Stand Alone Solar (SAS)

MARKET UPDATE

Ethiopia

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Africa Clean Energy
Catalysing Africa's Solar Markets

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The Ethiopia 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:
East Africa: Ethiopia, Kenya, Rwanda, Somalia, Tanzania, Uganda
West Africa: Ghana, Nigeria, Senegal, Sierra Leone
Southern Africa: Malawi, Mozambique, Zambia, Zimbabwe

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
AECF REACT	Africa Enterprise Challenge Fund's Renewable Energy and Adaptation to Climate Technologies
AfDB	African Development Bank
CBE	Commercial Bank of Ethiopia
DBE	Development Bank of Ethiopia
ECAE	Ethiopian Conformity Assessment Enterprise
ECIC	Ethiopia Climate Innovation Center
EEU	Ethiopian Electric Utility
ESEDA	Ethiopia Solar Energy Development Association
ETB	Ethiopian Birr
GIZ	German Society for International Cooperation
GOGLA	Global Off-Grid Lighting Association
LG	Lighting Global
MNOs	Mobile Network Operators
MDFRE&EEP	Market Development for Renewable Energy and Energy Efficiency Programme
MFIs	Microfinance institutions
MoTI	Ministry of Trade and Industry
MoWIE	Ministry of Water, Irrigation and Energy
NBE	National Bank of Ethiopia
NEP 2.0	National Electrification Plan
PAYG	Pay-As-You-Go
PUE	Productive Use of Energy
PV	Photovoltaic
PVoC	Pre-Export Verification of Conformity
REB	Regional Energy Bureau
RBF	Results-Based Financing
SACCOs	Savings and Credit Cooperatives
SAS	Stand-Alone Solar
SHS	Solar Home System
SNNPR	Southern Nations, Nationalities, and Peoples Region
USAID	United States Agency for International Development
USD	United States Dollar
VAT	Value Added Tax
WTP	Willingness To Pay

EXECUTIVE SUMMARY

Ethiopia is going through a transition that has been volatile and is likely to remain so both up to and beyond the upcoming elections in June 2021. This is not expected to derail the government's reform agenda.

The country's economy has been one of the fastest growing in the world, with an average of 10 per cent gross domestic product (GDP) growth in the past decade. With the advent of COVID-19, this is changing. **The International Monetary Fund (IMF) predicts that economic growth will decrease to 3.2 per cent in 2019/2020 and then rise to 3.7 per cent in 2020/2021.** Foreign exchange reserves are also currently low due to a drop in diaspora remittances and foreign direct investment. It is expected that the COVID-19 pandemic will further limit access to forex for stand-alone solar (SAS) companies.

To meet the updated National Electrification Programme (NEP 2.0) target of nine million off-grid connections,[1] annual supplies of SAS products will have to rise by an average of 12 per cent from 1.7 million units in 2021 to 2.7 million units in 2025. The estimated supply value (excluding distribution costs) for the solar home system (SHS) component of the off-grid plan is estimated at USD72 million in 2021 rising to USD171 million in 2025.

These targets far exceed current supply. For example, the highest half-year sales was 718,000 units in the second half of 2019.[2] A major increase in sales is **unlikely to be possible without a commensurate increase in the amount of forex available to private sector SAS companies** or allowing foreign companies to participate in off-grid solar distribution services.

Part of the projected demand is from over 45,000 unelectrified institutions in the country.[3] Some regional governments are trying to alleviate the problem by allocating budgets to purchase and install solar power in schools and health posts, but this is moving quite slowly.[4]

Consumer purchase decisions are generally based on cost rather than quality, posing a major challenge for importers of quality certified products. Microfinance institutions (MFIs) continue to extend credit to rural consumers, but the interest rates they charge are very high (up to 20 per cent), making them unaffordable to poor households.

There is a notable potential market for productive use of energy (PUE) solar products, especially for irrigation. The Ministry of Agriculture has a plan for small-scale irrigation technology and services between 2020 and 2025 that will see over one million hectares developed using over 400,000 pumps. Agro-processing activities such as grain milling, injera baking and milk cooling also have potential, but a more rigorous demand study, piloting of projects, and channelling funding to projects with promising scale-up potential will be needed.

A new National Bank of Ethiopia directive has allowed non-financial institutions to engage in the business of issuing payment instruments. This opens an opportunity for telecom companies to venture into mobile banking and payments thus reaching the unbanked and under banked population.

Access to forex remains one of the biggest barriers preventing the solar industry

"The country's economy has been one of the fastest growing in the world, with an average of 10 per cent gross domestic product (GDP) growth in the past decade. With the advent of COVID-19, this is changing. The International Monetary Fund (IMF) predicts that economic growth will **decrease to 3.2 per cent in 2019/2020 and then rise to 3.7 per cent** in 2020/2021.

1. *MoWIE (2019). National Electrification Program 2.0.*
2. *Global Off-Grid Lighting Association (GOGLA) (2020) Global Off-grid Solar Market Report*
3. *ibid.*
4. *Interview with the SNNPR REB.*

from scaling up in Ethiopia. The country is heavily reliant on imports of solar products, as manufacturing facilities are limited, so access to forex by SAS companies is critical. Access to financing is also a major challenge. Lending terms by banks can be prohibitive – some require 100 per cent or more of the borrowed amount in collateral. Loan repayment periods for loans to households are also short (one to two years). The World Bank and African Development Bank are in the process of setting up programmes to help mitigate this situation. Adapting asset based/inventory lending, already applied by commercial banks, to SHS could increase assess to finance by SAS companies.

The prevalent model of distribution is for MFIs to provide affordable financing to rural communities through tripartite agreements with Regional Energy Bureaus (REBs) and selected SAS companies to procure and install off-grid products for the customer. **According to regulations issued in 2020,[5] foreign companies are only allowed to participate in the local assembly and manufacturing of off-grid products. They are not allowed to participate in distribution, wholesaling and retailing.**

In other policy and regulations, larger SHS with quality certificates are exempted from import duty but 15 per cent value added tax (VAT) and 3 per cent withholding tax are still applicable. **Firms venturing into pay-as-you-go systems are facing financial constraints as they are required to file VAT every month for credit sales they expect to collect over several months. This severely limits their cash flow and working capital.**

The Ministry of Water, Irrigation and Energy should lead efforts to coordinate the REBs to harmonise the disparate licensing rules and regulations SAS companies face in the regions. Allowing foreign distributors end-to-end control over their supply chains will enable them to streamline costs. Policy dialogue between the government and industry stakeholders is essential.

