



**SMART VILLAGES**  
New thinking for off-grid communities worldwide

## Smart Villages in West Africa: Accra regional workshop report



**Workshop Report 20**

ACCRA, GHANA

May 2016

Key words:  
West Africa, Energy Access,  
Rural Development, Off-grid energy

## Smart Villages

We aim to provide policymakers, donors, and development agencies concerned with rural energy access with new insights on the real barriers to energy access in villages in developing countries—technological, financial and political—and how they can be overcome. We have chosen to focus on remote off-grid villages, where local solutions (home- or institution-based systems and mini-grids) are both more realistic and cheaper than national grid extension. Our concern is to ensure that energy access results in development and the creation of “smart villages” in which many of the benefits of life in modern societies are available to rural communities.

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## Publishing

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The Smart Villages Initiative is being funded by the Cambridge Malaysian Education and Development Trust (CMEDT) and the Malaysian Commonwealth Studies Centre (MCSC) and through a grant from the Templeton World Charity Foundation (TWCF). The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Cambridge Malaysian Education and Development Trust or the Templeton World Charity Foundation.

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## SUMMARY

On average, 60% of the population across the 15 countries that comprise the Economic Community of West Africa States (ECOWAS) is based in rural areas. Rural electrification rates in the region remain extremely low and estimates suggest that, for the region as a whole, only 19% of the rural population has access to electricity. Traditional biomass, which is utilised mainly for cooking, represents the bulk of final energy consumption in the region. In urban areas, charcoal remains the basic fuel despite efforts to promote liquefied petroleum gas (LPG), whilst the rural population tends to use firewood in traditional stoves. With increasing population and urbanisation, the use of firewood is having a severe impact on forest and woodland environments. It also has a negative effect on the health and quality of life of rural and urban people, in particular, women and girls.

From 23 to 25 May 2016, the Smart Villages Initiative along with SNV Ghana organised the first regional workshop in West Africa in Accra, Ghana to develop a better understanding of rural energy access in the region. The workshop brought together stakeholders from 13 countries from across the region and garnered substantial interest among a wide-range of stakeholders including representatives from the public sector, the donor community, non-governmental organisations (NGOs), the private sector, and academia.

Workshop participants were informed about SNV Ghana's efforts to improve energy access in rural areas in the country by investing in developing sustainable market systems in these communities. The government of Ghana is also



Women and children arrange fish for smoking during field visit to SNV improved cookstove project for fish smoking at Anyakpor Village near Ada Foah, Ghana.

actively involved in ensuring universal energy access in the country by 2030. For remote rural communities, the strategy calls for promoting decentralised electricity generation systems such as mini-grids or solar home systems (SHS). Across the West Africa region, there is a huge potential to increase renewable energy generation; however, these resources remain unexploited due to economic, political, and capacity constraints. The World Bank and International Finance Corporation's Lighting Africa programme is trying to act as a catalyst for market development and transformation in the renewable energy sector. They are also making efforts to deal with some of the constraints facing the off-grid energy sector.

For entrepreneurs working in the off-grid energy ecosystem in the region, one of the most pressing issues is lack of access to finance, especially at the consumer level. Entrepreneurs in the region are utilising a number of technologies to improve energy access in rural areas. While solar home systems are important, some organisations are trying to couple electricity generation with promoting improved cooking solutions based on biogas and LPG kits. A key lesson to emerge from these initiatives is the importance of training local entrepreneurs within rural areas, which can galvanise local development. It can also help create awareness about off-grid/clean energy solutions that are available to consumers. It is also important to build capacity at the local level and to train local people to provide after sales services to ensure that operations and maintenance can be provided to consumers locally.

Despite the emergence of a number of entrepreneurs in the off-grid energy sector, there is still a lack of scalable business solutions that can be offered to consumers at the bottom of the pyramid in off-grid rural areas. There were a number of common themes that emerged from the workshop. One theme was that despite the challenges, it is necessary to work with government at the

national and local levels. For their part, governments in the region have to implement policies and regulations that facilitate market development for high quality products instead of creating hindrances for the private sector. Another is the need to foster linkages between the private sector and financial institutions. Multi-lateral institutions can play an important role in offering credit solutions to develop the market for off-grid energy products. The government can also be an important source of low-interest credit for these firms. For their part, private sector firms working on the provision of off-grid energy solutions have to build awareness about their work with financial institutions.

