REGIONAL ENERGY BUREAUS IN ETHIOPIA: NEEDS ASSESSMENT REPORT AND ACTION PLAN

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Africa Clean Energy
Catalysing Africa's Solar Markets

TETRA TECH
International Development

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

Tetra Tech International Development

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Prosperity House, Westlands Road,
P.O. Box 4320, 00100, Nairobi, Kenya.
Tel: +254 (0)20 271 0485

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ABBREVIATIONS

Acronym	Definition
ACE TAF	Africa Clean Energy Technical Assistance Facility
AfDB	African Development Bank
BoA	Bureau of Agriculture
DBE	Development Bank of Ethiopia
EEU	Ethiopia Electricity Utility
ETB	Ethiopian Birr
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
LC	Letter of Credit
MFIs	Microfinance Institutions
MoTI	Ministry of Trade and Industry
MoU	Memorandum of Understanding
MoWIE	Ministry of Water, Irrigation and Energy
NEP 2.0	National Electrification Programme
NGO	Non-Governmental Organisation
OGS	Off-Grid Solar
PAYG	Pay-As-You-Go
PEA	Political Economy Analysis
PLWDs	People Living With Disabilities
PSEs	Private Sector Enterprises
PSNP	Productive Safety Net Programme
PUE	Productive Use of Energy
PVoC	Pre-export Verification of Conformity
REBs	Regional Energy Bureaus
SACCO	Savings and Credit Cooperative
SAS	Stand-Alone Solar
SHS	Solar Home Systems
ToR	Terms of Reference
ToT	Training of Trainers
TVET	Technical and Vocational Education and Training
USD	United States Dollar
WTP	Willingness To Pay

EXECUTIVE SUMMARY

Ethiopian Regional Energy Bureaus (REBs) promote off-grid energy services, mainly in the deep rural areas. Even though they support the implementation of energy plans and projects in their states, these bureaus have no power to influence energy policies and regulations. The primary source of energy law is the federal government in the form of constitutional provisions and parliamentary legislations. However, REBs have wide latitude, during implementation of policies and laws, in aligning them to their needs and economic and social contexts.

Communication between the Ministry of Water, Irrigation and Energy (MoWIE) and REBs needs to be strengthened. This will help to identify and address institutional, legal and implementation challenges, as well as to evaluate progress made by each region in meeting the National Electrification Program (NEP 2.0) universal electricity access targets by 2025. Stakeholders' collaboration and coordination is also crucial in expanding productive use of energy (PUE) for irrigation and agro-processing activities, and electricity access to schools and health institutions.

The objective of this report is to improve the enabling environment for stand-alone solar (SAS) at the regional level in Ethiopia by strengthening regional institutions, in particular REBs, to catalyse the development of the local SAS markets. This report is based on desk-based literature analysis and interviews conducted with multiple stakeholders at the federal level and in the Amhara, Benishangul-Gumuz, Gambella, Oromia, SNNP and Somali regions.

A large proportion of the population in all the regions in Ethiopia does not have access to electricity, and the level of financing for importers as well as consumers is not sufficient to meet the demand of over nine million un-electrified rural households.[1] This report concludes that regions in Ethiopia are at different stages of development in terms of access to infrastructure and social institutions. Among the regions covered in this study, Amhara, Oromia and SNNP have relatively more developed infrastructure compared to Benishangul-Gumuz, Gambella and Somali regions. The various stages of development influence specific challenges at the regional level, which include:

- **Access to finance:** The USD40 million Development Bank of Ethiopia (DBE) credit facility for solar provides loans to microfinance institutions (MFIs) operating in Amhara, Oromia, SNNP and Tigray regions. MFIs in Gambella, Somali and Benishangul-Gumuz regions are not currently benefiting from the facility. The DBE facility only allows MFIs to provide financing for SAS systems, excluding financing for productive use appliances and sharia-compliant financing.
- **Quality assurance:** Quality certification and verification is handled by different organisations at different levels. Commercial banks need quality certificates to be presented as a requirement to open letters of credit. When products arrive at customs, certificates need to be verified. Ministry of Trade and Industry is responsible for checking imported goods, including solar products, that need to meet mandatory quality standards. Once the product is imported into Ethiopia, REBs must also verify quality certificates when companies want to distribute solar products in their regions through MFIs. The many tiers of validation have created alignment and coordination problems for the smooth flow of solar products.
- **Coordination and partnership:** No regular communication and coordination between MoWIE and REBs exists on the progress made in off-grid solar (OGS) product distribution or on the planned and ongoing changes in policy and organisational accountability. In addition, REBs do not seek to get the buy-in of other relevant regional bureaus when developing their annual plans in order to align priorities and optimise the use of resources.
- **Energy nexus:** There are over 26,000 primary schools and 15,000 health posts with no access to electricity. In addition, about 90 hospitals, providing the most comprehensive health services, are still not powered and cannot provide optimum services. There are inadequate policies and regulations to support the adoption of renewable energy technologies to spur economic growth and improve social impact. In addition, inadequate financing for small-holder farmers due to the high-risk nature of products, lack of standards to guarantee the quality of the products, inadequate recognition of gender needs and low off-grid sector skills for local communities, are also key challenges.

1. *MoWIE (2019), National Electrification Programme.*

Product tracking: Currently, there is no mechanism to trace products that are imported and distributed in the country. Of particular importance is the lack of a platform to remotely track the operational status of institutional and productive use solar systems installed by donors and the government, including the location of the products.

Based on consultations with stakeholders in the six regions and feedback gathered from participants in the validation workshop, the following priority activities have been identified:

- A regional strategic plan, which is aligned with the NEP 2.0 universal electrification goal, will be developed to coordinate the actions of regional stakeholders and MoWIE. The strategic plan should indicate annual targets to measure energy access progress, identify resource needs and required institutional coordination to meet these goals in each of the regions. The regional strategic plan will be one document with separate chapters for each of the nine regions of the country.
- Harmonising and simplifying MoUs to be signed by MFIs and REBs for Private Sector Enterprises (PSEs) to distribute quality certified OGS products to households using MFIs' consumer financing loans. One template will be created for all the regions to follow in signing these tripartite agreements by comparing all the existing MoUs and then harmonising and simplifying them.
- Facilitate access to loans and sharia-compliant financing for Gambella, Benishangul-Gumuz and Somali regional MFIs from the DBE revolving fund. The DBE facility should extend financing for productive use appliances and establish an arrangement for MFIs to extend wholesale loans to savings and credit cooperatives (SACCOs) and for SACOOs to extend retail loans to consumers. In a similar vein, facilitate access to working capital loans for PSEs venturing into pay-as-you-go (PAYG).
- Establish a cooperative agreement with the Bureau of Agriculture (BoA) to educate farmers, using extension workers, on potential benefits of solar pumps and SAS products for agro-processing. In collaboration with DBE, undertake a pilot of solar pumps in selected locations and organise demonstration events with BoA.
- 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 ensure energy access and financing is inclusive. Subsequently, based on the findings, develop a gender mainstreaming strategy for MoWIE and REBs.
- Support technical and vocational, education and training (TVET) institutes to provide short-term trainings on OGS maintenance and repair at the regional level.
- Support the establishment of a regional OGS committee.
- Develop a guideline for the disposal of substandard products and solar e-waste. Law enforcement officials are currently facing difficulty in dealing with substandard and counterfeit products because of the lack of a guideline on the actions to be taken on these products.

1. SOCIO-ECONOMIC CONTEXT

1.1 STUDY BACKGROUND

Ethiopia made great strides in the past decade, achieving an average of 10 per cent Gross Domestic Product (GDP) growth per annum. However, with a GDP of USD84.4 billion and a per capita income of USD772 in 2018,[2] Ethiopia remains one of the poorest countries in the world.[3] The economy is still dependent on rain-fed agriculture, leaving most of the population vulnerable to the vagaries of nature, such as famine triggered by drought. According to the Ethiopia Socioeconomic Survey 2018/19, the average land holding in the study regions is less than 1.2 hectares and only 2.5 per cent of the fields nationally are irrigated. The most common irrigation method is river dispersion, which accounts for 58.8 per cent of irrigated plots. The survey finding shows the proportion of land cultivated using rain-fed agriculture is high, indicating huge potential to improve productivity from small landholdings by expanding irrigation using solar pumps and other methods.

In the study regions, 21 per cent of households have at least one non-farm enterprise[5] (NFE), which are more common in urban than rural areas. Electricity is the third main constraint, after finance and transport, in both rural and urban areas for households planning to establish NFEs. If due attention is given by the authorities to these problems, they can be resolved by extending business and consumer loans, through microfinance institutions (MFIs), for rural households to get access to off-grid solar (OGS) energy and establish NFEs that add value by processing raw agricultural commodities (e.g. grain milling and injera baking).

Over two-thirds of female household members in Benishangul-Gumuz, aged seven years and above, engage in collecting water and fuel wood every day. Solar powered safe drinking water facilities and off-grid lighting devices can help reduce the time spent by households in fetching water and collecting fuel wood, and support women's income earning activities by extending their working day or setting up small businesses that depend on energy provision.

Assistance for chronically food insecure woredas, through the Productive Safety Net Programme (PSNP),[5] is significant in Somali and Amhara regions, but minimal in Benishangul-Gumuz and Gambela. This indicates the likely presence of a significant number of people who require help in the form of subsidies to access OGS products. The economic slowdown due to the impact of Covid-19 and the worst attack of desert locusts in 25 years, which occurred in the first half of 2020, also exacerbated the food security situation in the country.

