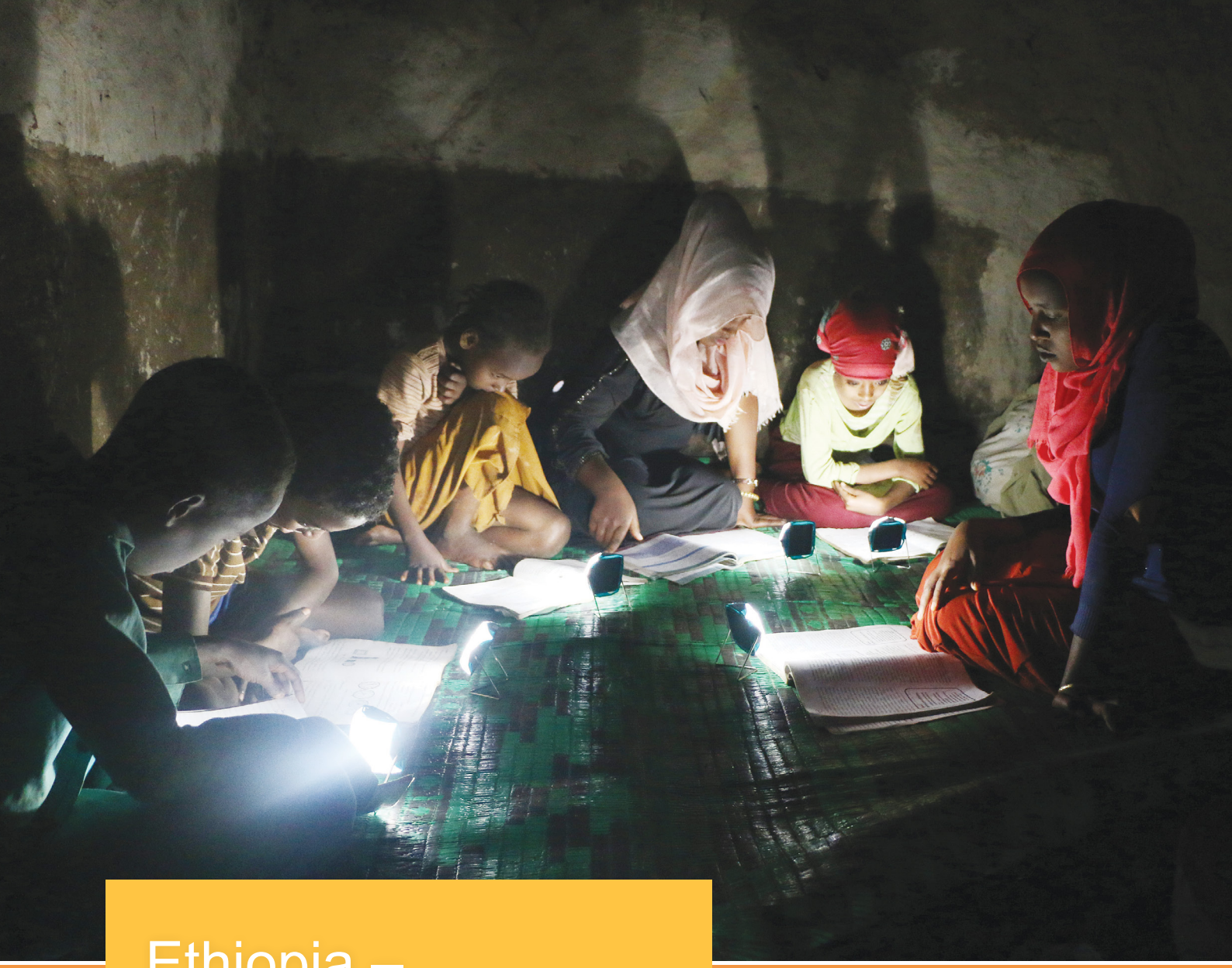

Ethiopia – Integrated Regional Energy Strategy

Final Report

Africa Clean Energy
Catalysing Africa's Solar Markets

TETRA TECH
International Development

UKaid
from the British people

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

Tetra Tech International Development

This report was authored by the Africa Clean Energy Technical Assistance Facility.

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Cover page: photo courtesy: www.afconsult.com. ÅF Lighting supports development project in Ethiopia

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Abbreviations

Acronym	Definition
AfDB	African Development Bank
DP	Development Partners
EEA	Ethiopian Energy Authority
EEP	Ethiopian Electric Power
EEU	Ethiopian Electric Utility
EMA	Energy Market Accelerator
FCDO	Foreign Commonwealth and Development Office
GESI	Gender Equality and Social Inclusion
GIZ	Gesellschaft für Internationale Zusammenarbeit (Germany)
IFC	International Finance Corporation
IGA	Income Generating Activity
MFI	Micro Finance Institution
MoWE	Ministry of Water and Energy
MSME	Micro, Small and Medium sized Enterprise
NEP	National Electrification Programme
OGS	Off-grid Solar
PAOP	Power Africa Off-Grid Project
PAYG	Pay-As-You-Go
PWD	People With Disabilities
REB	Regional Energy Bureau
REDPC	Rural Energy Development and Promotion Center
SACCO	Saving and Credit Cooperative
SAS	Stand-Alone-Solar
USAID	United Regions Agency for International Development
WB	World Bank
AfDB	African Development Bank
DP	Development Partners

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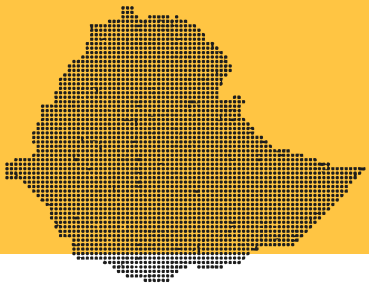
Executive Summary



In Ethiopia 56% of the population, over 60 million people, have no access to electricity. They use kerosene lamps, dry cell batteries, and fuel wood as their main source of energy. These energy sources do not provide adequate lighting and worse are harmful to their health and the environment. Aside from lighting, energy from grid and off-grid sources is vital to power irrigation, agro-processing and other commodity value added services. Households with solar irrigated facilities harvest twice or three times a year more, doubling their productivity and income. Expanding energy access to households at a rapid pace is required to help them benefit from these opportunities.

Off-grid solar can be deployed relatively quick to overcome the energy access challenge in deep remote rural locations. It also requires less investment cost, making it quite suitable to resource constrained developing countries, like Ethiopia. The significance of this was taken into consideration when the National Electrification Programme 2.0 was developed and targeted to connect over 9 million households using off-grid sources by 2025. Good progress was to electricity thousands of households through stand-alone solar (SAS) products during the Growth Transformation Plan II. But the supply of SAS could not keep pace with the demand towards the latter half of the GTP II period. As a result, the country will miss its target of universal electrification by 2025.

MoWE has revised the universal electrification target for Ethiopia to 2030 and a new 10-year strategic plan to achieve this objective is being drafted. In addition, most of the Regions have prepared their own 10 years Strategic Plans to align their activities with the federal plan. The stand-alone component of these plans, however, lacks specific details on how regions plan to ensure access to SAS services for vulnerable communities. They barely mention the impact energy could have on increasing productivity and income. And there is no consideration given for the promotion of solar powered value-added products, piloting productive use of energy, or securing funding for the expansion of successful solar projects.

Regional budget allocations in these plans are limited to household SAS services. There is no budget allocation at all for energy to impact economic growth. Regions do not allocate budgets for market surveillance activities to tackle the distribution of sub-standard and low-quality products. Budget is also not allocated for professional training of instructors for Technical and Vocational Education Training (TVET) courses to empower them to provide short term energy trainings on regular basis. This is likely due to the limited awareness on SAS services.

