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Africa Electrification Initiative (AEI) Low cost on-grid electrification technologies

Workshop

Arusha, 3-4 September, 2013

Background

Access to electricity is important for human wellbeing and development. While in the developed countries electricity is regarded as a precondition for decent living conditions, rural areas in Sub Saharan Africa suffer the lowest electrification rates in the world with as much as 85% of the rural population denied access. This situation is in spite of a large amount of money spent on rural electrification over many decades. The 'World Energy Outlook 2011' prepared by the International Energy Agency states that 1.3 billion people are without access to electricity of which 465 million people live in rural areas of Sub Saharan Africa. While sparse populations and remoteness from existing transmission and distribution facilities are major problems in tackling the issue of rural electricity access in Africa, a major factor are also the high cost solutions which have hitherto been used.

The project "dissemination of low cost on-grid electrification technologies" by the Africa Electrification Initiative (AEI) aims at redressing the situation by disseminating knowledge on appropriate low cost rural electrification technologies among the concerned stakeholders in Sub Saharan Africa and thereafter identifying examples where such practices can be put into operation. In the scope of this activity, two workshops are implemented to enable such low cost rural electrification practices to be mainstreamed among participating countries in Sub Saharan Africa.

Objective

The goal of this workshop is to empower energy practitioners and decision-makers in Sub-Saharan Africa with the knowledge needed to successfully implement low-cost rural electrification technologies.

The specific objectives towards this goal are to:

- ▶ Raise awareness about the existence of appropriate low-cost rural electrification technologies.
- ▶ Show how and where these technologies have been implemented successfully.
- ▶ Build capacity on implementing these technologies in Sub-Saharan Africa.
- ▶ Disseminate the knowledge produced at the workshop to participants and a wider audience in a user-friendly format.

Target Group

The workshop will target practitioners from energy utilities, regulators, relevant ministries and rural energy/ electrification agencies in Sub-Saharan Africa. These include decision-makers, electrification planning officers, energy policy officers, energy advisors, energy regulators, officials from relevant standards authorities and electrification engineers. A number of approx. 40 participants is expected to attend the workshop.

Scope and Format

The workshop will provide information on all available technologies for low cost rural electrification that have been successfully employed in developed and developing countries. These technologies will form the basic framework, from which solutions will be developed to reduce investment costs, while maintaining the required technical standards for rural electrification networks:

- ▶ Single phase medium voltage (MV) and minimal low voltage (LV) network systems
- ▶ Single Wire Earth Return system;
- ▶ Shield Wire Systems on existing transmission lines; and
- ▶ Low cost transmission extensions and grid substations.

After the presentation of the various low cost technologies, targeted case studies will be carried out using the information collected by participants from their own countries. To improve the usefulness of these sessions, basic information on the case studies will be circulated in advance to all participants, as well as experienced practitioners.

Workshop participants will be divided into groups to carry out the analysis of the various options available, and to come up with tentative solutions, which will be presented to the plenary sessions for a discussion among all participants. In addition, various characteristics and 'cost drivers' of rural electrification in different countries will be compiled and presented at the workshop. These characteristics and successful measures taken to overcome various cost barriers will provide participants with the possible applications in their own countries. The findings of the workshop will be compiled into a learning handbook and disseminated among participants and various rural electrification authorities, regulators, ministries and utilities in Sub Saharan Africa. Furthermore, web portal will be designed to enable a continuing dialogue and exchange of information on this topic. Practitioners can document successful applications of 'low cost technologies' as well as pose questions and seek solutions to problems from more experienced practitioners in the web portal.

Project Partners

This workshop is organized by the Africa Electrification Initiative (AEI) in cooperation with the Rural Energy Agency (REA) Tanzania, the World Bank and the EU Energy Initiative Partnership Dialogue facility (EUEI PDF). The Africa Electrification Initiative seeks to create and sustain a living body of practical knowledge and a network of SSA practitioners for the design, development, and implementation of rural, peri-urban, and urban on-grid and off-grid electrification programs.



The Africa Electrification Initiative (AEI)

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTAFRREGTOPENERGY/0,,contentMDK:22404873~menuPK:6613283~pagePK:34004173~piPK:34003707~theSitePK:717306,00.html>



Rural Energy Agency (REA) Tanzania

<http://www.rea.go.tz/Home.aspx>



World Bank

<http://www.worldbank.org/>



European Union Energy Initiative – Partnership Dialogue Facility (EUEI PDF)