Photo courtesy: www.solarcentury.com

5. *Council of Ministers Investment Regulation No. 474/2020.*

60m
Unelectrified population[i]

110m
Total population[ii]

109
People per km^2 population density[iii]

81
out of
100
Framework for stand-alone systems - score

Regulatory Indicators for Sustainable Energy (RISE)[iv]

64
out of
100
PAYG Market Attractiveness Index Score[v]

2025
Government target for universal electrification

8 Donor programmes supporting the SAS enabling environment

Highest solar sales at 71,000 were recorded in July-December 2019 but **reduced by 60%** in January-June 2020.

159
out of
190
ease of doing business rank[vi]

Almost **90%** of funding has come through the **USD 45M Market Development Credit Line (MDCL),** funded by development partners and administered by the government.

Figure 1: Ethiopia 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)

1. NATIONAL OVERVIEW

1.1 Current Context

Ethiopia is going through a political transition that has been volatile and is likely to remain so up to and beyond elections in June 2021. Since 2018, conflict has been ongoing in the Benshangul Gumuz region and western Oromia. However, the victory of the federal government over the Tigray Peoples Liberation Front (TPLF) forces in an open armed conflict in November 2020 has strengthened the administration of Prime Minister Abiy Ahamed to control on-going insurrections and continue with its reform agenda.

With a 10 per cent gross domestic product (GDP) growth in the past decade, Ethiopia is one of the fastest growing economies in the world.[6] This growth was mainly driven by large-scale investment in infrastructure and energy, made possible by Chinese loans, favourable commodity prices and international debt relief in the 2000s. According to the World Bank, extreme poverty declined from 55 per cent in 2000 to 25 per cent in 2018.[7]

The economic impact of COVID-19 in Ethiopia has been moderate but has the potential to worsen in the long term. The International Monetary Fund (IMF) predicts that economic growth will decrease to 3.2 per cent in 2019/2020 and to 3.7 per cent in 2020/2021. Foreign exchange reserves are also currently low due to a drop in diaspora remittances and foreign direct investment.[8] **Due to the pandemic inflation soared to 19.5 per cent in November 2020 while food inflation reached 22.1 per cent in the same month.**[9] The official exchange rate of the Ethiopian birr (ETB) depreciated by 23 per cent from ETB 32/USD on January 31, 2020 to ETB 39.4/USD at the end of January 2021.[10]

A World Bank survey found that about 8 per cent of companies laid off workers, mainly temporary ones.[11] The pandemic has affected firms mainly through a substantial drop in demand of products or services and higher prices for materials and intermediate goods. **COVID-19 and associated containment measures are also expected to make between 400,000 and 1.2 million people poor, almost half of whom are children.**[12] The restrictions imposed on the movement of people across regions and woredas have also disrupted sales of stand-alone solar (SAS) products.

1.2 Energy Access

The most recent access data is from 2018, when only 44 per cent of Ethiopians had access to electricity and of these, only 33 per cent (6.9 million households) obtained their power from the grid, while 11 per cent got it from other sources, including solar lanterns and solar home systems (SHS). Less than half (3.1 million) of those on the grid are estimated to have formal connections, the rest have informal connections that will need to be formally recognised by Ethiopian Electric Utility (EEU). Electricity access is primarily a rural challenge, with only 27 percent of rural households having access to electricity, and mostly through off-grid solutions. Around 2.2 million households had access to SAS electricity services by 2018.[13]

Over half of all Ethiopian households (56 per cent) have no access to any electric source. They either rely on dry cell batteries or have a grid or off-grid electricity supply that does not provide basic energy service (ability to light the house and charge phones and available for at least four hours a day, including one hour in the evening).[14] Cognisant of the magnitude of this challenge and the requisite large scale infrastructure investment in power generation, transmission and distribution required to create access for these households through the national grid, GOE devised a twin track strategy that combines grid and off-grid solutions. The off-grid solutions include stand-alone solar (SAS) systems such as solar lanterns and SHS, and mini-grids powered by renewable resources.[15]

6. *World Bank (2019). Accelerating distributed electricity and lighting in Ethiopia.*
7. *ibid.*
8. *IMF Country Report No. 20/150*
9. *Berhane, S. (2021). Association calls for adjustment of wage based on inflation.*
10. *NBE exchange rates.*
11. *World Bank (2020). Monitoring COVID-19 impacts on firms in Ethiopia.*
12. *UNICEF Ethiopia (2020). Socio-economic impacts of COVID-19.*
13. *MoWIE (2019). National Electrification Program 2.0.*
14. *ibid.*
15. *MoWIE (2019). National Electrification Program 2.0.*

Table 1: Energy access

Grid connections (%)	33%
Population without electricity access	60 million[16]
Grid tariff per kWh	ETB1.34/kWh (USD0.03/kWh) base tariff for average household consumption.[17]
Average customer kWh usage	120.7 kWh/month. This is the average consumption for grid-connected households.[18]

Improving Healthcare with Solar Power in Ethiopia - Little Sun | Photo credit. https://littlesun.com

15. *MoWIE (2019). National Electrification Program 2.0.*
16. *ibid.*
17. *Power Africa (2019). Off-grid solar market assessment: Ethiopia.*
18. *ibid*

2. DEMAND-SIDE: CONSUMER INSIGHTS

2.1 Addressable Market

Off-grid solutions are expected to provide services to 35 per cent of the population through nine million connections. According to the updated National Electrification Program (NEP 2.0), 3.3 million households residing less than 2.5 kilometres from the national grid are to receive off-grid power by 2025. The five million households living within 2.5 to 25 kilometres of the existing grid will be connected in the mid-term (by 2030). Those in the deep rural areas, who are less likely to be served by the grid (about 700,000 households or 4 per cent) of the total population, will be served by SAS solutions. The off-grid solution is an intermediate means of electricity access, reaching its peak of 35 per cent in 2025 and gradually declining to 4 per cent by 2030 as it gives way to the national grid.[19]

The NEP 2.0 off-grid access component is estimated to cost USD2.5 billion, with the government contributing about 40 per cent (USD1 billion) and the remaining to be syndicated through development partners and private sector resources.