Table 1: Selected socio-economic indicators of the study regions[6]

Region	Total households (#)	Households' dependent on non-grid lighting sources (%)	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	5,000,000	73%	1.0	8.3	5.7	20.8	15.3	44.5
Oromia	8,200,000	68%	0.8	(31.1)	1.6	24.5	30.5	59
SNNP	4,400,000	68%	0.4	(0.0)	2.5	22.7	27.1	46.7
Somali	1,300,000	77%	(0.0)	(100)	14.1	13.1	31.1	65.2
Benshagul	240,000	75%	1.2	(0.0)	0.2	17	35.3	67.3
Gambella	100,000	73%	0.5	(0.0)	0.2	27.2	10.1	29.9

2. *World Bank (2019), "World Bank Country Overview: Ethiopia."*
3. *World Bank (2019), Accelerating distributed electricity and lighting in Ethiopia.*
4. *Nonfarm enterprises include non-agricultural business/services such as running a shop, processing agricultural products, trading on a street or in a market or running a taxi/pickup truck or bar/restaurant.*
5. *PSNP is a Federal funded programme for chronically food deficit areas in the regions.*
6. *Central Statistics Agency (2019). Ethiopia Socioeconomic Survey 2018/19.*

2. OFF-GRID MARKET FORECAST

It is unlikely for Ethiopia to meet its universal electrification access target by 2025 as laid out in the National Electrification Program (NEP 2.0) if the current OGS products supply trend continues over the next five years. Supply has to increase dramatically for the NEP 2.0 plan to be met; the annual supply of quality certified products must increase by an average of 12 per cent per annum from 2021 to 2025. This translates to an additional expenditure of USD117 million per annum[7] for the next five years.

Table 2: Off-grid electrification demand, 2021–2025[8]

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

Comparing the quality certified GOGLA OGS sales trend, without considering non-quality certified imports, the estimated potential demand for the next five years shows a significant deficit in supply. To illustrate, the highest quality certified OGS products import was registered in the second half of 2019, with a total of 718,000 units. For Ethiopia to meet the 1.7 million units of imports forecasted for 2021, it needs to import an additional one million units over the figure recorded in 2019.[9] This is unlikely to be met without a commensurate increase in the amount of forex available to private sector OGS product importers from either donor supported credit facilities or allowing foreign companies to participate in OGS distribution services. Covid-19 related restrictions on the movement of people and cargo across regions might also complicate the achievement of these targets.

Household

In 2019, 56 per cent of the Ethiopian population was using electricity, 34 per cent from the grid and 22 per cent from solar. Although rural households' use of solar jumped from 16 per cent in 2016 to 30 per cent in 2019, the rate of electricity access for rural households was much lower than the national average of 34 per cent.[10] It is also worth noting that 60 per cent of rural households still use dry cell batteries, kerosene lamps and firewood, which is damaging to their health and the environment. Although there is a high demand for solar products, their access is constrained by different factors.

7. *AfDB (2019). Market assessment for the Ethiopia off-grid facility,*
8. *ibid.*
9. *GOGLA (2020). Global off-grid solar market report.*
10. *Central Statistics Agency (2019). Ethiopia Socioeconomic Survey 2018/19.*

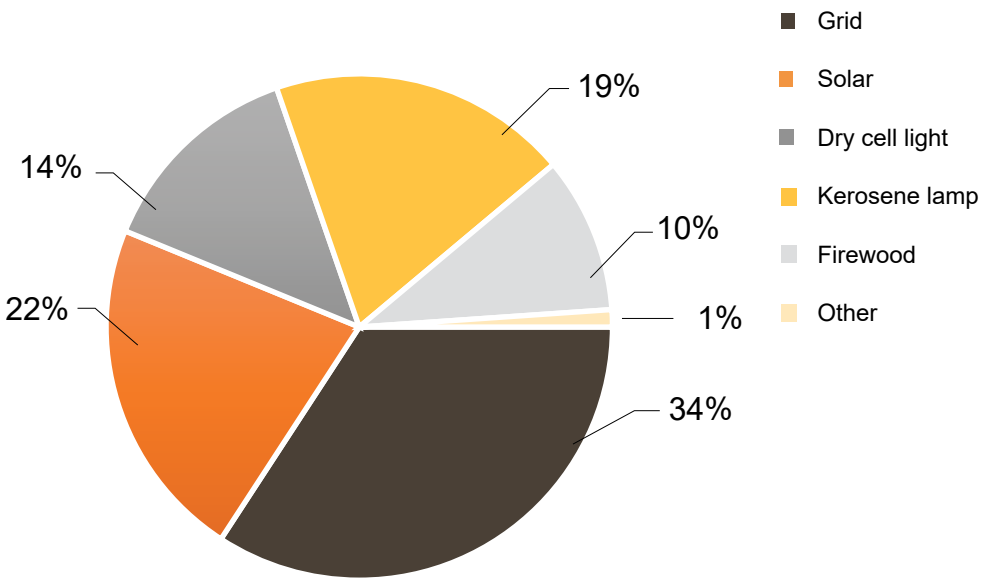


Figure 1: Lighting sources for households [11]

For those households that can afford to buy solar products with cash or through a financing plan provided by MFIs, access to OGS products is limited by the lack of availability of quality certified products in the market. Quality-certified solar products are also expensive compared to non-quality certified products, making them unaffordable for rural consumers. For example, in Asosa town, Benishangul-Gumuz State, the price of a 140W quality certified product is ETB40,000 while the price of a similar non-quality certified product is ETB21,000.[12]

Whatever is imported is mainly distributed in towns and adjacent small towns, with remote areas like South Omo not currently served by private sector enterprises (PSEs). This is mainly due to the existence of unsatisfied demand in towns and lack of road access to rural areas. One other challenge for consumer confidence is the distribution of non-quality certified products by some PSEs, mixed together with quality-certified products. According to the Regional Energy Bureaus (REBs) in this study, efforts to control non-quality certified products are exacerbated by the lack of guidelines on the disposal of these products.

Communication between MoWIE and REBs, and coordination between REBs and other relevant bureaus in the regions is weak, both in planning and managing the distribution of OGS products to target beneficiaries. There is no regular communication between MoWIE and REBs on OGS distribution or planned and ongoing changes in policy and organisational structures. Also, REBs do not seek the opinions of other relevant regional bureaus in developing their annual plans to be able to align priorities and optimise the use of resources.

PSEs are required to enter into a tripartite agreement with REBs and MFIs if they want to sell their OGS products on credit to households using MFI consumer loans. But they are free to sell in cash directly to consumers, with no obligation to sign these tripartite MoUs.

Energy nexus

NEP 2.0 aims to establish explicit cross-sectoral linkages with the productive use and social services sectors for the achievement of 100 per cent electricity access for primary and secondary schools, hospitals and primary health centres. A diagrammatic representation of the NEP 2.0 planned use of OGS in Ethiopia is shown in Figure 2.

11. *Central Statistics Agency (2019). Ethiopia Socioeconomic Survey 2018/19.*
12. *Interview with Benishangul-Gumuz Renewable Energy Bureau, 2020.*

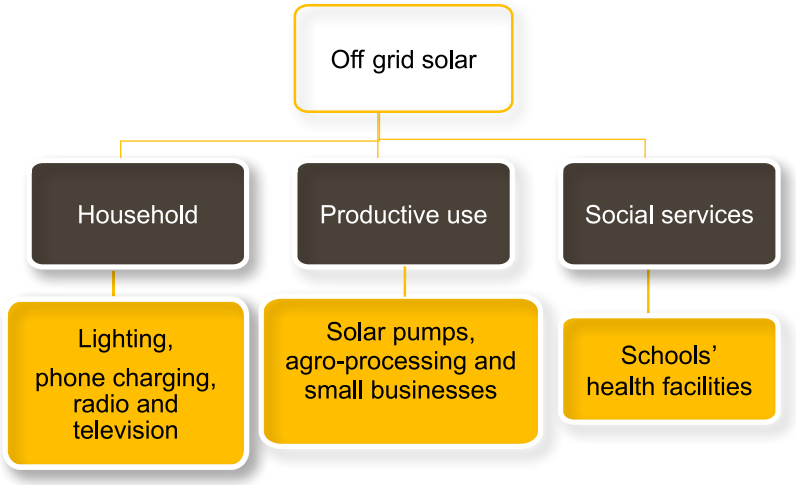


Figure 2: NEP 2.0 planned use of OGS

NEP 2.0 also has plans to provide all primary and secondary schools, and health facilities with access to adequate and reliable electricity services, whether on- or off-grid, by 2025.[13] Although access to electricity for schools and health facilities is relatively higher than for households, it is still far short of providing universal access. There are over 26,000 primary schools and 15,000 health posts with no access to electricity. In addition, about 90 hospitals, providing the most comprehensive health services, are still not powered and hence cannot provide services at their optimum capacity. All in all, there are over 45,000 institutions in the country in need of access to electricity.

With 23 per cent of secondary schools electrified, the Gambella region has the least number of electrified schools while Oromia has the highest number of electrified secondary schools at 74 per cent among regions covered in this study. The situation is worse for primary schools, with over 24,510 schools currently without access to electricity across all the six study regions, as highlighted in Table 3. There is no up-to-date data for the electrification of health posts, but it is likely that the situation is not different from other facilities as they are generally located in rural kebeles, the lowest administrative units in the regions.

Table 3: Number of institutions without access to electricity[14]

Institutions							
	Amhara	Oromia	Gambella	SNNP	Somali	Afar	Benishangul
Primary schools	6,022	10,948	142	4,876	1,436	605	481
Secondary schools	120	301	30	241	63	133	50
Health centres	195	456	4	101	115	27	26

Not all the regions under the study have programmes to address the energy access problem of social institutions. Some regional governments are trying to expand access to electricity to social institutions by allocating budgets annually for solar power installation in schools and health posts. However, the number of schools and health posts they can provide with power in this manner are less than 10, and with the current trend, many of them will remain without power for a long time to come. Institutional solar system installations, with the limited available budget of about ETB1 million a year, is further constrained by the lack of technical capacity to prepare technical specifications and evaluate responsive bids. Only two regions are known to allocate budgets for institutional solar system every year.