Regional Energy Bureaus (REB) do not have a well-articulated communication strategy for SAS. They do not have websites and use social media to build the profile of SAS. REBs do not promote the advantages of SAS access versus the grid and hence do not receive the required funding for the delivery SAS activities. Awareness creation events were not organised in a coordinated fashion to stimulate the uptake of SAS, particularly for productive use of energy.

Donor supported projects continue to have a national scope but should also allow room for regional priorities. Regional priorities depend on specific economic and social circumstances. For some regions, solar-powered water treatment plants to provide safe drinking water are the priority. Access to electricity for social institutions is considered an urgent task for others. REBs identified needs ranging from technical assistance, to funding arrangements to create access to loans for youth solar enterprise retailers, to funding support for incubation centres. In this regard, REBs participation in the Ministry of Water and Energy (MoWE) Off-grid Solar Task Force meetings will help to emphasize regional priorities with donors.

With the advent of the Energy Access Explorer (EAE) tool that enables users to identify the location of potential customers with the requisite income and critical mass and suitable places for PUE services, REBs can realistically plan interventions to expand SAS services. Using the EAE platform, MoWE and REBs may also monitor and evaluate their electrification progress by regularly updating the EAE system with newly connected households

and installed productive use of energy systems. The system is open for other stakeholders to target areas that are not yet served by the grid and are viable for off-grid energy sources. The platform will also be utilized by the Off-grid Solar Committee, established both at the federal and regional levels, to undertake periodic monitoring and evaluation assessments to scale up off-grid access.

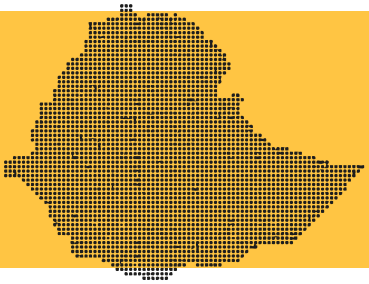
According to AfDB estimates, Ethiopia needs USD 587 million for the importation of SAS products to meet its universal electrification target by 2025. The government is not able to provide this level of funding required. However, the government may help reach these targets if foreign manufacturers, who enter joint venture arrangement with local companies, are permitted to engage in the importation and distribution of solar products. Priority consideration may be granted if such companies sign an undertaking to establish a local manufacturing facility after a specified period.

Key barriers identified by the report include intermittent supply of SAS products into the regions due to lack of FOREX for Private Sector Enterprises (PSE) to be able to import these products. Disparate rules and regulations required by each region for PSEs to sign to be able to access the consumer financing facility extended by MFIs to distribute their products has increased firms' compliance cost. High penetrations of substandard products in the regions have also made it difficult for quality certified products to compete in the regions.

Several recommendations are made in this report to overcome the identified barriers. Regional stakeholders must coordinate in a strategic fashion with the federal government and awareness creation events must have wider implications beyond household electricity and expand knowledge of product use of energy (PUE) services to improve farmers productivity and income.

The establishment of regional an Off-grid Solar Committee involving regional stakeholders to plan and organise awareness creation events has enormous significance for the uptake of PUE in the regions. It is also recommended that regions needs to plan and allocate budgets to empower TVETs, and undertake market surveillance activities to control substandard SAS products in the market, which not only undercut quality certified SAS suppliers but have a detrimental effect on consumer confidence limiting the market growth potential.

1. Introduction



Ethiopia's stand-alone solar sector has seen strong growth in the last decade but given the large ground to cover to meet the NEP 2.0 targets of 9 million off-grid electricity access, a lot remains to be done. The objective of the IRES (Integrated Regional Energy Strategy) Report is to:

- Estimate the resource needs for the import of SAS products and recommend ways to ease the FOREX constraint for the country to meet its universal electrification targets.
- Recommend key activities regional plans should focus on and set aside budget.
- Recommend communication strategy for REBs to create consumers awareness and get stakeholders buy in.
- Identify key interventions to support Gender and Social Inclusion (GESI).
- Recommend interventions by REBs to level the playing field for Private Sector Enterprises (PSE), and
- Recommend a monitoring and evaluation framework that will allow close coordination among stakeholders, regular assessment of progress to further expand good achievements and rectify implementation issues.

Energy related policies, proclamations, regulations, directives, planning, and strategy documents were reviewed during the desk research to prepare this report. Engagements and consultations were held with six of the ten REB heads, PSEs senior management, and senior staffs of donor organizations to gather primary data. The report consists of four sections and appendices as summarized below.

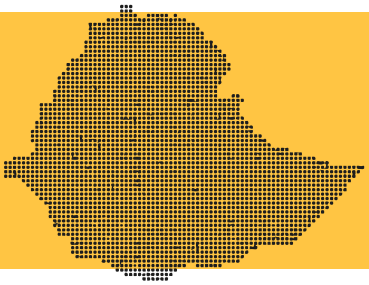
Brief background about Ethiopia's energy access context and the significance of energy for economic transformation and the magnitude of the SAS access challenge and the study methodology is presented in Section 2.

While there is a massive demand for SAS services in Ethiopia, the market remains behind its potential. Section 3 looks at the stand-alone solar ecosystem governing off-grid solar services delivery in the regions. These include the regulatory environment, SAS business operation environment, plans and budgetary allocations, trained workforce to support SAS services, GESI, communication strategy, monitoring and evaluation framework and the resource mobilization plan.

Section 4 discusses stand-alone solar barriers in the regions, including lack of access to finance, lack of access to DBE consumer finance credit facility, disparate requirements by each region for PSEs to access consumer finance facilities extended by MFIs and inadequate enforcement of quality standards.

Section 5 recommends key strategies to address SAS barriers in the regions. These include overcoming lack of access to forex, the need for revamping awareness creation activities into events, enforcement of quality standards, empowering TVETs to provide short term trainings on installation, maintenance, and aftersales services for SAS, establishing regional stand-alone solar committee to oversee SAS interventions in the regions and monitoring and reporting.

2. Ethiopia Energy Access Context



2.1 CONTEXT

Ethiopia has the fifth largest non-electrified population in the world after India, Pakistan, Bangladesh, and Nigeria[1] . Out of the total population of over 110 million, 60 million Ethiopians still lack access to electricity. They rely on dry cell batteries, kerosene lamps and fuel wood as lighting sources, which are harmful to the environment and personal health. Access to electricity in rural areas remains much lower than this national average with only 8% of rural households using electricity compared to 92% for urban areas[2]. Thus, access to electricity in Ethiopia is mainly a rural challenge, which is based mainly in the regions.

Cognizant of the magnitude of this challenge and the requisite large scale infrastructure investment in power generation, transmission and distribution lines required to create access to these households through the expansion of the national electricity grid, the Government of Ethiopia devised a twin track strategy which combines both grid expansion and off-grid solutions. The off-grid solution includes stand-alone-systems such as solar lanterns and home systems, and mini grids powered by renewable resources.

Access to clean, affordable, and reliable energy is also an enabling factor for economic development and poverty reduction. Energy is one of the vital components required for the creation and expansion of microenterprises in rural areas. Households with solar powered irrigation facility can harvest twice or thrice in a year, increasing their productivity and income. Schools with energy and internet access can tap into online education resources, access online lectures and can conduct sophisticated lab analysis. Health centres can keep vaccines in their fridges for an extended period, to control the spread of easily preventable diseases. Thus, energy access is at the core of the government poverty reduction and development agenda.

The plan is to achieve universal electrification access, using a hybrid of grid and off-grid connections, by 2025. The off-grid solutions are preliminarily expected to provide services to 35% of the population, for a total of 9 million households and estimated to cost USD 2.5 billion, with the Government contributing 40% (USD 1 billion) and the syndication of Development Partners and private companies contributing the remaining 60% (USD1.5 billion)[3].