NEP 2.0 also aims to provide all primary and secondary schools and health facilities with access to adequate and reliable electricity services, whether on- or off-grid, by 2025. Although access to electricity for these institutions is relatively higher than for households, it is still far short – over 26,000 primary schools and 15,000 health posts have no electricity. In addition, about 90 hospitals are still not powered. In total, there are over 45,000 institutions in the country in need of access to electricity services.[20] Some regional governments are trying to alleviate the problem by allocating budgets to purchase and install solar power, but with the slow pace at which this is being done, many of them will remain without power for a long time.[21]

2.2 Willingness to pay and affordability

A 2018 survey based on the multi-tier framework (MTF) indicated that households interested in purchasing solar lanterns with chargers said they need loans with up to 12 months repayment period while households that plan to buy SHS needed up to 24 months. It found that 80 per cent of respondents were willing to pay for a Tier 2 solar product upfront or through a payment plan whereas 20 per cent found it too expensive even with a payment plan.[22]

There is some inconsistency between the survey's findings of high willingness to pay and the reality on the ground, as SHS suppliers find it difficult to sell SHS. Just 31 per cent of imported SHS in the country have been sold, including with microfinancing through MFIs. But the fact that newer models of solar lanterns also provide radio and mobile phone charging functions could explain reduced interest in buying SHS.[23]

2.3 Impact of COVID-19

COVID-19, coupled with the worst attack by desert locusts in 25 years, is forecasted to lead to a fall of two million people (conservatively) into poverty, and a 10 to 15 per cent loss of employment or livelihoods leading to a cumulative loss of approximately 1.6 to 2.4 million jobs/livelihoods, mostly in urban areas. The impact is likely to be worse for women, mainly because they are over-represented in the workforce in industrial parks and the hard-hit tourism and hospitality sectors (80 per cent).[24]

2.4 Consumer Awareness

Consumers are not very familiar with the various solar products available in the market. Reasons include the multitude of products available in the market among which consumers find it difficult to differentiate; minimal or no access to the sales outlets; and limited outreach by suppliers.

In general, consumers are paying higher unit prices for the solar they are using since they generally focus on cost outlay, while as the capacity of the product increases, the landed cost per kWh of electricity reduces considerably. For example, a solar lantern costs USD1.64/kWh whereas a pico solar system costs USD0.91/kWh with higher output.[25]

19. ibid.
20. ibid.
21. Interview with the SNNP REB.
22. ESMAP (2018). Energy access diagnostic report based on the Multi-Tier Framework.
23. AfDB (2019). Market Assessment for the Off-grid Facility.
24. UN (2020). Socio-economic impact of COVID-19 in Ethiopia.
25. AfDB (2019). Market Assessment for the Off-grid Facility.

3. SUPPLY-SIDE: STAND-ALONE SOLAR COMPANIES

3.1 Pico-solar and Solar Home Systems (SHS)

Ethiopia remains the second largest market for SAS products in the sub-Saharan African region, with 235,000 units sold in the January to June 2020 period. However, considering that the June to December 2019 period had record sales of 718,000 units, there is a 67 per cent decline in sales. **The particularly high sales during this period may have been as a result of availability of forex through a World Bank and Development Bank of Ethiopia (DBE) credit facility (see Section 5).** Both cash and pay-as-you-go (PAYG) sales were affected in 2020, with the former recording a bigger drop.

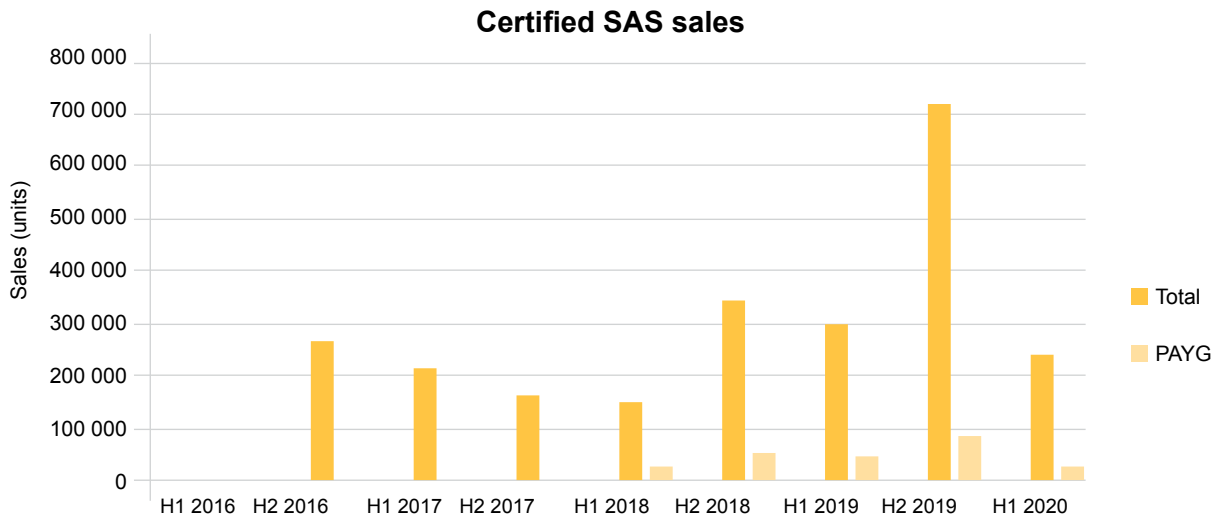

Figure 2: Certified SAS sales (Source: GOGLA)

The decline even from pre-boom figures is likely due to:

- Reduced forex available in the country, due to COVID-19 impacts as well as the drawing down of the DBE and World Bank facility.
- Restrictions on inter-regional public transport that affected the movement of SAS products. **The government did not designate SAS companies as essential service providers during the January to June 2020 period. These restrictions heavily impacted SAS companies.**[26]

Major features of the Ethiopian SAS market are:

- Foreign companies are not allowed to participate in distribution, wholesale or retail of SAS. As per Council of Ministers Investment Regulation No. 474/2020, they may only participate in local assembly and manufacture.
- Local manufacturing remains limited, and most SAS are imported from India, China and Kenya. At current rates, the sector will struggle to meet the NEP 2.0 electrification targets.
- The market is still dominated by very small solar products -- <1.5 watt-peak (Wp).[27]
- In the four populous regions of Oromia, Amhara, Southern Nations, Nationalities, and Peoples (SNNP) and Tigray, there has been an aggressive

26. *AfDB (2019). Market Assessment for the Off-grid Facility.*
27. *Interviews with solar importers and distributors.*

expansion of youth solar enterprise associations for retail, after sales and maintenance services. But limited access to loans and quality verified products are holding back their operations.

