STAND-ALONE SOLAR

INVESTMENT MAP

Ethiopia

February 2021

Africa Clean Energy
Catalysing Africa's Solar Markets

TETRA TECH
International Development

ENERGY MARKET ACCELERATOR ETHIOPIA

Implemented by PRECISE
strategy · finance · development

Shell Foundation

UKaid
from the British people

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

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ABBREVIATIONS

Acronym	Definition
AfDB	African Development Bank
CBE	Commercial Bank of Ethiopia
DBE	Development Bank of Ethiopia
ECIC	Ethiopia Climate Innovation Center
ESA	Ethiopian Standards Agency
ETB	Ethiopian birr
FCDO	Foreign Commonwealth and Development Office (formerly DFID)
GESI	Gender and Social Inclusion
GIZ	German Society for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit)
GoE	Government of Ethiopia
IPP	Independent Power Project
LG	Lighting Global
MDCL	Market Development (for Renewable Energy and Energy Efficiency) Credit Line
MFI	Microfinance institution
MoFED	Ministry of Finance and Economic Development
MoWIE	Ministry of Water, Irrigation and Energy
NBE	National Bank of Ethiopia
NEP	National Electrification Program
PAYG	Pay-as-you-go
PPP	Public-private partnership
PV	Photovoltaic
RBF	Results-based Financing
SAS	Stand-alone solar
SHS	Solar home system
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

The standalone solar (SAS) sector in Ethiopia is growing steadily, with increasing involvement from both the public and private sector. As of 2019, 24% of Ethiopian households are using an off-grid solar product as their main source of electricity[1]. However, over 70% rely on a solar lantern or pico system under 10W, which does not qualify for the level of access that the government seeks to achieve. Only 11% of households are therefore considered to be fully electrified by an off-grid source[2].

The government projects that 35% or 9.2 million households can meet their electrification needs using SAS solutions and intends to achieve this by 2025[3]. Several local and international companies have been established to meet the demand for off-grid solutions, with most dealing in SAS products, specifically solar lanterns, pico solar, and larger solar home systems, and a few productive use products. An emerging minority of companies are venturing into minigrid solutions as the government develops clear licensing and tariff regulations.

To meet demand for SAS products, the sector has attracted primarily debt funding through a government-run and donor-backed credit facility. Investors such as the World Bank have stepped in to bridge the SAS access gap, partnering with the Development Bank of Ethiopia (DBE) from 2012 - 2019 under a two-phase credit facility, the Market Development Credit Line (MDCL), to contribute a majority of total investment inflows. Under MDCL, 31 SAS companies received concessional foreign currency loans, 13 MFIs participated in a consumer financing facility, and over 1.2 million SAS products were distributed[4].

Private investments directly into SAS companies have been limited due to a restrictive regulatory environment. Forex policies prohibit businesses from possessing and using foreign currencies, restrictions around vertical integration create a fragmented supply chain, and regulations concerning mobile services limit adoption of scalable models like Pay-as-you-go (PAYG). Some international companies have raised debt and equity financing to support their broader regional operations. However, the remainder of investment into the market has mostly been in the form of grant financing from donors such as the African Enterprise Challenge Fund (AECF). Commercial bank opportunities are also few in the market due to unfavorable lending rates, limiting access to local currency debt for working capital.

Initially, solar lanterns received the heaviest investment, but home systems have seen a sharp increase in uptake. Market demand for lanterns has historically been significantly higher in Ethiopia. In phase I of MDCL, lanterns made up the majority – over 800,000 – of loan applications, with only ~10,000 thousand home systems funded by 2016. However, in phase II DBE specifically allocated 75% of funds towards home systems to encourage distribution and uptake, increasing sales to over 70,000[5].

While the investments to date have enabled growth in the sector, SAS companies still report limited access to finance. Under the National Electrification Program (NEP) 2.0, the GoE estimates a financing need of USD 1.76 billion between 2019 and 2025 to achieve 9.2 million off-grid connections[6]. SAS companies need access to three main functional sources of financing: (i) forex to purchase imports, (ii) working capital to support distribution, and (iii) capex and operating capital to expand the supply chain and other market infrastructure. Smaller local companies need grant or patient capital to reach commercial viability and prove their business models. Alternative mechanisms such as results-based financing and remittances also need to be tested and leveraged.

This paper explores the supply and demand barriers that restrict investment into the SAS sector. Forex restrictions, an unfavorable lending environment, and an opaque market limits visibility into opportunities and deters investors. On the demand-side, SAS companies

1 *GOGLA (2019), Ethiopia Country Brief*
2 *GOGLA (2019), Ethiopia Country Brief*
3 *MoWIE (2019), National Electrification Program 2.0*
4 *OCA consultation with Development Bank of Ethiopia (DBE), 2020*
5 *MoWIE (2019), NEP 2.0; OCA consultation and analysis*
6 *MoWIE (2019), NEP 2.0*

operate within a fragmented supply chain and struggle to adopt scalable models due to policies around vertical integration and mobile payments. This affects their ability to absorb external capital and increases costs of doing business, limiting affordability of SAS products for end consumers.

Various ecosystem players have implemented interventions over the past few years to support sector growth, but more can be done within the constraints of the market. The government, development partners, and other support actors have collaborated across programs to extend business and consumer financing, technical assistance to public institutions and financiers, consumer awareness, and to seek regulatory reforms. Past interventions notwithstanding, the SAS sector remains significantly underfunded given projected financing needs for universal energy access. Potential solutions to improving the local SAS investment climate include:

- **Investors can support targeted financing interventions that respond to specific market gaps.** SAS companies require forex to import products, which makes the case for increased concessionary forex loans in the market. However, small or early-stage players will still need grant or patient capital to develop and prove their business models. To increase access to working capital at affordable rates, blended finance models that crowd in commercial banks and employ risk mitigation mechanisms are needed. Alternative mechanisms such as results-based financing can incentivize companies to expand reach to remote regions and distribute products at reduced prices, while remittance solutions offer a demand-side subsidy to support household purchases and repayments.

- **The government and industry actors can play a key role in making the SAS sector more attractive to investment.** The local SAS manufacturing industry needs to build capacity to decrease sector reliance on imports and forex and to eventually position itself for regional opportunities. Across the supply chain, provisions for vertical integration are key to enabling companies to develop end-to-end expertise that allow them to operate at scale. An integrated supply chain will also encourage the adoption of PAYG models, which boast higher repayment rates and improved service delivery. Stakeholders should seek to extend technical assistance and build a knowledge base among early PAYG entrants to sustain this model in the market.

- **Continued technical support is essential to increasing sector transparency and informing investors of strategic opportunities.** Development partners like the World Bank and Power Africa have actively engaged the GoE on issues concerning SAS sector growth, extending large amounts of technical assistance. Continued support is necessary to shape policy reforms and financing interventions, but also to strengthen the data tracking and analytical capacity of the industry. At the household level, data on new connections and product sales by type and size is critical to measuring progress towards energy access goals. At the business level, assessing the technical assistance needs and overall investment readiness of SAS companies will inform investor strategies in the market.

- **Further reforms to relevant policies and consistent enforcement of regulations can foster a more enabling environment for scale and investment in the SAS sector.** Expanding provisions to extend mobile money services to agile players such as financial technology (FinTech) firms and telecoms – both local and international – can enable the growth of mobile payments. A clear enforcement standard for SAS products is needed to limit the mass importation of unverified products that decrease consumer confidence in the market. Similarly, adoption of standard customs procedures allows for consistent application of import duties and taxes across companies and products.

The state of play of the SAS sector will have implications for Ethiopia's ability to meet its goal of 9.2 million solar connections and universal energy access by 2025. Strategic and coordinated efforts across stakeholder groups can enable targeted investments to support growth of the sector. The recommendations detailed in this report can be used to that end through engagement of government, donors, private investors, and other support actors.

1. INTRODUCTION

Ethiopia has set a target to achieve 100% household electrification by 2025 through a combination of grid (65%) and off-grid (35%) connections under the National Electrification Program (NEP) 2.0[7]. Today, only 11% of households are connected to an off-grid source, leaving an off-grid energy access gap of 24%. Grid coverage is largely concentrated in urban areas; over 90% of urban households are connected to the grid while access rates in rural areas can be as low as 5%[8]. Under the NEP 2.0, the GoE plans to gradually extend grid electricity to households living up to 25km from the grid. However, given the time and cost of connection, off-grid solutions are to be implemented in the short- and medium-term. Additionally, at least 4% of the population living in the remotest parts of the country are expected to always be off grid[9].

The standalone solar (SAS) sector is fast-growing and will play a critical role in meeting electrification targets. The GoE plans to create 9.2 million new solar connections by 2025 – approximately 6.9 million Tier 1 and 2.3 million Tier 2 solar home systems[10]. A fast-growing SAS sector is expected to meet this need; the industry is characterized by: (i) large international companies with a regional presence – for example ENGIE Mobisol, D.light, Azuri, Fosera, (ii) international companies with a localized presence such as HelloSolar, (iii) established local companies like Green Scene Energy and Solar Development, and (iv) hundreds of smaller, locally owned retailers[11].

SAS companies will require strategic support from stakeholders to overcome barriers to entry and scale. Companies in the sector cite a lack of access to capital and an unfavorable regulatory environment as primary barriers to growth. The sector therefore presents opportunities for both public and private investments and advocacy efforts to promote the scale and uptake of SAS products.

This report aims to provide a comprehensive overview of the state of investment into standalone solar in Ethiopia and present opportunities to increase investment into the sector. In preparing this document, the research team performed extensive secondary research and conducted interviews with key stakeholders to gain an understanding of the state of investment, key players, and the policy environment of the sector. The report seeks to answer three main questions:

1. **What has been the nature of investment in SAS to date?**
2. **What are the main barriers to investment into SAS to date?**
3. **What are the highest potential interventions to accelerate SAS growth in Ethiopia?**

The report outlines known investments to date, an estimated financing need, barriers to investment, and recommendations for interventions to drive investment and sector growth. The broader off-grid sector consists of standalone products (SAS), productive use systems, and minigrids; however, this report will focus on the SAS sector, specifically solar lanterns, pico solar, and larger solar home systems (SHS). The report aims to inform a broad audience, including investors and SAS companies of the opportunities for investment in Ethiopia, government stakeholders of policy interventions, and development partners and other support actors of ways to advocate, technically assist, and catalyze growth in the sector.

