

P R O C E E D I N G S

National Workshop
**Dissemination of
Solar Energy
Technologies**
in **Ethiopia**

Successes, Challenges,
and Opportunities

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The Energy and Resources Institute



Federal Democratic Republic of Ethiopia
Ministry of Water, Irrigation and Energy



Horn of Africa
Regional Environment
Centre and Network



PROCEEDINGS

National Workshop
Dissemination of Solar Energy Technologies in Ethiopia:
Successes, Challenges, and Opportunities

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Foreword

The Ministry of Water, Irrigation, and Energy would like to welcome you all to this beautiful venue at the Horn of Africa Regional Environment Centre & Network (HoA-REC&N). This Centre symbolizes the commitment of Ethiopian Government and people of the Horn of Africa to sustainable environmental development in harmony with economic development.

Before undertaking today's consultations, I would like to point out some critical issues of importance to the energy sector and various government efforts in developing this sector.

The development of Ethiopia's energy resources particularly renewable energy technologies, such as hydropower, is most important for building our green economy. The Government's Climate Resilient Green Economy (CRGE) strategy and the five-year Growth and Transformation Plan (GTP) are explicit in addressing energy access, quality of supply, and productive energy use in the context of new energy policies and planning.

Since 2002, the country has been engaged in the realization of the millennium development goals, which includes Universal Energy Access Program that focuses on the provision of electricity to the rural poor at affordable rates.

At present, about 51% of the total Ethiopian population has an access to electricity. The country is at an encouraging level in meeting the millennium development goals with increased energy access. Since 2005, remarkable efforts have been made to expand grid electricity to thousands of rural towns, villages, and social service centers all over the country.

The government has a plan to expand electricity access from the present 51% to 75% by 2015. This expansion plan is an integral part of government's strategy to promote and support the development of social services and income generating activities in rural parts of Ethiopia.

In addition, the government has established an Off-grid Rural Electrification Fund that involves private sector participation to complement grid expansion. The following technology options are emphasized in the off grid programme: solar, micro-hydro, and wind to provide energy access to remote rural areas. The government through the Ministry is undertaking combinations of large to small micro hydropower development to electrify remote rural areas in the country.

Ethiopia aims to achieve carbon-neutral middle-income status before 2025 by ensuring continuous growth, while avoiding the trappings of business-as-usual development. The goal is to build a climate-resilient green economy. Our green economy strategy is based on four pillars, which are:

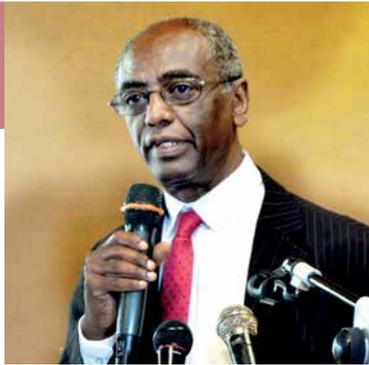
- Improving crop and livestock production practices for higher food security and farmer income, while reducing emissions
- Protecting and re-establishing forests for their economic and ecosystem services, and as carbon stocks
- Expanding electricity generation from renewable sources of energy for domestic and regional markets
- Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings

In this context, renewable energy technologies play a crucial role. The achievements made to date are encouraging. To further these achievements, the Ministry is working closely with the development partners and centres of excellence. Among them is HoA-REC&N, which has been active in rural energy development for last six years in Ethiopia. We commend HoA-REC&N's contribution through projects and also its capacity building to the energy sector.

In conclusion, we are grateful to HoA-REC&N and its Director, Dr Araya Asfaw for their efforts in organizing this workshop. I believe this workshop is a foundation to bring together relevant stakeholders for the development of solar energy in Ethiopia. I therefore, expect you all to discuss and reframe issues and share experiences. Most importantly, I would advise you all to set up a structure to have regular consultations pertaining to solar market development, finance and technology, and to identify key policy areas for intervention.

I wish you a fruitful deliberation and I declare the workshop open.
God bless you.

Honourable Kebede Gerba
State Minister, Ministry of Water
Irrigation & Energy, Ethiopia



Foreword

In 2012, Ethiopia had 86 million people residing in 16 million households with 83% of the population in rural areas. According to recent national statistics, 3.7 million households were using electricity for lighting in 2011 with electrification rate at 23% at the national level, 88% in urban, and 5% in rural areas. The rural population of Ethiopia relies heavily on firewood, kerosene, batteries, and candles for lighting, cooking, and heating purposes with detrimental effects on the environment, human health, and on economy. The settlement pattern of rural populations also makes it challenging to connect every rural village to the grid.

With the objectives of complementing on-going government efforts to meet the GTP and CRGE goals and to offer plausible solutions to the challenges hindering solar energy development in Ethiopia, HoA-REC&N in partnership with the Ministry of Water, Irrigation & Energy and The Energy and Resources Institute (TERI), India organized this two-day national solar workshop. The workshop was under the theme “Solar energy technologies dissemination in Ethiopia—Success stories, challenges, and opportunities”. More than 70 representatives from the following institutions: federal and regional energy bureaus, the Development Bank of Ethiopia, Ethiopian Conformity Assessment Enterprise, solar energy technology importers and distributors, NGOs, bilateral agencies, and major microfinance institutions participated in the workshop. It was our expectation that the workshop will be a platform for participants to share success stories, challenges, and opportunities in the country’s solar energy sector and to build partnerships. Also, a solar exhibition was also organized as a side event to showcase the various solar technologies present in the country.