There are several companies actively involved in the Ethiopian SAS market. Some of them handle multiple products including solar pumps, but the majority handle only solar lighting products.

With the support of multiple donors, HelloSolar has piloted a PAYG system in the Somali Regional State. The pilot has distributed 80 SHS kits, a success that has a wider demonstration effect on PAYG systems.[28]

A new entrant in the SAS business, Apex, came in last year; no companies have withdrawn recently.

Other SAS companies are listed in Table 2. Sales through MFIs are considered as sales through a credit model.

Table 2: Some active SAS companies [29]

Company	Business model	Brand	Comments
Lydetco	Credit and cash	Greenlight Planet	Also sells component-based systems.
Vera International	Credit and cash	d.light, Mobisol	Also sells solar water pumps and involved in mini-grids.
Rensys Engineering	Credit and cash	d.light, Mobisol	Also sells solar water pumps and involved in mini-grids.
Biftu Adugna	Cash	FuturaS, G3 Solar	Also sells solar TV and refrigerators.
Sun Transfer	Cash	Niwa, Mobisol	Also sells solar water pumps and component-based systems.
Green Scene Energy	Credit and cash	SunKing, BioLite, Fosera	Also sells component-based systems.
Hidasse Telecom	Credit and cash	d.light, Sunking, Renewit, Futurasun, Newa	
Solar Development	Credit and cash	Little Sun, Omnivoltaic, Fosera, Ovsolar	Also sells solar water pumps and component-based systems.
ACME Engineering	Credit and cash	OVES	Also sells solar water pumps and component-based systems, and is involved in mini-grids.
Fosera	Credit and cash	Fosera	
Kifiya Technologies	Credit and cash	d.light	
Ethio Resource Group (ERG)		SunKing, Omnivoltaic	Focused on solar water pumps, component-based systems and mini-grids.
ER AF	Credit and cash		Also sells solar water pumps.

If the NEP 2.0 targets are to be met, annual supplies of SAS products will have to rise significantly over the next few years by an average of 12 per cent, from 1.7 million units in 2021 to 2.7 million units in 2025 (see Table 3). Close to two-thirds of supply, or 6.8 million units, will be solar lanterns and the rest will be SHS and pico systems.

The estimated supply value (excluding distribution costs) for the SHS component of the off-grid plan is estimated to be USD72 million in 2021, rising to USD171 million in 2025. Cumulative investment in SAS products between 2021 and 2025 will be USD587 million (or about USD117 million annually), with SHS accounting for close to two-thirds of the total cost.

Comparing the quality certified GOGLA SAS sales trend, without considering non-quality verified imports, to the estimated potential demand for the next five years, there

28. Power Africa (2019). Off-grid solar market assessment: Ethiopia.
29. This list is not exhaustive.

is a significant gap. For example, the highest certified GOGLA sales were 718,000 units in the second half of 2019 against an estimated potential demand of 1.7 million units in 2021. The projected demand is also unlikely to be met without a commensurate increase in the amount of forex available to private sector SAS importers from either a donor supported facility or government coffers.

Table 3: Projected off-grid electrification demand, 2021–2025[30]

Stand-alone solar product	Specification	Projected demand (units in millions for lanterns, pico and SHS)				
		2021	2022	2023	2024	2025
Solar lanterns	3Wp	1.2	1.3	1.5	1.4	1.4
Pico-solar systems	10Wp	0.2	0.3	0.2	0.4	0.5
SHS	50Wp	0.3	0.3	0.5	0.6	0.8
Solar pumps	600Wp	28,683	34,133	40,613	48,335	57,519
Total		1,728,683	1,934,133	2,240,613	2,448,335	2,757,519

3.2 Productive Use Systems

The use of solar energy for productive purposes is still very low in Ethiopia.

Irrigation

Only about 10 per cent of farming households dependent on non-grid lighting sources use irrigation, compared to about 15 per cent of households that get electricity from the national grid.[31] But the potential for irrigation agriculture is high.

A recent study has shown that it is possible to irrigate seven million hectares of smallholder farms using solar pumps from shallow ground water and surface sources. It is estimated that 200,000 solar pumps are required to pump water from as shallow as 25 metres to irrigate these smallholder farms. The total estimated cost of these pumps is a little over USD209 million.[32]

Diesel generators are currently the main source of power for rural water supply systems. According to a study by Energy Market Accelerator Ethiopia, the market for solar pumps in Africa is expected to grow by 20 percent between 2018 and 2024, with Ethiopia potentially serving as the second-largest market for solar pumps.[33] Farmers who have used solar pumps for irrigation have increased their incomes threefold. Depending on the type of crop, farmers have reportedly earned an annual income of up to ETB100,000 (USD2,500), up from ETB30,000 (USD750).[34]

The government, under the Agricultural Commercialization Clusters (ACC), has identified (in the four major crop growing areas of Amhara, Oromia, Tigray and Southern Nations, Nationalities, and Peoples Region - SNNPR) nine priority crop value chains (wheat, maize, sesame, malt barley, tomato, onion, mango, banana and avocado) that are to be supported with small-scale solar irrigation facilities. The Ministry of Agriculture plans to develop over one million hectares with 400,000 solar irrigation systems.