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7 *MoWIE (2019), National Electrification Program 2.0*
8 *ESMAP (2018), Ethiopia: Beyond Connections*
9 *MoWIE (2019), NEP 2.0*
10 *MoWIE (2019), NEP 2.0*
11 *OCA consultations and analysis*

Danghesta village, Dangila district, Amhara region, Ethiopia, runs on gravity where water from a tank flows into the irrigation tubes. The tank is filled using a small pump powered by a solar panel. This home garden is part of a conservation agriculture trial that is being run in partnership with IWMI, Bahir Dar University, and the Innovation Lab for Small Scale Irrigation (ILSSI). Photo by Mulugeta Ayene/WLE.

50% of off-grid households depend on agricultural activity, many of which can be powered and intensified through off-grid energy,

2. INVESTMENTS OVERVIEW

Investors deployed at least USD 51.7 million to support SAS companies between 2012 and 2019, and an additional USD 200 million has been committed since 2020[12]. Development partners, government programs, and local NGOs have been the most active investors in the sector. Development partners include the World Bank, the African Enterprise Challenge Fund (AECF), FCDO, USAID, and Shell Foundation; DFIs include the African Development Bank (AfDB); while NGOs include entities like the Ethiopian Climate Innovation Center (ECIC).

2.1 Investor types

The Market Development Credit Line (MDCL), a donor-backed, government-run credit facility has been the largest source of financing to the SAS sector, contributing to almost 90% of investment[13]. The facility is a USD 45 million credit line funded by the World Bank and administered by the Development Bank of Ethiopia (DBE). The MDCL has financed at least 31 SAS companies with foreign currency debt, in addition to financing 13 Microfinance institutions (MFIs) with local currency debt to extend consumer financing to households[14]. A detailed overview of MDCL is shown in Case box I.

Grant financing has been another major catalyst of growth for SAS companies, driven primarily by development partners and local NGOs. AECF, under its Renewable Energy and Adaptation to Climate Technologies Sub-Saharan Africa (REACT SSA) program, dedicated USD 6.7 million to Ethiopia to support grant funds between USD 100,000 and USD 1.5M[15]. SAS grantees in Ethiopia include Fosera and Vera International[16]. Grants are also extended through local pitch competitions hosted by NGOs such ECIC[17]. A detailed overview of grant financing initiatives is shown in Case box II.

Co-creation efforts are also supporting the growth of SAS players in the market. The Shell Foundation with grant funding from FCDO and USAID worked with Belcash, a leading mobile money provider in Ethiopia, to create HelloSolar, a SAS company operating on a PAYG model. The company was created to catalyze progress in what is still a relatively nascent PAYG sector. The foundation invested an undisclosed amount into this venture but reported sales of 5,000 home systems sold by early 2020[18].

Private sector investment has been limited to international companies with regional operations. International SAS companies with operations in Ethiopia – for example ENGIE Mobisol, Azuri, D.light, Greenlight Planet – have raised various forms of commercial capital to support operations across multiple countries. Azuri has raised ~USD 53 million in mostly debt funding for its Sub-Sahara Africa operations. D.light and Greenlight Planet have raised USD 185 million and USD 167 million, respectively, from various investors for the same broad geographic focus. Local companies in Ethiopia are more likely to raise equity from family, friends, and angel investors[19] .

Commercial banks and financial institutions have also had minimal involvement, given regulations. The banking sector in Ethiopia is closed to foreign investment, restricting the lending instruments available to SAS companies. Some banks are willing to offer SME loans with interest rates of 12 - 15% but the shortage of forex has led most banks to prioritize businesses engaged in export – with interest rates for exporters set as low as 8% – at the expense of SAS companies who import and distribute locally .

12 *OCA consultations and analysis; Based on data accessible online from company and investor websites, investment databases such as GOGLA, and news publications.*

13 *OCA analysis*

14 *Various OCA consultations; MoWIE (2019), NEP 2.0*

15 *AECF (2018), REACT SSA – Ethiopia Programme, Term Sheet for Applicants*

16 *OCA consultation*

17 *Ethiopia Climate Innovation Center*

18 *Shell Foundation (2020), HelloSolar Learning Report*

19 *OCA research and analysis*

20 *USAID (2016), Opening Doors: A Performance Evaluation of the Development Credit Authority (DCA) in Ethiopia*

Case Box I: Market Development Credit Line (MDCL) - Credit facilities driving increased uptake of solar PV technologies.

Ethiopia's NEP 2.0 mandate to achieve universal energy access by targeting 35% off-grid household electrification has fueled a public push to support SAS companies. The low access rates in rural and remote parts of the country require companies to invest in extending their supply chain to where demand is highest. However, with virtually no manufacturing industry, the market is heavily dependent on imports. Local manufacturers are very few and those operating in the market are primarily engaged in the assembly of pre-made components. An example is Fosera, which has an assembly house in Bahir Dar, the capital city of Amhara region in Ethiopia, but executes its design and engineering in Germany and its component manufacturing in China and Thailand.

Dependence on importation combined with the cost of reaching the last mile creates a large demand for both forex, working capital, and consumer financing to distribute quality products. Restrictions on possessing or using foreign currency create a forex gap in the market. Furthermore, regulations prohibiting vertical integration creates a fragmented supply chain between importers and retailers, which adds unnecessary layers of cost and ultimately affects product pricing. Affordability of SAS products is a concern for many households, creating a need for consumer subsidies and financing.

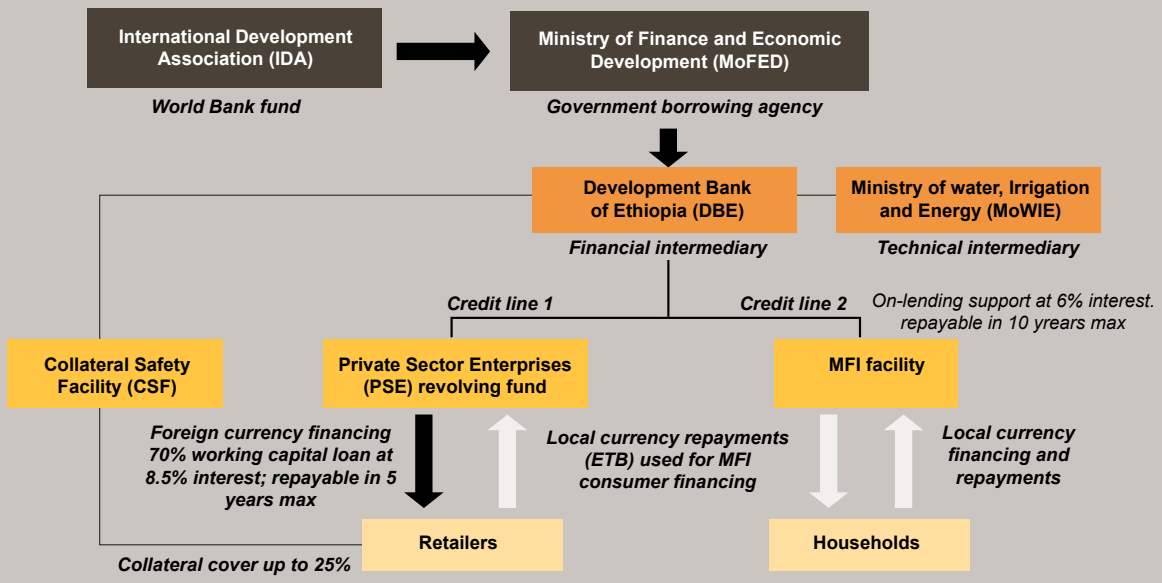
In response to these needs, the GoE in partnership with the International Development Association (IDA), a World Bank fund, established the Market Development Credit Line (MDCL), a two-phase USD 45M credit line that ran from 2012 - 2019. The MDCL is administered by the Development Bank of Ethiopia (DBE), supported by the Ministry of Water, Irrigation, and Energy (MoWIE) as the technical intermediary. The MDCL is designed with two windows:

i. **Private Sector Enterprise (PSE) revolving fund:** SAS companies can apply for foreign currency loans, with guaranteed access to forex for up to two years at 12% interest. Companies make repayments in local Ethiopian birr (ETB).
ii. **Microfinance Institute (MFI) consumer financing facility:** MFIs can apply for local currency wholesale loans, financed by repayments from the revolving fund, for up to six years at 6% interest.

Cumulative loans to SAS companies under the PSE fund amounted to USD 18 million in 2018 and to USD 16.5 million to MFIs.