<http://www.euei-pdf.org/>

AEI Workshop Agenda

DAY 1 – Tuesday, 3 September 2013			
08:15	<i>Registration</i>		
09:00	Welcome session <ul style="list-style-type: none"> • Opening Remarks • Welcome by Organizers • Definition of the Problem • Keynote Speech 	Arusha Regional Commissioner <i>tbc</i> Ami Mpungwe, Chairman of the Rural Energy Board Ambassador Jenny Hasselsten, World Bank Niklas Hayek, EUEI PDF Chrisantha Ratnayake, Consultant power engineer Prof. Izael da Silva, Strathmore University	
10:00	<i>Tea break</i>		
10:15	Presentations - low cost technology options: <ul style="list-style-type: none"> • Single Phase Reticulation: Results of NRECA Low Cost Electrification Study in Tanzania • Single Wire Earth Return (SWER) • Shield Wire Systems • Low Cost HT Grid Extensions 	Eng. Gissima Nyamo-Hanga, REA Tanzania Ralph Karhammar, Consultant Prof. Francesco Iliceto, University of Rome Jim VanCouvering, NRECA Foundation	
12:15	<i>Lunch</i>		
13:15	Plenary discussion on technology options		Moderation: Chrisantha Ratnayake, Ralph Karhammar
14:15	Breakout sessions: <p style="text-align: center;"><i>Analysis of Selected Case Studies</i></p> <p style="text-align: center;"><i>(note: Case studies will be circulated among different sessions on completion of the assigned study)</i></p>		
	Group 1 <i>Case Study: Ethiopia</i>	Group 2 <i>Case Study: Uganda</i>	Group 3 <i>Case Study: Single phase/Three phase alternatives</i>
16:15	Wrap-up Day 1		
16:30	<i>End of day 1 sessions</i>		

DAY 2 – Wednesday, 4 September 2013				
09:00	Presentation – electrification planning: <ul style="list-style-type: none"> • Network Planning Issues, Service Connection Costs and related considerations 		Chrisantha Ratnayake	
10:15	Breakout sessions: <i>Continuation of Case Study Analyses: Phase II: Finding Solutions</i>			
	Group 1 <i>Case Study: Ethiopia</i>	Group 2 <i>Case Study: Uganda</i>	Group 3 <i>Case Study: Single phase/Three phase alternatives</i>	Group 4 <i>Case Study: Tanzania</i>
12:15	<i>Lunch</i>			
13:15	Presentation of results of case studies		Head of each Breakout Group	
14:15	General discussion: <ul style="list-style-type: none"> • Low Cost Electrification Technologies • Service Connection Costs • Comparison of factors affecting participating countries 		Moderation: Chrisantha Ratnayake, Ralph Karhammar	
15:15	Closing Session <ul style="list-style-type: none"> • Conclusion • Closing Remarks 		Chrisantha Ratnayake Eng. Bengiel Msofe, REA Tanzania	
16:15	<i>End of day 2 sessions</i>			
19:00	<i>Dinner Reception</i>			

Attendees

<i>Country</i>	<i>Name</i>	<i>Title</i>	<i>Organization</i>
Botswana	Mr. Isaac Tlou	Rural Electrification Coordinator	Botswana Power Corporation (BPC)
Botswana	Mr. Steven Peloetletse	Project Management Officer, Rural Electrification	Botswana Power Corporation (BPC)
Ethiopia	Ato Frealem Kure	Acting Executive Officer, Universal Electricity Access Program (UAEP)	Ethiopia Electric Power Corporation (EEPCO)
Ethiopia	Ato Tesfaye Tamirat	A.A. Region Sales & Management Chief of Staff	Ethiopia Electric Power Corporation (EEPCO)
Gambia	Mr. Aziz Jawara	Regional Manager, Upper River Region	National Water and Electricity Company (NAWEC)
Ghana	Mr. Samuel Adjidjonu	Divisional Manager/ Rural Projects	Electricity Company of Ghana
Kenya	Eng. Benson Muriithi	Chief Manager, Distribution	Kenya Power and Lighting Company (KPLC)
Kenya	Mr. Harun Mwangi	Manager & Coordinator, Slum and Rural Electrification Projects	Kenya Power and Lighting Company (KPLC)
Liberia	Mr. Augustus Goanue	Executive Director	Rural Renewable Energy Agency (RERA)
Mozambique	Mr. Tirso Nhaguilunguana	Electrical Engineer	Electricidade de Mocambique (EDM)
Mozambique	Mr. Oscar Mauai	Electrical Engineer	Electricidade de Mocambique (EDM)
Mozambique	Mr. Mathikizana A.C Matos	Electrical Engineer	Electricidade de Mocambique (EDM)
Nigeria	Eng. Joseph Ciroma	General Manager, Project Management Unit	Power Holding Company of Nigeria PLC
Rwanda	Eng. Dieudonne	Director of Planning and Design, Electricity	Energy, Water and Sanitation Authority