Agro-processing

According to the Rocky Mountain Institute, agro-processing activities with promising potential in Ethiopia include grain milling, injera and bread baking, milk cooling, coffee washing and horticulture irrigation. This processing could lead to a potential return of USD4 billion in annual value by 2025. The associated demand for solar appliances to run these agro-processing activities is estimated to be USD380 million for solar companies.[35]

The substitution of diesel run mills with solar run mills has a significant opportunity for overall saving as the energy consumed per unit mass of grain milled is lower for electric mills than for their diesel equivalents.[36]

30. *AfDB (2019). Market Assessment for the Off-grid Facility.*
31. *Power Africa (2019). Off-grid solar market assessment: Ethiopia.*
32. *AfDB (2019). Market Assessment for the Off-grid Facility.*
33. *Energy Market Accelerator Ethiopia (2020). Scaling up solar pumps for irrigation and domestic water use in Ethiopia: The role of blended finance.*
34. *ibid.*
35. *Rocky Mountain Institute (2020). Capturing the productive use dividend.*
36. *ibid.*

Distribution channels

In the past productive use suppliers in Ethiopia have been few (less than 10 in 2017) and they were not keeping stock, rather operating on procurement as they supplied directly to projects sponsored by government and non-governmental organisations.[37]

This is likely to change as a few solar companies, such as Lydetco, Solar Development and Acme Engineering, move into solar pumps and cold chain businesses. New businesses are also coming into the solar irrigation market as they pilot direct distribution to farmers or engage MFIs for scale up. Solar Village Ethiopia, for example, is working with farmers and other stakeholders in the Southern Nations, Nationalities, and Peoples Region (SNNPR) and Amhara to understand the market, specifications requirements and willingness to pay. The firm has imported solar pumps with a power output of 300 and 600kWh at a cost of USD500 to USD1,000. So far, a high demand for these products has been reported.[38]

3.3. Ethiopia Solar Energy Development Association (ESEDA)

Since its establishment in 2010, ESEDA has actively participated in national committees established to address solar products quality issues, harmonisation of licensing rules across regions, expanding instalment-based payment systems (PAYG, MFIs) and streamlining fiscal policy measures. It also works with donor organisations to provide solar trainings. While it has only one staff member, it manages to carry out its role through elected officials.

There are also four regional associations that support their members with distribution and after-sales services, as well as providing free training: Amhara Solar Energy Development Association (ASEDA), Tigray Solar Energy Development Association (TSEDA), Southern Solar Energy Development Association (SSEDA), and Oromia Solar Energy Development Association (OSEDA). While ESEDA is required to work with these associations in some regions, no formal working relationships have been established.

Members of ESEDA are large importers and distributors while members of the regional associations are small retailers and youth associations that mainly work as agents for ESEDA members. With 80 active members, TSEDA is the largest regional association, while at 34 active members, SSEDA is the smallest. OSEDA and ASEDA have 75 and 57 active members, respectively.[39]

With 80 active members, TSEDA is the largest regional association, while at **34 active members, SSEDA is the smallest.** OSEDA and ASEDA have 75 and 57 active members, respectively.

37. *MoWIE (2017). Assessment of the governing factors affecting the scaling-up and sustainability of solar and wind water pumping systems.*
38. *AfDB (2019). Market Assessment for the Off-grid Facility.*
39. *Interviews with REBs.*

4. POLITICAL FRAMEWORK

4.1 Government Institutions

The government has committed, as part NEP 2.0 implementation, to streamline import procedures, expand mandatory standards for off-grid technologies and appliances, and support digital payment solutions in line with the financial inclusion strategy. It is also expected to introduce additional measures to overcome SAS quality issues and tax uncertainties. Already, the government has begun the process of procuring the services of Pre-Export Verification of Conformity (PVoC) agencies to stop the import of non-quality certified products.

These reforms should improve Ethiopia's score on the PAYG Market Attractiveness Index, which is currently 64 out of 100 points, 30 per cent on regulatory environment. While there have been improvements, coordination among the various institutions remains weak.[40]

Table 4: Government institutions in the SAS sector

Institution	Description and recent activity
Ministry of Water, Irrigation and Electricity (MoWIE)	Oversees the Ethiopian electricity sector. Mandated to develop and promote alternative energy resources and technologies including SAS.
Rural Electrification Fund (REF)	Formerly a part of MoWIE, it is now amalgamated with the Rural Energy Development and Promotion Center (REDPC), an autonomous government organisation reporting to MoWIE.
Ethiopian Energy Authority (EEA)	Independent regulatory agency. Together with Ethiopian Standards Agency, sets and regulates technical and safety standards for off-grid solar products.
Ethiopian Electric Utility (EEU)	Responsible for power distribution and sales. EEU also implements solar mini-grids where extension of the national grid is not viable.
Regional Energy Bureaus (REBs)	Represent regional power priorities and facilitate grid and off-grid expansion. Facilitate off-grid expansion.
Ethiopian Standards Agency (ESA)	Develops/adopts international standards for solar products.
Ministry of Trade and Industry (MoTI)	Responsible for checking that imported products are in compliance with standards before they are cleared from customs.
Ethiopian Conformity Assessment Enterprise (ECAE)	Provides quality testing services for SHS for importers and manufacturers.
Ethiopian Customs Commission	Enforces tax law on solar products in accordance with tax and customs legislations.

4.2 Energy Policy and Regulation

While the government has put in place a number of regulations to govern the SAS sector, there are still some gaps.

Implementation of quality standards requirements at customs is hampered by lack of up-to-date information on the latest off-grid technologies for customs officers, as well as lack of coordination among officers posted at various entry points which leads to unpredictable HS code classification, mistaken imposition of tariffs, or delays in clearance. There are 15 customs entry points in Ethiopia and only two – Addis and Modjo – apparently have customs officers trained in solar quality standards. But there are ongoing efforts to remedy this.

There are also gaps in the regulation of creditors resolving payment defaults. As such there is the concern of companies formulating their own policies on default and delinquency, which may too punitive and hurt the customer. An e-transaction directive has been drafted to support this but is yet to be implemented.

There are currently no e-waste regulations.

