Country	Togo
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Title	Technical Assistance for the Dissemination of Solar Energy Technology in Togo
Type of document	Deliverable 4: Training outcome report on capacity building workshop
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March 04, 2021

Implemented by:

Institute for Global Climate Change and Energy

1. INTRODUCTION

On Thursday, February 4th, 2021, the training workshop on the dissemination of solar energy technology in Togo was held in the conference room of Relais de la Caisse hotel in Lomé. This workshop aimed at training actors on the development of solar PV energy projects and drafting concept notes to secure financing for solar energy projects. The workshop was attended by representatives from the private sector, civil society organization, and public sector, including those from the Ministry of the Environment and Forest Resources and Ministry of Mines and Energy. The list of participants has been attached in the appendix below. The training workshop was divided into 5 phases: (i) the opening ceremony, (ii) the presentation of a welcome video message from the Director of the Institute for Global Climate Change and Energy (IGGCE) (iii) video PowerPoint presentations (iv) question and answer session (v) recommendations.

1.1. Opening ceremony

The opening ceremony was marked by a word of welcome from the National Designated Entity, Ms. YAOU Mery, who doubles as the Head of the Climate Change Division, Ministry of Environment, Togo (Fig. 1). Ms. YAOU pointed out that the Director of the Environment was to take part in the opening ceremony of the workshop but due to an urgent call, he could not be present at the opening ceremony. She then applauded the diversity of the actors present at the workshop, underlining that despite the current COVID-19 pandemic, the participants put up sincere interest in energy, and in particular clean and renewable energy, which contribute to the protection of the environment and the fight against climate change. She recalled that the workshop is part of the initiative of the government of Togo to mitigate greenhouse gas (GHG) emissions through the promotion of solar energy systems with a technology that is accessible, affordable, and sustainable to the most vulnerable populations. She also recalled the role of renewable energy in achieving the commitment set by the government of Togo in its nationally determined contributions (CDNs). Also, regarding the contribution of the energy sector in mitigating GHGs in Togo, she highlighted fundamental barriers, including technological barriers and the low purchasing power of energy by the population (poverty and economic accessibility of modern energy services). She suggested that recommendations would be formulated at the end of the workshop to improve the implementation of the said project and the living condition of the Togolese populations. After the opening ceremony Mr. Dodji AGBEZO, one of the field consultants of the project presented the general modalities of the training program (Fig. 2).

Figure 1. Welcome speech from the National Designated Entity

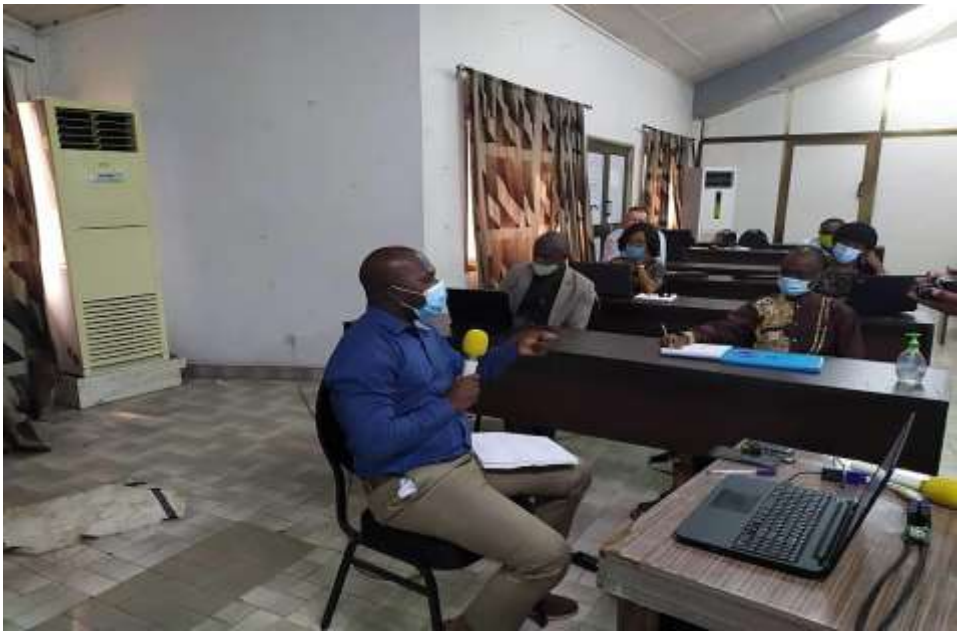

Figure 2. Presentation of training modalities by the field consultant

1.2. A video message from the Director of the Institute for Climate Change and Energy

The Director of IGGCE first welcomed participants to the training program (Fig 3). He was delighted with the opportunity offered to him to speak with the participants of the workshop while believing that all are doing well in this time of the COVID 19 pandemic. He pointed out

