



AFRICA **LEADS**
Partnership



Advancing Mini-grids as Drivers of Rural Development in Africa

Proceedings and Outcomes of the Inaugural Workshop of the Africa Mini-Grids Community of Practice (AMG-CoP) of Leading Countries in the Region

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August 2017





Table of Contents

About the LEADS GP	3
Acknowledgements	4
Introduction to the Africa Mini-grids Community of Practice	5
A cornerstone solution: Mini-grids providing power to unserved areas.....	5
The African Community of Practice for the Advancement of Mini-Grids.....	6
Key objectives for the inaugural meeting of the AMG-CoP	7
Proceedings.....	7
Priority issues identified during the inaugural workshop	8
Suggested work programme for the AMG-CoP	10
ANNEX A: Agenda	11
ANNEX B: List of Participants.....	13
Annex C: Country Presentations.....	15



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About the LEADS GP

The Low Emission Development Strategies Global Partnership (LEADS GP) was founded in 2011 to facilitate peer learning, technical cooperation and information exchange to support the formation and implementation of low emission development strategies. It has a focus on support to developing countries and regions.

LEADS GP engages leaders from over 300 institutions across government agencies, technical institutes, international agencies, and NGOs. It operates through regional platforms in Africa, Asia, Eastern Europe, and Latin America and the Caribbean and has six technical global working groups and a global secretariat. LEADS Practitioners in each region set priorities for learning, collaboration, and advisory support delivered collectively through the Partnership.

The Africa LEADS Platform is a membership-based platform that has over 500 members spread across 31 African countries and includes representatives from government, civil society, academia and the private sector. The AflP is guided by an independent Steering Committee and coordinated by a joint Secretariat operated by SouthSouthNorth, based in South Africa and Kwame Nkrumah University of Science and Technology, based in Ghana.

The LEADS Energy Working Group (EWG) is a demand-driven network comprised of more than 500 energy sector practitioners, representing national governments, multilateral institutions, private practitioners, and non-governmental organizations. It supports the regional LEADS GP platforms and operates in close collaboration with other sectoral platforms and the LEADS GP Secretariat. Membership is open to all interested parties. The EWG secretariat in 2016 was hosted by the Worldwatch Institute, in 2017 it is by SD Strategies.

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Cover photo: South Africa - Tourism - Electricity in an African village. Getty Images



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Acknowledgements

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Production of this report would not have been possible without the deep engagement and participation of the broad and growing network of partners in the AfLP and LEADS EWG.

Our sincere gratitude is extended to the governments, organizations and companies who participated in the initiative. While we hope the report is helpful to many practitioners, it first and foremost belongs to the country leads comprising this group.

Special thanks go to our workshop contributors and presenters, including Edward Awafoe, Olugbolahan Mark-George, Daisy Mukarakate, Tim Reber, Davinah Milenge Uwella, and John Yeboah.

Special credits go to Ameil Harikishun for his tireless effort to support and execute this event. We would also like to thank Dean Gioutsos, SD Strategies, for his contribution to the design and editing of this report.

Alexander Ochs
Director, SD Strategies &
Chair, LEADS Energy Working

Michelle du Toit
Executive Secretary
Group Africa LEADS Partnership



Introduction to the Africa Mini-grids Community of Practice¹

As isolated grid systems, mini-grids and micro grids are energy systems that utilize a set of energy generators, in some cases including storage systems, to serve a limited customer base using a distribution system that is capable of operating while not depending on inaccessible national electricity transmission networks. These systems typically range from a capacity of 10 kilowatts (kW) up to 10 megawatts (MW).¹ Renewable energy technologies have advanced so much in recent years that mini-grid systems based on renewables are now often the most affordable, reliable, and sustainable option for electrifying rural and otherwise hard-to-reach communities.



A cornerstone solution: Mini-grids providing power to unserved areas

The potential for applying renewable energy-based mini grid systems in Africa is enormous. The continent's renewable power potential substantially exceeds its current and projected power consumption needs. Studies consistently demonstrate that renewable energy technologies are the most economical solution for off-grid and mini-grid electrification in remote areas.

¹ Micro grids are usually defined as such in the range of tens to hundreds of kW, whereas the term mini-grid often refers to systems in the MW range. At the outset of this project, both micro grids and mini-grids are considered as potential technical solutions for providing energy access and as drivers of rural development. Depending on the request of participating countries, the focus will, or will not, be narrowed on one or the other.



Despite this opportunity, uptake of mini-grid systems at the community, private sector, utility, and hybrid levels remains underwhelming throughout much of Africa. Compared to stand-alone home energy systems, mini-grids require significantly more planning and institutional collaboration. Since they are designed to serve a community of electricity users, all mini-grids require enabling legal frameworks to ensure agreement on system planning, operation, pricing, and maintenance.

In many African countries, planned and existing mini-grid investments lack effective enabling frameworks attracting investments at the necessary scale. Goals and broad policy frameworks often exist – but only in some countries are these already components of comprehensive investment environments that also include powerful “cornerstone policies,” concrete regulations and standards, transparent and uncomplicated administrative processes, etc. Policymakers tasked with the advancement of mini-grids often lack the tools to create enabling environments, including quality technical data on resource potentials for mini-grid energy feedstocks, replicable socioeconomic and environmental impact assessment methodologies, and financing products for mini-grid development.