13. *MoWIE (2019). National Electrification Programme 2.0.*
14. *Ministries of Education and Health publications.*

Agriculture productive use of energy (PUE)

Agriculture is dominant in the Ethiopian economy at 40 per cent of GDP and with 78 per cent of the population employed in the sector. Potential productive uses of energy include: solar irrigation pumps; solar cooling for fresh food and drinks; poultry value chain (specifically incubation); lighting and heating; and oil processing, especially for sesame and flaxseed.

Under NEP 2.0, the government will provide incentives to encourage the adoption of renewable energy-powered pumps and substitution of diesel-based pumps with off-grid clean solutions since they are cheaper when measured based on a life-cycle cost basis and their lower carbon footprint. Shifting to solar irrigation could also save on scarce foreign exchange and the diesel subsidy costs to the government. Stand-alone solar (SAS) products can also power poultry incubators, grain milling, injera baking and other agro-industrial activities, creating further added value for households. Irrigation technologies help smallholder farmers gain from the variety and value of crops they can grow as well as increased yields from cultivation of crops twice or thrice a year. Income gains can be large, with estimates of revenue per hectare doubling as a result of irrigation.

To expand SAS productive use in Ethiopia, an enabling ecosystem must be established to ensure the supply of quality products as well as the affordability of these products to the consumers. The enabling ecosystem for productive use is summarised in Table 4.

Table 4: Demand and supply-side enablers for productive use assets[15]

	Supply side	Demand side	Institutional
Enablers	• Awareness of market needs. • Identification of least-cost electricity technology solutions. • Leveraging of distribution channels and multiple business models (public- and private-led). • Adequate product availability (machines and appliances). • Access to finance. • Enforcement of standards.	• Affordability of electricity services. • Affordable equipment. • Access to finance (e.g. MFIs).	• Institutional and administrative capacity. • Identification and tracking of possible regulatory barriers for an efficient and effective productive use programme. • Leverage coordination of government programmes and budgets.
Technical assistance and capacity building	• Identify a least-cost solution for adequate and reliable power provision for existing and potential productive uses. • Assess value chain constraints. • Identify appropriate appliances for different productive uses. • Identify implementation mechanisms leveraging on existing programmes and delivery infrastructure. • Identify enabling measures for the development of the appliances market and related access to finance measures.	• Demand stimulation, consumer awareness and educational campaigns on productive uses of electricity services and appliances (including demand-side management). • Market intelligence for willingness to pay (WTP) and possible access to finance channels.	• Ensure multi-sector collaboration for the design of a productive uses programme. • Programme implementation and monitoring.

15. MoWIE (2019). National Electrification Programme 2.0.

According to a study by the International Water Management Institute (IWMI), there is potential to irrigate 6.8 million hectares of smallholder farms using solar power pumps to pump shallow ground water (up to 25m) and water from other surface sources.[16] The analysis shows the suitability of solar pump technologies with a capacity to draw water not deeper than 25m is highest in Oromia followed by the Amhara region, as outlined in Table 5. It is also estimated that 0.2 million such solar pumps are required to irrigate these smallholder farms. The total estimated investment cost of these solar pumps is a little over USD209 million.

Table 5: Total potential suitable area (1,000 ha) for solar water-lifting devices[17]

Amhara	Benishangul	Gambella	Oromia	SNNP	Somali
1,834	21	16	3,569	1,087	125

Diesel generators are the main source of power for rural water supply systems in Ethiopia. The share of solar water pumping systems is very small, just 1 per cent of the total number of motorised pumps used in water supply schemes. According to a 2017 MoWIE study, there were around 500 solar water pumping systems installed in Ethiopia with power ratings between 1kW and 25kW. This is despite the fact that solar pumping systems costs were one-fourth the cost of diesel-powered pumps on a life cycle basis and fared better even compared to grid-powered pumps (ETB4.9/m3 for solar, ETB19.4/m3 for diesel and ETB6.1/m3 for grid-powered pumps).

There is no data on the regional distribution of solar pumps, but the picture is not likely to be different from the national figure presented above. According to the REBs, there are solar-powered irrigation systems, surface water treatment plants for safe drinking water and institutional solar power systems installed in rural areas by the government and donor agencies, but no exact figure is available at this point. In addition, regions like to get information on the operational status of the solar power system on a real-time basis to provide on-time maintenance and repair services. Based on the success of innovative pilot projects, some regions have also identified villages suitable for solar-powered water treatment plants and need support from donors to provide the inhabitants with clean safe drinking water.

Replacing diesel-powered generators with solar-powered generators is also another priority for regions. The Oromia region alone has identified 14 water facilities currently operating using a diesel-powered generator that need to be replaced with solar-powered generators on a priority basis.

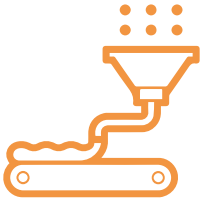
Solar pumps for high-value horticulture cultivation

ZOA Ethiopia, an international non-governmental organisation that aims to introduce high-value horticulture cultivation in Gambella, is preparing to introduce solar irrigation at the Karmi project site. The pilot project plans to grow okra, tomatoes, swiss chard and kale on 10 hectares of land. ZOA has organised 150 farmers into one cooperative (60 from Karmi and 90 from Jawi) and four farming groups to cultivate the land. It has also bought a solar pump at a cost of ETB465,000 and is currently doing site clearing. Farmers have been trained on solar pump repair and maintenance. The farm is expected to be operational in 2021 and will help farmers to produce twice or three times a year, which will undoubtedly improve the incomes of households participating in the project. If the budget (ETB750k) allows, ZOA plans to expand the project to three other sites.

16. *International Water Management Institute (2018). Business model scenarios and suitability: Smallholder solar pump-based irrigation in Ethiopia,*
17. *International Water Management Institute (2018). Business model scenarios and suitability: Smallholder solar pump-based irrigation in Ethiopia,*

Regional governments are currently looking for support to establish GPS-based data collection systems to get regular updates on which of them are working and which are not. ACE TAF is developing an Energy Access Explorer (EAE), a geospatial analysis tool for off-grid electrification planning. Upon development, the tool will be handed over to MoWIE. ACE TAF is also collaborating with the Ministry of Agriculture and MoWIE to get data inputs on the location of riverbeds, depth of groundwater, landcover and soil profiles to show irrigation and agriculture potential in Ethiopia.

Agro-processing



According to a study by the Rocky Mountain Institute (RMI), agro-processing activities with promising potential in Ethiopia include grain milling, injera baking, milk cooling, bread baking, coffee washing and horticulture irrigation. The study estimated that the processing of these commodities using electric appliances could lead to a potential return of USD4 billion in annual value by 2025.[18] The associated demand for solar appliances to run these agro-processing activities is estimated at USD380 million for solar companies.

REBs interviewed agree with the findings of the study and suggest the undertaking of further demand analysis, piloting of projects, addressing barriers and channelling funding to projects with promising results so that they can scale.

The study did not find any gender-disaggregated planning or reported data collected from stakeholders or government agencies from any of the regions visited. Regions need support to prepare a three to five-year strategic plan and detailed annual plans based on the NEP 2.0, and gender-disaggregated data reports to enable implementation follow up and progress reviews through regular monitoring and evaluation.

Gaps in PUE include inadequate policies and regulations to support renewable energy technologies and low off-grid sector skills for local communities. In addition, inadequate financing for smallholder farmers due to the expensive nature of products, lack of standards to guarantee the quality of the products and inadequate recognition of gender needs are key market gaps.

16. *Rocky Mountain Institute (2020). Capturing the productive use dividend.*

3. MARKET BARRIERS

3.1. OGS Supply Chain

The off-grid supply chain in Ethiopia is relatively undeveloped. It consists of importers, distributors, retailers, MFIs and a few manufacturers. PSEs mainly import household solar lanterns and pico systems, with the import and distribution largely undertaken by local companies as foreign companies are not allowed to operate distribution businesses in the country.

The distribution channels for residential solar systems may be broadly divided into channels distributing certified products and channels distributing non-quality certified products. The quality-certified product distribution channel is further sub-segmented by the distributors/retailers it uses to reach consumers, for example, using solar products specialised commercial distributors or purposely set up youth and women groups. A common trend across all the three populous regions of Ethiopia, namely Oromia, Amhara and SNNP regions, is the aggressive expansion of youth solar enterprise associations as a reliable business partner for solar product retail, aftersales and maintenance services as highlighted in Table 6. Most PSEs have established operations in Amhara, Oromia and SNNP and only a few of them have a presence in Benishangul, Gambella and Somali regions.

However, access to loans and poor supply of quality certified products are the main problems holding back the operation of PSEs and youth solar enterprise associations. OGS manufacturers in Ethiopia are engaged in the assembly of pre-made components. For example, Fosera, which operates a solar assembly in Bahir Dar, undertakes its design in Germany and its component manufacturing mainly in China. Lack of foreign exchange for the import of components negatively impacts the operation of assembly businesses.

MFIs extend consumer finance to households to purchase quality-certified solar products from companies that enter into tripartite agreements with REBs and MFIs. PSEs are expected to sign this agreement each time they come up with a new brand. The contents of these agreements also have varying requirements across the regions, which makes it difficult for PSEs to comply with them. As shown in Table 6, MFIs in Benishangul, Gambella and Somali regions have not signed MoUs with PSEs as they do not yet have access to DBE's revolving fund, set aside for MFIs to be able to extend consumer financing for the purchase of quality-certified products by households.

