CONCEPT NOTE

National Training Workshop on

The Use of HOMER Software as a tool for RE Project Design

Dates: March 18th – 20th 2014

Location: Lagos, Nigeria

Organized by:

National Centre for Energy Efficiency and Conservation (NCEEC)

Supported by:

ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

I. Introduction and Context

A. Brief Description

The National Centre for Energy Efficiency and Conservation (NCEEC) and The ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) are organizing a three-day Training Workshop on the use of HOMER as a tool for renewable energy (RE) project design from March 18th – 20th, 2014 in Lagos, Nigeria.

The training workshop will use theoretical concepts, simulations and practical exercises to prepare participants on the use of HOMER. This training is part of NCEEC's objective in building high level manpower in energy efficiency and conservation and in disseminating information on energy efficiency and conservation concepts through public awareness programs such as seminars, workshops and publications. This training is also part of ECREEE's objectives in building capacities in ECOWAS Member States in RE project design and appraisal, and to create an ECOWAS network of certified users in different RE project tools.

The training workshop addresses key barriers to the deployment of RE&EE technologies and services in Nigeria and the entire ECOWAS region.

B. Background

About NCEEC

The National Centre for Energy Efficiency and Conservation is a research Centre within the Energy Commission of Nigeria (ECN). It was set up by the Federal Government of Nigeria and began operations in December 2008. It is located at the Faculty of Engineering, University of Lagos, Nigeria.

Energy efficiency is an economy resource and can be thought of as an alternate "fuel'. It looks at the effects on businesses, institutions and households. Any energy saved in these sectors will usually be available to other users. The application of Energy efficiency and

conservation is vital in ensuring that renewable energy projects are sustainable for a longer period of time.

MAJOR OBJECTIVES

The objectives we seek to maximize include both economics as well as environmental issues for long-term sustainability. Sustainability ensures the availability of energy and a liveable environment for the future. The Centre is also a source of authoritative information and leadership on sustainable energy systems. In particular, we seek to:

- Undertake research into energy usage habits of industrial, institutional and household concerns with the view of finding optimal energy balances.
- Determine the optimal infrastructure expansion plan for energy networks.
- Generate reliable data on both traditional and new energy sources that will ascertain their real values in our energy mix. This will include data survey, experimentation and testing, analysis of reliability and cost performance of the existing systems
- Create and operate energy efficiency laboratories for the testing and calibration of transport, production and general energy equipment.
- Research on linkages between energy and other themes, including economy and social development impact, environment and climate change.
- Educate and train researchers through postgraduate degrees and short course programs on energy efficiency.
- Build strategic alliances and partnerships with other organizations, both local and international, in order to enhance internal capability to achieve objectives.

MISSION STATEMENT

The Centre is charged with the responsibility of organizing and conducting research and development in energy efficiency and conservation.

The functions of the Centre include to:

a. Develop guidelines for energy efficient end-use products and advise on their implementation.

b. Develop energy efficiency codes, standards and specifications for domestic, industrial and commercial facilities.

c. Gather, analyze and manage energy supply and consumption data and information.

d. Serve as a Centre for training of high level manpower in energy efficiency and conservation.

e. Develop and execute pilot demonstration projects highlighting, energy efficiency concepts

f. Disseminate information on energy efficiency and conservation concepts through public awareness programmes such as seminars, workshops, publications, etc and

g. Perform any other functions as may be directed by the Federal Government.

About ECREEE

As a policy response to the rising energy security concerns, continued lack of access to energy services in rural areas and the need for climate change mitigation the ECOWAS Energy Ministers established the first regional renewable energy promotion agency in Sub Sahara Africa. The Secretariat of the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) was inaugurated on 6th July 2010 with support of the ECOWAS Commission, the Governments of Austria, Spain and technical assistance of the United Nations Industrial Development Organization (UNIDO). The ECREEE Secretariat is based in Praia, Cape Verde, and operates with a small multi-national team of full time staff. ECREEE works through a network of National Focal Institutions (NFIs) which interlinks the Secretariat with all ECOWAS Member States. The overall objective of ECREEE is to contribute to the sustainable development of West Africa by improving access to modern, reliable and affordable energy services and energy security, and a reduction of negative energy related externalities (e.g. local pollution, greenhouse gas (GHG) emissions) through the dissemination of RE&EE technologies and services. ECREEE aims at the creation of favorable framework conditions for renewable energy and energy efficiency markets. The Centre supports activities, programs and projects directed to mitigate existing technical, legal, institutional, economic, financial, policy and capacity related barriers. The ECREEE activities

include fund mobilization, policy support, knowledge management and awareness raising, capacity development and business and investment promotion.

About HOMER

HOMER stands for **H**ybrid **O**ptimization **M**odel for **E**lectric **R**enewables. The HOMER energy modeling software is a powerful tool for designing and analyzing hybrid power systems, which contain a mix of conventional generators, combined heat and power, wind turbines, solar photovoltaic, batteries, fuel cells, hydropower, biomass and other inputs. It is currently used all over the world by tens of thousands of people.