A major outcome of the workshop was the establishment of a Solar Energy Technology Forum chaired by the Ministry of Water, Irrigation & Energy with HoA-REC&N as its secretariat. A steering committee comprising nine organizations including regional energy bureaus and solar companies was established to meet on a regular basis to further discuss on solar energy issues and to propose solutions to address these.

I believe the outcomes of this workshop will contribute to addressing the challenges we face with solar energy technologies in Ethiopia. On behalf of HoA-REC&N, I thank the Ministry of Water, Irrigation and Energy, TERI, and all the workshop participants for making the event a success.

Araya Asfaw, PhD

Executive Director, Horn of Africa Regional Environment Centre & Network, Addis Ababa University



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Acronyms

AETDPD	Alternative Energy Technology Development and Promotion Directorate
CRGE	Climate Resilient Green Economy
DBE	Development Bank of Ethiopia
ECAE	Ethiopian Conformity Assessment Enterprise
ETB	Ethiopian Birr
ESEA	Ethiopian Solar Energy Association
GTP	Growth and Transformation Plan
GIZ ECO	Deutsche Gesellschaft für Internationale Zusammenarbeit-Energy Coordination Office
HoA-REC&N	Horn of Africa Regional Environment Centre & Network
MOWIE	Ministry of Water, Irrigation and Energy
MOFED	Ministry of Finance and Economic Development
MDG	Millennium Development Goals
NGO	Non-Governmental Organization
OCSSCO	Oromia Credit and Savings Share Company
REF	Rural Electrification Fund
SEF	Solar Energy Foundation
TERI	The Energy and Resources Institute
VAT	Value-Added Tax

INTRODUCTION

Accelerating demand for energy due to increased socio-economic development and growth in Ethiopia for the past seven years has resulted in several initiatives, such as Scaling-upRenewable Energy Program (SREP) [1]. The Ministry of Water, Irrigation & Energy (MoWIE) launched the SREP in 2012 with the objective to meet energy demand with renewable energy sources (hydropower, solar, wind, geothermal, and biomass) as an integral part of the energy mix of Ethiopia. The Climate Resilient Green Economy (CRGE) [2] and Growth and Transformation Plan (GTP) [3], both national programmes, are explicit in addressing issues of energy access, quality of supply, and productive energy use in the context of new energy policies and planning [1]. The expected outcomes of the programmes are increased power generation from 2060 megawatts in 2010 [4] to 10,000 MW, increased electricity access rates from 45% to 75%, and increased current usage from 2 to 4 million coupled with scaling-up of renewable energy dissemination in Ethiopia by 2015.

Ethiopian electrification initiatives could be broadly categorized into two groups [4]: grid-based extension and off-grid. The off-grid programme accentuates renewable energy sources, particularly solar photovoltaic and micro-hydropower. Despite the recent increases in grid-based connection due to high investments, an estimated 12 million families will be without electricity by 2025 and may continue to rely on kerosene, candles, and fuel wood for basic energy needs [4]. These 12 million off-grid families account for about 84% (about 70 million people) of the population in rural areas of Ethiopia. According to the GTP, there is a set target of more than 3 million solar photovoltaic systems to be disseminated by the end of 2015 [5]. However, the target has not been achieved yet even with efforts from the Rural Electrification Fund (REF), private solar companies, NGOs, and foreign aid missions. Given the current electrification rates and the number of off-grid rural households, it would be prudent to develop a modern off-grid solar lighting market in Ethiopia.

To address these pertinent issues a “**National Workshop on Dissemination of Solar Energy Technologies in Ethiopia: Opportunities and Challenges**” was held from May 19th–20th, 2014 in Addis Ababa. The national workshop was attended by about 77 representatives from the MoWIE, Regional Energy Bureaus, Horn of Africa Regional Environment Centre and Network (HoA-REC&N), The Energy and Resources Institute (TERI), non-governmental organizations (NGOs), bilateral agencies, solar energy businesses, microfinance institutions, universities, and research institutes (Annex III for participant list).

Objective

The main objective of the workshop was to assess the current solar market in Ethiopia by reviewing successes and challenges of the stakeholders.

The specific goals were to evaluate opportunities, challenges, and best practices in policies and regulatory frameworks, marketing and financing and existing technologies.

This report summarizes the discussions held at the meeting and the main outcomes.

1. THE MEETING

1.1 Official Opening

Dr Araya Asfaw, Executive Director of HoA-REC&N, officially opened the meeting by welcoming the participants. He stressed the importance of national workshop to build collaborative partnerships. He mentioned that in the past Ethiopia was known globally for famine and drought; however, this image of the country is shifting towards economic growth and development, particularly by developing the



energy sector. He pointed out that the HoA-REC rural household energy projects are aimed at improving off-grid communities' access to basic energy for lighting and cooking.