that the training workshop is part of the technical assistance program implemented by the Institute for Global Climate Change and Energy, Kyungpook National University in South Korea, and supported by the Climate Technology Center and Network (CTCN), and the Korean government. He expressed regrets that the implementation team could not travel to Togo due to the COVID-19 pandemic. Also, he said that the objective of this training program is to equip participants with enough knowledge to enable them to develop national projects in the field of renewable energy.

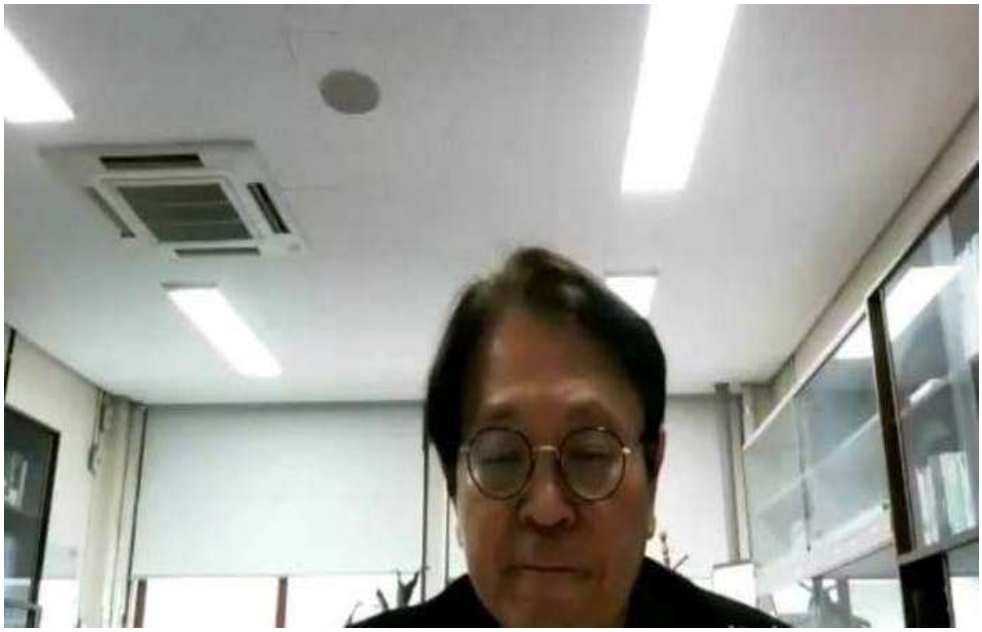

Figure 3. Welcome speech from the Director of Institute for Global Climate Change and Energy

2. PRESENTATION

The workshop was held for two days and twelve modules constituted the training workshop. The modules which were recorded as video presentations were first presented to the participants and then followed by explanations from tutors and local consultant as shown in Fig.4 and 5.