2.2 METHODOLOGY

The study utilized semi-structured questionnaires to gather primary data from government officials, Regional Energy Bureaus (REBs), development partners and private sector enterprises (PSEs). Interviews were conducted with six REBs from among ten we had requested to have interview with. Eight private sector enterprises (PSEs) have also shared us their experiences regarding the solar business environment in the regions. Two donor organizations have also shared us their perspectives on the challenges the sector faces and what they think should be done for the SAS to make a sustained progress.

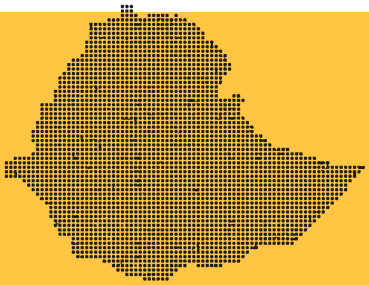
Secondary data was gathered from desk of review of relevant federal proclamations, regulations and directives, energy access and sector plan documents and federal and regional plan documents and data sets.

1 *2019 (A Joint Report of Custodian Agencies), TRACKING SDG7, The Energy Progress Report*

2 *2016 (CSA), Welfare Monitoring Survey*

3 *2019 (MoWE), National Electrification Program 2.0*

3. The Stand-Alone Solar Ecosystem in the Regions



This section discusses findings from the desk research and stakeholder interviews on the regulatory environment, solar businesses operation environment in the regions, strategic plans and budgetary allocations, trained workforce to support stand-alone solar services in the regions, gender and social inclusion, donors' stand-alone projects in the regions and regional stakeholders' coordination in SAS delivery.

3.1 THE REGULATORY ENVIRONMENT

The prevailing National Energy Policy was introduced in 1994. A revised energy policy (Draft, 2018) is currently under review by regional and federal stakeholders to cater for the growing energy demand, which is forecasted to grow by 30% annually, and give much room for the private sector in large scale projects and small energy technology modalities, like solar energy. The new draft policy underlies the need for providing incentives to encourage private sector investment in off-grid energy and promoting productive use of energy to create rural employment. It also stipulates creating electricity access for the wider population, using both on-grid and off-grid renewable resources.

The National Energy Policy was further complemented by the Climate Resilient Green Economy Strategy (2011) that introduced further additional specific measures such as improving industry energy efficiency, substitution of fossil fuels by biofuels, tightening of fuel efficiency of cars, exporting renewable power to substitute for fossil power generation abroad, minimising transmission loses from the national grid and creating energy access from off-grid energy services.

The Energy Policy and the Climate Resilient Green Economy Strategy (CRGES) were made into laws, to make them amenable for implementation, by the Energy Proclamation No. 810/2013, the Public-Private Partnership Proclamation (2017), the council of ministers' investment regulation No. 474/2020, the Energy Regulation (447/2019), the Mini-grid Directive (268/220) and the Captive Power Supply Directive No. 836/2021. These legislations regulate private sector involvement in the energy sector which is almost non-existent except for Corbetti and Tulu Moye geothermal projects. In this regard, there are two regulations still restricts foreign companies' participation in the SAS sector.

The investment regulation (474/2020) does not allow foreign companies to engage in SAS import and retail services. This regulation has closed the opportunity for foreign companies to introduce better supply and distribution management practices for last mile SAS retail and from directly marketing their products to consumers, potentially lowering the prices of SAS products. Mobile network operators (MNOs) are also barred from operating a mobile payment system in Ethiopia[4]. Reportedly, this is likely to change with the approval of the new directive drafted by NBE[5]. Mobile network operators have the scale necessary to create a large-scale payment system to enable controlled, small-size payments for solar to flow through and strengthen the digital payment system.

4 *2012 (NBE), Mobile and Agent Banking Services' Directives No. FIS /01/2012*

5 *2022 (Addis Zeibe), https://addiszeybe.com/safaricom-waiting-for-national-bank-directive-amendment-to-launch-m-pesa-in-ethiopia*

The National Energy Policy governs energy related matters both at the federal and regional levels. Regions have a constitutional right to flexibly adapt the Energy Policy to suit their local circumstances and enact legislations that facilitated the effective implementation of the policy in their jurisdictions. It is not the case though as all the regions we spoke to have no legislation of their own that are applicable in their jurisdictions. Although regions have no legislation of their own, they use the consumer financing credit facility extended by MFIs to oblige companies meet certain performance requirements. We briefly explore these requirements in the next section.

3.2 STAND-ALONE SOLAR BUSINESS OPERATION ENVIRONMENT IN THE REGIONS

Solar companies obtain investment permits, commercial registration certificates and business licences at the federal Investment Commission and the Ministry of Trade and Regional Integration. They are also required to sign Memorandum of Understanding (MoUs) with Energy Bureaus (REBs) in each region to be able to distribute their products using the consumer financing facility extended by each regional MFI. The content of the MoUs have varied requirements (agencies to use, deposit requirements, warranty periods etc.), from one region to the other making compliance costly and time taking.

Some regional MFIs require solar companies to make advance deposit ranging from 5% to 10% (for existing businesses and for new companies respectively) of the value of the imported solar kits into the country in a blocked account to be allowed to sale their products using the consumer financing facility extended by the MFIs. REBs agreed the deposit amount should be calculated based on the value of SAS products to be distributed in the regions. But they insisted the deposit requirement should remain in place as a guarantee to ensure companies provide aftersales services. And to ensure solar companies sale quality certified products as there were incidences in the past that some solar companies were found mixing sub-standard products along with quality certified products. In some instances, companies that fulfilled these requirements will find it difficult get access to the consumer financing loan.

The approval process for the release of funding from MFIs could sometimes take a year or more. MFIs are reluctant to release new funding when there are substantial arears of unpaid loans by consumers elsewhere in the region. REBs frequently intervenes to resolve this issues on a case by case basis but insist also for PSEs to supply quality certified products and provide regular aftersales services for consumers to pay their loans. If products are not up to the standard to provide the required services, consumers are not willing to repay loans.

Solar companies also complain that MFIs withheld their money for failures of aftersales services for which they are not responsible. REBs acknowledge the problem exists and had tried to resolve the issues on a case by case through discussion with the solar company and their appointed agents. They prefer to continue in resolving issues on a case-by-case basis rather developing a guideline on the roles and responsibilities of each actor in the supply chain. Allocating responsibility for aftersales services a priory between the solar company and the agent is something too technical for them to deal with.

3.3 STRATEGIC PLANS AND BUDGETARY ALLOCATIONS

It is during the second Growth and Transformation Plan (GTP II 2014/15 – 2019/20) that SAS enjoyed prominent attention as alternative energy source. And in the first half of the plan period alone, a total of 4,059,024 solar lanterns, 206,553 solar home systems, 4,484 institutional solar PV systems were distributed to households in the regions . The SAS products were distributed using the funding

support obtained from the Rural Electrification Fund. It was also planned to provide training for Technical and Vocational Education and Training (TVET) graduates although we could not find evidence if the plan was implemented or not.

SAS was given even much credence by the NEP 2.0. Off-grid solar was expected to provide electricity to 35% of the population for the country to realise its universal electrification access target by 2025. It is likely now the country will miss this target due to the faltering supply of SAS products for lack of Forex, the impact of COVID-19 and the lingering security situation in the north of the country. As a result, the NEP 2.0 universal electrification access target is now moved from 2025 to 2030 and to meet this target the federal government is preparing a 10-year strategic plan (2020/21 – 2029/30). Regions have also prepared their 10 years strategic plans by following the federal example.