For cookstoves, there is an urgent need to develop and implement standards as well as quality assurance programmes to promote investment in the sector. It is essential that projects aimed at increasing access to energy in rural areas capitalise on women and promote their involvement in micro and small enterprises. Local women's perspectives should be taken on board during the design and implementation of improved cookstove interventions. Availability of improved cookstoves can have a positive impact on rural incomes not only by reducing fuel requirements but also by creating a value chain.

A key lesson from the workshop was that community involvement is necessary for the success of off-grid energy projects across the region. Distributed off-grid electricity generation presents the best solution for remote off-grid rural areas, both for household consumption and productive use. For long-term sustainable development in rural areas, promoting the productive use of electricity is essential. Promoting productive enterprises can help alleviate the chronic poverty that most of these areas suffer from. It can also help stimulate the local economy and help increase incomes as it provides the opportunity for employment generation.



## INTRODUCTION

The Smart Villages Initiative began its regional engagement in West Africa with a workshop in Accra, Ghana in May 2016. Over three days, from 23 to 25 May, the workshop brought together more than 90 key stakeholders from the public sector, private companies, academia, civil society organisations, and entrepreneurs that are engaged in the off-grid energy sector across West Africa. The workshop provided an extremely useful forum to discuss some of the issues facing the region in improving energy access in rural areas and the discussions provided key learnings for Smart Villages Initiative and the participants.

This report summarises key points arising from the presentations and discussions and is accompanied by a policy brief that distils the main messages for the policy and development communities. Copies of the presentations are available on the Smart Villages website ([www.e4sv.org](http://www.e4sv.org)). A background paper was prepared by the Smart Villages team summarising key aspects of the energy situation in West Africa. This report can also be accessed on the website. The workshop agenda and the list of participants along with their organisational affiliations are provided in Annexes 1 and 2 of this report respectively.



Field visit to improved cookstove project for fish smoking at Anyakpor Village near Ada Foah, Ghana

## INAUGURATION OF FORUM

### Welcome Address

**James Robinson, SNV Ghana**

James Robinson welcomed workshop participants, pointing to the rich and diverse experiences of energy access in West Africa. He highlighted the value of sharing these experiences between countries and organisations involved in developing village level energy services. He noted that the Smart Villages Initiative workshop is a timely event to support such sharing of experiences.

He gave an overview of the work of SNV in Ghana, which focuses on developing sustainable market systems in rural communities generating inclusive and environmentally sustainable growth. Within the energy sector, SNV is undertaking programmes on improved cookstoves, biomass, pico photovoltaics (PV), and support to small and medium-sized enterprises (SMEs) involved in the energy market. He pointed to the previous day's field visit which looked at the work of SNV in supporting the productive use of energy through improved fish smoking technologies. Another project undertaken by SNV in Ghana and supported by the World Bank, is the development of an innovation centre developing local capacity in energy systems.

### Introduction to Smart Villages

**John Holmes, University of Oxford and Smart Villages Initiative**

John Holmes explained that the motivation for the Smart Villages Initiative lies in three numbers: there are 1.1 billion people without access to electricity, 3 billion people cooking on dirty and inefficient stoves, and consequently 4.3 million people die each year due to inhaling smoke and fumes. Energy access has now been recognised as a global priority through the inclusion of Goal 7 in the Sustainable Development Goals. It is also important to recognise that achievement of most of the Sustainable Development Goals relies on energy access.

The observation underpinning the concept of smart villages is that technological breakthroughs offer the possibility of creating opportunities for a decent life in rural communities and a more equitable choice between staying in the village and migrating to cities. The Smart Villages Initiative has an ambitious vision for energy access which, through appropriate integration with other development initiatives, can provide a good level of key services in rural communities, the creation of new income generating opportunities, enhanced democratic engagement, and build greater resilience to shocks.

The Smart Villages Initiative is focusing on local energy solutions and aims to provide insightful advice to policymakers, development agencies, and donors. The project team is based primarily at the Universities of Cambridge and Oxford. Key partners are the national science academies and Practical Action, and funding is provided by two charities: the Cambridge Malaysian Education and Development Trust and the Templeton World Charity Foundation.

Engagement programmes are being run in six regions that bring together the key frontline players in workshops and other events to discuss the challenges of village energy provision for development and how they can be addressed. This workshop initiates the West Africa engagement programme. Cross-cutting activities are being undertaken with aims including increasing media coverage of off-grid energy and providing forward looks at new technologies that may be on offer in future years.

A key aim is to identify the framework conditions that will support entrepreneurial activities at the village level in the provision and use of energy services, and that will maximise the leverage of private sector funding from government/donor support. It is considered essential to take an in-



tegrated and community-level approach. A key concern is to establish how villages can progress rapidly up the energy and development ladders.