He hoped that the meeting would address the challenges in market and show ways how suppliers could provide quality yet affordable products to consumers. He concluded that solving rural household energy crises could impact education, economic growth, and human development. He invited **H E Mr Kebede Gerba, State Minister of the Ministry of Water, Irrigation, and Energy of Ethiopia** to give the inaugural address.

The Honourable State Minister, Mr. Kebede Gerba congratulated HoA-REC&N and TERI for organizing the workshop. He underlined government's commitment in developing the energy sector through two national programmes explicit in their energy goals of GTP and CRGE. He noted that since 2002 efforts at the national level to implement Universal Electricity Access under the Millennium Development Goals has shown remarkable progress in expanding access to energy for grid electricity from 2,060 MW to 10,000 MW. He also pointed out that there are off-grid programmes geared towards expanding solar and micro hydropower for rural communities. He concluded that Ethiopia is committed to achieving carbon neutral status by 2025 and emphasized the relevance of these national workshops as opportunities for knowledge exchanges and learning.

Mr Abiy Ashenafi, Senior Consultant at HoA-REC&N was moderating the sessions. He thanked the State Minister by summarizing his two key messages- 1) The ministry encourages such forums to congregate relevant stakeholders to share experiences, and 2) To develop a regulatory framework that addresses issues raised systematically.

The moderator asked the panelists to introduce themselves and the participants to write down their expectations for the workshop.

1.2 Session I: Presentation on the Ethiopian Solar Market Outlook: Opportunities and Challenges

Mr Mekonnen Kassa, Senior Renewable Energy Expert and Consultant presented a presentation on the Ethiopian Solar Energy Market highlighting the following issues for debate:

Market Outlook, Technologies, and Micro-Financing

I. Opportunities

- There are three categories of consumers: households and small businesses, institutions including schools, health centres, etc., and telecom and signaling.
- High demand in off-grid areas for lighting and mobile charging as companies are expanding their markets, supply chains independently with some retail outlets in major towns, new entrants/larger players are emerging in the market and also due to active promotion by private sector agents and/or development bodies in the target market areas.
- Diversifying solar technologies, like solar lanterns for lighting and mobile charging, solar home systems with multiple light points and mobile charging, solar televisions and radios, solar water pumps, water heaters, and refrigerators.
- Payback for solar lanterns without cell phone charging is six to nine months, and with chargers, lower than 15 months.

II. Challenges

- High costs of products and to businesses, high costs of setting up retail outlets in target markets (i.e., off-grid communities);
- Dominating the off-grid market are project-based supplies with fewer companies working with local level service companies (installers and service providers).
- Lack of industry accountability to customers for products and services rendered. There are no government regulations and industry guidelines for self-regulation. This often leads to distrust among end-users when products breakdown after short periods of use.

- The electrification rate of the country is about 23% (88% urban and 5% rural) with an estimated 3.7million households electrified (WMS, CSA, 2012).
- Average off-grid consumer spends around ETB 40-60per month for kerosene (two to three litres) for lighting needs and ETB 30-60per month for mobile charging. With a heavy reliance on fuel-based light sources, kerosene dominates.
- Inadequate off-grid power financing, absence of financial support to the suppliers and distributors of lighting product.;
- The policies and regulatory environment are generally supportive but unaccompanied with specific strategies, regulations and investment plans to ensure scaling up (e.g., Feed-in-tariff have been promised but never realized).

III. Alternative Solutions

- Development and enforcement of appropriate product and technology standards, consumer education on product quality, publicizing minimum standards among stakeholders, enforcement of warrantee certificates and after sales services.
- Assisting development of supply chains.
- Developing varied financing mechanisms for consumers.
- Opportunities of lowering product costs by assessing the margins, FOB costs, freight charges, and taxes/duties.
- Mr Kassa concluded that, while the MoWIE has made tremendous efforts to promote solar technology, there needs a lot more focus on 1) a **National Solar Energy Development Strategy Programme** in collaboration with the solar energy development associations of Ethiopia and 2) initiating a **National Forum** for sector actors to address the challenges of the solar industry.

1.3 Session II: Panel Discussions on the Solar Energy Sector in Ethiopia

These reflections opened up panel deliberations on the workshop theme. Mr Abiy Ashenafi asked the panelists to briefly reflect on the concerns raised by Mr Mekonnen Kassa.



Mr Asres W/Giorgis, Director of the AETPDD-MoWIE informed participants that solar energy technology is the solution for off-grid rural communities and so must be promoted in Ethiopia. In his remarks, he pointed out that government has to give attention to the power sector. However, constraints stemming from the types of technologies imported into the country, the relevance of local production, and the role of private sector players

in solar businesses were issues that must be addressed and the technologies available in the country should be evaluated and developed. He identified the following challenges:

- I. Lack of harmony in the private and public sector efforts to bring about development.
- II. While technology available may be affordable there are problems with import regulations, which do not ensure adequate stocks/supplies.
- III. Lack of infrastructure to transport products to rural communities where the technologies are needed mostly.