Looking at of some of the regional strategic plans, one can find only the target number of SAS products to be distributed annually during the 10 years strategic plan period. The plans lack specific details on how regions plan to support vulnerable communities, such as women, get access to SAS services. It also barely mentions on coordinated awareness creation events to promote, pilot and scale PUE services.

Most of the regions (Amhara, Benishangul, Gambella and Sidama) allocate budget to facilitate the distribution of SAS products into Woredas, undertake a limited awareness creation activity, provide maintenance, and repair services to institutional solar systems of schools and health facilities and households. Afar and Somali regions go one step further by allocating budget for the purchase and distribution of SAS products to women and extremely poor households living in remote arid locations.

PUE related awareness creation activities have no budget allocations at all. Regions do not also allocate budgets for market surveillance activities to tackle the distribution of sub-standard and low-quality products in high risk Woredas. They also do not allocate budget to provide training of trainers' courses for TVETs to empower them provide short term technical trainings on their own in a regular basis. REBs agree they should plan on all these activities and secure budgets for delivering them but also say this is something beyond their control. They need support from senior officials to deliver on this.

This is also something that will take us to the next topic. How do we promote SAS services to secure the necessary funding from the authorities?

3.4 COMMUNICATION STRATEGY

SAS communication strategy should aim at three interrelated activities: raising the profile of SAS, organizing awareness creation events and promotion of quality certified SAS products.

SAS do not enjoy much publicity, compared to the national grid, to garners support from the authorities and the public at large for the delivery of SAS services in the regions. REBs do not have websites and use social media platforms to promote SAS benefits, accomplishments, and planned activities. REBs may also organize roundtable discussions aimed at educating the authorities on the likely contributions SAS likely make in resolving households' energy access challenges and expansion of PUE services to secure the necessary funding and support from the regional authorities.

Awareness creation should take the form of an event (A Field Day) and involve all relevant stakeholders, such as PSEs, Regional Agricultural Bureau (RAB), Regional Education Bureau, MFIs, Bureau of Women and Social Affairs, from the planning up to the final implementation. PSEs could exhibit the latest PUE equipment and run

6 *2018 (National Planning Commission), GTP II Midterm Review*

practical demonstrations to farmers. MFIs explain the terms and conditions of their consumer finance credit facility for buying solar irrigation pumps or solar powered agro-processing equipment. REBs could give presentations on available maintenance, repair and aftersales services should the equipment fail to function properly. Agronomist gives a briefing to the participants of the event on high value crops (such as vegetables) that could potentially grow in the areas using the solar powered irrigation facilities to recoup their investment.

Initially, the event could be organised in one or two sites and could gradually grow to cover the entire region. And the objective should be to achieve widespread use of PUEs to increase agricultural productivity and hence incomes of beneficiary households.

Quality certified products, which enjoy duty free privileges, are unable to compete with unverified products, due to their lower purchase price, even after the required taxes have been paid by the importer. This has brought a tremendous challenge for importers of quality certified products and calls for an awareness campaign to establish the value for money of purchasing certified products by the end users.

3.5 TRAINED WORKFORCE TO SUPPORT STAND-ALONE SOLAR SERVICES IN THE REGIONS

The significance of trained technicians for the expansion and sustainability of SAS services in remote locations were understood early on by MoWE. MoWE, in collaboration with Ministry of Education (MoE), has developed course content and curriculum, to provide training for Technical and Vocational Education and Trainings (TVETs) graduates on stand-alone solar installation, maintenance, and aftersales services although we could not find evidence if this is carried out as planned. GIZ also conduct short term technical trainings in the regions. And these trainings have somewhat reduced the burden for the private sector, by providing them with skilled workforce, in establishing their businesses in the regions. However, private solar companies we spoke to still complains of lack of trained technicians in the regions[7] .

A useful complement to this could be a short-term training that could likely be provided by TVETs themselves on a regular basis. Regions can arrange with the donors (or alternatively allocate their own budget) to provide training of trainer courses for TVETs and equip them with the necessary equipment to create the capacity for them to conduct short term trainings on regular basis. There is particularly an acute need in the regions for trained people in productive use energy such as the installation, maintenance and repair of solar powered irrigation and safe drinking water systems.

3.6 GENDER AND SOCIAL INCLUSION (GESI)

NEP 2.0 seeks gender targeting by REBs when identifying potential new customers and supporting PSEs penetration. It also recommends for REBs to encourage wholesalers, distributors, and manufacturers to give employment priority to women in the last-mile delivery of SAS products in rural areas. In this regard, the Amhara region REB requires enterprises, established to provide SAS distribution, installation, maintenance, and after-sales services, as agents of private solar companies, to include at least two women as members of the association. This has proved

7 *2022, Interview with a solar retail and consulting company.*

to be a good platform for skills development for the youth as well as job creation, but the gender balance is not documented.

It is also exemplary that the Afar and Somali regions allocate budget to procure and distribute SAS products to women and other poor households in the last three years (2018/19 – 2020/21). This has the advantage of both helping women get access to modern energy services while at the same promoting SAS products to other people living in that area. It is a good intervention that other regions worth emulating.

Organizing women led households into saving groups that collects small savings from each member every day/week to pay for SAS MFIs consumer finance loan, when it is due, is something REBs agreed to explore on a pilot basis.

While the GESI regulatory and policy framework in Ethiopia, is adequate, it has however not been implemented fully. Hence the benefits accruing from provisions in the policy framework have not been realised through enhanced gender and social inclusion.

3.7 STAND-ALONE SOLAR PROGRAMMES AND PROJECTS IN THE REGIONS

Most donor projects have a national scope in stand-alone solar interventions. Some donors usually start with few regions and gradually expand to cover the remaining regions through time. The only exception to these is projects in regions hosting refugees and internally displaced people (IDPs). The World Bank Development Response to Displacement Impacts Project (DRDIP) distribute solar products to IDPs and communities in the surrounding areas and ZOA install institutional solar PVs for health facilities and schools in Gambella region. Similarly, DRDIP and UNHCR distribute SAS products to refugees and people living in the vicinities of the refugees in Benishangul region.

It is good donors supported projects continue to have a national scope but should also allow a room for regional priorities. As an institution at the forefront of the implementation of SAS distribution to rural households, REBs have first-hand experience on the progress made on the ground and setbacks hindering further expansion. They also have different priorities depending on their specific economic and social circumstances. For some regions, solar-powered water treatment plants to provide safe drinking water are the priority. Access to electricity for social institutions is considered an urgent task for others. REBs support needs also range from technical assistance to funding arrangements to create access to loans for youth solar enterprise retailers to funding support for incubation centres. In this regard, MoWE managed REBs consultation with donors might help.

3.8 MONITORING AND EVALUATION FRAMEWORK

With the advent of the Energy Access Explorer (EAE) tool to help us identify the exact location of potential customers with the requisite income and critical mass and suitable places for PUE services, we can realistically plan our interventions to expand SAS services. Using the EAE platform, MoWE and REBs may also take their monitoring and evaluation system online by regularly updating the EAE system with newly connected households and installed PUE facilities. The system has an advantage that it is open for all stakeholders to see and accordingly target areas that are not yet served by the grid and off-grid energy sources. This should further be supported by Off-Grid Solar Task Force established both at the federal and regional level, which will at least undertake periodic monitoring and evaluation assessments to expand successes and tackle impediments.