The African Community of Practice for the Advancement of Mini-Grids

Through consultation between the LEADS GP, the LEADS Energy Working Group and the membership of the AfLP, **mini-grid systems were identified as a priority knowledge and action area for African country leads charged with designing low-emissions development strategies in the energy sector.** In response to this identified priority by AfLP member countries, the LEADS Energy Working Group (EWG) sought to collaborate with the LEADS African Regional Platform Secretariat to create a Community of Practice on mini-grids. In this regard, the EWG and AfLP act as “co-pilots” and designed a conceptual framework that provides guidance and flexibility to a country driven, peer-to-peer learning and collaboration platform. Beyond logistical support and a facilitating role, they support country leads and technical experts with communication, research and drafting capacities. Ultimately, they will analyze, synthesize, and disseminate results broadly, appropriately, and effectively.

A Community of Practice is a network of engaged experts from a shared sector or working area, in this case mini-grids, who form a group to regularly engage in peer-to-peer learning to improve their personal and collective group knowledge. A Community of Practice promotes forms of exchange both inside and outside of formal communication channels. By providing an inclusive, member-driven experience, it offers an alternative to conventional knowledge-sharing networks that tend to feature top-down development assistance. The ultimate goal of the initiative is to support African governments in creating and advancing policies and programs aimed at accelerating energy access and rural development through the application of mini-grid systems.



The Africa Mini-grids Community of Practice (AMG-CoP) convened African government officials from ten countries during the inaugural meeting held in Cotonou, Benin. The African government officials, referred to as members, comprise of individuals working in

respective national government entities with a mandate for energy, rural electrification and the development of mini-grids.²

Key objectives for the inaugural meeting of the AMG-CoP

The inaugural meeting of the AMG-CoP took place on the 27th of June, 2017 in Cotonou, Benin - a day prior to the Africa Carbon Forum (ACF). This provided an ideal setting for the meeting, as participants of the AMG-CoP consequently had the opportunity to then attend the ACF as well. This was regarded as a valuable opportunity by the attending members, since many of the members hadn't attended the ACF previously.

The primary objectives of the inaugural meeting were to initiate an open dialogue between country members on the topic of mini-grids, establish rules of engagement, determine common challenges and priority areas, and gather input for the AMG-CoP workplan. The AMG-CoP has been established as a country-driven platform, with a strong emphasis on country ownership of the initiative. Therefore, it was considered essential that the country members have the opportunity to steer the formulation of the AMG-CoP workplan.



Proceedings

The programme for the workshop was designed to facilitate highly interactive sessions, in which countries could discuss their national situations and expectations for the AMG-CoP, aiming at identifying the key issues that governments are seeking assistance with.³

² Annex 1 contains a complete list of African government officials, facilitators and speakers that attended the AMG-CoP inaugural meeting in Cotonou, Benin.

³ Annex 1 contains the AMG-CoP Inaugural Workshop Programme



The workshop commenced with each government presenting their country context, past progress and future ambition and described challenges and barriers to implementing mini-grids. All members contributed to this session with prepared initial presentations⁴ and were open in communicating the challenges their governments were facing. The session also provided a valuable opportunity for countries to learn about each other's contexts, with regards to electrification and mini-grids, and solidify a sense of common cause. The session was well-received by members and set the tone for a collaborative and honest atmosphere throughout the day.

The day proceeded with deliberations on common challenges and priority areas to be included in the CoP workplan (see below) Tim Reber (National Renewable Energy Lab, NREL) introduced a Quality Assurance Framework and highlighted multiple technical components that countries should consider when designing and ensuring the quality of mini-grids. Olugbolahan Mark-George, (Climate Economic Analysis for Development, Investment and Resilience, CEADIR), and Davinah Milenge Uwella (African Development Bank, AfDB), discussed aspects of finance for mini-grids. Sessions included conversations about private sector finance needs, the role of multilateral development banks, and the effectiveness of various existing initiatives aiming to support the planning, design and implementation of mini-grids in members' countries.



Priority issues identified during the inaugural workshop

The present governments identified several priority issues that they found not yet adequately addressed by existing initiatives and therefore nominated as potential work areas for the AMG-CoP:

1. Technical potential and pathways
- including feasibility studies and market assessments
2. Education and awareness
- including community-level schools and national technical institutes (design curricula, explore best practices in program set-up)

⁴ See Annex C



3. Access to donors and international financing for mini-grids

- including the mapping of available funding (bilateral and international, energy- and climate-related)
- including training local personnel in designing project pipelines and funding proposals
- including the design of templates for proposals

4. Business models for the implementation of mini-grids

- including providing examples of MG success stories in Africa: What successful business cases exist? What made them happen? Can they be replicated, and if so how? what key standards and lessons learned exist for the bankability of projects?
- including exploring the appropriate roles of governments, project developers and investors
- including bringing governments, project developers, investors, academia, and local communities together to discuss the path forward

5. Enabling policy environment and governance design for mini-grid implementation

- including guidance on how to organize multi-level and multi-stakeholder consultation required for the implementation of mini-grids; and on how to organize early community outreach and participation
- including exploring effective MG legislation: vision/targets, concrete policies
- including guidance on permitting processes, standards, guidebooks, accreditation processes (quality of affordable, reliable, safe service in the community's interest)
- including guidebook and trainings for auctions, tariff setting and PPAs
- including building continuity in governance & long-term knowledge management

Several initiatives already exist that are confronting the above priority issues. Governments agreed that the CoP would be an ideal meeting environment for representatives of these existing initiatives and the decision-makers participating in the CoP. The CoP meetings will continue to take place in small intimate settings and be characterized by an atmosphere of constructive teamwork, including lead personnel from participating countries. This should make them attractive to other service providers in this field. This approach has been suggested particularly for the above issue areas 1. – 3. The CoP has also been considered a good forum to present best practices and lessons learned with regards to these themes.