Mr Teshale Belihu, Director General of the Ethiopian Conformity Assessment Enterprise (ECAE), remarked on ECAE's effort supported by MoWIE to develop standards for solar technologies and cookstoves and how they have established testing facilities in Addis Ababa and Hawassa. He mentioned that efforts are underway to launch a few more testing facilities in the other regions. MoWIE purchased the testing equipment for ECAE, he added. However, he added that due to lack of awareness, there is low patronage of their services. Additionally, he expressed his worries regarding the increasing numbers of poor quality products dumped in the Ethiopian market that will result in consumer distrust in solar technologies. This issue needs to be tackled by enforcement of standards and testing of products.

Mrs Yemenzwork Gorfu, Development Bank of Ethiopia (DBE) underlined the role of the bank as a development and policy partner to the Government of Ethiopia.

She pointed out that the bank's role in the renewable energy sector is that of a financial intermediary for the MoWIE. It administers credit lines from the World Bank and Global Environment Facility (GEF) loan grant aimed at market development of rural electrification technologies (RET), such as biogas and solar. She said, DBE had so far supported six private sector entrepreneurs, and through their efforts, nearly 250,000 systems will be disseminated under the credit lines. Of these, 8,860 systems have already been disseminated and the remaining 156,256 to be disseminated soon. Additionally, ETB 120 million has been allocated to two microfinance institutions (MFIs) for biogas development.

However, the challenges with micro financing from DBE's experience are:

- I. Poor installation, maintenance, and quality of solar technologies, such as solar water pumps, low repair maintenance when pumps breakdown frequently resulting in end-users defaulting on loans.
- II. Lack of proper management in reclaiming loans from end-users. In most instances, there are no MFI employees assigned to follow-up with funds allocated to local cooperatives. In addition, it is costly for microfinance partners to follow up in remote areas to check how finance is being utilized.
- III. Product affordability coupled with high interest rates stemming from high import taxes makes the finance scheme more costly than beneficial.

She concluded that a clear solution to these financing problems would be to design high-level government strategies for the solar sector drawing from successful lessons from India and other countries.

Mr Samson Tsegaye, Director of the Solar Energy Foundation (SEF), Ethiopia, shared the details about the foundation's Solar Village Electrification Projects in Ethiopia. Adding that, through their efforts, about 30,000 solar home systems have been installed and are still functioning. He added that the focus of the foundation is to bridge gaps between the demand and supply, and to create awareness of solar options in rural areas. He outlined and expanded on the approaches of the foundation:

- I. **Soft loans:** Providing communities with soft loans payable over a period of 6.5 years saw 2,200 solar home systems installed in households in Rhema, Amhara Region. However, he cautioned that solar home systems are more sedentary than stand alone lanterns, and therefore, soft loans could be provided for the former and not for the latter. His reasoning was that the solar lanterns are easier to transport and so more difficult to keep a track. Hence, it is difficult to monitor customers during repayment and could lead to loan defaulting.

- II. The cost sharing approach: The cost-sharing approach was adopted by the foundation to share product costs with end-users. SEF does this to make products more affordable for rural households. In addition, households agree to save money each month after systems are installed for future battery replacements.
- III. Building trust: It is essential to build trust with end-users of these solar products by ensuring product quality and providing after sales services. He added that the foundation always consults the communities they work with and have trained on-site technicians on call to service and repair products.

He identified the poor mainstreaming of federal policies to the regions as a challenge for the foundation.

Mr Dereje Walligne, Chairman of the Ethiopian Solar Energy Association and Manager of Lydetco PLC in his remarks stated that affordability was not really an issue and the payback on smaller systems, such as solar lanterns, was really good. He added that, since solar lanterns require less maintenance and are easy for end-users to operate, they have revolutionized the market and are the most purchased products.

He highlighted the following challenges in his remarks:

- I. Poor implementation of policies and regulations at the federal and the regions. Citing the example of how ECAE ended the import inspection, which waived duty charges on solar products and how this resulted in duty charges being imposed by customs without informing the solar importers.
- II. He proposed having clear roadmaps in such instances for the respective government agencies that clearly identify roles and responsibilities to help avoid any confusion and clarify the certification process. He proposed for contracts of larger PV systems to include a maintenance plan for up to five years.

Regarding the certification, he felt that the ECAE does not have to repeat tests on already certified products (e.g., Lighting Africa certified products) but should rather focus on uncertified products on the market.

Mr Debajit Palit, Associate Director, Social Transformation Division and Lighting a Billion Lives Campaign, TERI shared the case India. He remarked that the market in Ethiopia, particularly the off-grid market, is huge but untapped. He added that there is a need to shift the focus of discussions from only product quality to also include possibility of diversifying technologies, including imported ones, for better consumer choices and mainstreaming solar products on the market. He made the following observations:

- I. There are market development challenges, whereby most solar distributors are part-time distributors of other products. The problem with these part-time solar distributors is that they are majorly based out of the main cities with no distribution channels focused in the rural areas. He proposed that there should be more mainstream solar distributors solely focused on growing businesses and nurturing the market.
- II. The government could ensure diversity of solar product imports if issues with foreign currencies, ambiguity around import duties/surcharges, and the long processes of certification and inspection are clarified.

He proposed the following solutions:

- I. For the Government of Ethiopia to support the development of solar entrepreneurs by offering entrepreneurial trainings for the rural markets and for DBE to allocate capital loans to support this.
- II. He proposed trainings on solar technologies for custom officials and relevant government agencies to ensure a more efficient inspection and certification process.