Unlike the national grid, the number of stakeholders involved in the implementation of SAS are varied and many. At the centre is MoWE, which is responsible for the national planning, coordination, and monitoring of SAS energy development. NBE is responsible for SAS payment systems policy and directives. Standard Agency develops and adopts SAS standards. Customs process SAS shipments and collect import duties and release goods for distribution. ECAE undertakes market surveillance to control sub-standard products. DBE manages donors' credit facility and extend Forex loan for PSEs for the import of solar products and local currency loan for MFIs to provide consumer financing loans for households to purchase SAS products. The Investment Commission regulations determine on who will be eligible to participate in solar retailing. REBs promote and facilitate access to SAS products in the regions (the full list of SAS stakeholders and their responsibilities are presented in the Annex to this report). This warrants the significance of SAS stakeholders' coordination at the federal level and the coordination between MoWE and REBs to resolve regulatory and implementation challenges.

MoWE is coordinating federal SAS stakeholders through the Off-grid Solar Task Force. MoWE has also conducted a six-month performance evaluation meeting with the REBs in 2021, for the first time in four years since the coming to power of Prime Minister Abiy Ahmed. This should be further institutionalized and develop into a regular bi-annually and annual meeting forums to assess implementation progress, identify challenges and finding appropriate solutions and set directions for the next course of actions. The coordination forums will help to learn from successes and scale them up widely across all the regions. Regions that have off-grid solar committees should further strengthen them while regions without these structures should be able to introduce one soon.

The pace of progress of off-grid electricity services expansion to connect new customers is quite slow; the rate remains at 11% for the past three years[8]. PAYGo services are not expanded in a scale to have a meaningful impact in creating access to underserved areas. Solar powered pumps use for drinking water and irrigation have not made sufficient inroads into rural areas because of lack of awareness creation and trained technicians for installation, maintenance, and aftersales services. Progress in all these areas requires coordination between the federal authorities, between MoWE and regions and among bureaus in the regions.

Awareness creation is critical for farmers to adopt new technologies, like PUEs. And as such regions should establish a standalone solar committee to plan, organise and oversee the stand-alone solar awareness creation events in the regions. The Committee will be chaired by the REB and have as its members the Regional Bureau of Agriculture (RBA), MFI representative, Regional Bureau of Women and Social Affairs (RBWSA), Regional Bureau of Education and Regional Bureau of Health.

The Committee will select the date and place of the event and extend invitations to PSEs to exhibit and demonstrate their PUE equipment during the event. Nominate capable experts from MFIs and RBA who will brief event participants on available consumer fiancé credit facilities for the purchase of PUE equipment and high value crops that could be harvested using the irrigation facility, respectively. The Committee will also oversee all the necessary logistics is in place for the event.

3.9 RESOURCE MOBILIZATION PLAN

If the NEP 2.0 plan is to be met annual supplies of OGS products will have to rise significantly over the next few years - annual supply must increase by an average of 12% from 1.7 million units in 2021 to 2.7 million units in 2025. Close to two-third of supply or 6.8 million units must be solar lanterns and the rest will be solar home systems and Pico systems.

8 *2019 (MoWE), National Electrification Program (NEP) II*

Table 1. Off-grid electrification demand, 2021 – 2025

Off-grid product	Specification	Unit	Unit price	Units -demand				
			USD/unit	2021	2022	2023	2024	2025
Solar lanterns	3Wp	No, million	20	1.2	1.3	1.5	1.4	1.4
Solar Pico systems	10Wp	No, million	60	0.2	0.3	0.2	0.4	0.5
SHS	50Wp	No, million	150	0.3	0.3	0.5	0.6	0.8
Solar pumps	600Wp	No.	1000	28,683	34,133	40,613	48,335	57,519

The estimated supply value (excluding distribution costs) for the home system component of the off-grid plan is estimated at USD 72 million in 2021 rising to USD 171 million in 2025. Cumulative investment in home solar system between 2021 and 2025 will be USD 587 million (or about USD 117 million annually), with SHS accounting for close to two – thirds of the total cost, table 2. If we add to these solar pumps, the total estimated supply cost reaches over USD 1 billion.

Comparing the quality certified GOGLA off-grid solar sales trend, without considering non-quality certified imports, the estimated potential demand for the next 5 years shows a significant deficit in supply. To illustrate the point, the highest quality certified OGS import was registered in 2019 with the total import of a little over one million units. For Ethiopia to meet the 1.9 million units of imports forecasted for 2022, it needs to import an additional one million units above and beyond the figure recorded in 2019, to satisfy the market demand. This is unlikely to be met without a commensurate increase in the amount of forex available to private sector OGS product importers.

Local manufacturing is very limited; mainly assembly processes for pre-made components but has high potential to grow given the GOE's prioritization of manufacturing activities. However, the current capacity of solar manufacturers is very small to make any significant difference in the supply of solar products to the local market.

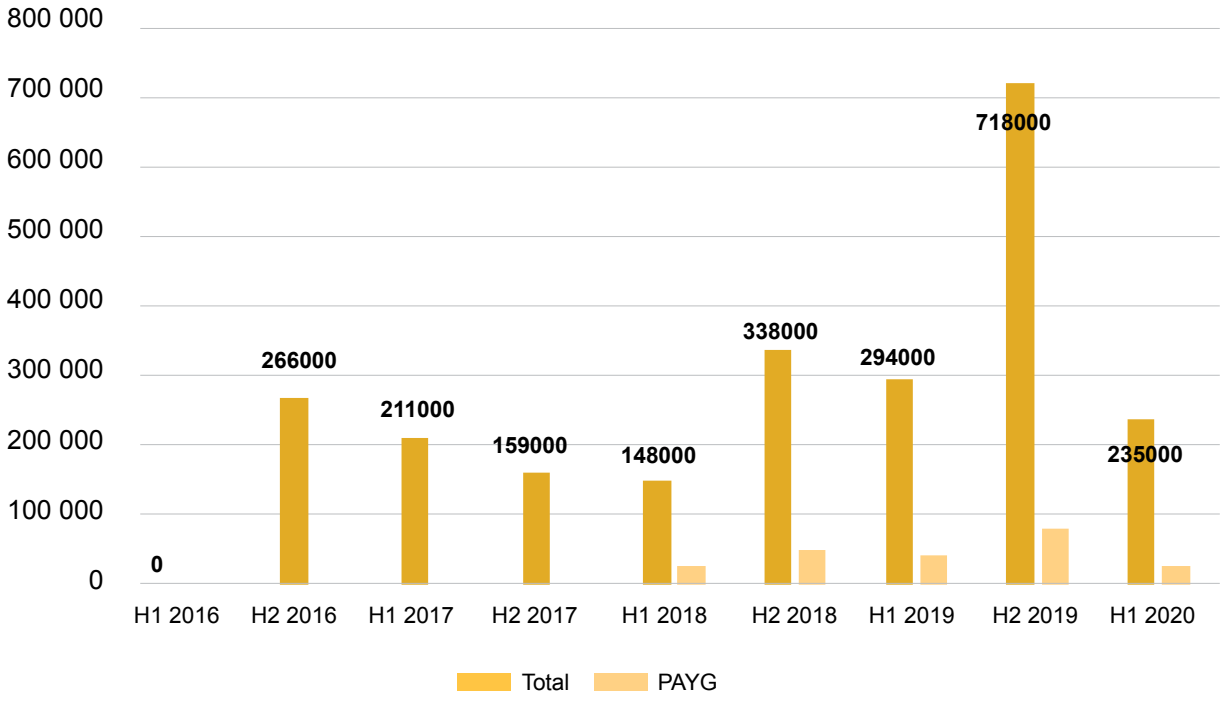
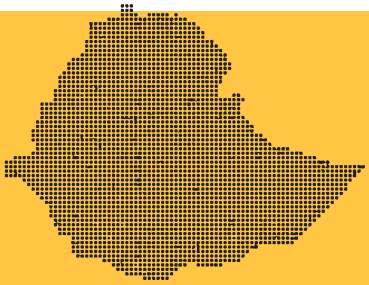


Figure 1, Certified off-grid solar sales (GOGLA)

4. Barriers to Stand-Alone Services Expansion in the Regions



This section discusses key barriers and gaps in the enabling environment for SAS development at the regional level following desk research and engagements with federal and Regional Energy Bureau stakeholders, as well as private sector enterprises (PSEs).