### Keynote address

**Kwabena Otu-Danquah, Energy Commission, Ghana**

In his opening remarks Kwabena Otu-Danquah welcomed workshop participants to Ghana. He explained that Ghana is on course for universal electricity access by 2030 with the active support of development partners. Electricity access rates are currently 80% in urban areas and 40% in rural areas. Substantial progress has already been made, but there are still many remote rural communities without electricity for whom grid extension will not be economically feasible in the near future. The Ghanaian government therefore has a policy of decentralised electricity generation for such communities through mini-grids or solar home systems.

Mini-grids may be based on renewable energy technologies, in some cases hybridised with diesel/biodiesel generators. US\$33.5 million has been committed to support the scale up of renewable energy based mini-grids, and the intention is to implement 55 solar mini-grids in the next three years. Stand-alone solar home systems are being deployed in schools, health centres, and other public facilities in villages. 2,400 such systems have been installed so far, as well as 16,800 solar home systems for rural households. It is also intended to replace two million kerosene lamps with solar lights by 2030.

In Ghana, there is a policy of cross-subsidisation between urban and rural consumers: although it is generally costs more to supply rural consumers than urban consumers, tariffs are the same in rural and urban areas. A “lifeline” tariff applies to customers using less than 50 kWh per annum. Tariffs then progressively increase



Mamadou Barry, Executive Director, Action Solidaire International, Senegal listens to proceedings.

through bands: 50 to 150, 150 to 300, 300 to 600, and greater than 600 kWh per annum.

A substantial portion of the population still relies on wood and charcoal for cooking, which has negative impacts on forests and the health of women and children. Ghana's SE4ALL action plan includes a provision to ensure cleaner cooking through increased access to, and use of, LPG. LPG bottles are being manufactured in Ghana. Improved cookstoves are also being promoted with a target deployment of two million by 2020. Standards are being established for improved cookstoves and two testing centres are being created. They will act as centres of expertise for improved stove design. Moreover, the government aims to increase the uptake of biogas and the increased use of pellets or briquettes and is promoting the creation of woodlands that are harvested sustainably for biomass.

Kwabena Otu-Danquah concluded with the hope that the workshop would develop concrete recommendations on how smart villages can be developed in rural areas of Ghana with the aim of increasing living standards. Rural Ghana is seen as the food basket of the country as it is in rural areas that the majority of food export products are produced.

## Workshop objectives

**Bernie Jones, Smart Villages Initiative**

Bernie Jones gave a brief overview of the workshop objectives to participants. He informed the audience that through the workshop, the Smart Villages Initiative hoped to gain a cross cutting view from the frontline in the following main areas: Initiatives to improve energy access in West Africa; government policies to improve energy access in rural areas; and the different business models being implemented by entrepreneurs in villages across the region.

Bernie Jones also hoped that the workshop would facilitate a dialogue and help identify the real opportunities and barriers facing improved energy access in the region. An area of substantial interest for the Smart Villages Initiative is to understand how public, private and institutional investment can complement each other to catalyse rural development. He encouraged participants to talk about the role of community participation in improving the sustainability of off-grid energy initiatives in rural areas. Finally, he observed that energy has to be a means towards an end, and the workshop was an ideal chance to discuss how improved access could contribute to increased well-being, both economic and social, in villages in West Africa.

## PANEL SESSION 1: OPPORTUNITIES FOR IMPROVING ENERGY ACCESS IN WEST AFRICA

### ECREEE and opportunities for improving energy access in West Africa

Yuri Lima Handem, ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

The Economic Community for West African States (ECOWAS) established the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) in 2008. It is the SE4ALL Focal Point for West Africa, and its secretariat is based in Praia, Cape Verde.

Yuri Lima Handem explained that while there is a huge potential for renewable energy and energy efficiency in West Africa, it remains largely unexploited. Constraints and barriers include:

- Economics: high upfront costs, lack of large-scale regional projects, and lack of innovative financing mechanisms
- Policy/institutional issues: absence of renewable energy targets in many countries, lack of policy measures to establish a level playing field for renewable energy technologies, and weak national agencies with unclear responsibilities for renewable energy generation
- Capacity building/technology transfer: inadequate skills, no local manufacturing base, and limited research and development (R&D) with poor linkages to the entrepreneurial/manufacturing sector

ECREEE aims to address these barriers and has four results areas: tailored policy, legal, and regulatory frameworks; capacity building; knowledge management, awareness raising, networks and advocacy; and business and investment promotion.

