



**ECOWAS Hands-On Training:
Renewable energy (hybrid) mini-grid systems
for rural electrification in West Africa**

Presentation and discussion of:

ECREEE Rural Electrification Program 2015-2020

UNIDO-ECREEE GEF-5 Project "Promoting investments into small and medium sized renewable energy technologies in the electricity sector of Guinea Bissau"

ECREEE-UNIDO GEF-6 proposal for a regional program on renewable energy (hybrid) mini-grids

Azalai Hotel (24 de Setembro), Bissau, Guinea Bissau

Date: 09 – 12 March 2015

Co-Organizers



Co-funded by



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1. Introduction

The ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), the United Nations Industrial Development Organization (UNIDO) and the Government of Guinea Bissau are organizing a Hands-on Training on Renewable Energy (Hybrid) Mini-Grid Systems for Rural Electrification in West Africa, from 09 to 12 March 2015 in Bissau, Guinea Bissau. The training is undertaken in the context of the GEF Project “Promoting investments into small and medium sized renewable energy technologies in the electricity sector of Guinea Bissau” and the development of a regional renewable energy mini-grid project for the entire ECOWAS region.

This initiative aims of promoting the contribution of renewable energy technologies to the regional rural electrification program, enhance the understanding of the different technologies solutions and financial schemes necessary for the complete development of the different phases of a renewable energy rural electrification project. The expected impact is an increase in the number of local stakeholders able to design, implement and maintain renewable energy rural electrification projects in all ECOWAS Member States, and an increase number of RE rural electrification project implemented in the region.

Back-to-back to the regional training, it will carried out the presentation and discussion of:

- ECREEE Rural Electrification Program 2015-2020
- UNIDO-ECREEE GEF-5 Project “Promoting investments into small and medium sized renewable energy technologies in the electricity sector of Guinea Bissau”
- ECREEE-UNIDO GEF-6 proposal for a regional program on renewable energy based (hybrid) mini-grids

On 9th March a common opening ceremony will be held. After the opening the participants of the Mini-Grid Training and the official launch of the GEF-5 Project will continue in different conference rooms. The GEF-5 workshop will be only held in Portuguese.

2. Background

Most of the ECOWAS population lacks access to electricity, with less than 50% of the population in ten out of fifteen countries in the region having electricity access. The situation is even more dramatic in rural areas where, across the whole ECOWAS region, only 8% have access to electricity. Rural electrification in the ECOWAS region presents contrasting situations amongst different countries, in terms of access to power services in rural areas, institutional framework of the sub-sector and technical and business models to extend service.

Huge differences exist in terms of access to electricity between urban and rural areas within the same country and amongst different Member States. In six countries (Burkina Faso, Guinea, Liberia, Mali, Niger and Sierra Leone) access to electricity in rural areas is below 5%, while it exceeds 35% in five countries (Cape Verde, Cote d'Ivoire, Ghana, Nigeria and Senegal). In Sierra Leone only 9% of total population and 1% of rural population have access to electricity, while in Ivory Coast about 60% of population have access to electricity, with almost 40% of rural population with access.

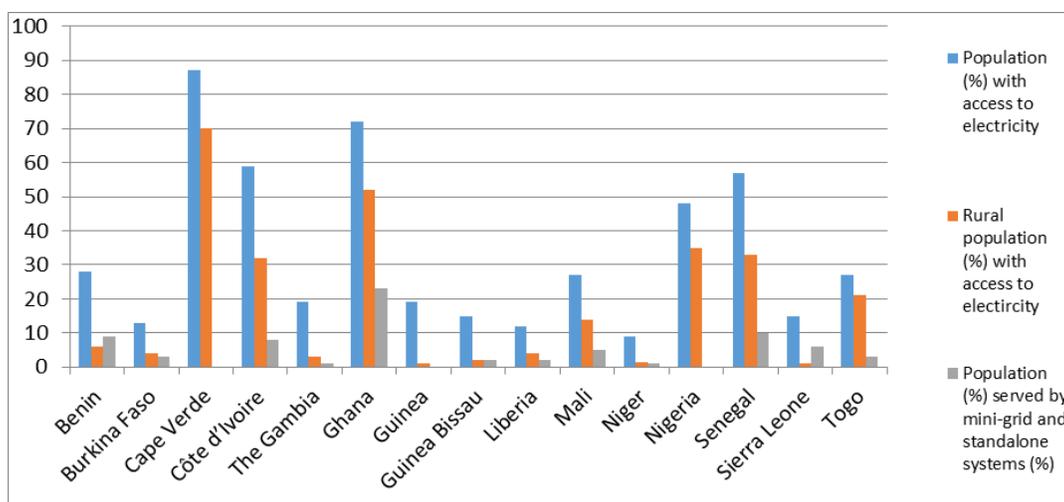


Figure 1 - Data from ECOWAS Renewable Energy and Energy Efficiency Status Report (REN21, forthcoming) and Final Regional Development and Implementation (ECREEE, forthcoming). Data on population served by mini-grid and standalone systems not available for Cape Verde and Nigeria.