4.1 LACK OF ACCESS TO FINANCE

Access to FOREX remains to be one of the key barriers preventing off-grid solar access from scaling up in Ethiopia and reaching rural households. The country is heavily reliant on imports of solar products, as manufacturing facilities are very limited, and access to forex by PSEs determines the volume of SAS products they can import and distribute in the domestic market. The World Bank/DBE credit facility, which ended in 2020, had alleviated this problem to some extent by extending hard currency loans for PSEs for purchase of hardware inventory (equipment, supplies) and local currency loans to finance operating costs, including consumer financing. PSEs wish to see DBE address the following issues for the upcoming World Bank Access to Distributed Electricity and Lighting in Ethiopia (ADELE) project.

- To benefit from Development Bank of Ethiopia (DBE) credit facility, the importer must get approval from Ministry of Water and Energy (MoWE) on the specific brand it is importing from an identified supplier. Once approved, it is difficult to change the supplier, if for whatever reason the supplier ceases to operate, leading the entire process to a standstill.
- The six months grace period is too short to start repayment on DBE loans for PSEs using PAYGo to distribute SAS products. It takes at least three months to import the product and an additional three months to distribute the products to buyers.
- Lack of continuous access to finance means the business cease to operate. And as a result, solar companies must pay for labour and other expenses without generating revenue, which means loss of profit.
- Lack of transparency in the allocation of funding to companies from the credit facility. Some companies complain that they were not allocated the amount of forex they had requested while they saw others getting what they had requested.

4.2 ACCESS TO DBE CONSUMER FINANCE FACILITY

Solar companies SAS products distribution is mainly concentrated in the four regions of Amhara, Oromia, SNNP and Tigray regions. This is partly due to the DBE revolving credit facility, which was mainly extended to MFIs based in these regions to finance household purchases of SAS products. These four regions have also a relatively developed distribution system at the grassroots level and more trained installation, maintenance and repair technicians compared to the other

regions, although a lot remains to be done in creating adequate number of trained technicians across all the regions.

Gambella, Benishangul, Afar and Somali regions have not yet got access to the DBE revolving fund for SAS consumer financing. The ACE TAF commissioned study has brought this issue into light and recommended ways for the authorities to resolve the issue without delay.

4.3 INADEQUATE ENFORCEMENT OF QUALITY STANDARDS

The market share of quality certified products is quite small: accounting only for 45% of solar lanterns and about 20% of solar kits sold in the market[9]. PSEs and REBs reckon the share of non-quality certified products to be even higher. According to them, 75% of solar products distributed either has defects or are non-functional. Regions do not seem to have also trained staffs to distinguish quality certified products from sub-standard products[10]. And the problem is further compounded by the lack of spare parts, to do repair and maintenance works on non-functional products, or lack of replacements. Buyers do not get also proper trainings on the use of the SAS products which leads to damages.

The price of quality certified products is high and not affordable for rural HHs. Non-quality certified products, by comparison, are cheap although they have no warranties. Because these sub-standard products are very cheap compared to the quality certified SAS products, they outcompete the quality certified SAS products in the market. But sub-standard SAS products are of poor quality and have a short service duration, undermining consumer confidence. Measures have been taken by the government to curtail the import of sub-standard SAS products but more still needs to be to be done.

Law enforcement officials are also currently facing difficulty in dealing with substandard and counterfeit products because of lack of a guideline on the actions to be taken to dispose the products.

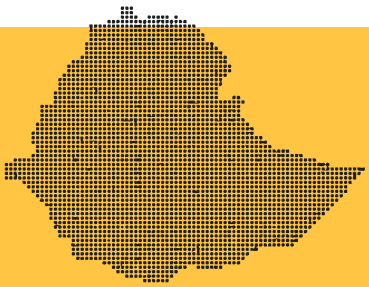
4.4 DISPARATE REGULATIONS

The prevalent model of distribution of solar products in regions is for MFIs to provide affordable financing to rural communities entering into tripartite agreements with Regional Energy Bureaus (REBs) and selected PSEs to procure and install off-grid products for the customer. However, the contents and requirements of these agreements vary from region to region. Some regions require private enterprises to use youth solar enterprises organized by the region to distribute solar products and provide after sales services while others leave it open for companies to choose their own agents. Warranty periods required from companies also vary from region to region. These disparate regulatory requirements will lead to an increase in firms' compliance costs and fragmentation of supply chains and ultimately to an increase in the final price of solar products.

9 *2016 (World Bank), Off-grid market study – Ethiopia: Retail audit, product evaluation and after sales service report*

10 *2022, Interview with solar companies and Regional Energy Bureaus*

5. Recommendations



Based on the findings and analysis in the preceding sections of this report, the following are the key recommended strategies to be implemented for SAS delivery in the regions.

5.1 OVERCOMING LACK OF ACCESS TO FOREX

The government may allow foreign companies, that enter into joint venture partnership with local distributors, to run import and retail business in Ethiopia for a specified number of years, preferably until 2030. Above and beyond alleviating the forex access problem, this arrangement will create the following additional benefits.

- Help the country achieve its universal electrification access target by 2025, which is unlikely to happen if the current SAS products supply trend continues.
- It will make solar appliances widely available to power water lifting for safe drinking water, expand solar pump irrigation, replace diesel pumps, and expand non-farm enterprises to process agricultural raw materials. These opportunities could not be realized if there is no adequate supply of SAS products to power these activities.
- Foreign private sector participation will reduce the markup applied to products exported to Ethiopia closer to the cost of production, improving affordability of quality products for the end user.
- Foreign companies' participation in import and retail business is also expected to bring foreign direct investment in maintenance and repair workshops, technical training facilities and spare parts inventory.
- It will allow foreign partners to gather valuable customer feedback and usage data that informs product development and tailor product offerings based on local customer demand.
- Local partners in this arrangement will benefit from new capital injection and technology transfer to scale up their operations and implement new consumer financing solutions such as PAYGo.

DBE is expected to manage the upcoming ADELE credit facility and it is quite helpful if DBE develop a transparent guideline, or share with PSEs if it has one already, on the requirements to access the fund.

The 6 months grace period to begin repayment on DBE loans is found to be insufficient by PSEs. Extending the grace period by few additional months may give PSEs sufficient time to generate revenue to start repayment.

5.2 EXTEND ACCESS TO THE DBE REVOLVING FUND TO ALL THE REGIONS

Some regional MFIs are not benefiting from the consumer financing revolving fund established by World Bank/DBE credit facility. MoWE and DBE should facilitate access to loans for Gambella, Benishangul-Gumuz, Afar and Somali MFIs from the DBE revolving fund. As also recommended by the ACE TAF recent study, the Off-grid Solar Task Force should facilitate access to the revolving for MFIs in these regions.

5.3 GENDER AND SOCIAL INCLUSION

Conduct a gender audit exercise to assess what has been achieved so far, what is missing and what needs to be done going forward to be sure energy access and energy financing is inclusive. And based on the findings, develop a gender mainstreaming strategy for MoWE and REBs.

5.4 ENFORCEMENT OF QUALITY STANDARDS

With all SAS imports now PVoC certified, it is essential that MoWE and donors assist regions to transition from the current quality verification into quality surveillance activities. And MoWE develop a disposal guideline for counterfeit, substandard and other low quality SAS products that do not meet Ethiopian compulsory standards.