Table 6: Off-grid supply chain in the regions

Regions	Private sector enterprises	Enterprise associations	MoU	Consumer financing by MFIs	PAYG presence
Amhara	Lydetco Vera International Solar Development ACME Engineering ER AF	Amhara Solar Energy Development Association (ASEDA) –57 members	Yes	Yes	Yes
Oromia	Lydetco Vera International Solar Development ACME Engineering ER AF Green Scene	Oromia Solar Energy Development Association (OSEDA) – 75 members	Yes	Yes	No

Regions	Private sector enterprises	Enterprise associations	MoU	Consumer financing by MFIs	PAYG presence
SNNP	Lydetco Vera International Solar Development ACME Engineering ER AF Green Scene	Southern Solar Energy Development Association (SSEDA) – 34 members	Yes	Yes	No
Somali	Vera International	N/A	N/A	Yes. Sharia-compliant financing	Yes
Benishangul	Vera International	N/A	N/A	N/A	No
Gambella	Natran Mohammed Solar	N/A	N/A	N/A	No

3.2. Consumer Financing

MFIs are the only organisations in the country providing consumer finance to rural consumers for the purchase of off-grid energy products including solar lighting systems. The main source of funding for MFIs is the World Bank/DBE credit facility, which extends retail loans for private sector enterprises and wholesale loans to MFIs. The WB/DBE credit facility extends foreign currency loans to PSEs to import solar products and local currency loans to MFIs to provide consumer financing for households. MFIs currently using the credit facility are located in Amhara, Oromia, SNNP and Tigray regions. These MFIs are owned by the regional governments and their operation is strictly limited to their respective regions. As noted previously, MFIs in Gambella, Somali and Benishangul-Gumuz regions (the three other regions covered by the study) are not currently benefiting from the DBE facility.

MFIs primarily use a group-lending methodology to serve their clients without traditional collateral and mostly operate in small towns and rural areas. However, the key challenge remains their high interest rates, which makes access to solar products expensive to the end-user. MFIs receive credit from DBE at 7 per cent interest rate and charge their households group-based borrowers 18–21 per cent. One of the reasons for the high-interest rates is the high cost of loan collection. Some MFIs are already burdened with debt due to their inability to collect repayment from their household borrowers. A case in point is OMO MFI which was one of the strong players in OGS distribution until recently, but its role is now reducing with ETB25 million of outstanding loans yet to be collected.

MFIs also suggested that an arrangement between them and savings and credit cooperatives (SACCOs) be established, with the former lending wholesale loans to SACCOs, which then provide retail loans to households. This arrangement has an advantage over the current arrangement of MFIs directly lending to consumers as cooperatives are better placed to know the loan repayment capability of their members. The arrangement could also see SACOOs benefit from MFIs' loan management experience and technical support. The system could be made even more viable if it is supported by a pay-as-you-go (PAYG) system.

There is some level of loaning to distributors from DBE and to consumers from MFIs but none to retailers, particularly youth solar enterprises that REBs have confidence in working with, not only for distribution of products but also in providing reliable aftersales and maintenance services. The youth solar enterprises can act as a vehicle for employment creation and innovation, and consideration should be given to providing them access to loans from donor financed credit facilities such as the WB/DBE facility.

3.3. Product Tracking and Reporting

Currently, there is no mechanism to trace products that were imported and distributed throughout the country. There is no platform to track their status remotely, including the location of the products and if they are working or not. Thus, a framework of understanding between all the stakeholders involved on how to monitor the status of imported products is needed. This includes solar water pumps and institutional solar products installed in schools and health centres by the government and non-governmental organisations (NGOs). This information will also help MoWIE/REBs to identify the areas that have been provided with electricity, the tier level and the areas that still need to be targeted. Capacity and Willingness to Pay (WTP) data can also be captured through the tracking systems and this will help in the realistic adjusting of the framework target.

REBs do not currently collect any disaggregated data on the number of OGS beneficiaries in their respective regions. Regions need support to prepare a strategic plan based on the NEP 2.0, disaggregated by gender. This is critical for the REBs to undertake proper regular performance evaluation, which will also provide gender differentiated information on outcomes.

3.4. Import and Quality Verification

Ethiopia is heavily reliant on the import of solar products from countries such as India and China since local manufacturing facilities are very limited. This requires putting in place the right regulatory framework and procedures to reduce the time it takes to access forex and working capital from DBE and to clear the goods from customs. Government institutions are playing critical roles in creating an enabling environment to scale up the distribution of OGS products. However, their efforts need to be more effectively streamlined and coordinated to ensure the quality of imported or locally assembled solar products meet the required standards and also remove barriers faced by the private sector during the importation of products. Figure 3 shows the key stakeholders involved in the quality certification process in the country.

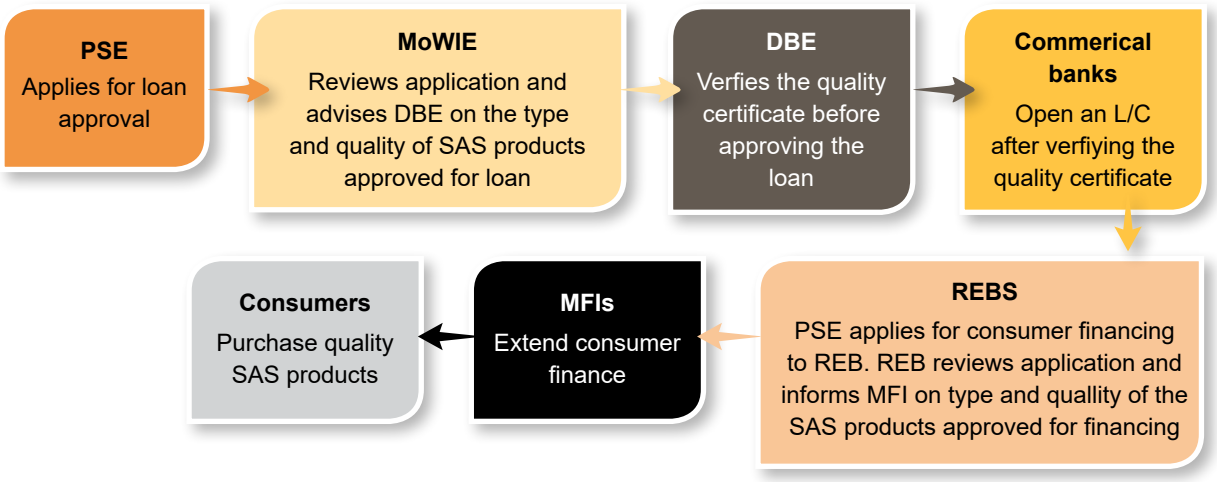


Figure 3: Relationship mapping of key stakeholders in the off-grid products quality verification process

The challenges PSEs face during importation of solar products and quality verification procedures are:

- Too many organisations are involved in the decision-making for the importation and quality assurance processes for OGS products. Solar enterprises need an approval letter from MoWIE to access foreign currency and loans from DBE. The process of approval at MoWIE is also very protracted, which is particularly difficult for new entrants.
- Quality certification and verification are handled by different organisations at different levels. Commercial banks need quality certificates to be presented as a requirement to open a letter of credit (LC). When products arrive at customs, certificates need to be verified as well. The Ministry of Trade and Industry (MoTI) is responsible for checking imported goods, including solar products, that must meet mandatory quality standards. This has created alignment and coordination problems, hindering the smooth flow of solar products.
- The quality assurance process does not seem to be effective as there is no mechanism to verify if certificates presented by importers are genuine. This is particularly the case for larger solar home systems (SHS) and non-Lighting Global approved products.
- New directives are implemented without prior consultation with and awareness of the private sector.

3.5. REBs Organisation Capacity

REBs promote off-grid energy services (electricity and non-electricity) mainly for the rural areas in their regions. They follow energy matters in their regions but have no power to influence or affect federal policies and laws that impact them. Energy laws primarily come from the national stage in the form of constitutional provisions and parliamentary legislations. Notable in this regard is the Energy Policy (draft, 2021), NEP 2.0 (2019), the Energy Regulation (447/2019) and the Climate Resilient Green Economy Strategy (2011).

However, REBs have wide latitude during the implementation of policies and laws in terms of aligning them to their needs and their economic and social contexts. This is also the reason for the disparate requirements applied in the tripartite MoUs signed with PSEs and MFIs. The MoUs are meant to control the entry of substandard products, but the requirements are not streamlined across regions. This, in turn, makes solar businesses experience difficulties in obtaining the MoUs to distribute solar products, hence creating operational challenges and delays. MoWIE should take the initiative to align the MoUs across the regions. Table 7 shows the factors that affect the ability of REBs to deliver on their mandate.

Table 7: Combined SWOT and PESTEL analysis

	Internal factors	External factors
Political	**Available resource:** REBs, the lead implementation agencies, have structure down to the woreda (district) level to promote OGS products to rural consumers. However, they do not have a clear energy/ electrification strategic plan. **Limited attention:** The energy sector is usually overshadowed and does not get much attention compared to water or other sectors that it is structurally combined with. **Disparate requirements** of each region for PSEs to meet to get into a tripartite agreement, such as warranty periods and restrictions on the type of retailers to employ, limits the ability of distributors to benefit from economies of scale and increase their compliance cost. **Coordination:** There is no established mechanism to get gender-disaggregated data on OGS beneficiaries and to track and monitor remotely if solar products are working or not.	**Market liberalisation:** Lifting the restriction on foreign companies' participation in SAS distribution will lead to increased competition, which could lower the price of products for consumers. **Political conflict:** Sporadic internal political conflicts have been happening in certain regions of the country since last year. This may likely be aggravated after the national election scheduled for June 21, 2021, disrupting the distribution of solar products.
Economic	**Affordability**: The price of kerosene fuel, one of the lighting sources in rural areas, is rising while the price of solar products is declining, making the latter cost-effective. Moreover, the expansion of infrastructure, particularly roads, has made most rural areas accessible to OGS suppliers. Hence, there is a growing demand for solar products in the regions, but supply is lagging behind because of a shortage of foreign exchange to import solar products. In addition, the long and cumbersome import and quality verification procedures, at the federal and regional levels, have made quality certified products expensive compared to non-quality certified products. **Access to finance:** Financing is available from DBE to MFIs for consumer financing. Benishangul, Gambella and Somali MFIs have not yet benefited from the scheme (to borrow and extend consumer financing loans to households). Lack of availability of forex for the import of solar products is the main constraint for the dissemination of OGS products in the country. **Community-based models:** Explore ways to provide consumer financing for households at lower interest rates by establishing an arrangement for MFIs to provide wholesale loans to SACCOs and for SACCOs to provide retail loans to their members.	**PSNP**: Building on the success of the programme, regions can put in place similar end-user financial support for the extremely poor and vulnerable groups, for whom MFI instalment payments for solar lanterns wouldn't be affordable. **Youth groups** already formed in woredas to conduct solar products distribution and provide maintenance services can be expanded to cover all regions and bolster gainful youth employment. **PUE**: Agriculture is a dominant source of livelihood across most of the regions. Thus, value addition and PUE through solar irrigation pumps, poultry value chain, oil processing, etc. offer great opportunities for youth and women's economic empowerment. **Capacity building:** Technical and vocational education and training (TVET) institutes have a presence in all regions and could be used to conduct training on OGS maintenance and repair. **Gender equality and social inclusion (GESI):** Support for female-headed households could be misused to benefit other households. Moreover, due to gender norms and disparities, there are significantly fewer women skilled to engage in solar industry employment at the technical level.
Social	**Awareness:** The general public and rural communities in the regions not only accept renewable technologies, but also actively support the widespread use of OGS technologies. **GESI**: Sensitisation and awareness about gender and social inclusion is limited.	**Accessibility** of mobile phones, satellite TV and radio programmes has increased awareness on the adverse impacts of traditional energy resources and the benefits of renewable technologies, contributing to changing lifestyles observed in rural areas.

