TRAINING COURSE PROSPECTUS

Title:	**EAC Regional Training Course on Standalone Solar PV Systems Design and Installation**
Place:	**Kenyatta University**
Date:	**16-26 September 2019 (10 working days)**
Deadline for Nominations:	**9 August 2019**
Organizers:	The East African Centre of Excellence for Renewable Energy and Efficiency (EACREEE) in collaboration with the International Solar Alliance (ISA), National Solar Energy Institute (INES) of France and Kenyatta University and support from the United Nations Industrial Development Organization, the Austrian Development Agency and the Government of France.
Language:	The language of instruction will be English.
Participation:	The training course is open to 25 participants from the East African Community (EAC) Partner States.
Participants' Qualifications and Experience:	Participants should be qualified technician or engineer by basic training and should be involved in designing/ implementing solar PV systems. As the training course will be conducted in English, participants should have sufficient proficiency to follow lectures and express themselves in this language without difficulty.
Purpose of the Course:	The purpose of the training course is to provide comprehensive and up-to-date, theoretical and practical knowledge on Standalone Solar Power Systems Design and Installation.
Nature of the Course:	The training course consists of lectures and practical session on design and installation and Maintenance of solar PV Systems. The course will cover a variety of topics, including overview of solar PV technology, introduction to basic electricity, system design requirements and technical specifications, load estimation, battery storage, software systems and operation and maintenance. Detail training programme is in the Annex.

Certification:	After successful completion, each participant will receive certificate of attendance.
Application Procedure:	Applicants should complete the standard EACREE application form for training courses and submit by E-Mail to info@eacreee.org. The applications must be endorsed by the employer. Nominations received after that date will not be considered.
Financial Arrangements:	There will be no tuition fees charged. However, each participant will make self-arrangements for travel and accommodation during the training course. The organizers will provide lunches and coffee breaks during the training course.
Liabilities:	The organizers of the course do not accept liability for the payment of any cost or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is traveling to and from or attending the course, and it is clearly understood that each participants (or sponsor), undertakes responsibility for such coverage. The participants would be well advised to take out insurance against these risks.
Contact Persons:	Mr. Michael Kiza Programme Management Expert East African Centre of Excellence for Renewable Energy and Efficiency (EACREEE) E-Mail: m.kiza@eacreee.org. Mr Fred Ishugah, Sustainable Energy Expert, East African Centre of Excellence for Renewable Energy and Efficiency (EACREEE) E-Mail: f.ishugah@eacreee.org; Eng. Elias Onyango Ako Chairman, Department of Energy Technology Kenyatta University E-Mail: ako.elias@ku.ac.ke

ANNEX: DRAFT TRAINING PROGRAMME

DAY 1: Monday, 16 September 2019

Time	Activity
8:30 – 9:00	**Registration**
9:00-10:15	**Training Opening** **Protocol – Welcome from university because will be hosting us**
10:15 - 10:30	**Coffee Break**
10:30 - 12:45	**Introduction to Solar Energy** *Basic background of solar and solar energy; Definition of terms; Solar Technologies; Benefits of solar energy; Solar PV systems: Features, Simplicity of Solar PV systems, Vulnerability of Solar PV systems. How much solar energy I am able to collect on specific sites? irradiation maps* *Introduce the small project*
12:45 - 14:00	**Lunch**
14:00 - 15:30	**Introduction to Basic Electricity** *Type of electricity; Voltage, Current and Resistance; Ohm's law and Power law; Power and Energy Calculations.*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	**Introduction to Basic Electricity** *Type of electricity; Voltage, Current and Resistance; Ohm's law and Power law; Power and Energy Calculations. Cable losses and resistance*

DAY 2: Tuesday, 17 September 2019

Module day

Time	Activity
9:00-10:45	**Solar PV System components: PV modules** *Basics of a PV module; Types of PV modules; I - V Curve; Size (Output Power); Peak hours; Tilt angle; Measurement of actual power; Connections to other PV modules; Maintenance of a PV Module; Common problems*
10:45 - 11:00	**Coffee Break**
11:00 - 12:45	**Solar PV System components: PV modules** **Practical Session**
12:45 - 14:00	**Lunch**
14:00 - 15:30	**Solar PV System components: PV modules** *Basics of a PV module; Types of PV modules; I - V Curve; Size (Output Power); Peak hours; Tilt angle; Measurement of actual power; Connections to other PV modules; Maintenance of a PV Module; Common problems*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	***Project :*** *Choose the module*