5.5 CAPACITY BUILDING FOR TVETS

Technical and Vocational Education Trainings (TVETS) could sustainably provide short term trainings on PUE solar installation, maintenance, and aftersales services by replacing the current adhoc trainings provided by donors. To be able to do this, TVETs should be provided with training of trainers' courses and supplied with the appropriate equipment and facilities. Some donors have already shown interest to help regions in this and regions should capitalise on that. Regions may also set aside a certain quota for women trainees to maintain a gender balance.

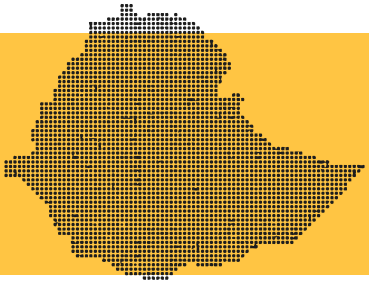
5.6 HARMONIZATION OF RULES AND REGULATIONS

The work of harmonizing the MoUs, which PSEs sign to distribute their products using the consumer financing facility extended by MFIs, has been on-going for some time now and needs to be completed soon to help poor rural households purchase SAS products.

5.7 MONITORING AND REPORTING

Regions monitors SAS implementation progress through the report they receive from Zones/ Woredas (districts). These reports are not gender disaggregated and lacks sufficient details on the type and size of the products distributed. To overcome these problems, regions may use the format presented in the Annex to this report.

Annex 1. Comaparative Analysis of SAS Delivery in the Regions



Annex 1. Comparative Analysis of SAS Delivery in the Regions

REBs SAS activities	Afar	Amhara	Benishangul	Sidama	Somali	Gambella
Responsibilities of the energy bureau	Procure and distribute solar products to the regional communities Awareness creation	Provide sustainable and affordable energy for all the regional people.	Institutional solar installation support Facilitate the distribution of SAS products Maintenance and repair of institutional and SAS kits	Awareness creation Facilitating the distribution of SAS products Maintenance and repair	Regulation, implementation, promotion, and awareness creation	Facilitate the delivery and installation of donor provided SAS products. Maintenance and repair services
Regional policies and regulations	No	Not available	Not available	Not available	Not available	No
Regional plans	3 years plan	10-year strategic plan	10-year strategic plan	10-year strategic plan	10-year strategic plan	10 years plan
Regional target from NEP 2.0	No	No	No	No	No	No
Budget	The regional government allocates budget for the procurement of SAS products to be distributed in the region.	Yes, for follow up support to Woredas.	Budget is allocated for follow-up support only	ETB 700k for Woreda bureau staffs' awareness creation	The regional government procures and distributes SAS products to households in remote locations	Yes, we have a small budget.
Access to DBE managed consumer finance	No	Yes	No	Yes	No	No
Monitoring and reporting	Reports from Woredas	Reports from Woredas	Reports from Woredas	Quarterly reports from Woredas	No	Reports from Woredas.

Annex 1. Comparative Analysis of SAS Delivery in the Regions (Continued)

REBs SAS activities	Afar	Amhara	Benishangul	Sidama	Somali	Gambella
Flow of standalone products to the region	Solar companies do not distribute SAS products in our region. There are no solar companies based in our region.	The flow of SAS is not adequate to meet regional demand.	From formal sources supply is Intermittent	Supply of SAS products is a challenge	Solar companies do not distribute SAS products in our region. Solar companies have no presence in our region.	It is intermittent.
Regional government SAS projects	Not available	Not available	Not available	Not available	Not available	
Progress evaluation forums with MoWE	We had one evaluation meeting with MoWE this year	No regular forum for progress evaluation.	Only one consultation this year in four years' time	Started consultation this year with a six-performance evaluation	There was one consultation this year.	Yes, only once this year.
Regional off-grid solar committee	Not available	We have two off-grid solar committees	We have one for the One – Wash project. Members of the committee are Education, Health and Women and Social Affairs Bureau	Yes. REB chair the committee and BoH, BoE and MoA are members.	No, we do not have	We have a steering and technical committee chaired by REB and evaluate the distribution of SAS products twice a year.
Main challenges	Lack of supply of SAS products in the region	Roughly, 75% of solar products distributed have defects and are non-functional. We have no trained staff to distinguish quality certified products from sub-standard products.	Lack of SAS supply in the region	Lack of access to consumer finance and trained staffs	The flow of sub-standard products from neighboring countries. We are also not getting quality certified products from the centre.	Lack of supply of quality certified products in our region.

Annex 1. Comparative Analysis of SAS Delivery in the Regions (Continued)

REBs SAS activities	Afar	Amhara	Benishangul	Sidama	Somali	Gambella
		There are no spare parts to do repair and maintenance work on non-functional products or replacements. The price of quality certified products is high and not affordable for rural HHs. Non-quality certified products are cheap although they have no warranties. Buyers do not get proper training in the use of the products which leads to damage. Shortage of spare parts. No trained technicians on the installation and maintenance of solar pumps for irrigation and safe drinking water.				
Trained technicians	We have very few trained people and need more	We have 40 Youth enterprises (with 5 -7 members per Woreda) with a total of 200 – 280 technicians. That number is sufficient for the time being.	We have 3 associations providing installation and repair services, but they are not active now.	There is no adequate number of technicians	We need to organize the youth into enterprises and train them in solar installation and repair services.	We have only a limited number of technicians and need to train more.

Annex 1. Comparative Analysis of SAS Delivery in the Regions (Continued)

REBs SAS activities	Afar	Amhara	Benishangul	Sidama	Somali	Gambella
Flow of standalone products to the region	Solar companies do not distribute SAS products in our region. There are no solar companies based in our region.	The flow of SAS is not adequate to meet regional demand.	From formal sources supply is Intermittent	Supply of SAS products is a challenge	Solar companies do not distribute SAS products in our region. Solar companies have no presence in our region.	It is intermittent.
Regional government SAS projects	Not available	Not available	Not available	Not available	Not available	
Progress evaluation forums with MoWE	We had one evaluation meeting with MoWE this year	No regular forum for progress evaluation.	Only one consultation this year in four years' time	Started consultation this year with a six-performance evaluation	There was one consultation this year.	Yes, only once this year.
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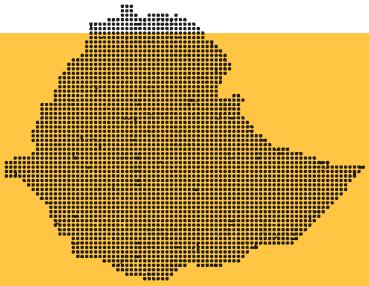
Annex 2. Key Stakeholders in SAS Sector