Dr Araya Asfaw concluded the panelists' remarks with the following recommendations:

- I. It is important to share experiences of other countries, such as Kenya and India.
- II. Solar is not competitive with large-scale power production but has a lot of potential for small-scale power generation. Hence, it has huge potential for off grid households.

Mr Abiy Ashenafi invited the participants to reflect on the issues raised by the panel.

Standards and Certification: The participants concurred that the current solar lighting standards are difficult to comprehend, suggesting that developing Ethiopian Standards should adapt to local conditions. According to the participants, ECAE will need to simplify their testing standards, stating clearly what tests need to be conducted and the timeframe between testing and certification. They noted that standards should be simplified to make them easier to understand from the federal to regional level.

Mr Teshale agreed with the suggestions stating that ECAE was in the process of reviewing the old standards and will need support from the public, particularly from the Ethiopian Solar Energy Associations and sector actors to set standards that prevent low quality products from the market.

Financing: Participants shared experiences of the unwillingness of microfinance institutions to avail credit lines for solar systems, while limiting access to financing to biogas technologies. The MFI responded stating the challenge for them was that the end-users are defaulting on loan payments due to low-efficiency and low-quality products, and lack of after sales maintenance when solar systems break down. Also the interest rates imposed on the systems make them too expensive for end-users. For instance, the BE sets interest rates at 6% for microfinance agencies and they intend to increase it to 15% interest rate for end-users.

Market Development and Policies: Both the panelists and participants agreed that developing the market could lead to more job creation for retailers and technicians. Also, by regulating policies to ensure local installations and assembling could add value to the market and build local capacities. Furthermore, creating supply chains and retail outlets in rural towns could lead to the sustainability of solar projects. The issue of product affordability was raised, but Mr Dereje Walligne emphasized that with the varied products in the market, consumers can choose products that are affordable to them with diversified technologies. Emphasis should be made on making foreign currency available to aid importation of products.

Product Recycling: The participants also added the importance of recycling old solar systems and battery replacements.

Mr AsressW/Giorgis reiterated the relevance of solar technologies for the country, reflecting on the relevance of the discussions. He added that the government is aware of these challenges and that as Ethiopia develops, policy and development must be in harmony.

Following these discussions, participants were asked to breakout into three working groups to address the salient points raised by the panelists and to come up with more detailed ways d highlighting priority areas for immediate action.

1.4 Session III: Working Groups Discussion

Working Group I: Policy, Legal and Regulatory Frameworks of Solar Technology



The group chaired by **Mr Asress W/Giorgis** was tasked to review the opportunities, challenges, and solutions under the sub-themes:

A. Business Development and Support

I. Opportunities

- Huge potential in off-grid markets for lighting and mobile charging;
- Waiving import duty fees and taxes on solar products to make products more affordable to consumers most of whom are rural.

II. Challenges

- Ambiguities in implementing the duty fee waivers have implications on product affordability. Opportunities such as local assembling and manufacturing that leads to job creation and value additions are not import tax exempted;
- Regulations surrounding the foreign currency make it difficult for importers to ensure continuous products supply;
- Lack of investors in this sector and also inadequate financial and technical capacity of stakeholders.

III. Alternative Solutions

- Adopting policies, which ensure value additions such as, product assembling and local manufacturing that are rewarded with tax exemptions. This should include discussion with state agencies, such as the Ministry of Finance and Economic Development (MoFED), customs authority agencies, and with Ethiopian Energy Authority among others.
- Waiving value-added tax (VAT) on solar imports to make products more affordable.
- More integrated promotional activities are required.
- Government support in the form of entrepreneurial trainings and startup capital for small businesses to enter solar market.
- Availing foreign currency and loans to solar businesses to import products so as to maintain adequate stock throughout the year.

B. Product Quality and Standards

I. Opportunities

- Ethiopian Standards Agency (ESA) and its subsidiary ECAE are in the process of preparing the draft document on Ethiopian Standards and protocols for the testing labs. With ECAE responsible for enforcing quality standards and recognized certification through inspection and testing services for exporters, producers, service providers, regulatory bodies, consumers, and importers.

II. Challenges

- The current standards do not test the efficiency of solar technologies, such as, solar water pumps and solar water heaters.

III. Alternative Solutions

- Policy dialogues are required among key stakeholders to contribute to the standards being set and to ensure that the ranges of solar technologies available in the market are captured in the standards document.

Working Group II: Marketing and Finance

Mr Samson Atsbha, Department Head, GIZ ECO chaired the session addressing the opportunities, challenges, and solutions of the solar market and financing.



The group discussed at length and concluded the following:

A. Market Outlook

I. Opportunities

- High demand in off-grid areas for solar systems with dual purpose of lighting and mobile charging
- There are markets for solar technologies that support radio and TV;
- Partnerships with MFIs to provide soft loans to the organized consumer groups.

II. Challenges

- Low quality and non-existent after-sale services often builds distrusts in products when the products breakdown after a short period of usage.
- Product affordability and appropriate financing solutions.
- Loan mismanagement is a major concern.