	Internal factors	External factors
Technological	**Technical innovations and competitions** have led to the introduction of solar kits that power more light bulbs and appliances and cut costs, bringing down prices. In addition to their original uses of lighting and hot water applications, solar products are being used in regions for charging, radio, TV and other small and bigger essential utilities. However, there is a lack of trained technical staff at regional level to design, maintain and repair solar systems and PUE appliances in remote rural areas, where private companies do not exist to provide the services.	**PAYG**: By combining mobile and banking services, PAYG has made it easy to sell solar products in instalments, thus making them affordable. However, the use of PAYG and mobile money is currently quite limited in Ethiopia due to the restriction imposed on foreign mobile network operators (MNOs) in digital payments.
Environmental	**Carbon emission reduction:** Ethiopia plans to achieve a middle-income economy, with a net-zero carbon growth, by 2025. The expansion of electricity generation from renewable sources of energy for domestic and regional markets constitutes one of the four pillars of the green economy strategy. However, due to funding constraints, particularly access to forex, the country may miss achieving the goal by the target date. Also, an e-waste disposal guideline may not be developed in time to deal with the threat from the growing accumulation of e-waste. **Quality assurance:** There is a lack of coordination and overlapping mandates among government institutions.	**Carbon financing initiative:** There is an opportunity to tap into the Carbon Initiative for Development (Ci-Dev), a World Bank trust fund that mobilises private finance for clean energy and transformative business models driven by the private sector. It delivers results-based financing to innovative and enhance transformative business models that are driven by the private sector. Ci-Dev has committed to purchase approximately $76 million in emission reductions (commonly known as carbon credits) from 12 energy access projects, all in sub-Saharan Africa. **E-waste:** The development of a guideline for the disposal of substandard and counterfeit solar products will assist the efforts of law enforcement officials to control the import and distribution of these products in the domestic market.

Quality assurance: There is a lack of coordination and overlapping mandates among government institutions.
E-waste: The development of a guideline for the disposal of substandard and counterfeit solar products will assist the efforts of law enforcement officials to control the import and distribution of these products in the domestic market.

Lack of forex for the import of solar products is the major binding constraint for the dissemination of OGS in the country. The World Bank funded DBE credit facility has to some extent alleviated this problem, but it turned out that the amount of forex extended to PSEs through this facility was too small to address the existing demand for solar products. The World Bank and the African Development Bank (AfDB) are at an advanced stage of launching an OGS support credit facility with a total sum of USD500 million (from which the forex lending to PSEs constitutes less than a tenth of the total sum). We believe this is still inadequate and a more effective and sustainable solution is to allow foreign solar companies to operate in the solar retail trade in the country. We will explore this issue further in our policy brief attached to this report.

4. POLITICAL ECONOMY ANALYSIS (PEA)

The PEA research focused on the incentives that can enable regional governments to prioritize resource allocation for the OGS sector. The research also considered the challenges faced by PSEs in solar product quality verification by a multitude of institutions and how this should be structured to reduce transaction costs that inflate the final price of solar products. The research also identified which donors should be contacted to identify priority interventions for the design and implementation of projects. The current system of licensing PSEs in the regions should also be redesigned in such a way that they face similar licensing requirement across all the regions. Moreover, the study also suggests an alternative institutional structure to the current MFI-led consumer financing for OGS. The key findings are summarised below.

Prominence of off-grid energy development projects: Off-grid energy development projects currently receive less priority from government officials, at least compared to grid energy development resource allocation. Government officials understand that the expansion of the grid to rural areas is expensive and cannot be accomplished in a short time, while OGS products are low-cost solutions that can be deployed quickly to address the electricity access problems of rural households. However, there is no fanfare and ribbon cutting at the completion of OGS projects. While of equal importance to grid access, OGS projects also do not attract much publicity from the media.

A public awareness campaign for OGS is essential to get the attention of the authorities as well as the required manpower and resource allocation. It will also help educate the public on the benefits OGS to households, its contribution to improving productivity through productive use and in creating better access to education and health services. It will also help outline the progress made to reach rural households with OGS and what is expected of the government in achieving universal access.

Quality standards verification. This is not carried out by one specific institution, with the information shared widely with all other relevant organisations. Instead, different institutions at various levels, such as MoTI, REBs, Ethiopian Energy Authority (EEA) and commercial banks all demand quality certificates and undertake their own verifications. The process is long, cumbersome and costly for PSEs and, above all, creates a loophole for abuse and corruption. The process is also replicated each time PSEs come up with a new product. The government is now finalising preparations to implement pre-export verification of conformity (PVoC) and it is hoped that this will make the multiple verification processes unnecessary in future.

MFIs provide consumer financing to rural communities. MFIs have been entering into tripartite agreements with REBs and PSEs selected 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 organised by the region to distribute solar products and provide aftercare 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 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.

REBs prefer donors to directly engage with them. As an institution at the forefront of the implementation of OGS 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, establishment of GPS-based data collection systems, getting real-time information on which solar water pumps and solar installations in schools and health centres are working and which are not, to funding arrangements to create access to loans for youth solar enterprise retailers. ACE TAF can support the inclusion of REBs in the Off-grid Task Force meetings.

Ethiopia is going through a political transition that has been volatile and is likely to remain so up to and beyond the election in June 2021. Since 2018, ethnic-based violence has been raging in Metekel zone Benishangul-Gumuz region, western Wellega in Oromia region and Konso in the SNNP region. The situation is likely to further aggravate during and after the election but is not expected to get out of the control of the federal government. It may, however, disrupt the distribution of solar products post-election in these areas and pockets of other regions where the election results are contested.

According to the World Health Organization (WHO), Ethiopia is currently one of five countries in Africa registering the highest numbers of Covid-19 cases, with a recent rise in the number of positive cases and deaths. There have been 198,794 confirmed cases and 2,784 deaths as of March 29, 2021. A SE4All survey on African and Asian OGS firms found a less grim but still worrying risk, which could potentially lead to a loss of 27 per cent revenue and layoff of workers unless governments designate OGS as essential services and provide the necessary support.[19] It is expected that Covid-19 will further limit access to forex for OGS companies as little was left in the government and World Bank-funded facility at DBE to be disbursed in 2021. Most of the funds were used in 2019.

19. SE4All (2020). Covid-19 update.

5. GENDER EQUALITY AND SOCIAL INCLUSION (GESI)

The study sought to understand the enabling environment for SAS at the regional level in Ethiopia, from a GESI perspective. It sought to identify the most effective processes and initiatives to enhance GESI in accessing OGS solutions at the regional level by reviewing the solar enterprise market, regulatory framework and capacity needs. It also assessed the stakeholders supporting GESI at both regional and federal level. The following section outlines the findings from this assessment.

Poorer households were more dependent on OGS, consumed less energy and faced less financial inclusion: There is a dearth of sex-disaggregated data from the regions, with only limited and non-comprehensive data from some of the regions available. The data available, though quite localised, indicates that poorer regions that are not connected to the grid are more dependent on OGS and have relatively less discretionary spending on energy. For example, in 2017, PAOP found that in Dire Dawa, 88 per cent of households depend on off-grid lighting sources. In Oromia, 40 per cent of households were OGS-dependent.

Of the households that were dependent on non-grid lighting, 60 per cent of those dependent on OGS were modest power consumers, most likely in low-income households and have lower discretionary spending of USD60–75. A further 20 per cent that were dependent on OGS were medium consumers with a slightly higher discretionary spending of between USD375 and USD660. In addition, 14 per cent of the households dependent on OGS were higher consumers with discretionary spending of over USD660. Notably, there is low financial inclusion among those households dependent on off-grid sources of lighting, and only 22 per cent of these have a bank account compared to 65 per cent who are connected to grid-lighting. It is clear from this data that poorer households were the most dependent on OGS, having inadequate or unreliable access to grid electricity, and were characteristically lower consumers with comparatively less financial inclusion.

There is a paucity of data on access to, and energy affordability for persons with disability: Data on persons with disabilities with regard to energy access and affordability is even less accessible. A 2013 International Labour Organization (ILO) report on disability in Ethiopia noted that an estimated 15 million children, adults and elderly persons were living with disabilities, representing 17.6 per cent of the population. The majority were living in rural areas with limited access to basic services, including energy. A study in Oromia Region found that 55 per cent of people living with disabilities (PLWDs) depended on family, neighbours and friends for their livelihood, while the rest were either begging or on some form of self-employment, implying even lower access to energy sources.