Source: MoWIE (2019), NEP 2.0; GOGLA (2019), Ethiopia Country Brief; OCA consultations and analysis

Figure 1: Flow of investment under the Market Development Credit Line (2012 – 2019)



**MoFED – Ministry of Finance and Economic Development*

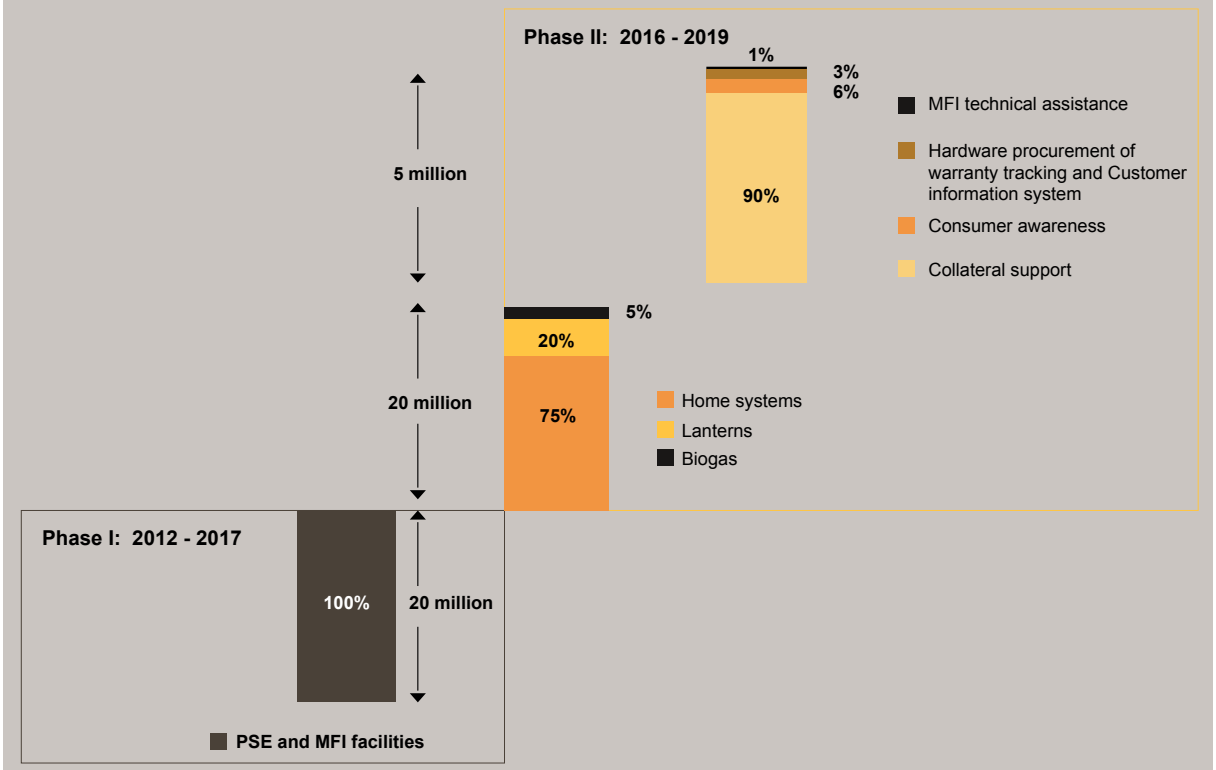
The first phase was financed with USD 20M and stretched from 2012 - 2017, during which over 800,000 solar lanterns and over 10,000 home systems were approved. About 14 SAS companies and 6 MFIs participated. The disparity between lanterns and home systems was due to an arbitrary allocation of funding towards eligible products. Demand for lanterns was highest in the market as most rural households do not have high energy loads.

In 2016 another USD 20M was approved and deployed for a second phase to run until 2019; however, the second phase was oversubscribed in less than a year – between 2017 and 2018. At MoWIE's request, 75% of funding was allocated to home systems to encourage uptake, causing approvals to increase to over 70,000 by 2019. In phase II, more than 30 SAS companies participated. Other eligible products under the credit line included solar water pumps and clean cooking technologies like improved cookstoves domestic biogas, and ethanol stoves. However, applications for these technologies were much fewer.

An additional USD 4.5M was also deployed in phase II to finance a Collateral Support Facility that guaranteed up to 75% of the loan amount for smaller SAS companies that had been ineligible in the previous round. The remaining funding went into technical assistance and consumer awareness.

Source: MoWIE (2019), NEP 2.0; GOGLA (2019), Ethiopia Country Brief; OCA consultations and analysis

Figure 2: Allocation of investment under the Market Development Credit Line (2012 – 2019)



In total, ~1.2 million solar lanterns and home systems - approximately 1.12 million lanterns and 72,000 systems - have been distributed through the MDCL. Over the facility's 8-year lifetime, 31 retailers and 13 MFIs participated. As of September 2019, when the project was scheduled to close out, almost all foreign currency had been disbursed.

Source: MoWIE (2019), NEP 2.0; OCA consultations and analysis

The MDCL has become a case study for successful interventions into the SAS sector in Ethiopia given regulatory barriers. At least two new facilities are in the pipeline that adopt a similar structure:

1. Accelerating Distributed Electricity and Lighting in Ethiopia (ADELE): The World Bank is in the design phase of a USD 450 million credit facility expected to launch in 2021 that aims to continue addressing the lack of access to forex and provide consumer financing. ADELE will be the largest facility ever created by the organization in this sector and will be structured around 5 components, with the first having 3 sub-components[21]:

a. Off-grid electrification for:
   i. Households through standalone solar systems
   ii. High-demand areas and hot spots for productive use through minigrids
   iii. Public and social institutions such as health centers and schools
b. On-grid electrification for urban areas
c. Technical assistance including capacity building for MFIs, retailers, and other stakeholders, and implementation support to promote efforts such as PAYG and tariff settings.

2. Enabling Access to Off-Grid Energy to the People of Ethiopia – Thematic Line of Credit to the Commercial Bank of Ethiopia: The African Development Bank (AfDB) in partnership with the Commercial Bank of Ethiopia is preparing to launch a new foreign currency facility. It will include a credit line for retailers aimed at addressing forex constraints, and an additional revolving credit facility in ETB to extend working capital and inventory financing loans to retailers and consumer financing to households through partner MFIs[22].

The AfDB-CBE credit line was originally sized at USD 100 million to be deployed in two tranches of USD 50 million each within 2 years. However, its 2020 rollout was disrupted by the Covid-19 pandemic. Irrespective of its eventual size the facility will differ from the MDCL in that it will be exclusively commercial finance as opposed to concessional loans. However, AfDB does not expect that the interest rates will be that much higher than the MDCL given that the financing will be coming from CBE's private sector financing window[23].

The facility was designed based on a market assessment of funding gaps and is expected to attract primarily commercial exporters, who can afford to borrow and repay commercial finance. It will also include a USD 2 million non-repayable grant to CBE for capacity building of SAS companies, MFIs, and other institutions[24].

Case Box II: Grant financing supporting SAS companies.

Local investments outside of government programs have been primarily in the form of non-repayable loans or grants, and technical assistance. Investments include:

i. **Renewable Energy and Adaptation to Climate Technologies (REACT) household program:** The African Enterprise Challenge Fund (AECF) dedicated USD 6.7 million in grant financing to Ethiopia's SAS sector under REACT. SAS companies were eligible for grants between USD 100,000 and USD 1.5 million. At least three companies won grants of undisclosed amounts, including Fosera and Vera International.
ii. **Shell Foundation, with co-funding from FCDO and USAID**: The Shell Foundation with grant funding from FCDO and USAID worked with Belcash, a leading mobile money provider in Ethiopia, to create HelloSolar, a SAS company operating on a PAYG model. The foundation invested an undisclosed amount into this venture but reported sales of 5,000 home systems at the start of 2020.
iii. **Ethiopia Climate Innovation Center (ECIC):** ECIC is an NGO housed within Addis Ababa University that aims to accelerate the development of locally relevant climate technologies. The center is funded by World Bank's InfoDev, FCDO, and the Norwegian Ministry of Foreign Affairs, and has sponsored pitch competitions in which solar entrepreneurs have won grants of US $35,000.

ECIC grants supported the scale of at least two micro entrepreneurs, WinSol Green Power Engineering and NBK. As of 2017, WinSol, which makes solar lighting kits and portable mobile chargers, had sold over 10,000 home systems and 15,000 solar mobile chargers. NBK, which specializes in larger home systems of 12 – 20 Wp and targets mostly farmers, had supplied over 750 units at the time of the grant across multiple woredas or districts. NBK also planned to invest the grant money in moving its manufacturing line from China to Addis Ababa to increase production from 800 units to 1,200 units annually.

Source: AECF (2018), REACT SSA – Ethiopia Programme, Term Sheet for Applicants; Shell Foundation (2020), HelloSolar Learning Report; Ethiopia Climate Innovation Center; InfoDev (2017), The Solar Entrepreneurs Who Light Up Ethiopia

21 OCA consultations and analysis
22 Clean Technology Fund (2020),Thematic Line of Credit to the Commercial Bank of Ethiopia; OCA consultation
23 OCA consultation and analysis
24 OCA consultation

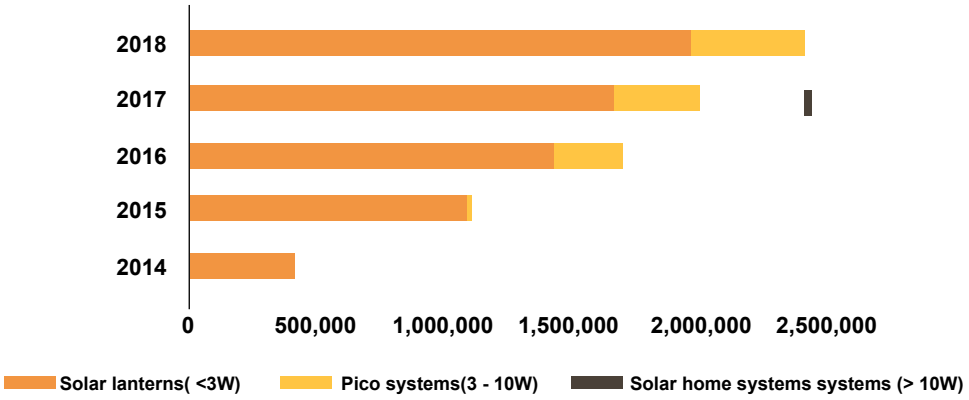
2.2 Investment per type of SAS technology

Solar lanterns have seen the highest traction in the SAS compared to pico solar and larger home systems. Almost 2.5 million SAS products were distributed between 2014 and 2018. While solar lantern sales were consistently the highest during this period, cumulative sales data shows increasing uptake of pico systems between 2016 and 2018, and a more recent uptake of larger home systems in 2018[25].

This can be attributed to more recent financing incentives for home systems such as MDCL, where 75% of funding under phase II was dedicated to home systems.

Products sold in Ethiopia cut across an estimated 335 brands of solar lanterns and 308 solar system or solar kit brands of various models[26].