DAY 3: Wednesday, 18 September 2019

Time	Activity
9:00-10:15	**Solar PV System components: Charge controller** *Basics of a charge controller; Types of charge controllers; connecting order; Maintenance of charge controllers; Common problems*
10:15 - 10:30	**Coffee Break**
10:30 - 12:45	**Inverters**

	Basics of Inverters; Types of Inverters; connecting order; Maintenance of inverters; Common problems
12:45 - 14:00	**Lunch**
14:00 - 15:30	***Project :*** *choose components*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	

DAY 4: Thursday, 19 September 2019

Time	Activity
9:00-10:15 Kenyatta University	**Battery** *Basics of Battery; Mechanism of a lead-acid battery; Type of lead -acid battery; Capacity; Ampere-hour Efficiency; Lifetime; Dead Batteries; Connections to other batteries; Safety; Maintenance of a battery; Common problems.*
10:15 - 10:30	**Coffee Break**
10:30 - 12:45	**Battery** *Basics of a Battery; Mechanism of a lead-acid battery; Type of lead -acid battery; Capacity; Ampere-hour Efficiency; Lifetime; Dead Batteries; Connections to other batteries; Safety; Maintenance of a battery; Common problems.*
12:45 - 14:00	**Lunch**
14:00 - 15:30	**Project** *Choose and test the battery*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	**Battery**

DAY 5: Friday, 20 September 2019

Time	Activity
9:00-10:45	**Practical session : reviewing first week concepts** *Project set-up*
10:45 - 11:00	**Coffee Break**
11:00 - 12:45	**Recap: First week Feedback / share of experience**
12:45 - 14:00	**Lunch**
14:00 - 15:30	**Practical session : Project**
15:30 - 15:45	**Coffee Break**

DAY 6: Monday, 23 September 2019

Time	Activity
9:00-10:45	**System Load** *Lighting, water pumping, etc; Types of loads; Common problems*
10:45 - 11:00	**Coffee Break**
11:00 - 12:45	**System Load Estimation**
12:45 - 14:00	**Lunch**
14:00 - 15:30	**Introducing system Design**
15:30 - 15:45	**Coffee Break**
15:45-17:00	**Project**

DAY 7: Tuesday, 24 September 2019

Time	Activity
9:00-10:15 Antoine	**System Design** *Load estimation; Inverter sizing and orientation; Charge controller sizing and orientation; Battery sizing and orientation; PV panel sizing and orientation; cable sizing; load plan; Daily operation*
10:15 - 10:30	**Coffee Break**
10:30 - 12:45	**System Design**
12:45 - 14:00	**Lunch**
14:00 - 15:30	***Project :*** *sizing calculation*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	**System Design**

DAY 8: Wednesday, 25 September 2019

Time	Activity
9:00-10:15 Antoine	**Exercises**
10:15 - 10:30	**Coffee Break**
10:30 - 12:45 Antoine	**Software tools to design**
12:45 - 14:00	**Lunch**
14:00 - 15:30	***Project :*** *Computer-based system modelling session*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	

DAY 9: Thursday, 26 September 2019

Time	Activity
9:00-10:15	**Mounting of PV components** *Roof top mount; Wall mount; Poll mount; Battery box; Switches and sockets; Voltage dropper; Circuit Breaker*
10:15 - 10:30	**Coffee Break**
10:30 - 12:45	**Installing Solar PV systems** *Preparation; Tools; Materials; Wiring Plan; Voltage drop; Wire size and distance; Location of main system; Miscellaneous Tips*
12:45 - 14:00	**Lunch**
14:00 - 15:30	***Project :*** *Installation preparation*
15:30 - 15:45	**Coffee Break**
15:45 – 17:00	***Project :*** *Installation*

DAY 10: Friday, 27 September 2019

Time	Activity
9:00-10:45	**Operation and Maintenance** *Inspections; Measurement of Voltage drop; components maintenance and care; Maintenance by technicians; Maintenance by users; Why do problems occur?; Major symptoms; Troubleshooting; Repair*

10:45 - 11:00	**Coffee Break**
11:00 - 12:45	**Project Monitoring**
12:45 - 14:00	**Lunch**
14:00 - 15:30	**Presentation of project by trainees** **Closing and Award of Certificates**
15:30 - 15:45	**Coffee Break and departure**