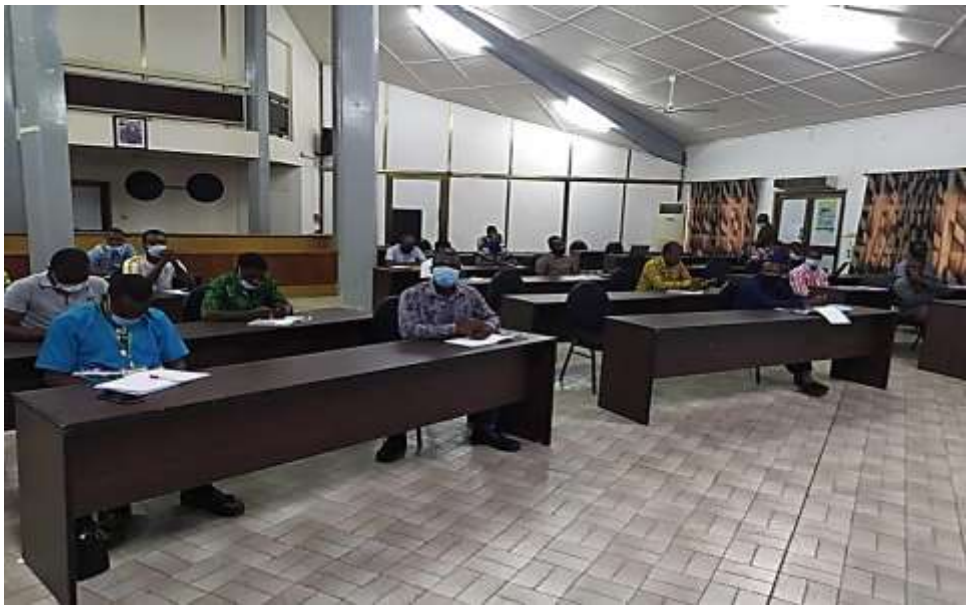

Figure 4. Presentation, question and answer sessions

Figure 5. Group photo of participants

2.1. Module 1: Understanding and applications of renewable energies

This first module focused on the applications of renewable energy. In this presentation, the speaker first recalled that according to Dr. Richard E. Smalley, Nobel Laureate in chemistry in 1996, energy is the most important challenge facing humanity. She then gave a general overview of greenhouse gas (GHG) emissions, relating in particular: (i) energy as a challenge for the future and (ii) an overview on CO2 emissions. The presenter reported that the global ambition for solar energy was to install 100 GW in 2012, 50 GW in 2014, and 345 GW in 2020. She also pointed out that Germany remains today the largest market for solar energy worldwide, and first in new and cumulative installations. She said solar energy markets are mainly distributed in Europe, making around 70% of global installations.

Questions that were developed during this first presentation related to (i) the principles and concepts of solar cells; (ii) classification of solar cells; (iii) types of solar cells; (iv) the system configuration diagram; (v) the solar cell value chain; (vi) conceptual diagram of the solar array; (vii) the solar power mock-up design process (in three stages: planning, design, and construction); (viii) the process of mounting the photovoltaic system; (ix) the criteria for confirming the installation (scope) of solar photovoltaic; and (x) the maintenance factor for solar power generation facilities.

2.2. Module 2: Microgrid photovoltaic system

Several points were developed by the speaker relating in particular to (i) the context of the micro-grid photovoltaic system; (ii) the justification/consideration of the micro-grid photovoltaic system; (iii) the basic assumptions of the project; (iv) the diagram of the micro-grid photovoltaic system; (v) the components of the micro-grid photovoltaic system; (vi) estimation of the basic load in rural areas; (vii) analysis of the composition of the photovoltaic system; (viii) the basic budget for the micro-grid photovoltaic system; and (ix) the project sequence of the micro-grid photovoltaic system.

Addressing the concept of a micro-grid photovoltaic system, the speaker showed that to use electricity as a source of energy, it is necessary to set up many installations: the power plant, the transmission line, substation, distribution line, etc. He pointed out that the transmission line in most African countries is poor due to economic problems. He equally highlighted the need to improve transmission line infrastructure for grid-connected areas or a micro-grid should be adopted for better electrification in villages and remote areas. He noted that the objective of this program is to introduce a completely reasonable photovoltaic system for the electrification of rural areas by using the micro-grid power system. The presenter mentioned several considerations to justify the micro-grid photovoltaic system: (i) the poor quality of the electricity distribution system in rural and isolated areas; (ii) the limited number of lighting installations in rural areas at night and the need for security lighting installations; (iii) the limited number of transmission lines in isolated rural areas due to the poor economic situation; (iv) the limited

nature of the electricity supply leading to poor educational conditions for primary and secondary (college) students; (v) the need for an intelligent diesel generator during the rainy season to compensate for the electricity required, due to low solar irradiation.

2.3. Module 3: Planning of renewable energy projects

In a brief introduction to this topic, the presenter first pointed out that the energy transition to renewable energy offers a unique opportunity to meet emissions targets while enhancing economic growth and improving human welfare. Renewable energy, he said, is an inevitable choice for climate change mitigation, as well as for sustainable economic growth due to its abundance, improved technology, and the drop in the cost of renewable technologies. However, the approach applied to the development of renewable energies in most developing countries lacks a critical and sustainable approach and therefore an appropriate approach must be defined for sustainable energy planning and development. He further noted that renewable energy actors involve the government providing incentives, funding agencies, development companies, and beneficiary communities.

2.4. Module 4: Feasibility and technical analysis of energy projects

The fourth theme focused on feasibility and technical analysis of energy projects.