40. Lighting Global (2019) PAYG Market Attractiveness Index

Table 5: Recent developments in the SAS regulatory environment

Policy/Regulation	Description and recent activity	Relevance to SAS sector
National Energy Policy (Draft, 2018)	Issued to update the 2013 one. Includes current developments in energy generation (geothermal projects, waste to energy plant in Addis and progress made to extract and export natural gas) and growth in transmission lines. Stakeholder consultations were held in early March 2021.	The policy stipulates increasing access to electricity through on-grid and off-grid technologies, providing incentives for private investment in off-grid electrification and facilitating financing for renewable technologies.
Investment Regulation No. 474/2020	As part of the negative listing approach, it provides three categories of investment areas: (i) Areas exclusively reserved for joint investment with government. (ii) Areas exclusively reserved for domestic investors. (iii) Area exclusively reserved for joint investment with domestic investors. Foreign investors are allowed to jointly invest with the government and domestic investors, but import, wholesale and retail businesses are reserved for domestic investors only.	Foreign companies are not allowed to engage in the import, wholesale and retail of SAS products.
Licensing and Authorization of Payment Instrument Issuers Directive No. ONPS/01/2020	Allows financial institutions (banks and MFIs) and non-financial institutions to engage in electronic payment and money transfer services, which were previously reserved for banks and MFIs only.	MNOs are now allowed to provide mobile payment services.
Proclamation No. 1097/2018 – Definitions of Powers and Duties of the Executive Organs of FDRE	Ministry of Trade and Industry (MoTI) mandated to control the compliance of goods with the Ethiopian standards and take measures against those found to be below the standards. Oversees the coordinated enforcement of standards by other enforcement bodies.	MoTI has temporarily delegated its responsibility for Ethiopian Conformity Assessment Enterprise (ECAE) to PVoC agencies to implement the system this year. ECAE has started the procurement process.
Import duties and taxes	Lighting Africa certified products are eligible to be imported duty-free, though implementation is not uniform and lacks clarity. Firms venturing into PAYG systems are facing financial constraints as they are required to file VAT every month (or every three months for taxpayers whose annual turnover is less than ETB70 million (USD 1.8 million)) for credit sales they expect to collect over several months.	Productive use appliances, components and parts and products novel to the market like solar TVs are sometimes incorrectly classified and made liable to tax. Reduce the working capital and turnover of SAS companies using PAYG may face cashflow problems.
Ethiopian Standard ES IEC TS 62257-9-8	A mandatory standard for stand-alone renewable energy products with power ratings < or equal to 350W, which was based on Lighting Global quality assurance framework, was adopted in 2016 to ensure quality of products in SAS lighting sector.	Procurement of PVoC agencies' services is now underway. It is expected that this will lead to more quality certified products in the market.

4.3 Financial and Mobile Payment Regulation

Foreign exchange policies: The National Bank of Ethiopia (NBE) closely controls foreign exchange transactions. In late 2018 and throughout 2019, several new directives were enacted to regulate foreign exchange. The availability of and access to foreign currency is determined based on the Forex Directive, which lists priority sectors from first to fourth. While most

of the priority lists under the previous directive remain the same, the new Transparency in Foreign Currency Allocation and Foreign Exchange Management Directive No. FXD /62/2019 has moved profits and dividends of investors from third to second priority. Manufacturers and assemblers of SAS products remain in third priority.

Previously, the NBE permitted foreign investors and exporters to obtain foreign loans only in cash, but the new Regulation of External Loan in Kind Directive No. FXD/61/2019, enacted on May 31, 2019, now allows them to obtain external loans in kind. Investors that can obtain foreign loans in kind are exporters, and foreign and domestic investors who are engaged in projects that generate foreign exchange. Importers of SAS products are not yet included in the forex priority list.

Policies for business and credit protection: The government, with the support of the World Bank, launched in 2017 a National Financial Inclusion Strategy (NFIS). The headline indicator for the strategy is to increase the percentage of adults with a transaction account from 22 per cent in 2014 to 60 per cent in 2020. Unfortunately, the strategy did not meet its target as the number of people who hold a bank account currently stands at 35 per cent.[41]

Mobile money: The 2020 Licensing and Authorization of Payment Instrument Issuers Directive No. ONPS/01/2020 by NBE allows non-traditional financial institutions to issue payment instruments. Services that traditionally fell under the banking service, such as local money transfer, can now be provided by non-bank companies that fulfil the criteria under the directive. Non-financial local institutions are also allowed to engage in digital payment and money transfer services, which opens the way for Ethio Telecom to venture into mobile banking and payments, and potentially engage in PAYG and airtime payments for solar using its extensive logistics network and about 44.5 million subscribers.[42]

Despite the appetite and high expectations of foreign financial and technology firms to invest in payment transaction services (including mobile money services), the directive has limited eligibility to Ethiopian nationals, the government and foreign nationals of Ethiopian origin.

Data protection: Financial and non-financial institutions engaged in mobile payment services are required by NBE to own their data and technology; if outsourced, it must be transferred by way of licensing to a local institution within five years.

Though Ethiopia has not enacted a specific law to address personal data protection, the country's scattered legislative framework is understood to require that personal data be collected and processed with due care and only for an intended lawful purpose. Ethiopia has several laws that relate to privacy and data security, including the 1995 Constitution.

Investor protection: Ethiopia has put in place the following measures to protect foreign investors.

- The Constitution and investment law protect investors against expropriation or nationalisation.
- Ethiopia is signatory to the Multilateral Investment Guarantee Agency and has concluded bilateral investment promotion and protection treaties with 30 countries.
- Investment law gives privileges to investors to fully repatriate profits, dividends, principal and interest payments on external loans, etc. in convertible currency.
- Investment law has given foreign investors the right to employ expatriate managers and experts.
- Ethiopia has signed double taxation avoidance treaties with 18 countries, so investors from these countries will have tax benefits as provided by the agreements.

The government, with the support of the World Bank, launched in 2017 a National Financial Inclusion Strategy (NFIS), to increase the percentage of adults with a transaction account from **22% in 2014 to 60% in 2020.**

Services that traditionally fell under the banking service, such as local money transfer, can now be provided by non-bank companies that fulfil the criteria under the directive.