Ethiopia's overarching development plan, the Growth and Transformation Plan (GTP II) identifies disability as a cross-cutting concern and focuses attention on education, training and rehabilitation, as well as equal access to services and opportunities for PLWDs. The country also has a National Plan of Action for PLWDs (2012– 2021), which provides for the inclusion of all Ethiopians with greater attention to rehabilitation, equal opportunities in education, skills training and work for PLWDs. There is a dire need for data that provides insights on the disability-energy nexus, and this could form part of any future intervention by MoWIE or other stakeholders' intervention in the access to energy space.

The survey findings are summarised under the thematic headings listed below. Key issues raised during our consultations and suggested solutions by the stakeholders are also presented to facilitate a common understanding.

1. Gender and social inclusion instruments

The foundation for gender mainstreaming was laid out by the Ethiopian Women National Policy (1993), which mandates all ministries and government organisations to have a Department of Women Affairs entrusted with the responsibility of organising women and promoting their interests. The Ministry of Women, Children and Youth Affairs is also mandated to support all ministries in this respect.

Regarding OGS, the National Energy Policy (draft, 2018) and NEP 2.0 also have specific policy instruments and strategies to support women to realise benefits from off-grid technologies. Ensuring the participation of women at all levels of decision-making on energy planning and management, collecting gender-disaggregated information and conducting gender research to guide interventions that enhance access for women to modern energy services are the main tenets of the Energy Policy.

NEP 2.0 seeks gender targeting by REBs when identifying potential new customers and supporting PSEs penetration. It also considers encouraging wholesalers, distributors and manufacturers to employ women in the last-mile delivery of products in rural areas as part of public support to local job creation and skills development.

Regional data reveals that the Women Affairs departments in ministries do not seem to be working as stipulated during their formation. Consultations with the Directorate of Women, Children and Youth Affairs at MoWIE revealed that it was not involved in the design and execution of OGS projects, yet these have a significant impact on the lives of women. They are also hampered by low staffing and technical capacity. The situation is the same across the other regions; the directorates are not actively involved in the planning and implementation OGS activities.

2. Support for entrepreneurship in the OGS sector

Women entrepreneurs engaged in the solar distribution business are few. Lack of exposure to business skills and good practices as well as of collateral to borrow funds from formal financial institutions have a disproportionate impact on women entrepreneurs' drive to engage in the solar sector, as is the case in other sectors, compared to men.

One potential intervention suggested by the women entrepreneurs consulted is to support aspiring women with business plan preparations and mentoring by partnering with networks such as the Ethiopian Chamber of Commerce, African Women's Entrepreneurship Programme (AWEP) and Association of Women in Business (AWiB). It would also be imperative for donor financed projects to include gender action plans and equitable mechanisms, taking into account women's disadvantaged positions, for example in raising sufficient collateral to get access to loans, to encourage women to access funds.

MFIs are the only organisations providing consumer finance for OGS in Ethiopia. The operation of MFIs is currently limited to four regions: Amhara, Oromia, SNNP and Tigray. MFIs in Gambella and Benishangul-Gumuz regions (the two other regions covered by the study) are not currently providing consumer finance to households. One pertinent example is the Poverty Eradication and Community Empowerment Microfinance Institution (PEACE MFI), which conducts targeted awareness creation, recruits loan applicants and helps women purchase OGS products using its loan facility. The only constraint hampering its operation is lack of adequate supply of quality certified products in the market.

Extending OGS access to poor women

Facilitating loan access for women who can pay the principal and interest may go a long way in resolving the OGS access problem. However, it will not entirely fix the problem. There are extremely poor and vulnerable groups that cannot afford to buy solar products even with a credit plan.

Building on the success of the safety net programme, similar end-user financial support could be extended to the poorest women households to get access to solar products. Alternatively, a subsidised loan, with a substantial grant element in it, could address the problem of extremely poor women.

Notably, the government has formed youth groups through regional governments in woredas to provide distribution and maintenance services. These services have been provided in partnership with private solar companies through an MoU between regional governments and solar companies. This has proved to be a good platform for skills development for the youth as well as job creation. This initiative has, however, not documented the gender balance or social inclusion, including PLWDs.

3. Context of gender mainstreaming in energy

A study that sought to evaluate the effectiveness of gender mainstreaming in the Amhara Region, found that there is an adequate legal and policy framework for gender mainstreaming, which has neither been implemented nor enforced fully. One gap in the regulatory framework is that gender targets, especially at the regional level, tend not to be explicitly stated in the policies and are therefore vaguely understood by implementers. Other studies have found that there is inadequacy of women personnel and skilled women in the regions in all sectors including energy, even though there have been attempts to provide incentives for women to join leadership and skilled positions. This has been blamed on cultural stereotypes and norms that have led to a situation where gender issues are not accorded priority even in cases where gender disparities are glaring. Another gap at both regional and federal level is that there is inadequate budget allocation for gender mainstreaming activities. This is largely because the concept and understanding of gender is low among the government agencies' planning and budgeting teams.

For instance, it was found that the Ethiopia Electricity Utility (EEU) has 17,004 permanent employees, with only 3,270 of these being female. Further, of the 19.2 per cent of women in the workforce, only 9 per cent were in management or leadership positions as at November 2019. This is despite the EEU having a Women's Affairs Policy and Procedures Manual in place since 2016.

The ESMAP programme in 2020 recorded that Ethiopia still had some of the lowest gender equality indicators in sub-Saharan Africa (SSA), especially in the energy sector. The burden of energy poverty falls disproportionately on women and girls due to their reproductive roles. This led to "Closing the Gender Gap Across Ethiopia's Energy Sector", a sector-wide approach that commenced with analysis of gender gaps and provision of high-level policy advice along with resource mobilisation from the World Bank.

Subsequently an initiative was launched, with actions aimed at closing the gender gap in energy at federal level, which include the following:

- Addressing occupational sex-segregation across sector utilities with over 14,000 personnel.
- Provision of child-care facilities in utility offices across all eleven regions in Ethiopia, which would effectively address an impediment to women's engagement in the formal workforce.
- Support career development of females through supporting women's and girls' entry into science, technology, engineering and mathematics (STEM), management and leadership roles.
- Prevention and response to gender-based violence (GBV) in the workplace and project sites.
- Promotion of female entrepreneurship in off-grid markets and removing productivity constraints of female entrepreneurs (e.g. access to finance and business skills).
- Through the Programme for Results (PforR) model, where funds disbursement is linked to achievement of programme results, e.g. in the EEU.
- Shift from ad hoc to deliberate systematic approach to address gender gaps over a five-year period using a grant facility where USD4.5 million from the World Bank has been leveraged.

To achieve these interventions, key dialogue actors and partners involved include the Ethiopia Climate Innovation Centre (ECIC), the Ministry of Women and Children's Affairs, Ethiopia Women Lawyers Association and Power Africa.

One of the projects under this initiative is implemented by the Ethiopia Solar Development Association (ESEDA), a non-profit association formed by stakeholders in the off-grid sector for policy advocacy on behalf of the sector, which is supported through this programme.

Conclusions

There is inadequate gender differentiated region-specific information available in the REBs or regional ministry departments. Most of the energy stakeholders operate at the federal level. There is no evidence pointing towards any significant attention provided to PLWDs with regard to energy access or energy entrepreneurship in any of the regions. While the regulatory and policy framework 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.

6. RECOMMENDATIONS

Based on consultations with stakeholders in the regions and feedback gathered from the validation workshop participants, the following recommendations are presented in order of importance and impact.

6.1. High Priority Activities

Policy support

- **Regional strategic plan:** A regional strategic plan, which is aligned with the NEP 2.0 universal electrification goal by 2025, will be developed to coordinate the actions of regional stakeholders and MoWIE. The strategic plan should indicate annual targets to measure energy access progress, identify resource needs and required institutional coordination to meet these goals in each of the regions. The regional strategic plan will be one document with separate chapters for each of the nine regions of the country.
- **Harmonising regional MoUs**: Harmonising and simplifying MoUs to be signed by PSEs, MFIs and REBs for PSEs to distribute quality certified OGS products to households using MFIs consumer financing loans in regions. One template will be created for all the regions by comparing all the known MoUs and then harmonising and simplifying them.

Coordination and partnership

- Organising regional off-grid solar committees to provide the necessary oversight and coordination on the implementation of the regional OGS plan. The committee will be chaired by the head of the REB and will be composed of members from the Cooperative Bureau, BoA, Women and Children Affairs Bureau, Education and Health bureaus, technical and vocational centres, regional enterprises, NGOs, MFIs and consumer representatives. The regional OGS committee will coordinate the actions of regional sector bureaus and regularly follow up implementation progress and address challenges.

Quality assurance

- Support MoWIE in developing a disposal guideline for counterfeit, substandard and other OGS products that do not meet compulsory standards.
- With the implementation of PVoC in the horizon, MoWIE should assist regions to transition from the current quality verification into quality surveillance activities.

Access to finance

Facilitate access to DBE loan facility to MFIs, cooperative and PSEs.

- Some regional MFIs are not benefiting from the consumer financing revolving fund established by World Bank/ DBE. The main reason is due to the failure of these MFIs to renew their operating licenses. MoWIE and REBs should facilitate access to loans for Gambella, Benishangul-Gumuz and Somali MFIs from the DBE revolving fund.
- Similarly, facilitate access to working capital loans for PSEs venturing into PAYG, and MFIs lending should expand further to include OGS productive use.
- Cooperative unions: A wholesale loan arrangement between MFIs and cooperative unions will help the latter to do the last mile distribution of OGS products. This arrangement helps to distribute the right products based on individual households' ability to pay as cooperative unions have good knowledge of the incomes of their members.