The issue areas 4. and 5. were highlighted by member countries as critical for the up-scaling of mini-grid implementation. They overlap with the LEADS GP's overall orientation and the strengths of the organizations organizing the AfLP and EWG. They have therefore been put forward as the top priority areas for the AMG-CoP going forward.



The countries also agreed that the NDC Leadership Compact and the many other direct country support initiatives should be looped back into the CoP group work and beyond, at the regional AfLP meetings, to disseminate learnings. Individual country deep dives and early mover support through the LEADS GP and partnering organizations will be explored toward this goal.

The group further agreed to actively support women in this initiative, and to measure success in this regard along at least two indicators: First, their equal representation in the initiative, and second, through addressing gender as an issue in each and every future component of the CoP's work programme.

Suggested work programme for the AMG-CoP

The inaugural meeting provided substantial input from the member countries with regards to the work plan that they would like to take forward. This input has shaped the activities to take place in the future months.

With consensus among the CoP members on priority issue areas 4. and 5. as the most vital at the current point in time, it is proposed that these constitute specific work streams which can be explored more deeply in order to reach the necessary knowledge and expertise found to be currently lacking.

To this end, the second AMG CoP workshop is proposed to take place in Abidjan in October, around the AfLP regional platform meeting, where these two topics will be comprehensively addressed. Additionally, this meeting will allow the CoP members to refine their work plan preferences and approaches for proceeding over the course of the following year.

In order to make these activities feasible, the following tasks will be addressed in the coming months: information coming out of the first workshop will be distributed, a specific work plan will be designed and put forward to the CoP members for their additional input and approval;



work will begin on the mapping of and connection with other mini grids initiatives.

A funding proposal will also be developed, and discussion needs to take place on the development of both a member's sharing platform and an online open platform.

Beyond this - in the period between November 2017 and mid-2018 - resides the responsibility of the CoP members to work on the implementation of their work stream activities, and to document the outcomes of their efforts. A report on the main

findings of these efforts will be developed and distributed to all of the CoP members.

Finally, coming to the end of the implementation period, a final AMG-CoP workshop will be held, with the aim of reflecting and taking stock of the progress made through the CoP structure, and deliberating its continuation



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ANNEX A: Agenda

AFRICAN COMMUNITY OF PRACTICE
FOR THE ADVANCEMENT OF MINI-GRIDS AS DRIVERS OF RURAL DEVELOPMENT
(AMG-COP)

A peer-to-peer collaboration initiative for African policy leaders

AGENDA

INAUGURAL MEETING

27 JUNE 2017

PALAIS DES CONGRÈS
BOULEVARD DE LA MARINA, COTONOU,
BENIN

Conference Chairs:

Michelle du Toit, Executive Secretary of the Africa LEADS Partnership,
michelle@southsouthnorth.org

Alexander Ochs, Director, SD Strategies & Chair of the LEADS GP Energy Working Group,
ochs@sd-strategies.com

Conference Secretariat

Ameil Harikishun, Working Group Liaison Africa LEADS Partnership,
ameil@southsouthnorth.org, Tel: +27 72 733 7976 (Whats App only)



0900 – 1000 Welcome & Introduction

Introduction to the 1st Inaugural Meeting of the AMG-CoP: Goals, agenda, facilitators, logistics

Questions, Answers, Comments

1000 – 1130 Country Introductions and Scoping Exercise

What do countries have, where are the challenges?

Each country presents three slides on

- 1) Energy for All: Situation & Goals
- 2) Existing Mini-Grids
- 3) Key Challenges and Suggestions for the Community of Practice

Followed by Q&A

1130 – 1145 **Coffee**

1145 – 1300 Discussion of CoP Work Program

What do countries want to collaborate on?

Key distinction: What do we want to work on together? What is best achieved by direct country-specific deep dives?