In the ECOWAS region, 42% of the overall population has access to electricity, but this falls

to 8% for rural communities. This means that 175 million people in West Africa have no access to improved electricity services. ECOWAS is committed to meeting the goal of universal energy access in 2030 as set out in Sustainable Development Goal 7. It has set a target to supply 22% of the rural population with mini-grids and standalone systems by 2020. This will be increased to 25% in 2030. This corresponds to 60,000 mini-grids being installed by 2020 (with a combined capacity of 3.6 GW), and 128,000 (capacity 7.68 GW) by 2030. The required investments for the mini-grids and stand-alone systems total €32.3 billion. Targets have also been set for the deployment of improved cookstoves (60% of population served by 2020 and 100% by 2030) and access to LPG (17% of population with access by 2020 and 32% by 2030).

Grid extension is considered to be the most appropriate approach for villages close to national grids. Standalone systems are more suitable for scattered settlements. For “intermediate” villages, which are defined as isolated villages with higher population densities, clean mini-grids are considered to be the preferred option. The main barrier is often the regulatory and legal framework and the associated requirements on tariffs. At the current stage of the market development, there is still need for financial support to the promoters of mini-grids to make the investment economically and financially viable. In 2014, ECOWAS launched its second Renewable Energy Facility providing €1 million in co-financing grants (25-50%) of €50,000-200,000 to mini-grid schemes. The emphasis of this Renewable Energy Facility is on project sustainability (such as ownership, management, operation and maintenance). Applicants need to mobilise non-grant co-funding.

ECOWAS has developed the ECOWREX knowledge management tool ([www.ecowrex.org](http://www.ecowrex.org)), which provides geographically based informa-

tion on energy resources, infrastructure, and resource potential.

### Off-grid energy opportunities in West Africa

**Allwell Nwankwo, IFC, Lighting Africa**

One quarter of Africans without access to electricity live in West Africa. Africans as a whole spend US\$17 billion each year on off-grid lighting and phone charging, around US\$4 billion (or 24%) of which is spent in West Africa alone. To put this into context, the majority of people living off the grid have a daily income of less than US\$2. Allwell Nwankwo considers this both a challenge and an opportunity.

There is a growing menu of technologies and business models for the off-grid energy market, making electricity more available and attractive, both for the poor and for people that are slightly better off, making it easier to climb the energy ladder. Pay-as-you-go solar home system companies are expanding fast by using scalable business models: they are investment ready.

To attract investment, mini-grids need a robust business model that can demonstrate profitability, and they need to be operated by an experienced team. Mini-grids are considered to be technically and commercially viable for population densities above around 125 people per square kilometre.

Allwell Nwankwo explained the activities of Lighting Africa, a joint initiative of the International Finance Corporation (IFC) and the World Bank to accelerate the development of markets for clean off-grid energy products in sub-Saharan Africa. Lighting Africa mobilises the private sector to build sustainable markets that will provide millions of people in Africa that are not connected to grid electricity with clean, affordable, and quality lighting products, most of which are solar powered. Lighting Africa does not deliver services itself; it focuses on catalysing

market development and transformation. For example, a US\$13 solar light typically pays for itself in 3 to 4 months in sub-Saharan Africa, considering the cost of kerosene and candles which it replaces.

Key lessons learned to date include:

- Quality assurance is critical to prevent market spoilage: quality bureaus have a big role to play.
- It is important to understand the consumers through gathering market intelligence. Typically, West African consumers are very aspirational.
- Consumer education helps to build awareness, knowledge, and adoption.
- Deep retail distribution chains need to be built.
- The entire value chain needs access to affordable finance.
- Governments need to recognise the potential of off-grid products to help change lives. They should remove barriers, for example tariffs, VAT, and business bottlenecks.
- Off-grid energy products can have a great impact on people's quality of life (health, savings), business, educational outcomes, and social life.

### Rural electrification experience in Nigeria Abdulmutalib Yussuff, National Centre for Energy, Efficiency and Conservation, Energy Commission of Nigeria

Abdulmutalib Yussuff, speaking from the perspective of the National Centre for Energy Efficiency and Conservation in the Energy Commission of Nigeria began by highlighting the experience of rural electrification in Nigeria. Electricity access in the rural areas of Nigeria is around 18%. There is an over-reliance on oil and gas in Nigeria's electricity system, and there are 25 million petrol and diesel generators.



It is easier to supply households in rural communities if the business model for a local electricity system is built around access to power for productive enterprises in the village. The private sector is anticipated to play a big role in driving the energy transition in Nigeria. To facilitate the transition, he advised workshop participants to work with key actors, including the private sector.