The ECOWAS/UEMOA White Paper on access to energy services targeted 36% of the rural population to have access to electricity and 60% of the rural population to live in localities with access to electrified social services (health, education, water supply, street lighting) by 2015. These targets are a long way from being met.

Grid extension is often seen as first option for electrification across most ECOWAS member states. However, because 75% of the population without electricity in the region lives in rural and often remote areas, grid extension in the near future remains economically unrealistic. Within this scenario, mini-grids and stand-alone solutions are often the most suitable option for providing electricity to rural populations.

The ECOWAS Renewable Energy Policy, adopted by the Heads of State in Jul 2013 in Abuja, sets ambitious targets for the share of renewable-energy based mini-grids and stand-alone systems in the electricity supply to rural areas of the Member States by 2020 and 2030. The ECREEE Rural Electrification program (ERuReP) 2015-2020, a component of the ECREEE Access to Improved Energy Services (EAIES) initiative, is thus created to contribute to the achievement of these goals supplying 25% of rural population with mini-grid and stand-alone systems through:

The implementation of ~ 60,000 mini-grids between 2014 and 2020 for a total capacity of 3,600 MW in order to serve 71.4M people for a total investment of €13.2 Billion across six years. This would be ~€ 2.2 billion per year, which represents less than 0.5% of ECOWAS current nominal GDP of € 540 billion.

These systems will complement extension and intensification of the grid to bring about the desired universal access by 2030, in line with the SE4ALL goals.

However, achieving these targets across all Member States will require a consistent approach that draws on best practice in the region and internationally. While each Member State will have to develop its own approach and programme it should not be necessary for each to have to search for the best solutions, business models and technology. ECREEE has an important role in supporting the Member States to learn from their experience, draw on international best practice and to share this knowledge and to help secure financing to achieve the objectives across the region.



The table below presents a synthesis of the regional status in regards to the existing policy environment for the achievement of EREP objectives.

	Benin	Burkina Faso	Cabo Verde	Côte d'Ivoire	Gambia	Ghana	Guinea	Guinea-Bissau	Liberia	Mali	Niger	Nigeria	Senegal	Sierra Leone	Togo
Current rural electrification status	Red	Red	Green	Yellow	Red	Yellow	Red	Red	Red	Red	Red	Yellow	Yellow	Red	Red
Targets for rural electrification	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red
Existing policy, legislation and plans	Yellow	Yellow	Green	Yellow	Yellow	Green	Yellow	Yellow	Green	Green	Yellow	Green	Green	Yellow	Yellow
Instruments in place	Yellow	Yellow	Green	Red	Yellow	Yellow	Red	Red	Red	Yellow	Red	Green	Green	Red	Red
Status of SE4ALL action agenda	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red

Figure 2 Green, yellow and red represent respectively high, medium and low progress to achieve EREP targets

3. Workshop Objectives

The main objectives of this workshops are:

- Reinforcing the capacities among ECOWAS member states of public and private stakeholders on technical, economical and policy aspects for the promotion, implementation, management, operation and maintenance of clean energy and hybrid mini-grids; particularly strengthen the capacities of key stakeholders from Guinea Bissau;
- Promote experiences exchange among ECOWAS member states on clean energy and hybrid mini-grids
- Present and discuss:
 - ECREEE Rural Electrification Program 2015-2020
 - UNIDO-ECREEE GEF Project “Promoting investments into small and medium sized renewable energy technologies in the electricity sector of Guinea Bissau”
 - Joint ECREEE-UNIDO proposal for a regional program on clean-energy mini-grids co-funded by GEF 6 and other partners

In particular, activities and actions strive to:

- Enhance understanding of regional stakeholders on the technical, economical and policy aspects for the promotion, implementation, management, operation and maintenance of renewable energy (hybrid) mini-grids
- Facilitate the understanding of the peculiarities associated to each renewable energy source i.e. solar, wind, biomass, hydro
- Showcase viability of renewable energy (hybrid) mini-grids by visiting the Bambadinca system
- Provide an overview on available policies and regulatory mechanisms to promote clean energy and hybrid mini-grids



- Provide information on the advancement on renewable energy (hybrid) mini-grid promotion in the region
- Inform and gain participants feedback on ECREEE Rural Electrification Program 2015-2020 and Joint ECREEE-UNIDO proposal for a regional project on renewable energy (hybrid) mini-grids co-funded by GEF 6

4. Workshop Results

It is expected that the training workshops will produce the following practical results:

- The participants will enhance their knowledge on technical, economical and policy aspects for the promotion, implementation, management, operation and maintenance of clean energy and hybrid mini-grids
- The participants will identify and apply the most suitable mechanism to promote clean energy and hybrid mini-grids in their countries.
- The participants will understand the peculiarities of clean energy and hybrid mini-grids
- Strengthening of cross-country networking on clean energy and hybrid mini-grids

5. Participants

It is expected that over twenty participants (2 from each Member State) drawn from the competent public institutions i.e. Rural Electrification Agencies, Ministries of Energy and the private sector will actively participate to the workshop.