	Ngizwenayo	Access Roll-Out Program (EARP)	(EWSA)
South Africa	Mr. Bruce McLaren	Senior Technologist	Eskom
Tanzania	Mr. George Nchwali	Director, Finance and Administration	Rural Electrification Agency (REA)
Tanzania	Eng. Bengiel Msofe	Director, Technical Services	Rural Electrification Agency (REA)
Tanzania	Mr. Musa Muze	Legal Affairs Manager	Rural Electrification Agency (REA)
Tanzania	Ms. Grace Mathew	Training and Capacity Building Manager	Rural Electrification Agency (REA)
Tanzania	Mr. Seleman Byarugaba	Finance Manager	Rural Electrification Agency (REA)
Tanzania	Ms. Justina Uisso	Project Appraisal and Supervision Manager	Rural Electrification Agency (REA)
Tanzania	Ms. Jaina Msuya	Information, Education and Communication Officer	Rural Electrification Agency (REA)
Tanzania	Ms. Amina Lwasye	Ag. HR&AD Manager	Rural Electrification Agency (REA)
Tanzania	Ms. Theresia Nsanzugwanko	Ag. Head of Procurement Management Unit	Rural Electrification Agency (REA)
Tanzania	Mr. Clement Kisinga	Procurement Officer	Rural Electrification Agency (REA)
Tanzania	Mr. Gissima Nyamohanga	Ag. Technical Assistance Manager	Rural Electrification Agency (REA)
Tanzania	Ms. Salome Lelly	Internal Auditor	Rural Electrification Agency (REA)
Tanzania	Ms. Ester Mponda	Administration Officer	Rural Electrification Agency (REA)
Tanzania	Ms. Vestina Rwelengera	Ag. Monitoring and Evaluation Manager	Rural Electrification Agency (REA)
Tanzania	Ms. Innocensia Makinge	Accounts Officer	Rural Electrification Agency (REA)
Tanzania	Mr. Geoffrey Mwakijungu	ICT Officer	Rural Electrification Agency (REA)
Tanzania	Daniel Mungure	Senior Accountant	Rural Electrification Agency (REA)
Tanzania	Mr. Nicolaus Moshi	Ag. Planning and	Rural Electrification

		Database Management Manager	Agency (REA)
Tanzania	Mr. Willa Haonga	Legal Affairs Officer	Rural Electrification Agency (REA)
Tanzania	Mr. Theophil Bwakea	Project Identification and Promotion Officer	Rural Electrification Agency (REA)
Tanzania	Mr. Emmanuel Yesaya	Project Identification and Promotion Officer	Rural Electrification Agency (REA)
Tanzania	Mr. Advera Mwijage	Technical Assistance Officer	Rural Electrification Agency (REA)
Tanzania	Ms. Sophia Mgonja	Deputy Managing Director	TANESCO
Tanzania	Patric Songa	Principal Engineer	TANESCO
Tanzania	Peter Shayo	Director Distribution	TANESCO
Tanzania	Mr. Aurea Bigirwamungu	Marketing Engineer	TANESCO
Tanzania	Mr. Ephraim Cheyo	District Manager, Mbozi	TANESCO
Uganda	Mr. Godfrey Werikhe	Manager, Project Development & Management	Rural Electrification Agency (REA)
Uganda	Mr. Muganzi Medard	Manager, ERT Programme	Rural Electrification Agency (REA)
Uganda	Mr. John Turyagenda	Senior Projects Engineer (Construction)	Rural Electrification Agency (REA)
Uganda	Ms. Flavia Uwayezu	Senior Projects Engineer (Planning)	Rural Electrification Agency (REA)
Uganda	Ms. Elizabeth Kabagambe	Engineer	Power Networks Ltd.
Uganda	Mr. Joseph Nyanzi Kubo	Engineer	Power Networks Ltd.
Uganda	Mr. Geoffrey Bakkabulindi	PhD Candidate, Department of Electrical and Computer	Makerere University

		Engineering	
Zambia	Mr. Nason Musonda	Power Distribution Development Officer	Rural Electrification Authority
Zambia	Mr. Suzyo Silavwe	Provincial Rural Electrification Officer	Rural Electrification Authority

Resource Personnel

Name	Title	Organization
Prof. Francesco Iliceto	Professor Emeritus, Faculty of Engineering	Rome University “La Sapienza”
Mr. James Van Couvering	Senior Utility Specialist	National Rural Electric Cooperative Association (NRECA)
Prof. Izael Da Silva	Deputy Vice-Chancellor	Strathmore University
Mr. Chrisantha Ratnayake	Consultant Power Engineer	EUEI PDF
Mr. Ralph Karhammar	Consultant Power Engineer	Africa Energy Practice, The World Bank
Mr. Niklas Hayek	Junior Project Manager	EUEI PDF
Ms. Jenny Maria Hasselsten	Operations Officer	Africa Energy Practice, The World Bank
Ms. Tatia Lemondzhava	Consultant Energy Analyst	Africa Energy Practice, The World Bank
Mr. Gidibo Tindwa	Events and PR Coordinator	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Ms. Blaga Zlateva	Intern	EAC-GIZ Programme on Regional Integration

Donors

Name	Title	Organization
Mr. Elsam Byempaka Turyahabwe	Project Development Officer	East African Community (EAC)
Mr. Peter Kinuthia	Senior Energy Officer	East African Community (EAC)
Mr. Fredrik Werring	Program Officer	Royal Norwegian Embassy, Dar es Salaam, Tanzania