### **Energy Commission Ghana's role in promoting off-grid electrification** **Kwabena Otu-Danquah, Energy Commission**

Kwabena Otu-Danquah spoke about the work of the Energy Commission in Ghana to promote renewable energy systems. The Government has set a target to have 10% of electricity supply from renewable energy technologies by 2020. This shift to renewable energy will be facilitated by feed-in tariffs, which are set in law. A key challenge for the deployment of renewable energy technologies in rural communities is their high cost, which makes it difficult for poorer people to afford them. Credit facilities for poor people are a possible solution to overcome this problem. Given that there are a lot of people living in the countryside, there is a large potential market for renewable energy technologies and hence an opportunity for the private sector, which will need to work in partnership with government.

If renewable energy technologies are not installed well, they will break down quickly. Attention therefore needs to be given to setting standards and quality assurance—certification of installers is important. Such standards and quality assurance will help to give reassurance to bankers so that they will provide loans for off-grid renewable energy systems.

### **Discussion**

A lively discussion followed the panel presentations. An initial concern raised in the discussion was that governments sometimes set unrealistic energy access goals, which are not supported

by the necessary actions and investments. Subsequently, some of the necessary actions were explored, in particular appliance and installation standards, mini-grid financing, appliance affordability, and gender issues.

Energy efficient appliances will play an important role in meeting energy access targets. To do this, some countries (for example, Nigeria and Ghana) have already introduced standards for appliances and implemented testing facilities. Associated initiatives are needed to promote consumer awareness of the value of energy efficient appliances. Energy efficiency labelling requirements, for example on lightbulbs, air conditioners and fridges, are in place in Ghana, where the government will make a contribution to the cost of a new refrigerator when an old refrigerator is handed in. Moreover, they have banned the import of second-hand refrigerators.

It is also important to set standards for installing solar home systems and to provide the requisite training for installers. In line with this, GIZ is developing the curriculum of a programme for installers and technicians, and ECREEE is developing a certification system for West Africa building on the work that has already been done in individual countries in West Africa.

For mini-grids, entrepreneurship will play a key role in delivering quality services. The main challenge for mini-grid entrepreneurs is access to finance. To overcome this constraint, the IFC has a team that helps projects become bankable, which includes focusing on building the capacity of project teams. Generally, banks do not have a good appreciation of the issues and opportunities of the off-grid energy sector—training initiatives are needed to sensitise them. In Ghana, examples were given where banks are only willing to lend for one year at a 30% interest rate. In Nigeria, some banks are ready to support entrepreneurs in the off-grid energy sector and funding has been set aside by government so that financial institutions can make loans at interest rates of around 9%.

Another topic of discussion was the affordability of appliances, which can be negatively impacted by high import taxes. In countries such as Ghana, the PV panel is exempted from import taxes, but other components such as batteries are not exempted as it is difficult to differentiate them from other uses.

Energy initiatives should be inclusive and responsive to gender issues. It was noted that the Lighting Africa programme is gender inclusive—for example, in Nigeria, they track how many women have been reached by micro-loans. They specifically work with five micro-finance institutions, dealing with 3 million people, 90% of which are women. They find that the default rate on micro-finance loans by women is close to zero. The micro-finance institutions are happy to deal with them.

### **Findings of the Smart Villages engagement programme in East Africa** **John Holmes, University of Oxford and Smart Villages Initiative**

John Holmes summarised the findings of the Smart Villages engagement programme in East Africa, which began with a regional workshop in Arusha, Tanzania in June 2014 and was completed with a final workshop in Kigali, Rwanda in September 2015. He reviewed cross-cutting issues, solar home systems, mini-grids, and more general issues in respect of delivering the Sustainable Development Goals.

With regard to cross-cutting issues, a key concern in East Africa is the need to improve access to affordable finance: for the capital cost of mini-grids and the working capital required by businesses selling solar home systems. Options to improve access include building and sharing track records of income streams for pay-as-you-go approaches to solar home systems and sharing the risks of financing energy schemes through credit guarantees provided by governments and donors. Entrepreneurs have a key role to play and

value business incubation and advisory services. Their plea is to cut red tape and be given more breathing space to get their businesses off the ground. More needs to be done to build technical, institutional, and business capacity.

