment of 300 donated SHS units to underserved communities for both residential and productive use. It also collaborated with the Lagos State Employment Trust Fund (LSETF) to identify essential workers across the state that should benefit from SHS unit distribution. The programme further saw an expanded outreach to three centres focused on gender-based violence prevention and child advocacy.

Table 8: Key development partners supporting OGS

Development partner: programme	Type of assistance	Objective
FCDO: Africa Clean Energy (ACE) Technical Assistance Facility (TAF)	Technical assistance	Strengthening the enabling environment to catalyse private sector delivery of SAS technologies.
FCDO: Nigeria Infrastructure Advisory Facility (UKNIAF)	Technical assistance	Technical advisory support to REA on pilot off-grid projects with selected electricity DisCos. Focus on mini-grids but also assesses the viability of SHS financing models.
FCDO: Solar Nigeria Programme	Grant	Grants to companies that provide solar products, services or consumer financing to build their capacity to scale up.
GIZ: Nigerian Energy Support Programme (NESP)	Grant, Technical Assistance	Advisory services with regard to energy policy and management, and technical assistance including on pilot projects for SAS.
Global Environmental Facility (GEF)	Grant	Policy de-risking, financial de-risking, knowledge management and scaling up.
Heinrich Böll Foundation	Technical assistance	Has supported research and programmes related to SAS in Nigeria.
IFC: Lighting Africa	Technical assistance	Aims to increase access to better, cleaner and safer off-grid lighting and energy products. Offers training, data collection, regulatory analysis, etc.
Shell Foundation, USAID Scaling Off-grid Energy (SOGE), FCDO: Nigeria Off Grid Market Acceleration Programme (NOMAP)	Technical assistance	Piloting off-grid SHS payment systems to address current difficulties companies face in collecting payments. Providing data collection, geospatial analysis and community-level surveys to build market intelligence.

Table 8: Key development partners supporting OGS (Continued)

Development partner: programme	Type of assistance	Objective
US Trade and Development Agency (USTDA)	Grant	Awarded a grant to Darway Coast Nigeria for a feasibility study on provision of SAS electricity for 80,000 households and businesses.
USAID Power Africa (PA): Nigeria Power Sector Program (NPSP)	Technical assistance	Five-year reform effort aimed at increasing electricity availability, access and reliability throughout Nigeria using various targeted interventions.
World Bank and AFDB: Nigeria Electrification Project (NEP)	Grant	Seeks to leverage private sector investments in solar mini-grids and stand-alone solar systems to provide electricity to 2.5 million people and 70,000 MSMEs. Over 105,000 SHS systems sold across the country. With REA provided COVID-19 support on health clinic electrification.

6.2 Training Institutions, Incubators, Accelerators

There are several solar training and educational institutions, including the Federal Government's National Power Training Institute of Nigeria (NAPTIN).¹⁴⁹ Private companies such as Asteven, Blue Camel Energy, Ashdam Solar and Rubitec Solar have also begun to offer technical training.

Incubators and accelerators for the renewable energy sector are becoming increasingly more active with Clean Technology Hub (CTH) and the Nigerian Climate Innovation Centre (NCIC) leading the way under the All On supported Off-grid Renewable Energy Enterprise Development Programme. Under the programme, both organisations have successfully incubated over 40 off-grid renewable energy start-ups independently, but with All On as impact investors. All On is currently investing in 15 of them over two cohorts.¹⁵⁰

6.3 Market Data

SAS companies in Nigeria are in need of verifiable, accurate data in order to plan strategically. Although there has been some research made publicly available, most companies still deploy their own resources in market research. Recent literature on SAS is limited to the GOGLA 2020 Stand-alone solar Market Trends

Report and the Regional Off-Grid Electrification Project (ROGEP) Stand-Alone Solar Market Assessment and Private Sector Support Facility Design for Nigeria. ACE TAF is soon to publish a Nigeria Stand-alone Solar Market Research Deep Dive to provide detailed data and analysis on the sector, and an SAS Investment Map to showcase the existing investment landscape and suggest how the private sector can position itself to take advantage of upcoming opportunities. More broadly, the Achieving Sustainable Development Goals in Nigeria's Power Sector: Assessment of Transition Pathways report identifies pathways available to Nigeria to meet its 2030 electricity access, renewables and de-carbonisation goals in the power sector.¹⁵¹ Much of the other off-grid market research focuses on mini-grids.

ACE TAF and the World Resources Institute (WRI), in collaboration with REA, are developing the Energy Access Explorer (EAE), an online multi-criteria analysis geospatial tool that brings together several data sets on energy supply and demand, with the goal of enabling more comprehensive planning. The EAE uses current location-specific resource availability and infrastructure data to represent energy supply. It also incorporates demographic data and information on social and productive uses to visualize demand for energy services.

institutions include the Federal University of Akure, Sokoto Energy Research Centre at Usmanu Danfodiyo University, Sokoto, National Centre for Energy Efficiency and Conservation (NCEEC), BAS Associates Consulting, Greco Power and Energy and Renewable Energy Technology Training Institute (RETTI).

NOMAP has worked with Fraym to locate more than 265 viable communities for SHS deployment. It is also providing subsidies to Nigerian SHS companies interested in subscribing to the “dataFraym web tool,” a market intelligence platform that enables clients to make strategic and operational decisions based on hyper local consumer data. Nithio, another market research organisation, provides household-level risk analytics to

unlock scalable consumer financing in Africa. A One-Stop-Shop Investment Platform for Renewable Energy and Energy Efficiency offers relevant information for investors.¹⁵² The Nigeria SE4ALL platform was also launched to provide access to digital, ground-truthed data for the coordination of electrification efforts in the country.¹⁵³



In conclusion

- Annually, certified SAS are reaching less than 2% of Nigeria's enormous off-grid (15.4 million household) and under-served populations
- 2019-2020 currency volatility and GDP decline from oil shocks was worsened by COVID-19 restrictions, but 2021 projections show stabilisation and recovery
- Mobile transactions are skyrocketing, albeit from a low base -- up more than tenfold
- Government is actively promoting SAS electrification and local solar assembly & manufacturing, including through the “Solar Power Naija” COVID relief package
- Commercial investment has been growing for big international players, while most solar retailers (80%) operate without any credit line
- Government support, increasing financial inclusion, consumer lending options and a COVID-related boost in awareness of the value of solar all make for strong potential growth.



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