For either grid-tied or off-grid environments, HOMER helps determine how variable resources such as wind and solar can be optimally integrated into hybrid systems. Engineers and nonprofessionals alike use HOMER to run simulations of different energy systems, compare the results and get a realistic projection of their capital and operating expenses. HOMER determines the economic feasibility of a hybrid energy system optimizes the system design and allows users to really understand how hybrid renewable systems work.
As distributed generation and renewable power projects continue to be the fastest growing segment of the energy industry, HOMER can serve utilities, telecoms, systems integrators and many other types of project developers – to mitigate the financial risk of their hybrid power projects.

HOMER Energy provides software, services and an on-line community to the diverse group of people who are using HOMER to design hybrid systems. More information can be found at http://homerenergy.com/index.html

II. Activity Objectives and Key Results

A. Primary objectives

To increase the knowledge on simulation and dimensioning tools for the energy system in Nigeria

B. Key outcomes being sought

The workshop aims at achieving the following specific objectives:

- To empower an expert pool from relevant RE & EE, Energy and Power institutions in Nigeria on the use of the HOMER Software.
- To understand the complexity of hybrid systems and the need for simulation and dimensioning tools.

III. Activity Description (Tasks and outputs)

A. Outputs and Benefits

HOMER can be used to determine how various resources can be integrated to provide an optimal hybrid system. This can be used for feasibility studies and to estimate the financial capacity of a proposed hybrid power system. Besides direct training benefits, the workshop will also facilitate synergies and cooperation between relevant RE & EE, Energy and Power institutions in Nigeria.

B. Expected Results

By the end of the workshop, it is expected that the participants will be able to:

- Complete a HOMER software based exercise for any community within Nigeria.

IV. Participants and Requirements

The direct beneficiaries of the workshops are RE & EE, Energy and Power institutions in Nigeria.

A maximum of 30 participants will be selected according to geographical criteria to ensure the broad presence of relevant institutions.

Requirements from the candidate

- Understanding of the basics of Hybrid, Stand-alone and Grid-connected systems using different types of energy resources;
- Good overview of simulation tools and software for electricity;

• Understanding of cost and economic analysis of power systems' life cycle.

The participant is required to bring his/her own laptop.

V. BASIC INFORMATION FOR PARTICIPANTS

A. REGISTRATION PROCESS

Candidates are required to submit their applications on http://www.ecreee.org/homer-online-questionnaire before February 28th. Further information on the training, including reading material, is available on http://www.ecreee.org/event/national-training-workshop-use-homer-software-tool-renewable-energy-project-design.

B. ENQUIRIES AND CORRESPONDENCE

All enquiries and correspondence prior to the workshop should be addressed to:

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C. INDICATIVE TRAINING SCHEDULE

TIME	***ACTIVITY***
DAY ONE	***INTRODUCTION***
8:00 - 9:00	*Registration*
9:00 – 10:00	*Opening, Overview of NCEEC, ECREEE and participants presentation*
10:00 – 11:00	*Overview of the training course: critical concepts, approach and specific needs from the users*
11:00 – 11:30	*Tea/ coffee break*
11:30 – 12:30	*General introduction: Overview of design and simulation tools*
12:30 - 13:15	*PROS & CONS about Homer simulation tool*
13:15 – 14:30	*Lunch*
14:30 – 15:30	*What you can do (and what you cannot do) with HOMER:* *Examples, outputs, results and data processing.*
15:30 – 17:00	*HANDS on HOMER: practical session with the user interface*
17:00	*End of Day 1*
DAY TWO	***SYSTEM DIMENSIONING***
9:00 – 10:30	*Introduction to Exercise 1*
10:30 – 11:00	*Correction of Exercise 1*
11:00 – 11:30	*Tea/ coffee break*
11:30 – 12:45	*Introduction of Hybrid systems*
12:45 – 14:00	*HANDS on HOMER: Simulating and dimensioning and Stand-alone Hybrid System* *THE INPUTS* • *Energy Demand: the load profile INPUT* • *Energy Resource INPUT* • *Technical equipment and costs INPUT*

	• *Constraints INPUT*
14:00 – 15:30	*Lunch*
15:30 – 17:00	*THE OUTPUTS* • *Outcome of the simulation: List of possible systems* • *Interpretation of the economical results* • *Analysing the simulated performance of the system* • *Exporting data for further uses*
17:00	*End of Day 2*
DAY THREE	***SYSTEM DIMENSIONING & TECHNICAL VISIT***
9:00 – 10:00	*Introduction to Grid Connected systems*
10:00 – 11:00	*HANDS on HOMER: Simulating and dimensioning a Grid Connected System* *THE INPUTS* • *Energy Demand: the load profile INPUT* • *Energy Resource INPUT* • *Technical equipment and costs INPUT* • *Restrictions INPUT*
11:00 – 11:30	*Tea/ coffee break*
11:30 – 13:00	*THE OUTPUTS* • *Outcome of the simulation: List of possible systems* • *Interpretation of the economical results* • *Analysing the simulated performance of the system* • *Exporting data for further uses*
13:00 – 14:30	***Technical Visit to NCEEC***
14:30 – 15:30	*Lunch*
15:30 – 16:15	*Simulation of Technical Visit*
16:15 – 17:00	*Evaluation and Conclusion of training*