III. Alternative Solutions

- To deal with affordability and financing solutions. Market segmentation was suggested to identify the communities' needs and where necessary subsidies or soft loans should be given
- Building local capacities in rural communities to provide after sales services in the form of basic repair and maintenance.
- Creating an enabling environment for MFI involvement.

B. Marketing, Distribution and Financing

I. Opportunities

- Leveraging the existing market systems, working with regional energy bureaus, and pre-existing retail networks to promote solar technologies.
- Building linkages with stakeholders in the health and education sectors in rural towns to promote renewable technologies.

II. Challenges

- Marketing and promotional costs are often too high for distributors/solar business importers.
- There is a subsidy or no subsidy dilemma, which often creates confusion among consumers and suppliers. This may lead to market spoilage.
- Lack of adequate finance models.

III. Alternative Solutions

- Diversifying product loan portfolios by micro-finance such as loans for agriculture supplies to include solar technologies.
- Reviewing best practice models, such as, “pay as you go” by MKOPA in Kenya among others. Also, built remote monitoring devices in solar systems to monitor loan payments and discontinue systems when end-user defaults. Create revolving funds for battery and product replacement.

Working Group III: Technology



The group chaired by **Mr Mesfin Shimeles, Technical Director, ERE PLC** was tasked with deliberating appropriate solar technologies for Ethiopia. The group came up with the following:

A. Technology Adaptation & Disposal (including product recycling/battery replacement)

I. Opportunities

- The technologies available, such as solar lanterns and solar home systems are user friendly, easier to disseminate, and operate. On the other hand large photovoltaic modules require qualified technicians to install. Providing technical support after installation open opportunities for job creation.

II. Challenges

- With no strict regulations on battery disposal, end-users may randomly dispose the batteries and endanger their health and pollute the environment with battery-operated systems (BOS).
- Limited services and unavailability of spare batteries, bulbs, and other parts to replace the old systems;
- High installation costs to end-users coupled with poor installation services for large PV systems and solar home systems (SHS).

III. Alternative Solutions

- Establish waste management/recycling for BOS disposal and to create awareness during promotional activities about the disposal of the solar products.
- Develop capacities of local technicians to replace batteries for repairing and maintenance.
- Enforcement of quality standards and control the market to eradicate substandard products.

1.5 Wrap-up and Key Messages

The participants agreed that meeting primary (basic) energy needs of basic lighting and secondary needs of off-grid communities should be priority for all. The stakeholders present in the workshop represented the key players in the sector and considered their contributions instrumental to drawing the following priority areas:

- I. Creating a forum for the relevant actors in the solar market to meet and exchange knowledge on the solar industry.
- II. Initiating the structures through which relevant issues are identified and addressed by the relevant bodies.

Other specific issues were:

- I. Setting quality standards and control for products and services.
- II. Market development through capacity building of retailers and technicians with value additions from local assembly. Installations, maintenance, and repairs should be supported by government, NGOs, and bilateral agencies.
- III. The question “**Is financing an issue?**” was raised and the following points were made:
 - The approach by some NGOs among others giving away products for free to rural households is not sustainable;
 - Most rural people could afford solar products. However, they prefer to buy on credit because they do not trust the sellers and/or products they are buying. The loan gives them a chance to see if the product is worth their money. However, there are the “poorest of the poor” in the rural communities that could benefit from subsidy supports to purchase systems.
 - Solar lanterns are affordable, however, solar home systems are often expensive, and hence, loans are given to purchase SHS. However, interest rates on loans are still high and could burden end-users. Loans on SHS are payable from six to seven years at 100 birr per month compounded with VAT and a 7.5% interest rate. Thus acts as a burden for the consumer;
 - Adopting installment payment schemes such as, the revolving fund approach, whereby, systems are controlled remotely and switched off when loans are unpaid is beneficial.
- IV. Disposal of BOS through proper waste management treatment systems should be discussed at the onset of dissemination and must be the responsibility of the supplier.

Recommendations

The participants proposed to set up a national solar technology forum chaired by a steering committee (SC) that comprises all stakeholders present. The SC will set up three thematic working groups on the areas discussed at the workshop. The mandate of the forum will be committed to scaling up the solar energy access in off-grid areas by identifying areas of interventions.

Discussion of the forum was moved to the next day. Participants agreed to reconvene on the Day 2 to deliberate over the members for the forum and the governing by-laws.

2. MAIN OUTCOMES

The Regional Energy Bureaus shared experiences from their regions by raising the following issues:

- I. Huge demand for solar technologies in rural areas, however, there is an absence of reliable products and suppliers in these rural areas.
- II. Inadequate maintenance capacities and no after sales services.
- III. Most often solar companies approach regional energy offices to recommend them to the respective rural communities. The regional energy bureau does not have the mandate to do this.

- IV. Installed solar facilities are not operational (Somalia Region, Gambela), there is not enough local ownership.
- V. The solar business is based on project and therefore based on the specification of the project. Too many buyers set the specific technical specifications instead of complying with the set national standards;
- VI. Companies are not responsible for the functioning of the system, but only the installation. Installations need to take the local circumstance into consideration
- VII. There are no follow-ups and coordination with the local regional bureaus. Often the regions are informed late.
- VIII. Installations should be done by taking the local circumstance into consideration.