41. *The Global Findex Database, 2017.*
42. *New Business Ethiopia (2020). Ethio Telecom to boost mobile subscribers to 49 million.*

4.4 Gender and Social Inclusion Mainstreaming

Strategies to support women in realising the benefits of off-grid technology have been laid out in the National Energy Policy draft and the NEP 2.0. This includes collecting gender disaggregated information, facilitating credit mechanisms for women, and encouraging employment of women in the supply chain.

The Directorate of Women, Children and Youth Affairs at MoWIE however is constrained by low staffing and technical capacity, and has not been involved in SAS projects to date.

Care Ethiopia has a project that links women with solar suppliers, builds their business skills, and provides follow-up support. They have recruited more than 300 women agents, with plans to grow to 500.

Lack of exposure to business practices and lack of collateral to borrow funds from the formal financial institutions have a disproportionate impact on female solar entrepreneurs. A potential intervention is to support aspiring women with business plan preparations and mentoring within networks such as the Ethiopian Chamber of Commerce, Alliance of Women Enterprise Program (AWEP) and Association of Women in Business (AWiB).

Her first solar-powered light: *In Addis Ababa, Ethiopia, a schoolgirl is introduced to Little Sun – her first solar-powered light – and the concept that she can hold power in the palm of her hand. The lamp helps children in off-grid areas study at night without the toxic smoke of fuel-based lighting like kerosene lanterns. The Little Sun solar lamp's unique design is a favourite with children around the world. Photo credit: Merklit Mersha*

5. FINANCING

5.1 Supply Chain Financing

SAS companies' access to capital remains limited due to statutory restrictions and high collateral requirements by banks. Importers cannot raise foreign equity capital since they will lose their privileged local company status that allows them to engage in the import and distribution of solar products. Lending terms by banks can be prohibitive – they require high security for their loans (usually 100 per cent or more in collateral). Grants and interest free loans have to some extent bridged the gap.

SAS companies have benefited from grants and interest free loans from donor supported programs, such as AECF's REACT Household Solar Programme, to meet their capex and working capital needs. Fosera, Vera International and Lydetco are some of the companies that have benefited from this scheme.

SAS distributors also have limited access to forex from banks as they are not part of the priority lists drawn by NBE. The forex access and working capital needs of SAS companies was met to a large extent by the World Bank supported USD 40 million DBE credit facility, which was effective in mitigating foreign currency constraints and providing consumer finance through MFIs at a relatively low interest rate (6%). As of June 2020, 800,000 SAS products meeting Lighting Global quality standards had been imported and distributed by 29 approved retailers (eight in Phase 1 and 21 in Phase 2), providing clean, safe lighting and modern energy services to more than three million Ethiopians.[43]

The World Bank is currently in the design phase of a new USD400 million credit facility under the Accelerating Distributed Electricity and Lighting in Ethiopia (ADELE) project, which is expected to be launched in 2021.The facility will provide foreign currency loans for purchase of hardware inventory (equipment, supplies) and local currency loans to finance operating costs and consumer financing.[44] The project will be the first of its kind in introducing results-based financing (RBF), which will offer competitively awarded incentives to SAS companies to accelerate expansion, with a particular focus on deep rural areas, as well as technical assistance to facilitate implementation.

The African Development Bank (AfDB), in partnership with Commercial Bank of Ethiopia (CBE), is planning the Facility for Energy Inclusion Off-Grid Energy Access Fund (FEI OGEF) to provide a USD100 million commercial local currency debt to support off-grid electrification. The facility could finance around 10 per cent of the investment required for off-grid electrification (which is estimated at USD1 billion). It will be distributed as follows: 1.3 million stand-alone home systems, 120 solar-powered mini-grids and about 27,000 solar-powered micro irrigation pumps.[45]

5.2 Consumer Financing

Regarding Lighting Global certified products, the main consumer finance facility in the market has been the World Bank credit line, a USD45 million facility financed by the International Development Association (IDA) specifically for retail lending to SAS companies and wholesale lending to MFIs. The credit facility is managed by DBE as the financial intermediary and MoWIE as the technical intermediary.

The interest rate MFIs charge households is very high since DBE exercises no oversight over MFIs' lending to households. MFIs receive credit from DBE at 7 per cent (versus 9.25 per cent from CBE and 14 per cent from private banks) and charge household borrowers 18 to 21 per cent, depending on the loan terms. The high interest rate, coupled with the short loan repayment duration for loans to households (one year for solar lanterns and two years for SHS) makes solar products expensive for consumers. Additionally, payment is sometimes made just once during harvest time for farmers, giving them limited repayment frequencies.[46]

Adoption of PAYG has been slowed by the restriction imposed on foreign companies and stringent requirements placed on local companies. The Licensing and Authorization of Payment Instrument Issuers Directive No. ONPS/01/2020 reserves participation in digital payments to only Ethiopian nationals. Foreign mobile network operators (MNOs) have the technology and strong capital base to establish a viable PAYG system, but because of the restriction, the country cannot tap into the rich experience in other countries to scale PAYG.

43. *AfDB (2019). Market Assessment for the Off-grid Facility.*
44. *World Bank (2019). Accelerating distributed electricity and lighting in Ethiopia.*
45. *AfDB (2019). Market Assessment for the Off-grid Facility.*
46. *AfDB (2019). Market Assessment for the Off-grid Facility.*

The directive also requires prospective local mobile payment providers to put up ETB50 million (USD1.25 million) as minimum capital. Additionally, the entity must have at least 10 shareholders, all of whom must be Ethiopian nationals. The capital requirement is very high for fledgling local fintech companies to meet. The restriction on foreign ownership also alienates locally registered fintechs that have foreign shareholders or have raised external funding.

Microfinance Institutions (MFIs)

MFIs have entered into tripartite agreements with REBs and selected SAS companies that will procure and install off-grid products for solar customers. The five largest are Oromia Microfinance, Amhara Credit and Savings Institution, OMO Microfinance, Dedebit Credit and Savings Institution and Addis Credit and Savings Institution, all government owned. They are the main institutions currently providing instalment sales to solar end-users, primarily through group lending[47], although lending for off-grid technologies represents only about 1 per cent of their portfolios.[48]

There are 19,000 savings and credit cooperatives (SACCOs) nationwide, representing 3.8 million active savers, providing small loans to their members.[49] Except a few isolated examples, such as Mehlik Cooperative Union in SNNPR, which once purchased solar products from a private company and distributed to its members,[50] the majority do not distribute SAS products.