6.2. Medium Priority Activities

Gender and Social inclusion

- **National dialogue platform:** Given the different initiatives supporting gender and social inclusion with regard to energy access, MOWIE could consider initiating a national dialogue platform to bring all the stakeholders supporting GESI together to validate the findings from this assessment. More importantly, the national dialogue forum could also take stock of progress, identify shared opportunities for intervention and challenges, and subsequently, craft a joint redress mechanism.

- **Actors in the OGS sector could seek to pool synergies,** looping in PAOP, ESMAP and other localised initiatives with a regional presence, and active in GESI, to share resources and comparative advantages for greater impetus and traction of GESI initiatives in OGS, at both regional and federal level.
- **Gender audit at federal and regional level:** 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. Subsequently, based on the findings, develop a gender mainstreaming strategy for MoWIE and REBs.
- **Support to women savings and credit associations:** With the support of the regional Youth, Women and Children Affairs Bureau, women in Gambella region are setting aside money as savings for purposes unrelated to OGS. An arrangement can be made with the regional MFIs to use these savings as a down payment for the women to access OGS products.

Capacity building

- **Product tracking:** MoWIE should expedite the work it has started to create a database for tracking the operational status of institutional and productive use solar installed in various locations. MoWIE should install a platform to remotely track the status (location and if it is working or not) of products imported and distributed throughout the country and solar pumps and institutional solar installed by the government and NGOs in rural areas.
- **Guideline for the disposal of substandard and counterfeit products.** Law enforcement officials are 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. We recommend the Quality Assurance Task Force take the lead on this and the key activities include:
  - developing a concept note for the preparation of the guideline
  - delegating to the quality assurance working group to prepare the guideline
  - validation workshop for stakeholder comments on the guideline.
- **Capacity building support for TVETs.** Support TVETs to provide short-term trainings on OGS maintenance and repair services. The key activities include:
  - develop course content/curriculum for a short-term course for solar technicians
  - conduct training of trainers (ToT) courses in TVETs
  - assist TVETs to conduct trainings for OGS associations and retailers.
- **Equip the regional incubation centre with necessary equipment and facilities.** Solar incubation centres established in regions so that budding solar entrepreneurs have access to the required facilities to start operations. We recommend MoWIE and REBs work together to supply the necessary facilities to the centres.

Energy nexus

- Support REBs in preparing technical specifications and evaluation criteria to purchase and install appropriate solar systems to rural health posts and schools.
- Productive use of solar. The potential to increase agricultural productivity using solar pumps for irrigating smallholder farms is very high in Ethiopia. OGS can also be employed to provide safe drinking water from surface water. Likewise, value addition on raw agricultural commodities using SAS creates incomes and employment opportunities for the people living in rural areas. Key activities to scale PUE at regional level include:
  - Undertake awareness creation on productive use of solar.
  - Establish a cooperative agreement with the BoA to educate farmers using extension workers on potential benefits of solar pumps and SAS products for agro-processing activities.
  - Undertake piloting of solar pumps in selected locations and organise farmers demonstration events.
  - Undertake piloting of SAS appliances for certain selected agro-processing activities and organise farmers' demonstration events.
- To benefit from value addition through processing of agricultural commodities, undertake further demand analysis and piloting of projects. This will help to identify potential barriers, establish a mechanism to address them and channel funding to projects with promising results so that they can scale rapidly.

7. ACTION PLAN

The action plans are derived from consultations with stakeholders in the regions and the validation workshop held to gather feedback on the preliminary findings of the study. To make each recommendation amenable for intervention by relevant stakeholders, specific actions required to be taken, responsible leading agencies and the timeline for implementation are provided below.

There are specific action points that are applicable only to one or two regions. For example, sharia-compliant consumer financing are applicable only to Somali and Benishangul-Gumuz regions, where the majority of the population are Muslims. On the other hand, there are specific actions that are applicable across all the regions. For example, almost all the regions have requested capacity building support regardless of minor differences on the type of trainings required. In this regard, we have taken the liberty to standardise the intervention by providing the trainings through TVETs across all the regions for sustainability reasons. Productive use solar utilisation, with slight differences from one region to the other, is at a very low level in Ethiopia. In this case, we have recommended similar actions across all regions that would ensure widespread use of the technology in the country.

Table 8: Action plan

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
8.1 Federal government	**8.1.1 Establish a platform to remotely track product status i.e. location of and if it is working or not, of solar pumps and institutional solar products installed by the government and NGOs in various locations**				MoWIE
	Continue to engage with donors who have shown willingness to provide assistance to install the system	X			
	Installation of the system		X		
	Training and operation			X	
	8.1.2 Capacity building training for REBs and MoTI on quality assurance, PVoC and market surveillance	X			MoWIE
	8.1.3 Gender auditing				ACE TAF
	Develop terms of reference (ToR)	X			
	Hire consultants to conduct the study		X		
	Undertake the study		X		
	Develop gender mainstreeting plan and GESI task force			X	
	8.1.4 Facilitating access to loans for Gambella, Benishangul-Gumuz and Somali regional MFIs from DBE revolving fund, access for productive use solar, PSEs access to finance for productive use solar and establishing an arrangement between MFIs and SACOOs for the former to extend wholesale loans to the latter and for SACOOs to extend retail loans to consumers. Similarly, facilitate access to working capital loans for PSEs venturing into PAYG				MoWIE, World Bank
	Consultations with relevant stakeholders with the aim of reaching a consensus in creating access to loans for the institutions identified above	X			
	DBE starts extending loans to MFIs and PSEs	X			

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	8.1.5 Productive use solar				MoWIE
	Facilitate PSEs to access forex from donor financed credit facilities for the import of solar pumps	X			
	Piloting of promising agro-processing projects in selected regions		X		
	Arrange loans for individuals, cooperatives and associations to engage in agro-processing activities using productive use solar			X	
	8.1.6 Harmonising and simplifying regional MoUs				ACE TAF
	Draft national MoU for discussion	X			
	Organise a workshop for REBs to discuss the draft MoU	X			
	Final draft	X			
	8.1.7 Guideline for the disposal of substandard and counterfeit products				Quality Assurance Task Force
	Develop a concept note for the preparation of the guideline	X			
	Delegate to the quality assurance working group to prepare the guideline	X			
	Hold validation workshop for stakeholder comments on the guideline	X			
	8.1.8 Develop regional strategic plan (based on NEP 2.0, covering all the regions)				ACE TAF
	Develop ToR	X			
	Develop inception report	X			
	Draft report	X			
	Validation workshop	X			
	Final report	X			
8.2 Amhara	**8.2.1 Establishment of Off-grid Technical Working Group (OTWG)**	X			
	Development of regional OGS implementation plan and monitoring mechanism	X			

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	Develop an operation guideline for private OGS product suppliers				REB, Amhara Credit and Saving Institution ACSI/ MFIs
	Identify relationships, terms and conditions, and other relevant operation principles that need to be standardised and formalised	X			
	Develop an operation guideline that includes a standard MoU for agreement between REBs and OGS product suppliers, defining product standard and certification requirements, working agreements with energy enterprises, provision of aftersales/maintenance services, working with MFIs, etc.		X		
	8.2.2 Awareness creation: Collaboration with the Amhara agriculture extension programme to create awareness on solar agriculture appliances		X		REB
	Identify other sector organisations such as BoA, Water Bureau, Bureau of Trade and Industry (BoTI, etc. with existing or potential projects on PUE with OGS products	X			
	Form a cooperation agreement for collaboration and integration of activities	X			
	8.2.3 Capacity-building training for TVETs on OGS product installation and maintenance at training of trainers (ToT) level				REB, MoWIE
	Assess earlier works on curriculum development for OGS products for TVETs	X			
	Develop course content/curriculum for a short-term course for solar technicians		X		
	Conduct ToT courses in TVETs		X		
	Assist TVETs to conduct training for other TVETs and technicians		X		
	8.2.4 Develop guideline for identification, selection and formation of solar enterprises, intentionally design GESI focused/centred solar enterprises				REB
	Study and identify attributes of a sustainable solar enterprise	X			
	Develop guidelines for identification, selection, formation and enabling of solar enterprises		X		

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	Develop a guideline for intentionally designing and forming GESI focused solar enterprises		X		
	8.2.5 Design and pilot consumer financing through rural savings and credit cooperatives (RSACCOs)				REB, DBE, donors, solar enterprises, RSACCOs
	Assess the legal framework for RSACCOs for provision of consumer financing	X			
	Map out the transaction requirements and processes for transfer of OGS products and payments		X		
	Assess and plan for electronic payment systems for product purchase and loan repayment to overcome management and administration limitations of RSACCOs			X	
8.3 Benishangul-Gumuz	**8.3.1 Assist the regional MFIs to access loans from the DBE revolving fund**				REB, Regional MFI
	Renew the regional MFIs' operations license	X			
	Engage with MoWIE and DBE to meet loan access requirements	X			
	Start extending consumer loans (including sharia-compliant loans) for households		X		
	8.3.2 Awareness creation on productive use solar				REB, MoWIE
	Establish a cooperative agreement with BoA to educate farmers, using extension workers on potential benefits of solar pumps and SAS products for agro-processing activities	X			
	Undertake piloting of solar pumps in certain locations	X			
	Undertake piloting of SAS appliances for selected agro-processing activities		X		
	8.3.3 Organising regional OGS committee				REB
	Prepare working guidelines for the regional OGS committee	X			
	Conduct inaugural meeting		X		
	8.3.4 Assist TVET institutes to provide short-term trainings on OGS maintenance and repair services				REB, MoWIE
	Develop course content/curriculum for a short-term course for solar technicians	X			