6. Organizers

The Workshop is organized by:

- ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)
- United Nations Industrial Development Organization (UNIDO)
- Ministry of Energy and Industry of Guinea Bissau

7. Date and Venue:

- Date: 09 – 12 March 2015
- Venue: Hotel Azalai, Bissau (09,10 and 12 March) and Bambadinca (11 March), Guinea Bissau

8. Interpretation

- Interpretation in English and French will be provided



Responsible ECREEE staff:

- Jansenio Delgado, ECREEE Capacity Building Program Coordinator
- Nicola Bugatti, ECREEE Rural Electrification Program Coordinator

Responsible UNIDO staff:

- Martin Lugmayr, UNIDO Sustainable Energy Expert and GEF Project Manager
- Gentjan Sema, UNIDO Project Assistant

Responsible staff at the Ministry of Energy and Industry:

- Biabé Sigá, ECREEE Focal Point
- Júlio António Raul, National GEF Project Manager



9. Program

Monday, 09 March 2015	
08:00 – 08:30	<p>Registration together with the ECOWAS participants of the “Hands-On-Training on renewable energy mini-grid (hybrid) systems for rural electrification”</p>
08:30 – 09:00	<p>Official opening together with the participants of the Hands-On-Training H.E. Mr. Domingos Simões Pereira, Prime Minister of Guinea Bissau (tbc) H.E. Mr. Florentino Mendes Pereira, Minister of Energy and Industry (tbc) H.E. Mr. Daniel Gomes, Ministry of Environment and Natural Resources (tbc)</p> <p>Welcome Addresses: H.E. Ms. Maria do Valle Ribeiro, United Nations Deputy Special Representative and United Nations Resident Coordinator in Guinea-Bissau Mr. Mahama Kappiah, Executive Director of ECREEE Mr. Martin Lugmayr, Sustainable Energy Expert, Energy Branch, UNIDO</p>
	<p>Photo of participants</p>
09:30	<p>Introduction of the participants, presentation of the program (ECREEE)</p>
09:45	<p>Basics on renewable energy (hybrid) mini-grids (Trainer), Q&A</p>
10:15	<p>ECOWAS renewable energy (hybrid) mini-grids regional targets, overview of the current situation, results of the last EREF call (ECREEE), Q&A</p>
10:30	<p>Renewable energy (hybrid) mini-grids project cycle (Trainer) , Q&A</p>
11:00	<p>Coffee Break</p>
11:30	<p>Demand assessment: practical exercise to design a simple Excel tool to quantify the load demand curve (Trainer)¹</p>
12:30	<p>Renewable energy resources assessment: sources of information and methodologies (Trainer) , Q&A</p>
13:00	<p>Lunch</p>
14:30	<p>Sizing and pre-feasibility: overview and demonstration of HOMER and other softwares (Trainer) , Q&A</p>
15:30	<p>Coffee break</p>
16:00	<p>Engineering: experience based tips and hints (Trainer) , Q&A</p>
17:30	<p>Summary of the 1st day</p>

¹ Each participant will have to use its own computer and be familiar with Excel



Tuesday, 10 March 2015

08:30	Demand Side Management, Metering and Control: different solutions (Trainer) , Q&A
09:30	Management, Operation and Maintenance systems: characteristics of different models (Trainer)
10:30	Coffee break
11:00	Burkina Faso approach to Management, Operation and Maintenance (FDE), Q&A
11:30	Economic analysis of mini-grids: CAPEX, OPEX and Tariff setting (Trainer) , Q&A
13:00	Lunch
14:30	Senegal approach to tariff (ASER) , Q&A
15:00	Commercial and Financial viability of clean-energy mini-grids, the role of subsidies (Trainer) , Q&A
15:30	Coffee break
16:00	Commercial and Financial viability of clean-energy mini-grids, the role of subsidies (Continued) (Trainer) , Q&A
16:30	Different policies for clean energy mini-grids promotion (ECREEE)
17:00	Mali policy framework for clean-energy mini-grids (AMADER), Q&A
17:30	Summary of the 2 nd day

Wednesday, 11 March 2015

08:00	Transfer to Bambadinca
10:00	Presentation of the project (TESE) , Q&A
11:00	Visit to the Bambadinca solar PV hybrid mini-grid: technical aspects (TESE)
13:00	Lunch
14:30	Management, Operation and Maintenance system (Bambadinca community association) , Q&A
16:00	Return to Bissau

Thursday, 12 March 2015

08:30	ECREEE Rural Electrification Program 2015-2020: presentation and discussion (ECREEE)
11:00	Coffee break
11:30	Presentation on the joint ECREEE-UNIDO proposal for a regional GEF-6 project on renewable energy



13:00	and energy efficient (hybrid) mini-grids in the ECOWAS region
	Discussion
13:30	Evaluation of Workshop quality, handing out of certificates and closure of the workshop
	Lunch



Workshop Secretariat

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