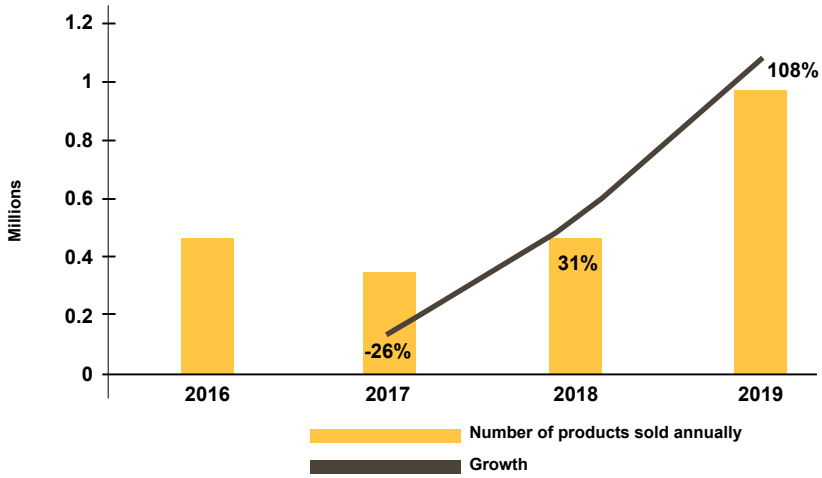
Figure 3: Cumulative off-grid sales of quality-verified SAS products, 2014 – 2018



Source: GOGLA sales summaries; Lighting Africa (2016), Off-grid Market Study – Ethiopia, Retail Audit, Product Evaluation and After Sales Service Report; OCA analysis

The annual sales trend and the yearly growth in the sales of solar products show the increased private sector participation in the sector. Portable lanterns and SHS combined sales continue to grow year on year except for 2017 due to the temporary suspension of imports by the Ethiopian Revenue and Customs Authority (ERCA). Between 2018 and 2019, sales grew by 108%.

Figure 4: Annual sales data and growth trends for SAS products (2016 - 2019)



Source: GOGLA (2019), Ethiopia Country Brief; OCA analysis

25 *GOGLA sales summaries*

26 *Lighting Africa (2016), Off-grid Market Study – Ethiopia, Retail Audit, Product Evaluation and After Sales Service Report*

The majority of suppliers in the market are retail brand importers of household solar lanterns and pico systems. In order to combat market distortion caused by inferior products, the GoE has engaged in a coordinated effort with development partners to put in place product quality standards. In January 2016, the Lighting Global (LG) quality assurance framework became the market standard for assessment of imports, approval for financing, and other retail incentives. However, retailers of LG-certified products, known as Associate retailers, still make up a minority of the market. 89% of solar lanterns and 92% of home systems are uncertified, off-brand generics that are imported through unregulated channels[27].

Case Box III: GESI considerations in the SAS sector

Gender and Social Inclusion (GESI) investments have focused on efforts to increase the number of female SAS entrepreneurs raising investment as well as empowering low-income women and youth to be integrated into the supply chain.

i. **GESI considerations and progress to date under MDCL**
   a. **Women-led SAS companies raising capital:** MoWIE reports at least 4 female entrepreneurs applying for a total of USD 1.5. million in forex funding under MDCL. This followed a DBE-sponsored information session with various local women's business associations to increase awareness of the credit line and encourage more female applicants.
   b. **Female-headed households purchasing SAS products:** By the end of phase I in 2016, 28.6% of loans through the MFI consumer finance facility had been accessed by female applicants. In the rollout of phase II, MoWIE conducted consultations with MFIs to understand challenges in reaching out to female consumers. By June 2017, loan access rates for female applicants increased to 35%.
   c. **Technical assistance to increase GESI investments:** All participating MFIs received training on reaching more women with consumer financing that showcased the business case for female customers using global case studies. MoWIE also reports that advisory services were provided to DBE to help develop processes for assessing the creditworthiness of female entrepreneurs.

ii. **SAS companies integrating low-income women into the supply chain:** Companies like Solar Development are integrating vulnerable women into their distribution networks. Solar Development is part of a larger impact program that identifies low-income women of specific profiles, specifically women unable to support themselves and their families through traditional avenues such as farming and supports them in the distribution of solar equipment.

To date, Solar Development has onboarded 620 women onto their distribution network, falling short of their target of 1,000 women due to Covid-19 disruptions. The company also sponsors the women with distribution kits that include a branded apron, umbrellas, marketing materials, as well as training them in skills such as bookkeeping. Such impact models however have limited commercial impact for companies as women often face challenges in acquiring financing to move larger inventories

iii. **Youth enterprises empowering low-income youth:** Youth enterprises have become a core distribution channel for SAS companies. However, similar to vulnerable women, low-income youth are often at a disadvantage in being integrated into the supply chain as they cannot access financing and typically have lower education levels, requiring technical skills training and financing from companies.

2.3 Impact of Covid-19 Pandemic

The Covid-19 pandemic had implications for investment into the SAS sector, diverting planned resources. The much-needed foreign currency channels that support SAS imports were largely inaccessible as the government re-allocated its limited reserves towards emergency safety measures. The USD 100 million AfDB-CBE credit facility was halted as key stakeholders were forced to reassess their priorities. It is unclear whether the facility will maintain its intended size when it eventually launches[28].

Safety measures implemented to combat the spread of Covid-19 disrupted ongoing distribution activities of SAS companies. Due to heightened health screening measures at key entry points, companies were unable to import products into the country. Restrictions on movement and on in-person interactions disrupted sales, especially to remote areas, which impacted revenues for many companies. Solar home systems were not designated as essential goods by the government and were therefore subject to movement restrictions at both the regional and woreda levels[29].

27 *Lighting Africa (2016), Off-grid Market Study – Ethiopia, Retail Audit, Product Evaluation and After Sales Service Report*
28 *OCA consultation*
29 *OCA consultations*

Notably, the pandemic may play a role in promoting uptake of PAYG due to increased awareness of digital transactions. Restricted movement and social interactions forced people to turn to online payments to transact. Financial institutions and FinTechs reported an increased use of their digital services as well as a growing demand for digital loan repayments. This behavioral change has the potential to support lobbying efforts around PAYG for the SAS sector and for mobile payments more broadly[30].

2.4 SAS sector financing need

Using NEP 2.0 targets, MoWIE estimates a USD 1.7 billion financing need to support SAS service delivery to 9 million households by 2025[31]. Financing estimates consider three funding needs: forex, working capital, and capital and operating expenditures. A detailed breakdown is shown in the Figure 5.

Figure 5: SAS financing need across business needs and sizes (2019 - 2025)

Financing need / structure	Use of financing	Total cash need, 2019 - 2025 (USD, Millions)	Investment instruments across growth-stages		
			Seed	Growth	Expansion / Scale-up
Forex	Importation of SAS products	1,330	Grants or non-repayable loans	Non-repayable or concessional loans	Concessional loans
Working capital	Day-to-day trading and distribution	1,750	Grants	Short-term, concessionary debt	Commercial debt
Capital and operating expenditures	Establishing and expanding supply chain and other market infrastructure	575	Grants & Equity (prove model, build team)	Equity & Debt (market entry, early expansion)	Various (growth infrastructure, receivables financing)
Total cash need (without revolving facility)		3,700			
Estimated reduction through revolving fund	Reduces the need for continuous injection of capital. Forex repayments are used to extend working capital loans.	(1,940)			
Total cash need (with revolving facility)		**1,760**			

Source: MoWIE (2019) NEP 2.0, OCA consultations and analysis

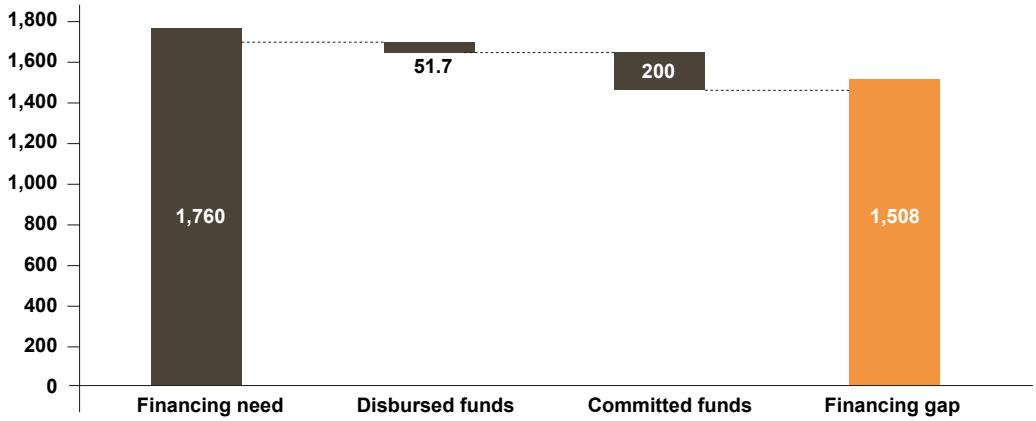
A revolving forex facility is crucial to lowering capital requirements. Here, forex repayments are used to refinance working capital as well as capital and operating expenditures. Without employing a revolving fund, the capital requirements increase considerably to USD 3.7 billion – a USD 2 billion addition[32].

Capital and operating expenditures will vary across SAS companies of different sizes. At the seed-stage, companies require grant or equity financing – or other forms of patient capital – to iterate their operating models until they are proven in the market. Financing also goes towards early hires to grow the team. At the early- and growth-stages, equity financing is appropriate to fund market entry activities or expansion into new areas. However, given the foreign investment restrictions in Ethiopia, most companies are only able to raise family equity, which may fail to meet the capital requirement. Debt financing is therefore a viable alternative. Lastly, at the expansion or scale-up stage, various financing instruments can be used to establish growth infrastructure and finance a growing receivables portfolio[33] .

To date, an estimated USD 51.7 million has been deployed in the SAS sector – primarily towards forex financing – and another USD 200 million committed in 2020. This leaves a financing gap of ~USD 1.51 billion as shown in the Figure 6[34].