In a brief introduction to this topic, the presenter listed a series of questions necessary for any clean energy feasibility analysis: (i) What are the main technical, environmental, and planning issues and risks associated with the project? (ii) What is the expected return on investment? (iii) What is the most suitable solution for your project? (iv) What types of financing or discounts are available?

Two main points were developed as part of the analysis of feasibility studies for the implementation of solar photovoltaic energy projects: (i) the solar photovoltaic system; and (ii) the design parameter of a solar photovoltaic system.

2.5. Module 5: Renewable energy tools

During this presentation, the speaker first gave a general overview of renewable energy tools, including hybrid energy systems. She then presented and analyzed ten popular software packages used in the field of renewable energies: HOMER, Hybrid2, RETScreen, iHOGA, INSE, TRN SYS, iGRHYSO, HYBRIDS. The speaker noted other software to include RAPSIM, SOMES, SOLSTOR, HySim, HybSim, IPSYS, HySys, Dymola / Modelica, ARES, SOLSIM, and HYBRID Designer.

2.6. Module 6: Monitoring and evaluation planning

The speaker first pointed out that the monitoring and evaluation planning module aims to provide participants with guidance on how to develop a comprehensive monitoring and evaluation

system for energy projects. This module is designed for use by monitoring and evaluation specialists, international development managers, and policymakers. According to the presenter, this module adopts the broader use of a USAID-proposed M&E plan as a key planning document for consistency and continuity in the M&E system. The speaker also showed that there are four key elements of a monitoring and evaluation system, namely: (i) a causal framework analysis; (ii) a logical framework; (iii) a matrix of indicators; (iv) and a data collection and analysis plan.

2.7. Module 7: Tips for Writing an Effective Funding Proposal

The seventh presentation covers tips for writing an effective fundraising proposal. Six points were developed under this theme: (i) what is a funding proposal? (ii) outline of a funding proposal; (iii) overview of the different steps to win funding proposals; (iv) basic elements to consider in a funding proposal; (v) some reasons why the proposals fail; (vi) common structure of project proposals.

2.8. Module 8: International cooperation for the financing of alternative energies in developing countries

The presentation centered around three main points: (i) the global requirement for investments in renewable energy; (ii) financial products for renewable energies; and (iii) international cooperation to attract investors. Addressing the issue of the global requirement for investments in renewable energy, the presenter first reviewed the cumulative investments in renewable energies between 2016 and 2050; annual investments in clean energies for energy transformation by each region until 2050; the share of the total annual investment of each region. The speaker noted that Africa faces several challenges and constraints in developing renewable energy projects: (i) the lack of trust vis-à-vis foreign investors, which is justified by the absence of a legal framework (transparent and fair process; political and institutional stability; government effectiveness concerning long-term policies and incentives, consistency and visibility on policy measures); (ii) the absence of a risk mitigation policy; (iii) the lack of convertible currency (financial strength of local banks; the small scale of the national economy; very limited availability of local debt financing; very high financial cost); (iv) lack of public support; (v) lack of appropriate technology; (vi) lack of investment-ready projects or bankable projects with an attractive value proposition.

2.9. Module 9: Practice of environmental and social impact studies

In this presentation, four main points have been developed concerning the issue of ESIA: (i) generalities; (ii) the environmental and social impact study (ESIA) "; (iii) the procedure for carrying out an environmental and social impact study (ESIA); and (iv) characterization of impacts. In a general overview of the practice of environmental and social impact studies, the presenter first reviewed some definitions of the concept of environment. She then underlined the importance of the concept of the environment, which is a major issue for humans.

2.10. Module 10: Financing solar energy in Togo using a PAYG model.

This model was developed based on the concept of USAID, the World Bank Group, and the international finance corporation. The speaker said the need for this model is justified by the will of the Togolese government to solve the problem of energy insufficiency by reducing dependence on polluting fuels which are harmful to the population and the environment. The main points that were developed include: (i) How to develop a PAYG and compare it to other projects? (ii) the global PAYG market/analysis of the PAYG global market; (iii) PAYG in Togo / PAYG market analysis in Togo; (iv) lessons learned from PAYG and key considerations from around the world; (v) the proposed PAYG business model.

2.11. Module 11: No border for COVID-19

The presentation centered around three axes, namely: (i) understanding COVID-19; (ii) transmission of COVID-19; and (iii) the management of COVID-19. The speaker noted that Coronavirus has existed for several years. He referred to WHO data according to which the disease caused by the novel Coronavirus, SARS-CoV2 is now officially called COVID-19. The Coronavirus according to him, has always existed around us in adulthood and is generally manifested with headaches, cough, sore throat, rhinorrhea, symptoms of nasal congestion, and that it can infect both humans and animals.