2.1 Ways Forward and Inter-Institutional Collaborations

The participants reconvened on day two to deliberate over the members of the forum and the governing by-laws. The workshop concluded with two key outcomes:

- I. **Formation of the Solar Energy Technology Forum** (Refer to Annex IV): The members of the steering committee were elected, including the MOWIE (as Chair), HoA-REC&N (as secretariat), private entrepreneurs, DBE, GIZ, ECAE, Solar Energy Foundation, Ethiopian Solar Energy Association, and Regional Energy Bureaus (on a rotating basis in every two years with the first four regional bureaus to be nominated by the MoWIE), microfinance association, and the Ministry of Finance.
 - On financing the forum's meetings, Dr Araya Asfaw suggested that HoA-REC&N as the secretariat would raise the funds needed to ensure that the forum is operational.
 - Mr Abiy Ashenafi reviewed the draft by-laws prepared by Mr Mekonnen Kassa with the participants. These by-laws outlined the roles and responsibilities of the steering committee chair, secretariat, and the members in the decision making process. The group endorsed this after some minor suggestions, such as the composition of the forum.
 - The steering committee divided into three working groups, is scheduled to meet once every quarter to deliberate on the issues concerning solar technology in Ethiopia.
- II. It was agreed by all that **the National Solar Forum** shall reconvene annually to track the progress and to prepare a series of policy briefs under the three working groups.
 - Dr Araya concluded the workshop by thanking all the participants and accepted HoA-REC&N's role as secretariat of the forum. He stressed that we could only solve the problems in the sector through collaborative partnerships with all solar players. He added that HoA-REC&N was committed to adopt low carbon technologies, pointing out that the workshop's venue is a green building, which will have solar installations such as solar water heaters and solar cookstoves.
 - He hoped that by partnering with TERI, there would be knowledge exchanges that will benefit and advance Ethiopia's solar industry.
 - Mr Asress W/Giorgis acknowledged all the participants and assured them of the SC's commitment of serving them and the industry.

ANNEXES

Annex I: Programme

Day 1: May 19, 2014

9:15 am – 9:30am	Registration and Coffee/Tea
9:30 am – 9:40am	Programme Introduction Mr Abiy Ashenafi, Senior Consultant, HoA-REC&N
9:40 am – 9:50 am	Welcome Address Dr. Araya Asfaw, Executive Director, HoA-REC&N
9:50 am – 10:10 am	Inaugural Address H E Mr Kebede Gerba, State Minister, Ministry of Water, Irrigation & Energy
10:10 am – 10:20 am	Participants Introduction
10:20 am – 10:40 am	Photo Session and Tea/Coffee Break/Solar Products/Companies Exhibition
10:40 am – 10:50 am	The Ethiopian Solar Market: Status, Challenges and Outlook Mr Mekonnen Kassa, Consultant and Expert on Renewable Energy Technologies
10:50 am – 11:50 am	Round-table Discussion: Solar Technologies Dissemination in Ethiopia: Opportunities and Challenges Moderator: Mr Abiy Ashenafi Panelists: Mr Asres W/Giorgis, Ministry of Water, Irrigation & Energy Mr Debajit Palit, Associate Director, TERI Mr Dereje Walligne, Chairman Ethiopian Solar Energy Association Mr Samson Tesgaye, Solar Energy Foundation Ethiopia, Country Director Mrs Yemanzwork Gorfu, Development Bank of Ethiopia Mr Belihu Teshale, Ethiopian Conformity Assessment Enterprise, Director Dr. Araya Asfaw, Executive Director, HoA-REC&N
11:50 am – 12:30 am	Q&A: Panelists and Participants
12:30 pm – 12:45 pm	Working Groups
1:00 pm – 2:00 pm	Lunch
2:00 pm – 3:15 pm	Breakout Sessions: Guiding Principles and Working Group Discussions, Mr Mekonnen Kassa, Mr Fitsumbrhan Tsegaye
3:15 pm – 3:40 pm	Tea/Coffee Break
3:40 pm – 4:00 pm	Presentations: Working Groups
4:00 pm – 4:30 pm	Conclusions /Ways Forward
4:30pm – 5:30 pm	Drinks/Informal Meetings

Day 2: May 20, 2014

9:30 am – 10:00 am	Registration/Refreshment
10:00 am – 11:00 am	Follow-up Discussion
11:00 am – 12:00 pm	Exhibition
12:30 pm – 1: 30 pm	Lunch
1:30 pm	Departure

Annex II: References

- Scaling-up Renewable Energy Program, Ethiopia Investment Plan, January 2012.
- Federal Democratic Republic of Ethiopia, Ministry of Water & Energy.
- Climate Resilient Green Economy Strategy (CRGE).
- Growth and Transformation Plan (GTP).
- Lighting Africa, Policy Report Note Ethiopia. 2012
- Lighting Africa Program. Ethiopia Market Intelligence. June 2013 (Unpublished)

Annex III: Participants List

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Annex IV: Terms of Reference for the Steering Committee

I. Background

The Ethiopian Solar Energy Forum (ESEF) is a national platform that will bring together policy makers, regulators, industry, experts, and consumers to exchange and share their experiences and to discuss the challenges encountered and other emerging issues in solar energy development in Ethiopia.