30 *OCA consultations*
31 *MoWIE (2020), NEP 2.0*
32 *MoWIE (2020), NEP 2.0*
33 *OCA consultations and analysis*
34 *OCA analysis based on projected financing need by MoWIE and estimates of capital deployed and committed.*

Figure 6: Estimated financing gap in the SAS sector (USD, millions)



Source: MoWIE (2019) NEP 2.0, OCA consultations and analysis

Disbursed funds include the USD 45 million under MDCL and USD 6.7 million from AECF. Committed funds include an estimated USD 100 million from both World Bank's upcoming ADELE program[35] and AfDB's Thematic Line of Credit to CBE[36]. The funding estimate from ADELE is based on assumptions of financing allocation across program components. Details of the exact allocation have not yet been released.

To date, an estimated **USD 51.7 million** has been deployed in the SAS sector – primarily towards forex financing – and another **USD 200 million** was committed in 2020.

35 *Allocations to SAS under ADELE are based on assumptions given the research team's knowledge of the areas of focus for the program. See the "Investment overview" section for more details on ADELE.*

36 *The AfDB / CBE facility was originally sized to be USD 100 million. However, Covid-19 disruptions to the program's launch and reallocation of state resources may impact its size in the future.*

3. BARRIERS TO INVESTMENT

3.1 Supply-side barriers to investment

3.1.1 Foreign currency restrictions

Foreign currency impositions have constrained growth in the SAS sector. Given the small SAS manufacturing industry in Ethiopia, the market is largely comprised of retail importers of products who require forex to make purchases. The NBE however restricts the possession and use of foreign currencies and foreign exchange transactions. This is done with the aim of protecting the purchasing power of the local currency and ensure price stability[37]. Furthermore, the GoE maintains strict local content regulations that imply that any operator that receives foreign direct investment (for example equity investment) would then be considered foreign owned. A SAS company in this position would therefore be ineligible to operate as a retailer and directly serve customers[38] .

3.1.2 Unfavorable lending environment

Commercial loans from local banks are few and interest rates are high, limiting access to working capital. MoWIE estimates that 48% of financing required to meet NEP goals will be working capital and yet interventions to date have been primarily focused on enabling access to forex for imports[39]. This leaves SAS companies to rely on the commercial sector for local currency debt. However, the share of SME lending to overall lending in Ethiopia is only 7%, one of the lowest in Sub-Saharan Africa. Some commercial banks are willing to offer SME loans with interest rates of 12 - 15% but the shortage of forex has led most banks to prioritize businesses engaged in export - with interest rates for exporters set as low as 8% - at the expense of SAS companies who import and distribute locally[40].

SAS companies also face stringent collateral requirements that present a barrier to accessing local commercial finance. Collateral rates required by banks in Ethiopia, when compared to loan size, are significantly higher than in many African countries. For example, over 96% of loans in Ethiopia are backed by collateral compared to approximately 73% across Sub-Saharan Africa. The value of collateral as a percentage of the loan is also much higher for SMEs loans at 178% compared to 165% for larger firms[41]. Newer companies and start-ups may therefore be unable to put up the necessary security, which can require assets to be valued at the cost of the proposed project for a year, easily in excess of USD 1 million[42]. Even the Collateral Safety Facility (CSF) under MDCL is reported to have conservative rates. Some companies under MDCL, particularly foreign-owned entities, resorted to building houses and other infrastructure to reach eligibility[43].

Cash guarantees are a viable alternative to collateral, but SAS companies often find this option unavailable. Under MDCL, SAS companies were not permitted to exchange local currency cash reserves for forex and instead required to take out a loan from DBE to import solar products[44]. This disqualifies eligible companies that are liquid but lack the necessary collateral. CBE accepts bank guarantees as a substitute for collateral, but this often requires a long-standing relationship with a local bank, which start-ups new to the market may not have developed.

3.1.3 Unsuitable financing structures

SAS manufacturers cite ill-suited financing provisions that limit access to forex. Under MDCL, DBE extends forex to manufacturers and assembly houses to help meet capital expenditures at the early stages of a project, such as purchasing equipment and setting up a production line. The objective is to facilitate manufacturing until the point of initial exportation of products, from which producers can internally generate the forex that they need to sustain the business. While

37 *Business Environment Reform Facility, Foreign exchange allocation and access for businesses in Ethiopia, 2018*

38 *MoWIE (2020), NEP*

39 *MoWIE (2020), NEP*

40 *USAID (2016), Opening Doors: A Performance Evaluation of the Development Credit Authority (DCA) in Ethiopia*

41 *Banking reform and SME financing in Ethiopia: Evidence from the manufacturing sector, African Journal of Business Management*

42 *OCA consultations and analysis*

43 *OCA consultations and analysis*

44 *OCA consultations and analysis*

this approach has proven effective for certain sectors such as horticulture, where ongoing expenses comprise primarily of consumables like packaging materials, SAS manufacturers require a consistent supply of forex to import large quantities of components[45].

Time to approval for forex loans is too lengthy for SAS companies with high working capital needs. DBE loans under MDCL average 2 months to be approved from the time of application. The process involves reviews from both DBE and MoWIE to approve products and verify certification and after-sales services requirements. While a rigorous process ultimately protects the consumer, having many intermediate steps can cause delays[46].

3.1.4 Macroeconomic barriers

Industry stakeholders cite the opaque nature of the market as a potential deterrent to investors. Investors have limited information on private investment flows into the SAS sector as companies can be reluctant to divulge such information. This limits visibility on successes and failures in the market, which is critical to build a knowledge base for both companies and investors. Additionally, data on the level of investment readiness of SAS companies is lacking; investors are unclear on the technical assistance needs of companies to prepare them to raise and absorb capital. The GoE has also cited an insufficient level of tracking under programs like MDCL. Available information is limited to approved loans and the geographical areas served. Data on new connections, products types and sizes sold, and distribution channels is lacking, all of which are crucial in measuring progress towards NEP 2.0 goals[47].

3.2 Demand-side barriers to investment

3.2.1 Low integration of the supply chain

Restrictions around vertical integration have created a fragmented supply chain, limiting the ability SAS companies to raise and absorb capital. Current government policies restrict retailers to exercise control over multiple parts of the supply chain. Importers, retailers, and even manufacturers are required to operate within their specific market function. This constrains scalability since companies build little business experience across the supply chain, limiting growth and ability to absorb the ticket sizes that many investors in the sector seek to deploy[48] .

The fragmented supply chain has increased business costs for SAS companies and decreased affordability for consumers. A lack of vertical integration has forced companies to apply markups on SAS products as an additional layer of cost is incurred at each point along the supply chain. Extending reach to more remote households has become expensive for many SAS companies but also reduced the market opportunity in rural areas[49].

3.2.2 Consumer ability and willingness to pay

Rural households struggle to afford SAS products and consumer financing mechanisms fall short in improving affordability. Under MDCL, DBE exercised little oversight on interest rates set by MFIs to lend to households, which can be more than 2x the interest rates that they pay[50]. MFIs borrow from private banks at 14% and from MDCL at rates below 10%, with DBE bearing the full risk of the loans[51]. However, MFIs lend to households at rates as high as 25%. When set against the average monthly income of a rural household (approx. $21), SAS products can be seen as a luxury by consumers. Additionally, the majority of consumers are agricultural households that rely on seasonal income, which is often incompatible with repayment terms[52].

3.3 Regulatory/policy barriers to investment

3.3.1 Policies restricting mobile money services and PAYG

Regulations around mobile money services have stifled the adoption and scale of Pay-as-you-go (PAYG) models in the SAS sector. The National Bank of Ethiopia (NBE) restricts the issuance of all payment instruments – including mobile money – to financial institutions, primarily banks and MFIs. The bank-led model, compounded by a fragmented supply chain,

45 *OCA consultations and analysis*
46 *OCA consultations and analysis*
47 *OCA consultations and analysis*
48 *MoWIE (2020), NEP 2.0; OCA consultations and analysis*
49 *MoWIE (2020), NEP 2.0; OCA consultations and analysis*
50 *MoWIE (2020), NEP 2.0; OCA consultations and analysis*
51 *Development Bank of Ethiopia (2015), The Role of DBE in Financing Inclusive Investment in Climate Resilient Green Economy*
52 *ESMAP (2018), Ethiopia: Beyond Connections; OCA consultations and analysis*

restricts growth of PAYG to the banked population but also requires more intermediaries to deliver PAYG solutions, creating cost implications for SAS companies. A few companies are in the pilot stages of implementing PAYG services, for example Hello Solar, SunKing, Azuri, GreenScene Energy, and Fosera[53].

SAS companies who want to adopt PAYG cite challenges around licensing. PAYG systems are deemed a financial service by the government and requires operators to obtain a financing license, which is much more difficult to acquire than a distribution license. Furthermore, companies have to pay all tax-related charges for credit sales, with or without successful collections. Financial institutions in comparison only pay taxes on money collected or revenue generated. This presents a higher risk to extend credit especially in a nascent PAYG sector where market data on customer repayment behaviour is limited and discourages SAS companies from adopting the model[54].

3.3.2 Enforcement of tax and quality regulations

Tax exemption policies on solar products are often inconsistently applied. Companies can pay anywhere from 0% to 35% in customs duty for the same technology. For more novel products in the market, such as solar-powered appliances, tax officials have minimal precedence from which to categorize products within the tax-exempt category. Non-lighting products such as solar TVs thus face additional scrutiny at customs. Furthermore, in past periods of civil unrest, the government has put a 10% sur tax on all equipment coming into the country that would be subject to an import tax. In an already politically unstable market, this can become cause for concern among investors[55].

Inadequate enforcement of quality standards of SAS imports has led to an influx of non-certified, cheaply produced goods and decreased market confidence in solar products. Tax exemptions can only be effective when there is reliable oversight of imports. In 2016 only 40% of solar lanterns and 20% of solar kits coming into the market were quality-approved[56]. There is wide-spread use of unregulated distribution channels to circumvent import duties and taxes applied to uncertified products. A large quantity of unverified products crosses the borders with neighbouring countries like Kenya and Somalia and are traded on a cash basis with local currency. The prevalence of low-quality products has shaped local perceptions of the sector and negatively impacted consumer confidence in solar energy products[57].