Break out tables for discussions lead by 4 facilitators

Plenary discussion of break-out discussion results

1300 – 1400 **Lunch**

1400 – 1515 Training: Service Quality Assurance

Using NREL's Mini Grid Quality Assurance Framework

1515 – 1530 **Coffee**

1530 – 1645 **Plenary Discussion: Investors' Needs, Working Business Models, Effective Policies and Measures**

Private and finance sector practitioners discuss their experiences with CoP member countries

1645 – 1730 Conclusions & Next Steps

Wrap-up of Day and Discussion of Next Steps



ANNEX B: List of Participants

Bénin

Mr Todeman Flinso Assan

Direction Générale de l'Énergie

Democratic Republic of Congo

Mr Olivier Bingana Kumbana Wa Baki

Commission Nationale de l'Énergie (CNE)

Ms Blanche Mazeya Mbonga

Ministry of Environment and Sustainable Development

Germany

Mr Alexander Ochs

LEDS GP (SD Strategies)

Ghana

Mr Edward Awafo

AfLP Secretariat (KNUST)

Mr Andrew Tonto Barfour

MINISTRY OF ENERGY, GHANA

Mr John Yeboah

ECOWAS Centre for Renewable Energy And Energy Efficiency (ECREEE)

Mr Kwabena Otu-Danquah

Energy Commission

Ivory Coast

Mr Konan Jules Afferi

Research Institute for New Energies (IREN)

Liberia

Mr Prince Nanlee Johnson

Ministry of Lands, Mines and Energy

Mali

Mr Ousmane Ouattara

Mali Folkecenter

Namibia

Mr Paulus Ashili

Ministry of Environment and Tourism (MET)

Mr Shimweefeleni Gottlieb Hamutwe

CSP TT



AFRICA LEADS
Partnership



Nigeria

Mr Abbas AbdulRafiu

National Environmental Standards and Regulations Enforcement Agency

Mr Okon Nsekenyin Ekpenyong

Energy Commission

Mr Olugbolahan Mark-George

CEADIRE/Abt Associates

Rwanda

Ms Davinah Milenge Uwella

AfDB

Sierra Leone

Mr Edward Pieh Bendu

Ministry of Lands, Country Planning and Environment

Mr Robin Fola Mansaray

Ministry of Energy

South Africa

Ms Michelle du Doit

AfLP Secretariat & SouthSouthNorth

Mr Ameil Rabin Harikishun

AfLP Secretariat & SouthSouthNorth

Tanzania

Ms Pamela William Levira

Meteorological Agency

Uganda

Ms Justine Akumu

Ministry of Energy and Mineral Development

USA

Mr Tim Reber

National Renewable Energy Laboratory (NREL)

Zambia

Mr Suzyo Joe Silavwe

Rural Electrification Authority

Zimbabwe

Ms Daisy Mukarakate

UNDP Regional Service Center for Africa - Climate Change, Energy and DRR Cluster



Annex C: Country Presentations



Advancing climate-resilient low emission development in Africa



BENIN

Mr. SEMASOU Clarence, General Director,
Ministry of Energy, Water and Mines (MEEM)/National
Renewable Energy and Energy Efficiency Agency
(ANADER)

Inaugural Workshop of the African Mini Grids Community of Practice (AMG-CoP)

Cotonou, Benin, 26 June 2017



Energy for All: Situation & Goals

Energy for All

1. Around 7 million of people were without access to electricity in 2013 (REN21, 2016)
2. 31 % of national electrification rate with 58% in urban areas while 6.7% in rural areas (2014)

Goals

1. Reach 65 % of national electrification rate (95% urban, 50% in rural) by 2030
2. By 2020, 850 locality will be electrified by isolated mini-grids



Existing Mini-Grids

1. 96 mini-grids with an estimated power of 3,1 MW
2. 87 of them are fully operated
3. The current mini-grid system are based only on off-grid solar PV system
4. They are built by the private companies that win the contract after tender,
Currently, they are owned by local Public authority but it is planned later on to be transferred to private company
5. The ongoing project is financed by the national budget and UEMOA;
Business Model : Private sector-based model
6. **Success Story**: Electrification of KPOKISSA Village with a mini-grid solar PV system

Where: KPOKISSA is a remote Village in Zou Division, southern Benin.

Why:

- Rising of local business and households' income;
- Meet the village expectation in term of electricity;
- Increasing of education rate (Students have light at night);
- Health improvement of the population (no exposure to kerosene fumes)...



Key Challenges and Requests for the Community of Practice

Challenges advancing Mini Grids:

1. Lack of funds
2. Scarcity of expert know-how
3. Lack of a strong institutional framework

Requests for Support from Joint Work in the Community of Practice

1. Capacity building in funds acquiring
2. Strengthening the skills of technicians and experts in the design, installation, and maintenance of the mini-grid system





Democratic Republic of Congo (DRC)

MAZEYA MBONGA Blanche, Climate
Change Expert; Ministry of the Environment
and Sustainable Development and
BINGANA Olivier, Chef of Department/
Renewable Energy; CNE/Min.ENERGY



Existing Mini-Grids

Existing Mini Grids - please use your own definition for what constitutes an MG

1. Mini Grids exist in DRC. However, they are badly known.
2. Mini Grids are using different sources of energy: -Solar; -Wind; -Small Turbines on Water Courses – Fuel Oil.
3. Private Business Men Build Mini Grids
4. Business Men Financed Mini Grids from their own pockets.
5. A business man: a Congolese living in South Africa; couldn't install his private mini grid for electricity production; because of too many formalities to be filled; So, he gave up and went back to South Africa.

However, the electricity sector is liberalized by Law No. 14/010 on 17 July 2014.



Energy for All: Situation & Goals

Energy for All

1. 90% of the Population miss regular access to electricity
2. Less - 1% of the rural population have access to irregular electricity

Goals

1. The Goal is to "Raise the Rate of Electrification in Rural Areas".
2. Encourage the Private Sector to Produce, distribute and sell Electricity in Accordance with National Related Laws.