The aims and objectives of the ESEF are as follows:

- Identify the barriers (technical, financial, policy, etc.) and emerging issues for sustainable solar energy market development and recommend actions to the relevant bodies.
- Facilitating transfer of knowledge between policy makers, regulators, industry executives, and experts through regular meetings, workshops, and other events.
- Support, enhance, and promote business opportunities for solar energy technologies and products through exhibitions, trade fairs, and other events.
- Promote knowledge sharing and communication in the solar energy field
- Competitions and awards promoting solar energy.
- Collaborate with national and international organizations to advance the solar energy development in Ethiopia.

The ESEF is governed by the Steering Committee, whose members are elected by the Forum membership. The Steering committee will implement the decisions of the General Assembly of the Forum.

II. Role of the Steering Committee

The Steering Committee will be responsible for the management of the Ethiopian Solar Energy Forum. The specific roles of the Committee are as follows:

- Develop and implement specific actions (studies, research, panel discussions, workshops, meetings, exhibitions, trade fairs) to achieve the objectives of the Forum.
- Ensure that effective and inclusive consultation processes are established to maximize the engagement and participation of stakeholders in the implementation of specific actions.
- Appoint ESEF Technical Committee members and establish working groups to deal with specific tasks that might be needed to support the work of the Steering Committee.
- Implement any other activities that may be required to achieve the ESEF objectives.

III. Responsibilities of the Steering Committee Chair

The responsibilities of the Steering Committee Chair are as follows:

- Coordinate meetings and sets the agenda for each meeting.
- Ensures that agendas and supporting materials are delivered in advance to the members of the meetings.
- Makes the purpose of each meeting clear to members and explains the agenda at the beginning of each meeting.
- Clarifies and summarizes what is happening throughout each meeting.
- Keeps the meeting moving by putting time limits on each agenda items and by keeping all meetings as short as possible.

- Encourages broad participation of the members in discussion.
- Ends each meeting with a summary of decisions and assignments.
- Follow-up the performance of the Technical Committee and Working Groups and inform the Steering Committee members thereof.
- May invite members of the Technical Committee and Working Groups, consultants and other experts to provide relevant information, material, or knowledge to the Steering Committee if necessary.
- Shall submit regular reports on progress to the General Assembly of the Forum.

IV. Responsibilities of the Steering Committee Secretary

The responsibilities of the Steering Committee Secretary are as follows:

- Prepare and issue notices for meetings.
- Keep minutes of each of its meetings in which the following must be recorded:
 - Date, time, and place of the meeting
 - The names of the members present
 - A summary of every decision taken at the meeting
 - If a member requests, the fact that he or she voted against any decision taken.
- Ensure that documents are made available to Steering Committee members three to five days in advance of a Steering Committee meeting. These documents will include the following:
 - Agenda for upcoming meeting
 - Minutes of previous meeting
 - Any other documents/information and reports to be considered at the meeting.
- Minutes will be taken at each meeting and confirmed at the following meetings. All corrections to minutes must be tabled at the meeting.
- HoA-REC&N will provide secretariat services for the Steering Committee. The specific secretarial functions include producing documentation and meeting minutes, managing correspondence, information management/dissemination and other related tasks.

V. Responsibilities of Steering Committee Members

Individual Technical Committee members have the following responsibilities:

Understand the goals and objectives of the ESEF.

Actively participate in meetings through attendance, discussion, and review of minutes, papers and other Technical Committee documents.

Support open discussion and debate, and encourage fellow Steering Committee members to voice their insights. Always be present in all the Committee meetings.

7. General

- **Membership** : Members of the Steering Committee are elected by the General Meeting of the ESEF based on their ability to represent the interests of stakeholders, their specialist knowledge in the sector, and their ability to help resolve issues that emerge in solar energy development. The table below lists the membership of the Steering Committee and their respective positions.

Organization	Position in the Steering Committee
Ministry of Water, Irrigation, and Energy	Chair
Ethiopian Solar Energy Association	Member
Association of Ethiopian Micro finance Institutions	Member
Solar Energy Foundation	Member
Ethiopian Conformity Assessment Enterprise	Member
Development Bank of Ethiopia	Member
GIZ-ECO	Member
Regional Energy Bureaus (on a rotating basis every two years—The first four regional bureaus to be nominated by the MoWIE)	Member
Horn of Africa Regional Environment Center and Network (HoA-REC&N)	Secretary

7.2 Quorum and Decision-making

7.2.1 Quorum

To approve a decision, the Steering Committee will require a quorum of six members.

7.2.2 Decision-making Process

In principle, the Steering Committee will make decisions based on consensus. If consensus is not achieved, a simple majority vote will be taken. If the votes are divided 50–50, the chair of the Committee shall have the casting vote.

7.2.3 Frequency of Meetings

The Steering Committee shall hold its regular quarter meetings on the first Tuesday of the first week of each quarter. The Chair of the Committee, as deemed necessary, may call special meetings at any time.

8. Modifications to Terms of Reference

Modifications to these Terms of Reference may be proposed and adopted at any meeting of the Steering Committee.



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