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

4. EXISTING INITIATIVES TO ENCOURAGE INVESTMENT

4.1 Access to finance

Development partners and the GoE have spearheaded new initiatives to increase access to forex. The World Bank and AfDB are innovating within regulatory constraints such as foreign currency restrictions by setting up legitimate, government-administered credit lines to support the SAS sector. Other development actors like AECF, Shell Foundation and ECIC are enabling grant financing, which is important for capital-intensive sectors like off-grid energy. However, there has been limited transparency on the recipients in some of these grant programs and the successes to date. More visibility on how grant programs are promoting uptake can encourage other investors.

The GoE is implementing economic reforms to attract foreign direct investment into major sectors, including energy. The Home-Grown Economic Reform Agenda 2019 enacts new laws to allow for a focus on liberalization and greater ease of doing business in Ethiopia to attract investment[58]. The GoE plans to open up the off-grid sector to foreign investors, issuing a new regulation in January 2019 (No. 447/2019), which stated that a special directive will be given to define the roles and responsibilities for national and foreign firms in off-grid generation, transmission, distribution, and sales[59]. To see greater impact, the government can also open up sectors that support off-grid energy – such as transportation and telecoms – to foreign investors.

On the demand-side, MFIs and other stakeholders are supporting consumer financing options to improve affordability of SAS products. MFIs have increasingly become an integral part of SAS distribution due to their role in enabling consumer access to finance. To date, at least 13 MFIs have been onboarded onto the MDCL facility. However, MFI interest rates remain high for rural consumers, suggesting the need for increased demand-side subsidies. Support actors like Power Africa are also actively exploring the feasibility of remittance-based solutions that would enable natives in the diaspora to pay suppliers directly for systems that will be installed in Ethiopia[60]. The DoE in collaboration with the Diaspora Trust Fund is undertaking a remittance study to assess opportunities offered by diaspora remittances for financing off-grid solutions[61].

4.2 Technical assistance

Stakeholders are extending technical assistance to build capacity within the public sector and support energy access targets. Power Africa is working with the Ministry of Finance and Economic Development (MoFED) to set up and independent power project (IPP) unit within MoWIE. The IPP unit is expected to advise on and facilitate private sector-led investments in renewable energy, including solar energy. The World Bank is also engaging the GoE on creating a more enabling environment for PAYG services, including developing a white paper that articulates the barriers to scale for PAYG models in Ethiopia[62].

4.3 Policy and regulations

The GoE implemented tax exemptions on SAS products to enable importation and distribution. In 2016, MoFED designated solar products under 15Wp, typically lighting products, as exempt from custom duties (import duty of up to 35% and an excise tax of up to 100%). Importers of large solar home systems above 10W or who have Lighting Global quality certification can also request exemption[63]. However, the exemptions have not always been applied consistently, leaving SAS companies that are short on forex vulnerable to high taxes. ACE TAF is also supporting the Ethiopian Customs Commission to develop a customs handbook for solar products.

The GoE with support from stakeholders are engaging in a coordinated effort to put in place product quality standards. To combat market distortion caused by inferior products, the MDCL set an eligibility requirement of LG-certified products for SAS companies. As a result,

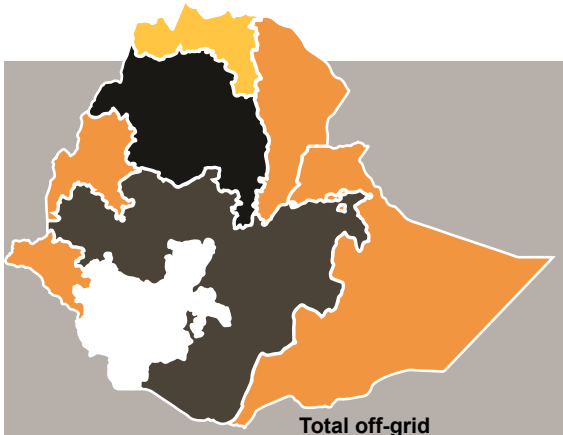
58 *Office of the Prime Minister, A Homegrown Economic Reform Agenda: A Pathway to Prosperity*
59 *Mesfin Tafesse and Associates, New Developments in Energy Regulations*
60 *OCA consultation*
61 *MoWIE (2020), NEP 2.0*
62 *OCA consultations and analysis*
63 *Lighting Africa, Ethiopia Policy Report Note*

Sun King and d.light brands accounted for 87% of total product imports[64]. The certified brand market continues to grow due to such financing and tax incentives from the government. However, oversight of less regulated channels remains weak allowing sub-standard products to enter the country.

The GoE has drafted policy to create a better enabling environment for mobile payments, which can support PAYG in the SAS sector. Instalment-based financing mechanisms for SAS products are still largely limited to MFIs, with only a handful of companies piloting PAYG. The bank-led model of mobile money services means that mobile payments can only scale as fast as the number of bank accounts created. With the increasing subsidization and penetration of mobile technology, the market will continue shifting away from traditional to mobile banking, as has been the trend in other countries. In recognition of this, the NBE issued a directive in March 2020 (No. ONPS/01/2020 Licensing and Authorization of Payment Instrument Issuers), which allows non-financial institutions to apply for licenses to issue payments instruments, including mobile money[65]. However, the directive has a number of prohibitive requirements[66] :

- It is contingent on mobile money providers putting up 50 million ETB (USD 1.6 million) as a minimum requirement.
- No individual, other than the GoE, can hold more than 20% of the shares in a licensed mobile money service provider, and the entity must have at least 10 shareholders, all of whom must be Ethiopian nationals.
- It does not extend to internationally owned companies, which significantly limits its impact as most financial technology companies are foreign owned.

Thus, the draft in its current form alienates locally registered FinTechs who have foreign shareholders or who raised external funding from foreign-owned funds. Locally owned FinTechs and startups on the other hand may struggle to meet the capital requirement given forex restrictions, or lack the capacity or appetite to navigate the lengthy due diligence processes of the regulator to acquire the license. The mobile payments market needs to be opened up to all FinTechs, telcos, and other eligible players to enable a competitive market that can drive innovation in the PAYG and SAS sectors.



Case Box IV: Regional overview of off-grid energy access across SAS products

	Total off-grid access rate	Solar lantern (<3W)	Pico solar (3-10W)	SHS (>10W)
Tigray	36.9%	16.6%	20.2%	0.1%
Oromia	36.3%	6%	30.3%	12.6%
Amhara	22.5%	8.7%	13.7%	1.2%
SNNPR	7.8%		N/A	
Somali, Afar, Gambela and Benishangul - Gumuz states (limited data available)				

64 *ODI (2016), Accelerating access to electricity in Africa with off-grid solar, Ethiopia*

65 *Euromoney, Lack of licensing clarity tempers Ethiopian mobile money optimism, June 2020*

66 *OCA consultations and analysis*

In addition to existing financing and strategic interventions, it is important to understand the state of the SAS sector as it relates to regional energy access rates for key product categories. This can inform geographical interventions and expansion of reach at the last mile. SAS installations comprise primarily of small solar systems under 10W – lanterns and pico systems – while larger home systems still sit at a relatively low access rate of <15%.

The Tigray state in the Northern part of Ethiopia boasts the highest off-grid access rate of ~37% but has a negligible presence of SHS. This is likely driven by the remote position of the state and reluctance or inability of SAS companies dealing in larger home systems to extend their supply chain so far out. Companies therefore require financing incentives such as results-based mechanisms and more affordable working capital as detailed in the next section. Oromia has a comparable access rate to Tigray yet far higher penetration of pico and SHS, due to the proximity to the capital city, Addis Ababa, that is situated within the state. Amhara and Southern Nations, Nationalities, and People's Region (SNNP) have lower access rates of ~23% and 8%, respectively, while other states have limited data on off-grid energy access.

Source: MoWIE (2019) NEP 2.0, OCA consultations and analysis

Photo credit. PAMIGA/Ries Engineering. www.journals.openedition.org/

5. RECOMMENDATIONS TO ACCELERATE INVESTMENT

Existing initiatives have laid the groundwork to catalyze growth and investment in the SAS sector, but critical gaps need to be addressed to meet electrification targets. The GoE aims to create 9.2 million new connections by 2025 through off-grid solar connections alone. Given the pace and cost of this goal, the SAS sector remains significantly underfunded and needs to generate traction quickly. The section below highlights potential solutions to market gaps that government, development partners, and other investors can act on to drive towards universal energy access.

5.1 Supply-side interventions

Blended finance can leverage concessional and commercial capital to reduce risk for lenders and interest rates while providing much-needed working capital for SAS companies. Development partners and government institutions like DBE and CBE should seek to crowd in commercial banks by taking a first-loss debt position that reduces risk for smaller lenders. DBE is already doing this with MFIs through MDCL by bearing the full risk of consumer loans[67] but is missing out on local banks that have pre-existing relationships with SAS companies. Blended finance can also serve to reduce commercial interest rates – if concessional lenders establish interest limits – and can address reservations that banks have in lending to SAS companies, such as a shortage of forex and a perception of the sector as high-risk given reliance on imports and a lack of integration in the supply chain. With more commercial lenders in play, SAS companies can start to move away from grant financing and build a repayment history that unlocks future capital for continued growth.

Guarantee facilities and cash guarantee provisions can minimize collateral obligations for SAS companies and allow for higher lending volume. The conservative collateral rates in Ethiopia are reflective of the wider banking environment and the low-risk appetite among banks. However, development partners and investors can establish risk mitigation mechanisms, such as a guarantee facility that buys down the risk for any bank that extends forex loans to SAS companies, or which makes provisions for SAS companies that are liquid to use cash guarantees by exchanging local currency for forex. Guidance should be sought from NBE on eliminating the collateral requirement if cash reserves are used[68] .