Key Challenges and Requests for the Community of Practice

Challenges advancing Mini Grids:

1. Availability of Funds
2. Be in Accordance Congolese Regulations
3. Difficulties for poor people, to pay for the electricity used

Requests for Support from/Joint Work in the Community of Practice

1. We need Financial Support;
2. We need support in Technology Transfer;
3. We need Capacity Building Support.





Advancing climate-resilient low emission development in Africa



SIERRA LEONE

Robin Fola Mansaray, Head, Renewable Energy & Energy Efficiency, Ministry of Energy

Inaugural Workshop of the African Mini Grids Community of Practice (AMG-CoP)

Cotonou, Benin, 26 June 2017



Existing Mini-Grids

Existing Mini Grids - please use your own definition for what constitutes an MG

A source of power in a community serving the energy and electricity needs of households, productive enterprises and public institutions and therefore constitutes the following demand management, promotion of productive end use, and quality of electricity service, tariff design, revenue collection and end user finance in relation to size of the community, size of the population, distance to the national grid, complexity of the terrain and the economic strength of the community.

[Total number, estimated total capacity]

Three (3) Solar Mini-grids with a total capacity of 270 KW or 0.27 MW at Segbwema, Panguma and Gbinti in Kallahun, Kenema and Port Loko Districts respectively.

One Hydro Mini-grid with a capacity of 250 KW or 0.25 MW at Yele Town in Tonkolili District

One Hydro Mini-Grid with a capacity of 128 KW or 0.128 MW at Makali in Tonkolili District.

One Solar/Hydro Mini-Grid with a capacity of 120 KW or 0.12 MW at River number 2 along the Freetown Peninsula Road, Western Rural District.

50 small mini-grids (extension of the fifty 6 KW pV systems at the CHCs) to larger pV capacities with additional 10, 20, 30 or 40 KWp, according to the size of the village with 30,000 (est.) direct beneficiaries connected to small mini-grids by December 2017

40 large mini-grids privately operated to be completed by October 2020 with 70,000(est.) direct beneficiaries

The 50 small and 40 large mini-grids would sum up to 5 MW. Therefore the grand total estimate is about 5.77 MW.

It is also worth noting that other Mini-grids are operated in some communities by private people using diesel generators but are excluded here as it is difficult to obtain the information needed.

Current state: all fully operational? Not all are operational at the moment. Currently four are fully operational but we are hopeful that by December 2017 over 50 would be fully operational.

[Technologies of existing mini grids] The following technologies are currently in use i.e. solar, hydro and solar/hydro hybrid

[Who built the mini grids, who owns them?] These are built by International Organizations and International Non-Governmental Organizations e.g. UNOPS, Weithungehille (WHH), Energy for Opportunity (EiFO), Cooperazione (COOP) and NED POWER. The assets are normally handed over to Government through the Ministry of Energy and the Ministry in turn hands over the assets to the local community for operation and management.

[How were the existing mini grids financed, what is the business model?] Mostly financed by donor funding i.e. E.U, U.K Government through DFID and the Chinese Government.

[ONE example success story: What, where, why a success?] The Yele Hydro Mini-Grid as it is one of the remote community without grid access that are constantly enjoying electricity more than even some parts in the city and it is managed by the developers.



Energy for All: Situation & Goals

Energy for All

1. [Current share of population without regular/reliable energy access]

The current share of population without regular /reliable energy access can be deduced and put in terms of households according to the 2015 population census as 82.2 % because 76.4 households use battery/rechargeable light as the main source of lighting, followed by households with the Electricity energy access as 17.8 percent. The use of other sources (wood, kerosene, generator, solar, gas and candle) accounts for 5.7 percent.

2. [Electricity rate in rural areas versus city]

The overall Access to Electricity is 12.5% (10% urban and 2.5% rural) with a grid connected capacity of 120 MW constituting a Thermal capacity of 64 MW and Renewable Capacity of 56 MW

Goals[Electrification Goal] 1. Ensure adequate, reliable, affordable and cost effective power supply within the country 2. Improve accessibility to electricity supply, particularly in the rural areas. 3. Improving energy efficiency and conservation in all sub-sectors 4. Provide adequate energy for socio-economic activities as included in the National Energy Policy documents: Agenda for Change and Agenda for prosperity.

[Mini Grids-specific Goal] To improve access to reliable and cost effective energy services for priority institutions such as health centres, Schools and Agriculture, Business Centres, Chiefdom administrative offices and chiefdoms households, which will be done by means of Solar Energy Systems (Solar Home Systems, Mini-Grids and Solar Power Plant) and also to develop capacity of local associations to take ownership of the assets. The integration of mini-grids with the distribution networks where possible.