There is a continuing value in initiatives to increase villagers' awareness of energy technologies, their benefits, and how to use them. "Seeing is believing", so we should do more to publicise successful examples. Women and young people should be directly involved in energy initiatives: women have proved themselves as great energy entrepreneurs, and young people need to be able to see that initiatives will lead to a desirable future life in the village. There are many examples of how the free distribution of energy technologies spoils markets by undermining businesses and creating a handout mentality. Often, such equipment soon falls into disuse.

Solar home systems have made rapid advances in recent years and are being rolled out at scale in East Africa on a fully commercial basis. The key factors that have enabled this progress are the substantial reductions in the cost of solar panels, the availability of much more efficient DC appliances, and business models that get around the initial cost hurdle through pay-as-you-go or pay-for-services approaches. Third generation solar home systems require one-third the power to support a given level of service, their weight has been reduced from 50kg to 6 kg, and costs have been reduced by 30–50%. To further accelerate rollout, better access to finance and an enhanced skill base are needed, and existing distribution networks may usefully be leveraged. An important question is whether the East African approach can be adopted and adapted to West Africa.

More needs to be done to tackle the problem of poor quality and counterfeit products, which may require international action. Necessary technical developments include better batteries, design for recycling, plug and play technologies, improved

control systems, and further advances in appliance efficiency.

While there have been successful pilots of mini-grids in East Africa, they have not made the same progress as solar home systems primarily because revenues do not yet match costs. In order to “balance the books”, costs may be reduced through technical developments, economies of scale through replication, the use of anchor loads to absorb costs, reducing setup overheads and financing costs, and potentially, for an interim period, capital cost subsidies. On the revenue side, it is important to set the tariffs appropriately, stimulate productive enterprises to increase incomes, increase load factors and the numbers of houses and businesses that are connected. Operating cost subsidies may be needed for an interim period, but an exit strategy should be identified.

For village level energy initiatives to be successful, there must be extensive community engagement to build ownership: villagers should control their development path and be the main drivers of energy initiatives. Energy schemes should build on local knowledge, cultures, and customs. It is

important to build trust through working with trusted local individuals and organisations and to identify and nurture local champions. The poor and marginalised should have a voice and benefit from the scheme, not just the powerful people in the village. Projects are 70% social and 30% technical.

John Holmes finished with some reflections on the Sustainable Development Goals. An appropriate level of ambition should be set for Goal 7 on energy access if it is to enable achievement of the other Sustainable Development Goals and the realisation of smart villages. Sustainable Development Goal 17 is concerned with strengthening the means of implementation. Participants in the East Africa workshops identified the need for better coordination between development agencies and donors, and for improved sharing of information between the organisations involved in energy access. There would be value in enhanced collaboration between universities and companies delivering energy services. More needs to be done to track and evaluate the development outcomes that result from energy access initiatives.



Howard Alper, Professor of Chemistry at the University of Ottawa and Smart Villages Board member, engages with the panel.



## ENTREPRENEURS IN THE OFF-GRID ENERGY ECOSYSTEM IN WEST AFRICA: ELEVATOR PITCHES

Entrepreneurs from different countries in West Africa gave brief insights into the operations of their respective organisations.

### Kwasi Owusu Gyeabour, Barefoot Power Africa Limited

Kwasi Owusu Gyeabour informed participants that Barefoot Power is a global, social, for-profit enterprise that manufactures and distributes pico PV and solar home systems. It seeks to improve the livelihoods of people at the base of the economic pyramid. Founded in 2005, Barefoot Power has impacted the lives of 3.5 million people in over 21 countries so far.

Barefoot Power offers energy efficient products that are in sync with customer needs in West Africa. The product offering includes everything from lights, phones, and radios to fans, TVs, and laptops. In terms of lighting products, Barefoot Power offers basic kits, like a mobile lamp but also sells larger solar home systems in many rural villages. Barefoot Power products come with a two-year warranty and SHS like the Barefoot Connect 600 can also power a radio, fan, and phone. The Connect 3000, another model in the Barefoot range, comes with a 30 W solar panel and can power five lamps for four hours as well as a radio, phone, fan, TV, and laptop.

Talking about the evolution of customer requirements, Kwasi Owusu Gyeabour noted that solar PV lamps used to be the most popular products, but now consumers want better and higher power products to make their lives more comfortable, such as fans and TVs. In keeping with the changing market requirements, Barefoot Power is now offering a Solar Pedestal Fan as well as a 22-inch, 12 V TV with a 28 W average power consumption. One of the major constraints facing the development of the market for home based solar solutions in the region is a lack of access

to finance. Barefoot Power has been working with farmers in rural communities to remove this constraint.