Results-based financing (RBF) can incentivize SAS companies to expand their reach to underserved regions. RBF mechanisms can be implemented in at least 3 ways: (i) as benefits to SAS companies before-the-fact to reduce the business cost of extending the supply chain to hard-to-reach areas, ultimately reducing the price for consumers, (ii) as benefits to SAS companies after-the-fact upon proof of sale of a product to a customer at a reduced price, or as (ii) as a direct benefit to consumers to purchase off-grid products from SAS companies. Such incentives can also serve to subsidize the cost of mobile transactions and promote the uptake of PAYG services. RBF has not been implemented in Ethiopia, but the GoE has demonstrated a willingness to experiment with similar approaches, for example, the Ministry of Finance is subsidizing transaction fees for 900,000 to 1 million end user beneficiaries[69].

While forex restrictions remain in place, proven financing mechanisms such as concessional loans through government-approved channels and grant financing can continue to catalyze growth in the SAS sector. Investors and other development partners are well-placed to advocate for policy reforms that can liberalize the Ethiopian economy and foster foreign investment. However, in the more immediate term investors should seek to replicate financing models have been validated in the market over the past 10 years, such as concessional loans through government-administered facilities like MDCL, grants or non-repayable loans like AECF and ECIC, and co-creation efforts such as the Shell Foundation and HelloSolar.

67 *Development Bank of Ethiopia (2015), The Role of DBE in Financing Inclusive Investment in Climate Resilient Green Economy*

68 *OCA consultations and analysis*

69 *OCA consultations and analysis*

Improved data tracking capabilities in large SAS-focused programs can increase sector transparency and investor confidence in the market. The Ethiopia Investment Commission (EIC) has reported increased requests for support from international investors, especially from diaspora players, to engage in the off-grid market[70]. To build capacity within the EIC, the Directorate of Electrification (DoE) within MoWIE has invested USD 1 million in technical assistance to equip EIC representatives with knowledge of the local investment climate[71]. However, the existing knowledge base lacks accurate and recent data on new off-grid connections and installations across product types and sizes[72]. SAS companies also need to be assessed on their technical capacity such as receivables portfolio, distribution strategy, and debt obligations, to determine technical assistance needs and future investment readiness. Stakeholders can support efforts to create a data tracking platform that monitors relevant data points and helps to highlight sector opportunities more confidently for investors.

5.2 Demand-side interventions

Building the capacity of the local SAS manufacturing industry can reduce the sector's dependence on imports and attract foreign investment. Ideally, local solar manufacturers should meet local retail demand as a workaround to the forex gap. However, manufacturers are few in the market, constrained by the same foreign currency restrictions, and primarily engaged in the assembly of imported pre-made components or assembly kits. They are therefore unable to import components in the quantities and product mix needed to position themselves as suppliers for local wholesalers, and their cost savings are minimal in comparison to retailers. Key considerations for building a domestic manufacturing capacity include: (i) reliable access to grid electricity, (ii) increased forex allocations to SAS manufacturers, (iii) complementary investment in component manufacturing for both on-grid materials such as poles and off-grid materials such as batteries and solar panels[73]. Overtime, Ethiopia can position itself as a regional manufacturing hub to serve the fast-growing SAS markets in East Africa.

Enabling vertical integration within the SAS sector will be a major step towards reducing the need for forex, supporting PAYG adoption, and enabling scale. SAS companies should be allowed end-to-end control over importation, distribution, and after-sales services in the interest of quality assurance and improved service delivery. Companies can collect valuable customer feedback and usage data that informs product development and promotes high repayment rates. PAYG models in other markets have been proven around vertical integration. Stakeholders should engage the GoE on Investment Proclamation (849/2014), which prohibits foreign-owned companies from retail trade[74], and seek guidance from the Ministry of Trade on acquiring exemptions for SAS companies to vertically integrate their business models. Vertical integration is an extremely capital-intensive effort however and local companies will still require some forex or will otherwise struggle to expand supply chain capabilities. Recommendations around forex must be addressed in tandem to catalyze meaningful change.

Remittance-based financing can create consumer financing linkages through ePayments on SAS products, reducing risk for lenders. Ethiopia has one of the largest diaspora populations in Africa, a result of previous civil unrest which saw large groups of locals relocate to Europe and North America. Remittances are contributing meaningfully to foreign exchange, with support from the diaspora continuing to grow, and in 2018, a Diaspora Trust Fund was set up to safely channel remittances into the country[75]. Given the foreign currency restrictions and low-income levels in-country, remittance-based financing can provide valuable financial links to the SAS sector, reducing the long-term energy costs incurred by households and the risks to lenders. Similar models are succeeding in other markets. Remitters in Haiti reported over 25% of finances sent were used to cater for energy bills and BBOXX has experimented with this scheme in Rwanda with the support of the Shell Foundation. ePay transactions are made securely online with a debit or a credit card with zero transfer fees from anywhere in the world[76]. Due to the remote nature of the remittance provider, high levels

70 *MoWIE (2020), NEP 2.0*
71 *MoWIE (2020), NEP 2.0*
72 *OCA consultations and analysis*
73 *MoWIE (2020), NEP 2.0*
74 *InforMEA, Investment (Amendment) Proclamation No, 849/2014*
75 *The Ethiopian Diaspora Trust Fund*
76 *Shell Foundation, Sending Energy Home: Bboxx helping Rwandan diaspora fund energy access, 2019*

of trust and reassurance is required to ensure funds are used appropriately and that there are reliable channels for distribution to remote areas.

5.3 Policy and regulatory interventions

Engaging the GoE on liberalizing the mobile money industry while developing PAYG expertise in the market can enable the growth of mobile payments in the SAS sector. NBE's new draft directive allowing non-financial institutions to issue mobile money is gaining momentum in the public sphere. Mobile money is a key enabler of PAYG and there is a strong opening to engage the GoE, through NBE and the National Financial Inclusion Steering Committee, on opening up provisions to all FinTechs and telecoms – both local and international – to eliminate unnecessary intermediaries and reduce transaction costs. In markets with wide-scale adoption of PAYG such as Kenya and Uganda, mobile money services are managed end-to-end by telecommunication companies, for example, Safaricom in Kenya, and MTN in Uganda. The regulatory environment is more conducive as telecoms are not under the regulatory purview of the central banks. Furthermore, there is opportunity to start building a knowledge base among early PAYG entrants in Ethiopia that can continue to serve the market as it grows. Stakeholders should enable collaboration between local companies and private sector actors with experience in markets that have mature PAYG ecosystems.

Quality standards and tax exemptions applied to SAS products should be more consistently enforced through better inter-agency collaboration and by leveraging regional energy bureaus. The voluntary standard for pico-PV lighting products adopted by the Ethiopian Standards Agency (ESA) has succeeded in giving quality-verified products preferential treatment to acquire financing through DBE[77]. However, beyond this context, the standard is having little effect in limiting the importation and sale of low-quality products. Additionally, there needs to be a clear enforcement mandate for quality standards. In 2016, duties related to quality verification transferred into the Ministry of Trade, a transfer of mandate that was not clearly communicated to retailers[78]. The sector would benefit from better collaboration between the ESA, Ministry of Trade and Industry, and customs authorities, as well as regional energy bureaus (REBs), which are acting in some parts of the country to restrict the supply of poor solar products. If capacity within the ESA and customs authorities is low, leveraging REBs to monitor and report on distribution activities at lower administration levels can help bridge the regulatory gap.

Foreign currency channels were largely inaccessible as the government re-allocated its limited reserves towards emergency safety measures

77 *MoWIE (2020), NEP 2.0*

78 *ODI (2016), Accelerating access to electricity in Africa with off-grid solar, Ethiopia*

6. CONCLUSION

The SAS sector will play an important role in meeting Ethiopia's goal of 100% electrification by 2025. The GoE estimates a USD 1.7 billion financing need to meet this target; however, the level of investment to date falls far below the required amount. Commercial activity continues to grow despite limited investment, but SAS companies will struggle to operate at scale and reach remote off-grid consumers without strategic support. Targeted investment, technical assistance, and strategic policy reforms are needed to propel the sector forward.

Development partners and the government have been primary contributors to investment flows and technical assistance in the SAS sector. Collaboration between the actors like the World Bank and DBE has enabled the largest source of debt financing for SAS companies to date. AECF, ECIC and other donors have extended grant financing and other forms of patient capital. Furthermore, various forms of technical assistance have been provided to government institutions to inform policy reforms. Continued stakeholder collaboration is needed to increase investor confidence in the market.

To position the sector for continued growth, targeted financing interventions that respond to specific market gaps are needed. SAS companies across growth stages require forex to import products given NBE's restrictions and will benefit from increased concessionary and grant capital in the market. Small or early-stage players in particular need patient capital to prove their business models and as they develop a receivables portfolio. Blended finance models that crowd in commercial banks and employ risk mitigation mechanisms can increase access to working capital at lower interest rates. Additionally, less stringent collateral requirements, such as allowing companies to trade in local cash reserves for forex, can increase lending volumes. Results-based financing can also incentivize companies to extend their supply chain to remote regions and offer products at reduced prices, while remittance solutions offer a demand-side subsidy to support household purchases and repayments.

In tandem, the government with support from support actors can play a key role in making the SAS sector more attractive for investment. Increasing the capacity of the SAS manufacturing sector can reduce reliance on both imports and forex, and the industry can eventually position itself for regional opportunities. Enabling an integrated supply chain is key to attracting investment as companies can build in-house, end-to-end capacity that supports operations at scale. Vertical integration is also critical for adoption of PAYG models; however, more enabling mobile money policies that open up the industry beyond banks are required to promote mobile payments. In parallel, stakeholders should extend technical assistance to SAS companies piloting PAYG models and seek to build a knowledge base that can serve the market as it grows. Industry knowledge should extend to measuring the collective progress towards universal energy access by tracking critical data points such as new connections to increase transparency and investor confidence in market opportunities. Lastly, consistent enforcement of SAS quality standards and tax exemptions through greater inter-agency collaboration is required.