Key Challenges and Requests for the Community of Practice

Challenges advancing Mini Grids:

- [Challenge no. 1] • Lack of legal framework and enforcement mechanisms/specific policy on Mini-grids
- [Challenge no. 2] • Lack of financing and private investment
- [Challenge no. 3] • Lack of local human capacity

Requests for Support from/Joint Work in the Community of Practice

- [Request no. 1] The Development of Legal framework and enforcement mechanisms/specific policy for mini-grids
- [Request no. 2] To help with the accessing of finance by the private sector for investment in Mini-grid
- [Request no. 3] To Finance the installation of more mini-grids with a preferred business model for replication





Nigeria

Engr. Okon N. Ekpenyong
Director (Linkages & Consultancy)
Energy Commission of Nigeria

&

Abbas AbdulRafiu,
Principal Scientist
National Environmental Standards & Regulations Enforcement Agency

Presenter
Abbas AbdulRafiu

Inaugural Workshop of the African Mini Grids Community of Practice (AMG-CoPz)

Cotonou, Benin, 26 June 2017



Existing Mini-Grids

Existing Mini Grids -

- [Total number (34), estimated total capacity 31MW]
- [Current state 29 are fully operational? While 5 Non-Operational]
- [Technologies of existing mini grids: 6 are Hydro, 3 Biomass, 2 wind, while 23 are PVC]
- [Who built the mini grids 5 by UNIDO, 6 by BOI/UNDP, 1 by UNDP/GEF, 1 by GIZ. Who owns them?]
- [How were the existing mini grids financed; NESCO, UNIDO, ECN/SERC, GVE/CTI PFAN, Sosai Renewable Energies Coy Ltd, ECN/UNDP/GEF, Arnergy Solar Limited. What is the business model? Pay AS You Go]
- [ONE example success story: What, where, why a success?] Green Village Electricity (GVE) installed a 24kWp solar PV system in Egbeke community. The solar PV mini-grid created 36 jobs within the community during the course of implementation. The mini-grid provides electricity for 1,920 people living in 240 households, the community church, health center, school and market.



Energy for All: Situation & Goals

Energy for All

- Current share of population without regular/reliable energy access is 57.6% of total population
- 39.3% of rural population lack access to Electricity, while 78.3% in the cities

Goals

- [Electrification Goal] "To provide 75% of the population (rural or urban) by 2020 access to reliable electric power supply, in a way that would allow for reasonable return on investment of at least 10% of renewable energy mix by 2025, through appropriate tariff that is economically responsive and supportive of the average rural customer"
- [Mini Grids-specific Goal] to promote a full menu of electrification options-grid and off-grid (mini-grid & stand-alone) from thermal and renewable at least one in each of the 774 Local Govt. Areas (REA, 2016)



Key Challenges and Requests for the Community of Practice

Challenges advancing Mini Grids in Nigeria:

- engagement model between the consumers and investors
- Inadequate evacuation capacity & strong administrative controls to prevent collection losses and bypasses
- Limited capacity of up-takers to pay for the electricity consumed
- Inadequate local indigenous human and manufacturing capacities
- High initial investment cost for sustainable/renewable energy technologies

Requests for Support from/Joint Work in the Community of Practice

- Organize and deliver technical and business training for Mini-Grids developers/investors at community levels to Nigeria team
- Assist the country's team in the development of work plans for the strategic roll out CoP
- Establishment of Community-based RE-Mini-Grids for micro-enterprises and focal person in LGAs (one per LGA)
- The design and testing of Financial model in partnership with MFIs and technology providers of Mini-Grids electricity in rural community





Key Challenges and Requests for



Advancing climate-resilient low
emission development in Africa



NAMIBIA

Shimweefeleni G. Hamutwe
Technical Advisor
MET/MME

Inaugural Workshop of the African Mini Grids Community of Practice (AMG-CoP)

Cotonou, Benin, 26 June 2017



Energy for All: Situation & Goals

Energy for All

1. Current share of population without regular/reliable energy access : 60%
2. Electricity rate in rural areas versus cities : 15% vs 75%