3. QUESTIONS AND ANSWER SESSION

To allow participants to have clarifications on the thematic issues that required further clarifications, discussions were opened at the end of each presentation.

Module 1:

- Does renewable energy have no side effects on human health (side effects on human health)?
- What do we mean by solar kits? What definition to give to the notion of solar kits?
- Do these kits need to be integrated into solar panels?
- The costs mentioned in the presentation?
- What is the difference between solar energy and thermal energy?
- What are the elements of this technology?
- Can you perform a benchmark between these two types of energy and see what best corresponds to the realities of Togo.

Module 2:

- What does solar wire pumping correspond to?
- Are there street lighting kits that integrate inverters?
- Is it possible that during the day we can consume solar energy without batteries?

- Define the concept of micro-grid.
- Have the prices of the equipment presented been approved? (Specify whether the prices of the equipment shown are approved).

Module 3:

- Are there special treatments for company employees?
- Has a case study been carried out in Togo with the HOMER software?

Module 4 and 5:

There were no questions.

Module 6:

- What tools are used for the assessment of emissions?

Module 7:

- Are there specific donors in Togo who finance or who can finance projects in the field of renewable energies?
- How can we concretely make a project credible?
- As a young start-up, where can we go to find funds or financing?

Module 8:

What mechanism can be put in place to link MFIs and renewable energy companies to facilitate access to finance?

Module 9:

- What do we mean by reversible or irreversible impact?
- Does Togo also make notices for environmental impact assessment?
- Does Togo have a list of projects with ESIA?
- What is the difference between a public hearing and public consultation?

Module 10:

- Can we get an idea of the companies that are developing PAYG in Togo?
- How can a business get started with PAYG?
- Is there a market study for the PAYG model in Togo?

Module 11 and 12:

No questions

4. RECOMMENDATIONS

At the end of the workshop, recommendations were made to the project implementer, the Ministry of the Environment, and private sector entrepreneurs.

To the workshop organizers

- ✓ Organize training on resource mobilization and funding opportunities for renewable energy projects;
- ✓ Facilitate the partnership between MFIs and banking institutions and entrepreneurs/promoters of renewable energies;
- ✓ Create a fully dedicated local institution to promote networking with promoters of renewable energies like the MIFA for example;
- ✓ Facilitate and or subsidize imports of solar equipment;
- ✓ Create a monitoring committee or a platform for discussion and information sharing bringing together entrepreneurs and the public sector (state structures);
- ✓ Promote and develop local skills for the next training sessions;
- ✓ Make available a mapping network to allow entrepreneurs not to clash with the State in their actions.

To entrepreneurs

- ✓ Sort out opportunities (calls for projects) both nationally and internationally;
- ✓ Explicitly highlight the innovative nature of the projects developed;
- ✓ Take an example from the innovative nature of the company "Entrepreneurs du Monde" to resolve certain difficulties that companies face so as not to always expect everything from the State.

5. GENERAL CONCLUSION

The training workshop on solar PV technology, renewable energy planning, and renewable energy financing was attended by about thirty five (35) participants including but not limited to; government officials, researchers, technicians, project developers, financiers, and end-users. The participants gained enough skills and knowledge on the development of renewable energy systems, and some participants testified to be able to plan renewable energy systems after attending this two days workshop.

The workshop ended at 4:00 p.m. with a word of thanks from Mrs. YAOU Méry who congratulated the participants for their keen interest in the training workshop. Follow-up questions were responded to by phone calls and emails, and the implementation team would continue to remain in contact with the participants for advice and guidance on the development of renewable energy systems.

APPENDICES

Appendix 1. List of participants

MINISTERE DE L'ENVIRONNEMENT
ET DES RESSOURCES FORESTIERES

SECRETARIAT GENERAL

DIRECTION DE L'ENVIRONNEMENT

Division de lutte contre les changements climatiques

N° _____/DE/DLCC

REPUBLIQUE TOGOLAISE
Travail-Liberté-Patrie

Liste de présence de workshop on solar energy technology and financung

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MINISTERE DE L'ENVIRONNEMENT
ET DES RESSOURCES FORESTIERES

SECRETARIAT GENERAL

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REPUBLIQUE TOGOLAISE
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Liste de présence de workshop on solar energy technology and financung

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