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	Conduct ToT courses in TVETs		X		
	Assist TVETs to conduct trainings for OGS associations and retailers		X		
	8.3.5 Facilitate access to loans from MFIs for women-led households to purchase OGS products				Bureau of Youth, Women and Children Affairs (BoYCA), REB
	Undertake women targeted awareness creation on the benefits of OGS	X			
	Encourage and support MFIs to extend loans to women	X			
	8.3.6 Training on PVoC implementation				MoWIE, REB
	Training of REB staff on PVoC implementation manual and quality surveillance for OGS products	X			
8.4 Gambella	**8.4.1 Assist institutes to provide short-term trainings on OGS maintenance and repair services**				REB, MoWIE
	Develop course content/curriculum for a short-term course for solar technicians	X			
	Conduct ToT courses in TVETs		X		
	Assist TVETs to conduct trainings for OGS associations and retailers		X		
	8.4.2 Awareness creation on productive use solar				MoWIE, REB
	Establish a cooperative agreement with BoA to educate farmers, using extension workers, on potential benefits of solar pumps and SAS products for agro-processing activities	X			
	Undertake piloting of solar pumps in selected locations and organise farmers' demonstration events		X		
	Undertake piloting of SAS appliances for selected agro-processing activities and organise farmers' demonstration events		X		
	8.4.3 Assist the regional MFIs to get access to loans (including sharia-compliant ones) from DBE revolving fund				MoWIE, REB
	Renew the regional MFI operational license	X			
	Engage with MoWIE and DBE to meet loan access requirements	X			

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	Start extending consumer loans for households		X		
	8.4.4 Assist women organised in savings groups to access loans from MFIs for the purchase of SAS products				
	Undertake women targeted awareness creation on the benefits of OGS	X			
	Encourage and support MFIs to extend loans to women	X			
	8.4.5 Training on PVoC implementation				ACE TAF
	Training of REB staff on PVoC implementation manual and quality surveillance of OGS products	X			
	8.4.6 Organising regional OGS committee				RBE
	Prepare working guidelines for the regional OGS committee	X			
	Conduct inaugural meeting		X		
	8.5.1 Scale up solar powered surface water treatment plants pioneered by donor agencies to increase access to safe and clean water for rural households				MoWIE, REB
	Identify suitable locations for the project	X			
	Install solar powered water treatment plants in the selected locations		X		
	Training and operation of the water treatment plants		X		
	8.5.2 Equip the regional incubation centre with necessary equipment and facilities				MOWIE, REB
	Undertake equipment inventory to identify missing tools, machinery and equipment	X			
	Procurement of required tools, machinery and equipment for the centre		X		
	Training and operation		X		
	8.5.3 Awareness creation on productive use solar				REB, MoWIE
	Establish a cooperative agreement with BoA to educate farmers, using extension workers, on potential benefits of solar pumps and SAS products for agro-processing activities	X			
	Undertake piloting of solar pumps in selected locations and organise farmers' demonstration events	X			

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	Undertake piloting of SAS appliances for certain selected agro-processing activities and organise farmers' demonstration events.		X		
	8.5.4 Assist TVET institutes to provide short-term trainings on OGS maintenance and repair services				MoWIE, REB
	Develop course content/curriculum for a short-term course for solar technicians	X			
	Conduct ToT courses in TVETs		X		
	Assist TVETs to conduct trainings for OGS associations and retailers		X		
	8.5.5 Training on PVoC implementation				MoWIE, REB
	Training of REB staff on PVoC implementation manual and quality surveillance of OGS products	X			
	8.5.6 Facilitate access to loans from MFIs for women-led households for the purchase of OGS products				REB
	Undertake women targeted awareness creation on the benefits of OGS	X			
	Encourage and support MFIs to extend loans to women	X			
8.6 SNNP	**8.6.1 Assist TVET institutes to provide short-term trainings on OGS maintenance and repair services**				MoWIE, REB
	Develop course content/curriculum for a short-term course for solar technicians	X			
	Conduct ToT courses in TVETs	X			
	Assist TVETs to conduct trainings for OGS associations and retailers	X	X		
	8.6.2 Organising regional OGS committee				REB
	Prepare working guidelines for the regional OGS committee	X			
	Conduct inaugural meeting		X		
	8.6.3 Equip the regional incubation centre with necessary equipment and facilities				MoWIE, REB
	Undertake equipment inventory to identify missing tools, machinery and equipment	X			
	Procurement of required tools, machinery and equipment for the centre	X			

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	Training and operation		X		
	8.6.4 Awareness creation on productive use solar				REB, MoWIE
	Establish a cooperative agreement with BoA to educate farmers, using extension workers, on potential benefits of solar pumps and SAS products for agro-processing activities	X			
	Undertake piloting of solar pumps in selected locations and organise farmers' demonstration events	X			
	Undertake piloting of SAS appliances for certain selected agro-processing activities and organise farmers' demonstration events.		X		
	8.6.5 Scale up solar powered surface water treatment plants pioneered by donor agencies to increase access to safe and clean water for rural households				MoWIE, REB
	Identify suitable locations for the project	X			
	Install solar powered water treatment plants in the selected locations		X		
	Training and operation of the plants		X		
	8.6.6 Training on PVoC implementation				MoWIE, REB
	Training of REB staff on PVoC implementation manual and quality surveillance of OGS products	X			
8.7 Somali	**8.7.1 Assist the regional MFIs to get access to sharia-compliant financing from DBE**				MoWIE, DBE, REB
	Consultation with MoWIE and DBE to meet the financing requirements	X			
	Get approval	X			
	8.7.2 OGS product quality control: Addressing problems related to infiltration of poor quality OGS product				Private companies, REB, MoWIE
	Make genuine certified OGS products available and affordable in the region by linking major suppliers to region level retailers	X			
	Ensure availability of warranty and aftersales services for both small and large capacity productive use OGS products/systems such as solar pumps and institutional systems	X	X	X	
	Identify, select and train solar crews at regional level to provide aftersales services such as maintenance	X	X	X	

Table 8: Action plan (Continued)

Region	Recommended actions	Implementation time frame			Responsible implementation agency
		2021	2022	2023	
	8.7.3 Expand consumer finance options				DBE, MFIs, commercial banks (that work with AfDB for OGS product financing)
	Make sharia-compliant financing available to consumers of OGS products	X	X		
	Scale up PAYG model	X	X	X	
	8.7.4 Capacity building on OGS product distribution				Technical, Vocational and Enterprise Development (TVED), Urban Job Creation Agency, Bureau of Youth and Sport, Bureau of Women and Children, TVET
	Identify and provide training on product promotion and distribution		X	X	
	Develop solar enterprises to distribute OGS products, including larger systems for productive use		X	X	
	Organise ToT by TVETs on OGS product installation and maintenance Note: There are 14 TVETs in the region; the Jigjiga TVET would train the others		X	X	
	Build market linkage between consumers, MFIs and solar enterprises		X	X	

ANNEXES

Annex I: Roles of government organisations

Organisation	Responsibilities to off-grid electrification	Relevant role in solar product quality approval and importation
Ministry of Water, Irrigation and Electricity (MoWIE)	• Technical support for energy development programme • Conduct energy supply and demand study • National energy policy development • Develop, promote and disseminate alternative energy (improved cook stoves, institutional and household solar technologies, biogas energy and micro-hydro power energy sources) • Provide production, training, and laboratory services on alternative energy technologies • Promote off-grid rural electrification by providing technical and financing support for private enterprises and consumers	• Provide policy advice to Ministry of Finance on need for tax exemption • Inform Ministry of Trade and Industry on need for mandatory quality standards for solar products • Approve solar enterprises, provide support letter to access DBE loan
Ethiopian Energy Authority (EEA)	• Regulate the energy markets and service quality • Promote energy sector competitiveness and ensure energy efficiency and conservation • Promote efficient and reliable electric supply for both on-grid and off-grid services	• Regulate quality of solar products • Inform Ethiopian Standards Agency about mandatory quality standard parameters for solar products • Inform Ministry of Trade and Industry (MoTI) that the mandatory quality standard applies to imported solar products that are less than 15Wp • For non-mandatory quality compliance, EEA is responsible for verifying and allowing imports • Delegate to MoTI to control solar product quality on its behalf at customs check points
Ministry of Finance	Propose fiscal incentives/measures (i.e., tax reduction, exemption, etc) for approval.	• Inform implementing organisations such as MoTI and Customs Commission that solar products are exempt from import duty • Make financing for solar products available through the Development Bank of Ethiopia
Ministry of Trade and Industry (MoTI)	• Control the compliance of goods and services with the requirements of mandatory Ethiopian standards and take measures against those found to be below the standards • Cause the coordinated enforcement of standards applied by other enforcement bodies	• Ensure that all solar products under 15Wp imported into the country meet the mandatory quality standard • Order commercial banks to check quality certification of solar products before opening letters of credit for importation

Annex I: Roles of government organisations (Continued)

Organisation	Responsibilities to off-grid electrification	Relevant role in solar product quality approval and importation
Customs Commission	Collect revenue from customs duties	Enforce tax law on solar products in accordance with tax and customs legislations. It checks for certification of solar products greater than 15Wp, otherwise confiscates products. For products with capacity of less or equal to 15Wp, it checks for Lighting Global certificates
Ethiopian Standards Agency (ESA)	Standards formulation, training and technical support, and organising and disseminating standards, conformity assessment procedures and technical regulation for customers	• Develop mandatory quality standard parameters • Develop quality standard guideline for solar products
Ethiopian Conformity Assessment Enterprise (ECAE)	Provide testing, inspection and certification services to ensure the quality of products and services	• Sets testing procedures for evaluation of quality of solar products as per the guideline given by ESA • Collect samples for imported solar products and conduct tests from Customs Commission and MoTI. Communicates test results back to Customs Commission and MoTI to be used as part of the customs clearance procedure
Regional Energy Bureaus (REBs)	Promote off-grid energy services (electricity and non-electricity), mainly for rural areas in their regions	• Promote solar products to consumers • Work with MFIs for approval of solar enterprises to supply their products through MFIs

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Fourth Floor, Prosperity House, Westlands Road |
PO Box 19084 – 00100 | Nairobi, Kenya.