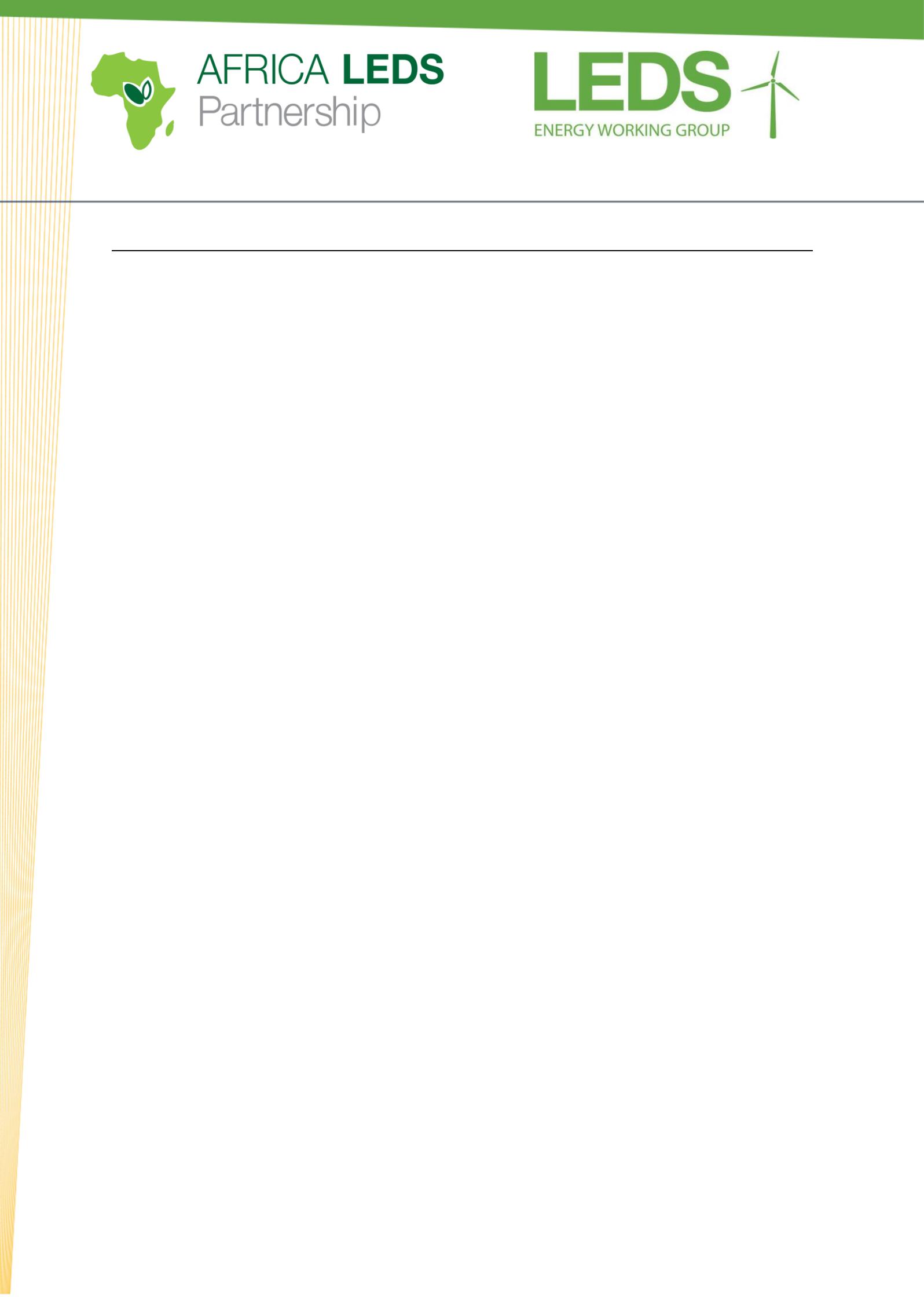
Goals

1. Electrification Goal: **security of supply; economic growth; support industrialisation; etc.**
2. Mini Grids-specific Goal: **Improved livelihoods/services in remote /off-grid areas through provision of modern CLEAN energy, etc.**





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 **UNITED REPUBLIC OF TANZANIA**



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Inaugural Workshop of the African Mini Grids Community of Practice (AMG-CoP)
Cotonou, Benin, 27 June 2017

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**Key Challenges and Requests for
the Community of Practice**

Challenges advancing Mini Grids:

1. Local O & M capacity availability.
2. Roll-out of Cost Reflective Affordable tariffs for poor communities vis-à-vis grid tariffs.
3. Ownership/Management Structuring

Requests for Support from/Joint Work in the Community of Practice

1. Technical capacity development for local O&M of Mini-Grids to ensure continuous 24-hour supply
2. Appropriate Financing Mechanism/Structuring for Mini-Grids Finance
3. Post Installation Operation and Management Arrangements - e.g. policy frameworks for public Mini-Grids.





Existing Mini-Grids

Existing Mini Grids – closed non-grid connected energy system providing modern clean energy to various households, institutions, businesses, etc. for a community.

1. Total number: 10; estimated total capacity: 700kWp with 4MWh storage
2. Current state: all fully operational: Yes
3. Technologies of existing mini grids: PV, PV Hybrid(solar heating, gas, bio-mass, diesel)
4. Who built the mini grids: Government, private sector (businesses/industry/NGOs), development partnerships, etc.
Who owns them: Government institutions, private sector (businesses/industry/NGOs), etc.
5. How were the existing mini grids financed: Public, Private, Grants, Partnerships
What is the business model: Use and Pay Charge; Built-Own-Operate, etc.
6. ONE example success story:
What: Gobabeb Desert Mini-Grid
Where: Namibian Desert
Why a success: used as R&D for Mini-Grids for improvements/innovations; income generation as eco-tourism lodge of which income used to sustain O&M.



Energy for All: Situation & Goals

Electrification goal. Improve electricity access from 38% in 2014 to 50% by 2025 and to at least 75% by 2033.

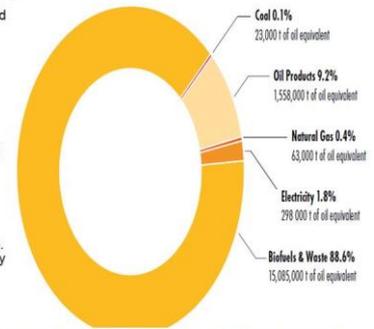
Mini Grids-specific Goal: to develop small power generation of capacity ranging from 100 kW to 10 MW and utilizing renewable energy resource. We have 76MW installed capacity from renewable energy.

Energy access to the national grid: 10% household connected, 1% is able to use electricity for cooking, 7% of rural people and 40% of urban people have access to electricity.