The REF once used Energy Service Cooperatives (ESCOs) to lend to household consumers of SHS at an attractive 6 to 8 per cent interest, one year grace period and 10-year maturity period. This arrangement worked well until the dissolution of ESCOs due to lack of resources; government may consider re-establishing them to replace or work alongside MFIs as an intermediary.[51]

Mobile money networks

Mobile money penetration is very low in Ethiopia, with only 3 per cent of Ethiopians having accounts.[52] This is changing now – recently all the major banks and MFIs have introduced mobile money services, and enabled public services such as water, electricity and telecom bills to be paid this way. Peer to peer transactions are also operational.

The liberalisation of the telecom sector to allow two foreign operators and sell a minority stake in Ethio Telecom, it seems, does not include mobile money services, which dashes the hopes of mobile operators looking to enter the Ethiopian market.[53]

Another change that will have a significant impact on the implementation of PAYG is the recent development of a national digital identification system.

Remittances

In 2018/19 the Ethiopian diaspora sent USD6.4 billion through both formal and informal remittance methods.[54] This is a significant source of foreign exchange, and could be transformative if linked directly to purchase of solar products – something Power Africa, among others, is looking into.

There are 19,000 savings and credit cooperatives (SACCOs) nationwide, representing 3.8 million active savers, providing small loans to their members. Except a few isolated examples, such as Mehlik Cooperative Union in SNNPR, which once purchased solar products from a private company and distributed to its members, **the majority do not distribute SAS products.**

47. *A lending mechanism in which a group of individuals provide loan guarantee through a repayment pledge. The incentive to repay the loan is based on peer pressure, if one group member defaults, the other group members make up the payment amount.*
48. *MoWIE (2019). National Electrification Plan 2.0.*
49. *MoWIE (2019). National Electrification Plan 2.0.*
50 *Interview with the Head of SNNPR Regional Energy Bureau.*
51. *AfDB (2019). Market Assessment for the Off-grid Facility.*
52. *Power Africa (2019). Off-grid solar market assessment: Ethiopia.*
53. *Burkitt-Gray, A. (2021). World Bank questions Ethiopia's stance in telecoms competition.*
54. *IMF (2020). Article IV Consultation Report: Ethiopia.*

6. MARKET SUPPORT

6.1 Development Partners

World Bank and AfDB provide loanable funds to help SAS companies get access to forex to import products, and to MFIs to enable them extend consumer financing to households.

A number of donors are also actively providing technical assistance in identifying barriers that hinder the uptake of SAS, and developing institutional capacity, laws and regulations that will facilitate private sector-led solar projects.

An Off-grid Task Force, chaired by MoWIE and composed of members from key ministries, donors and ESEDA, was established in 2020 to coordinate the activities of the government and donors in the SAS sector. The Africa Clean Energy Technical Assistance Facility (ACE TAF) played a role in the establishment of the task force and three other sub-working groups on quality assurance, fiscal incentives and payment options. ACE TAF continues to act as the coordinator of the Off-grid Task Force.

Table 6: Development partners in the SAS sector

Development partner: Programme	Type of assistance	Objective/Target
Sustainable Energy for All	Technical assistance	Promote policy advocacy and networking, and support the development of country-level action agendas.
Energy Sector Management Assistance Program (ESMAP): Africa Renewable Energy Access Program (AFREA I&II)	Technical assistance	Create an enabling environment for regional cooperation and private sector participation in energy generation, transmission and distribution. Advisory services aimed at increasing institutional capacity.
United States Agency for International Development (USAID): Power Africa	Technical assistance	Regulatory support to facilitate private sector-led solar projects.
Energising Development (EnDev)	Technical assistance	Promote sustainable access to modern energy services that meet the needs of the poor – long lasting and affordable. Raising awareness through campaigns, assisting entrepreneurs with energy-related businesses as well as transferring knowledge regarding technology and business skills.
Foreign, Commonwealth and Development Office (FCDO): Africa Clean Energy Technical Assistance Facility (ACE TAF)	Technical assistance	Assist 14 African governments to unleash the solar household market, tackle the policy and regulatory barriers to household energy access, and to accelerate a market-based approach to clean energy access.
World Bank: Ethiopia Electrification Program (ELEAP)	Technical assistance	Increase access to electricity in Ethiopia and enhance institutional capacity for planning and implementation of the government's electrification programme.
German Society for International Cooperation (GIZ): Energy Solutions for Displacement Settings (ESDS)	Technical assistance	Improve energy access through market-based approaches in refugee hosting areas, with a focus on Gambela.

Table 6: Development partners in the SAS sector (Continued)

Development partner: Programme	Type of assistance	Objective/Target
Strategic Climate Fund: Scaling up Renewable Energy Program (SREP)	Financing	Grants, equity, concessional loans and guarantees to scale up the deployment of renewable energy solutions.
GIZ: The Ethiopian German Energy Cooperation	Grants, technical assistance	Improve and develop a sustainable energy infrastructure for modern and efficient energy markets through the increased use of renewable energy and energy efficiency technologies. Doing this through: Innovation competition for on- and off-grid rural decentralised electrification. Local PV demonstration. Mentorship and business development support for competition finalists. Seed funding and project scale up.
UN Capital Development Fund (UNCDF): Clean Start	Grants, technical assistance	Incubate scalable energy financing models. Technical assistance to increase the scale potential of financing models by providing value-added support.

6.2 Training Institutions & Incubators

GIZ is providing training on institutional SAS installation, maintenance and after-sales services for youth solar enterprises.

MoWIE has built solar manufacturing incubation centres in Amhara, Tigray, Oromia and SNNP regions that are equipped with workshops and laboratory facilities. It has also supplied the centres with small equipment such as furnaces, moulds and weighing scales. Regions were expected to supply the remaining equipment but have not yet done so. As a result, all the incubation centres are yet to start operations.

ACE TAF PARTNERS INCLUDE:

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