### Fatima Oyiza Ademoh, Ajima Farms and General Enterprises Nigeria Limited

Fatima Oyiza Ademoh informed participants that Bio-2-Watts began in 2015 with two off-grid communities in Abuja, Nigeria in the Kuje Area Council. These communities are based in the villages of Riji and Kuwizhi. While there is much emphasis on remote rural communities, in many cases villages close to a major city are often without energy. Elaborating her point, she observed that in the Kuje Area Council alone, there are 260 off-grid villages.

Energy poverty in rural off-grid communities has dire consequences for productivity and the quality of life. However, bio-degradable waste from people, businesses, animals, and crops presents a readily available fuel which is not being used productively. All this “waste” can be put to use by converting it to biogas. This can be done by feeding it into a biogas digester, which generates gas and powers a biogas generator. The electricity generated by the biogas is then distributed via a mini-grid system.

Bio-2-Watts is based on such a system and will be completed in August 2016. On completion, it will boast a 124 m<sup>3</sup> bio-digester that will be able to generate 20 kW. 500 metric tonnes of organic waste are generated daily within the immediate project site which will provide the input for producing biogas.

Talking about the business model, Fatima Oyiza Ademoh observed that it begins with sourcing the primary input, in this case organic waste, which when processed generates electricity as well as liquid fertilizer. The company is also deploying



energy-saving technologies, which means that they will be able to produce more fertilizer as a by-product.

Residents are currently spending US\$20.04 per month to charge their mobile phones, buy batteries for flashlights, and pay for wood and fuel. The projected monthly tariff for the supplied electricity is US\$15, which will power a TV, charge phones, run a refrigerator, and give light. In Kuje alone, there are 15,600 households, and at US\$15 each per month, there is a US\$2.8 million service gap for the most basic of energy needs. The target market is not the domestic market alone and the company also aims to provide electricity to local schools and businesses, and energy as well as fertiliser to local farms.

Fatima Oyiza Ademoh envisaged that the impact of the biogas digester and generator on the local community will be substantial. It is likely that people will have access to social services including an automated water system, enhanced community security, and a 24-hour health care centre. Moreover, there is likely to be a reduction in post-harvest losses, added value for agricultural products, and reduced emissions of greenhouse gases since diesel generators will no longer be needed. Young people will also be trained in biogas technologies and clean cookstoves will be deployed.

### **Sayouba Guira, Nafa Naana**

Regarding the energy situation in Burkina Faso, Sayouba Guira noted that estimates suggest that 45 people die every day from indoor air pollution. Fuel purchases account for 8% of the family budget, and 105,000 hectares of forest are lost every year due to dependence on firewood for cooking and heating.

To deal with some of these issues, the social enterprise Nafa Naana is running a programme to improve energy access. The organisation's main target is women and low-income households

in rural and suburban areas. There are several major problems that Nafa Naana has to deal with including: low household incomes, a weak distribution network, and a lack of information. Nafa Naana aims to address these problems through affordability, accessibility, and building awareness. For last mile distribution, it offers forty different products, including solar lanterns, solar kits, LPG stoves, and improved cookstoves. To get over the supply chain issues there are three Nafa Naana shops that sell the products directly to customers, 84 micro-franchised retailers, and 107 partnered key accounts across the country. People pay in instalments over the course of three months. Women have especially benefited from Nafa Naana products, both as retailers and as consumers.

Sayouba Guira observed that the business model of the company is organised in a way that it generates revenues from two sources: the gross margins on products and services, and revenue from carbon credits sold (which is in progress). Until now, Nafa Naana's financial deficit has been covered by grants from the Agence Française de Développement, DfID in the UK and the Fondation AnBer. Nafa Naana has distributed over 36,000 energy efficient products, including 17,705 improved cookstoves, 11,690 LPG stoves, 7,273 solar lamps and solar home system kits, and 254 other products. In 2015, the company was 64% self-sufficient and generated €241,188 in sales.

Sayouba Guira observed that thanks to the organisation's work in 2015 there was a saving of 18,970 tonnes of firewood, and prevention of 34,121 tonnes of carbon emissions.

### **Sokhna Khadidia Thiam, Consortium Sahélien d'Energies Renouvelable (COSEER)**

Sokhna Khadidia Thiam informed the audience that COSEER was founded in 2010 with the goal of responding to Africa's energy needs, especially

those of rural populations. The company specialises in renewable energy (solar, wind, and biogas), the environment and energy efficiency to support sustainable development in Africa. With partners from across Europe, Africa, and Asia, COSEER provides equipment for rural electrification and decentralised energy, and represents organisations and businesses that specialise in energy and the environment.