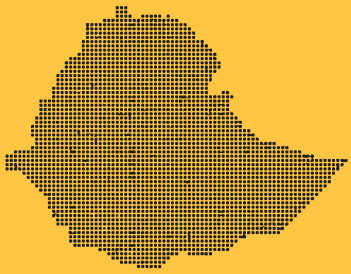


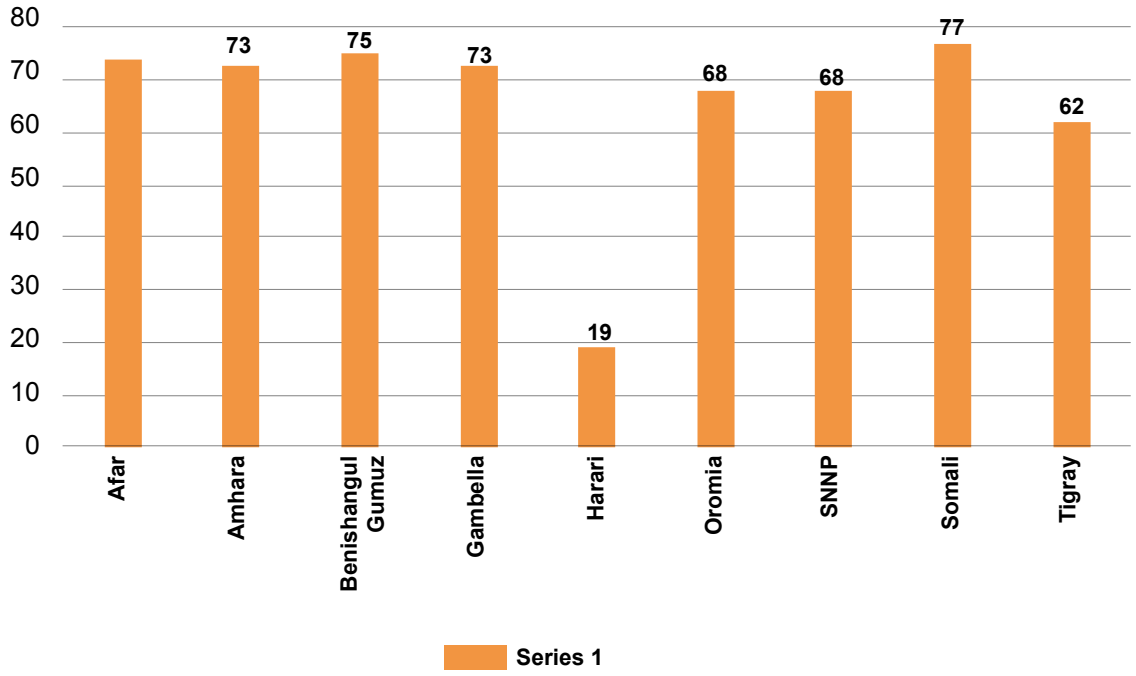
Institution	Description and recent activity
Ministry of Water and Electricity (MOWE)	Oversees the Ethiopian electricity sector. Mandated to develop and promote alternative energy resources and technologies including SAS.
Ethiopian Energy Authority (EEA)	Responsible for developing rules, directives, and standards for the electricity sector. Regulates energy conservation and efficiency. 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, both from the national grid and mini grid.
Regional Energy Bureaus (REBs)	Awareness creation and facilitation of the delivery of grid and off-grid services.
Ministry of Trade and Regional Integration (MoTRI)	Responsible for checking that imported products are in compliance with the standards before they are cleared from customs.
National Bank of Ethiopia (NBE)	Issue directives that determine access to forex on a priority basis and on who is eligible to operate a mobile payment system.
Ethiopian Standards Agency (ESA)	Develops/adopts international standards for solar products.
Ethiopian Conformity Assessment Enterprise (ECAE)	Provides quality testing services for SHS for importers and manufacturers. It is also currently delegated by MoTRI to implement the PVoC system.
Ethiopian Customs Commission	Enforces tax law on solar products in accordance with tax and customs legislations.
Development Partners (WB, PAOP, GIZ EnDev, Shell Foundation solar Market Accelerator, ACE TAF, and others)	Provide funding, technical support, policy, and regulatory advice to upscale off-grid solar services.
Finance Institutions (DBE, Commercial banks, MFIs (ACSI, Dedebit, Omo Micro Finance, OCSSCO, etc), Rural SACCOS)	Extend working capital loan to solar companies, consumer financing for households for the purchase of SAS products.
Civil Society organizations and associations (Ethiopian Solar Energy Development Association (ESEDA), Ethiopian Women in Energy Network (EWiEN))	Advocacy on behalf of their members and awareness creation and promotion to expand SAS services.
Private sector enterprises (PSEs)	Import, wholesale, and retail sales of SAS products.
Ethiopian Investment Commission (EIC)	Determines who is eligible to participate in SAS import and retail services.

Annex 3. Energy Policies, Regulations and Study Documents Relevant to the SAS Sector

Policy/Regulation	Description and recent activity	Relevance to SAS sector
National Energy Policy (Draft, 2018)	Issued to update the 2013 one energy policy. 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.	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 local 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 not allowed to set up financial accounts to provide mobile payment services. This looks likely to change soon with the government allowing Safaricom to provide mobile payment system.
Quality control	Ministry of Trade and Regional Integration (MoTRI) 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 control the services of PVoC agencies.
The NBE's Directive on Forex Allocation and Management (Directives No. FXD/67/2020)	The industrial sectors are divided into three prioritised groupings for access to hard currency for importing goods / services and import of SAS products is not one of them.	Import of SAS products will be severely affected by the lack of priority access to forex.
Import duties and taxes	The memorandum of understanding signed by the Ministry of Finance in 2010 allows Lighting Africa certified products to be imported duty-free. However, it is not uniformly implemented to components and parts, and lacks clarity. Firms venturing into PAYGo 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, which is 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. The government recently introduced a 5% duty on imported solar products. Reduce the working capital and turnover of SAS companies using PAYG may face cash flow problems.

Annex 4. Households getting lighting from non-grid sources, percent[11]





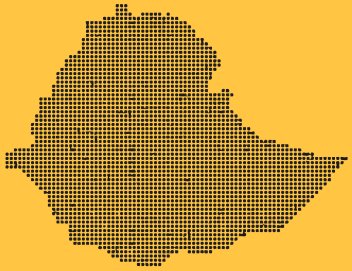
11 *2019 (Power Africa), off-grid solar market assessment, Ethiopia*

Annex 5. Selected Socio-Economic Indicators of the Study Regions[12]

Region	Time spent on agricultural activities (%)	Time spent on non-farm activities (%)	Average cultivated land holding (ha)	Motorised pump irrigation (%)	PSNP Direct support (%)	Any non-farm enterprise (%)	Time men spend collecting water and fuel wood per day (mins)	Time women spend collecting water and fuel wood per day (min)
Amhara	69.5	6.3	1.0	8.3	5.7	20.8	15.3	44.5
Afar	42.8	4.6	0.1	(21.3)	5.4	13.6	21.3	61.1
Oromia	58.3	6.2	0.8	(31.1)	1.6	24.5	30.5	59
SNNP	60.6	7.7	0.4	(0.0)	2.5	22.7	27.1	46.7
Somali	42.1	2.5	(0.0)	(100)	14.1	13.1	31.1	65.2
Harari	25.7	9.5	0.4	67.6	6.1	29.4	19.9	26.5
Tigray	44.7	6.9	0.7	(13.1)	10.7	26.5	24.9	46.8
Benishangul	43.2	5.4	1.2	(0.0)	0.2	17	35.3	67.3
Gambella	36.4	7.6	0.5	(0.0)	0.2	27.2	10.1	29.9

12 *2018/19 (CSA), Ethiopia Socio Economic Survey*

Annex 6.
Reporting Form



Region	Brand	Size	Number of Households Who Purchases Stand-Alone Solar Products							
			Woreda1		Woreda 2		Woreda….		Total	
			Male	Female	Male	Female	Male	Female	Male	Female
		Up to 10.99 Wp								
		11 – 20.99 Wp								
		21 - 49.99 Wp								
		50 – 99.99 Wp								
		100 Wp +								
	Sub-total									
		Up to 10.99 Wp								
		11 – 20.99 Wp								
		21 - 49.99 Wp								
		50 – 99.99 Wp								
		100 Wp +								
		Sub-total								
	Total									

Africa Clean Energy Technical Assistance Facility (ACE TAF)

Tetra Tech International Development leads the implementation of the Africa Clean Energy Technical Assistance Facility together with several key partners. Tetra Tech International Development is responsible for the programme set-up, leadership and overall management taking an inclusive and collaborative approach ensuring that we engage partners throughout the implementation of the programme.

Ethiopia – Integrated Regional Energy Strategy

Final Report

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