The recommendations detailed in this report can inform and enable investment into the SAS sector. Across all interventions, continuous dialogue, advocacy, and co-development of solutions with the right government stakeholders is critical. The GoE has demonstrated a willingness to work with development partners on key barriers to achieving universal energy access. With a detailed NEP 2.0 strategy for reference, a deep understanding of market barriers, and proposed solutions for investment, support actors are well-positioned to catalyze rapid and sustainable growth in the SAS sector.

Development partners such as Power Africa and the World Bank are actively engaging the government to explore optimal tariff rates that can ensure the commercial viability of productive uses of energy.

APPENDIX

Development program and Partners	Target industry and Program objectives	Approach	Results to date
World Bank – *Lighting Africa*			
Partners • IFC • Scaling-Up Renewable Energy Program (SREP) • ESMAP • MoWIE • Climate Investment Fund • IKEA foundation	**Focus:** Solar Home Systems **To accelerate the development of off-grid solar lighting and energy market through:** Improving the enabling environment for the off-grid sector by adopting national quality standards and implementing the quality assurance; Supporting the scale-up and replication of high potential businesses; Consumer awareness and education campaign; Addressing policy barriers that impede the development of the off-grid lighting market.	Quality Assurance: Support the adoption and implementation of Lighting Global standards to develop a sustainable market for quality-verified solar products; Business Development Support for the establishment of local entrepreneurs; Access to Finance; Consumer education; Market Intelligence of the market and supply chain.	800,000 quality verified products imported; Market Insight reports published; 5 MFI's are providing consumers micro-loans for quality-verified off-grid lighting and energy products; Ethiopian government adopted national standards for off-grid products.
World Bank – *Ethiopia Electrification Program (ELEAP)*			
Partners • IDA • MoWIE • EEU	**Focus:** Grid and off-grid electricity **Increase access to electricity in Ethiopia and enhance institutional capacity for planning and implementation of the government's electrification program.** Provide 5.4 Million people access to grid electricity; Provide 255,000 people with off-grid electricity; Improve planning and implementation capacity of the electricity sector in Ethiopia.	Establish on-grid electricity connections; Establish off grid electricity access; Sector capacity and organizational reform; Strengthen fiduciary systems; Strengthen sector planning capacity; Strengthen sector institutional capacity; Train EEU and MoWIE staff.	Directorate for Electrification set up in MoWIE; 23 EEU and MoWIE staff trained under the Program; 947,410 people provided with electricity.
World Bank – *Renewable Energy Guarantee Program (REGREP)*			
Partners • MoWIE • EEA • EEP	**Industry:** Solar and wind Independent power producers (IPP) **Increase renewable energy generation capacity through private sector participation in Ethiopia** Support the Government of Ethiopia's ongoing power sector reforms and leverage private sector financing for renewable energy generation; Support the development of over 1,000 MW of greenfield solar and wind energy Independent Power Producer (IPP) projects in Ethiopia	Payment guarantees to secure PPA payment to IPPs; Loan guarantees to secure debt repayment by IPPs; Transaction advisory and programmatic technical assistance.	New project and no results reported to date.

Development program and Partners	Target industry and Program objectives	Approach	Results to date
World Bank – *Market Development for Renewable Energy and Energy Efficient Product Credit Line (MDFRE and EEP)*			
Partners • MoWIE • DBE • MFIs	**Industry:** Biogas, Solar Home System and lanterns, Improved cook stoves **Expand the local renewable energy market and increase affordability of renewable energy products for households.** Provide access to finance to remote off-grid renewable energy programs through a dedicated credit line for off-grid renewable energy; Give access to more than 15 million people; Distribute more than 2.5 million products.	Technical support for DBE and MoWIE; Carbon Financed Programs; Credit line to support working capital of project developers (private sector enterprises; SME etc.); Credit line to provide on-lending support to MFIs to lend to small households at an interest rate 6% and repayment of 10 years max. DBE will bear the full risk of the loans to MFIs.	Increased Tier 1 Access Rate by ~1m households; 1,500,000 solar lanterns distributed; 10,000 Solar Home Systems; 500,000 EE Lamps 5000 Biogas.
World Bank – *Accelerating distributed electricity and lighting in Ethiopia (ADELE) - In pipeline*			
Partners • MoWIE • EEU	**Industry:** Grid, solar minigrids, and solar home systems **Expand access to:** **1) Solar home systems for households (HHs), small-holder farmers and small businesses** 2) **Solar minigrids for rural economic development** and support the roll out of minigrids paired with energy-efficient appliances for productive use 3) **Standalone solar systems for social institutions (particularly schools and health centers);** Capacity building, technical assistance and implementation support	Strengthen access to financial service access points and financial infrastructure; Provide credit facilities to private sector enterprises (specially to promote PAYGo), MFIs, and SACCOs, to enable access to consumer finance; Offer competitively awarded incentives to off-grid solar companies with a particular focus on deep rural areas.	New project and no results reported to date.
GIZ – *The Ethiopian-German Energy Cooperation*			
Partners • MoWIE	**Industry:** Solar photovoltaic **Improve and develop a sustainable energy infrastructure for modern and efficient energy markets through the increased use of renewable energy and energy efficiency technologies.** Creation of a market environment for the private sector with an enabling framework for public-private partnerships, a vital mechanism to commercialize renewable energy technologies; Support policy dialogue and build connections between the business and policy sector.	Innovation competition for on- and off-grid rural decentralized electrification; Local solar photovoltaic (PV) demonstration centers; Rehabilitation of existing hydropower stations in collaboration with the German private sector; Mentorship and business development support for competition finalists; Seed funding and project scale up through the German-Ethiopian Energy Cooperation; Linkages with senior experts in Ethiopia and Germany.	New project and no results reported to date.

Development program and Partners	Target industry and Program objectives	Approach	Results to date
GIZ – *Energy solutions for Displacement setting (ESDS)*			
Partners • Agency for Refugee and Returnee Affairs (ARRA) • UNHCR • MOWIE • UKAID • Swiss Agency for Development • Irish Aid • KOICA • SNV	**Industry:** PV systems and cooking stoves **Improve the sustainable energy access through market-based approaches in refugee hosting areas,** with focus on the Gambela region. **Strengthen the collaboration of humanitarian aid, development, and peace-building actors in displacement settings.**	Policy framework: Support to developing cooking fuel strategy; provide training to partners and advisory services to promote financial needs; Market based access to sustainable energy for the camp infrastructure; Provide services on business model and financing schemes P and M service; capacity of local entrepreneurs; Marketing based access to sustainable energy (Lighting and cooking) for households.	New project and no results reported to date.
FCDO – *Africa Clean Energy (ACE) Technical Assistance Facility (TAF)*			
Partners • UKAID • World Bank • World Resource Institute • GOGLA • Open Capital Advisors • The Energy and Resources Institute (TERI) • Solar Sister	**Industry:** Standalone solar **Catalyze a market-based approach for private sector delivery of renewable energy electrification technologies, with a focus on high quality stand-alone solar systems.** Strengthen Policy/regulatory reforms; Minimizing fiscal barriers; Innovation in financing; Consumer protection; Support for industry associations and rural electrification authorities;	Technical assistance to improve the enabling environment for a market-based approach; Finance for businesses wanting to enter new and emerging SHS markets; Test innovative approaches to stimulating private sector investment and a market development.	New project and no results reported to date.
USAID – *Power Africa Off-grid Project*			
Partners • RTI International • Fraym • Norton Rose Fulbright • Practical Action Consulting • Tetra Tech	**Industry:** Solar Home Systems and minigrids **Offer broad-based market intelligence to investors and financiers and advise governments on establishing supportive policy frameworks and providing hands-on support to companies.** Help build the off-grid market to accelerate private sector-led energy access; Provide technical assistance and targeted grand funding; Provide hands-on support to companies.	Policy and Regulatory design and implementation that are supportive of the private sector; Gather and disseminate market intelligence to companies, investors and governments to inform them about the latest sector developments; C-suite recruiting, business model development, sales strategy, product sourcing and strategic partnerships Cross-Sectoral Integration.	Helped establish 10,796 grid connections; Supported the GoE with the initial landmark IPP for the Corbetti and Tulu Moye Geothermal Projects that will generate up to 1000mw Assisted with the development of new laws and regulations that will facilitate private sector led IPP investments; Supported the Eastern Africa Power Pool (EAPP) responsible for facilitating cross border trading of renewable energy; Developed Ethiopia's Off-Grid Solar Market Assessment Finalizing solar remittance platform.

Development program and Partners	Target industry and Program objectives	Approach	Results to date
UNCDF – *Clean start*			
Partners • MoWIE • DBE • UNDP / GEF • SIDA • NORAD • ADC	**Industry:** Renewable energy **Promote Sustainable Rural Energy Technologies for Household and Productive Uses projects.** **Offer catalytic finance models that unlock public and private resources in "last mile" environments,** especially at the domestic level, to reduce poverty and support local economic development.	Finance for clean energy to incubate scalable energy financing models; Technical assistance for clean energy to increase the scale potential of financing models by providing value-added support; Advocacy and partnerships to co-create ecosystems for scale in partnership with stakeholders.	Laid down foundations for supporting national meso-level institutions, including DBE, set up inject more capital into the energy sector; Provided USD 5000 grant to 14 companies to promote sustainable technologies.
AFDB – *Facility for Energy Inclusion's Off-Grid Energy Access Fund (FEI OGEF)*			
Partners • EU • KfW • Nordic Development Fund • GEF	**Industry:** Off-grid solar **Provide a debt financing facility for small-scale off-grid solar and minigrid energy access projects.** Scale-up access to affordable clean energy for off-grid households in Ethiopia and facilitate a long-term sustainable financing environment for off-grid energy access, with particular focus on mobilizing local currency financing and crowding-in local financial institutions (LFIs).	Develop a private sector-driven market for off-grid energy solutions in Ethiopia by providing a line of credit to local commercial banks; Provide local currency loans to cooperatives and microfinance institutions (MFIs).	In the pipeline.

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