Electricity supply: TANESCO supply 98% and 2% min grids. Tanzania's electricity generation capacity is 1,357.69 MW (hydro 42%), natural gas 45% and liquid fuel (13%). Per capita electricity consumption: 100 KWh/y (versus 500 KWh required for quality life)

Challenges: Research development (technology, climate change, higher initial upfront cost, and electricity accessibility)

Source: <https://www.worldfuturecouncil.org/roadmap-100-re-poverty-eradication-tanzania/>





Existing Mini-Grids in Tanzania

Mini Grids – smaller power plants, mini hydro, biomass and solar and wind power system for public institutions or individual household with capacity to generate electricity of up to 10MW..

1. Technologies: Solar, wind, mini hydro, and biomass technology.
2. Example: Tanzania Wattle Company (TANWAT), 2.5 MW, biomass technology, TPC sugar cogeneration (Moshi) 17.5MW, SAO Hill Energy (biomass) (Mufindi) 15.75MW, The PowerCorner project 45KWH.

Source: https://www.esmap.org/sites/esmap.org/files/4b.%20TANZANIA_Innovation%20in%20Delivery%20of%20Services.pdf



Key Challenges and Requests for the Community of Practice

Challenges advancing Mini Grids:

1. There is limited collaborative research development that maximize the use of available meteorological data and information (wind, solar and rainfall data) to better plan for changes in energy demand.
2. Successful large-scale deployment of mini grid technologies must include an understanding of the impacts of weather and climate to energy resources.

Requests for Support from/Joint Work in the Community of Practice

1. We request for research project and program development that facilitate effective application of weather and climate data to support effective energy production and management with the goal to achieve optimal balancing of supply and demand as well as to drive behavioral changes in energy saving.
2. We request for development of the projects that improves the understanding of the impacts of weather and climate to energy resources in Tanzania.

Thanks for listening





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emission development in Africa



ZAMBIA

**Suzyo Joe Silavwe - Chief Engineer
Renewable Systems**

Rural Electrification Authority (REA)

Inaugural Workshop of the African Mini Grids Community of Practice (AMG-CoP)

Cotonou, Benin, 26 June 2017



Energy for All: Situation & Goals

Energy for All

1. Zambia is a resource rich, lower-middle-income country with a population of close to 17 million. The second most important energy source in Zambia after wood fuel, providing about 10 percent of total electricity supply. The electricity supply industry in Zambia is dominated by the vertically integrated utility ZESCO Limited (ZESCO).

2. The electricity sector is overseen by the Ministry of Energy (MoE), which provides policy guidance. The independent Energy Regulation Board (ERB) is responsible for licensing, tariff setting, and monitoring and service standards for all segments of the energy sector.

3. Access to electricity, especially in rural areas, is strikingly low. The overall national electricity access rate, defined as connection to the grid, is low at 31 percent. More than 67 percent of the population in rural areas and only close to 4.4% for grid power while 7.4% from solar power in rural areas, have access to electricity. In addition, 4.6 percent of households have access to lighting energy through Solar PV systems.

Goals

1. REA created through Act No. 20 of 2003 whose mandate is to provide electrical infrastructure to rural areas using appropriate technology to increase access rate and improve the quality of life. REA vision – "The electricity infrastructure for rural areas".

2. REA intends to continue promoting Renewable Energy by developing the Renewable Energy projects and provide targets and opportunities. Work closely with the private sector in developing RE projects. REA has the following opportunities for private sector participation:

- Provision of available sites for development, Capital subsidies, Project feasibility studies, Project Management and Operation



Existing Mini-Grids

Existing Mini Grids - please use your own definition for what constitutes an MG

1. Total number: One, 60kWp Solar Mini grid, Samfya District, Luapula province
2. Current state: Fully operational, supplying 450 customers
3. Isolated Solar Mini grid technology
4. Built and Owner by REA. The plant is being run by the Kafita Cooperative.
5. Financed through a Grant from United Nation Industrial Development Organization (UNIDO); The business model is Community based business model. Kafita cooperative and responsible for Operation and maintenance of the plant with technical support from REA
6. success story of Mpanta has led to REA developing the following MG:
 - Under Implementation
 - > 200kWp Chunga isolated solar mini grid located in the Kafue National Park, in Mumbwa District of Central Province.
 - > 300kWp Lunga isolated solar mini grid located on Kasomalunga island in Lunga District of Luapula Province.
 - > 640kW Kasanjiku Mini Hydro located in Mwinilunga District of North Western Province.
 - > 1MW Chimpenpe Mini Hydro located 67km from Kawambwa district of Luapula province.
 - Lunga Wind Assessment Project
 - > REA is undertaking a Wind Resource Assessment (60meter met mast) in Lunga District for a possible a hybrid mix with the Lunga Solar mini grid



Key Challenges and Requests for the Community of Practice

Challenges advancing Mini Grids:

1. High cost of developing mini – grids – REA has to provide a capital subsidy
2. Ability to pay the Cost Reflective tariff to meet costs operation and maintenance of mini –

3. Private sector is more interested in grid connected renewable energy projects

Requests for Support from Joint Work in the Community of Practice

1. Partner with private sector to finance feasibility studies for development projects
2. Business models to structure in anchor loads capable of paying a cost reflective tariff to cover operation and maintenance
3. The Government of the Republic of Zambia through relevant institutions is creating an environment to increase private sector participation in the implementation of Renewable Energy projects



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