For large consumers, COSEER provides solutions that do not require batteries or a connection to the grid. The company also offers auto consumption solar systems that are self-regulating according to electrical loads and consumption. This type of device is offered with a ten-year guarantee, and allows large energy consumers savings of 70- 85% of their electricity bills

For smaller customers, based in off-grid communities where energy needs are lower, COSEER offers solutions for rural electrification and distributed energy, including hybrid solar systems with a mini-grid that distributes energy across the village, solar home systems, and a system for producing biogas for cooking.

COSEER has sold over 100 solar home systems (50 to 100 W) in Senegal, and has assembled and distributed 1,500 solar lanterns as part of the Energising Development (EnDev) project in Senegal. They have also focused on post-installation operations and maintenance by training locals in the installation and maintenance of solar systems in the country's north and northeast. To increase incomes in rural areas, COSEER worked with World Vision to install 11 solar dairies in isolated areas (including PV, batteries, DC refrigerators, welding equipment, and lighting).

Other achievements include working with the Netherlands to provide solar energy to 120 health clinics as well as the creation of a hybrid solar mini-grid of 15 kW in Toubel Bali as part of a public-private partnership with l'Agence Nationale des Ecovillages (ANEV) du Sénégal. The com-

pany has also been involved in the development of eight solar mini-grids (20-25 kW) in isolated areas of Matam as part of the Electrification Rurale à Initiative Locale du Programme Sénégalais d'Électrification Rurale.

### Kofi Tandoh, Azuri Technologies

Azuri is a pioneering solar manufacturing company based out of Cambridge, United Kingdom. The company sees itself operating in the technology sphere as opposed to a simple solar energy product company. It is one of the pioneers of pay-as-you go (PAYG) technology. PAYG in general is a system where people put a SIM card into the solar system. Consumers can then use mobile phones to pay for the solar system, or they can use scratch cards to do so.

What is important with the PAYG system pioneered by Azuri is that there is no SIM card embedded in the product. This means that Azuri products can be used in off-grid remote communities and be can topped up with a scratch card. Many of Azuri's competitors do not have such systems which means that their systems do not work in remote areas where there is no cell phone coverage.

Azuri is also actively trying to tap into the agricultural sector. Cocoa farmers have been provided with solar systems for lighting together with portable devices on which they can see farming videos etc. and can have access to information on agricultural best practices, thereby raising productivity.

The value proposition from Azuri is a long-term engagement spread over three stages. In the first stage, customers begin using pico solar lighting systems as a substitute for kerosene based lighting and for mobile charging. In the next step, customers purchase larger solar home systems coupled with aspirational good and service, like TVs, radios, and fans—all with PAYG embedded. In the final step, it is envisaged that technology is utilised for productive uses, like irrigation,

refrigeration, and retail. Increased consumer income delivers increased revenue.

Azuri has also pioneered the development of HomeSmart technology which takes solar home systems a further step. The HomeSmart system adapts the electricity usage to dynamically scale back appliances to suit the customer's needs. For example, if there isn't enough sunlight the system automatically dims the lights so that the batteries last longer.

### **Olasimbo Sojinrin, Solar Sister**

Olasimbo Sojinrin from Solar Sister started her pitch by observing that energy poverty is primarily a gender issue. For electricity access in Nigeria, she observed that only 36% of people in the country have access to electricity, while in rural areas, only 24% have energy access. The majority of those affected by energy poverty are women and girls. Women are also likely to be more exposed to indoor air pollution, which is the third highest killer in Nigeria.

The distribution model of Solar Sister was initially based on cosmetics distribution, like Avon. The team focuses on gender inclusive workforce development and building women's leadership at all levels. Solar Sister develops a woman-to-woman distribution network for portable clean energy technology solutions. The organisation has developed key partnerships with manufacturers to provide durable, affordable lights and cookstoves. They have also developed partnerships with the Global Alliance for Clean Cookstoves.

Entrepreneurs associated with Solar Sister earn income by building independent, clean energy businesses. By doing so, not only do they make money but they also bring clean energy access to their communities. Communities benefit from the solar lights and cookstoves, which helps to create multiple benefits for households.

Olasimbo Sojinrin identified training of entrepreneurs as a crucial reason for success. It is extremely important to reinforce women's agency for successful businesses in rural areas. Success



Fatima Ademoh, Ajima Farms and General Enterprises Limited, Nigeria



relies on much more than business skills and women have to be empowered and see their own positive qualities, not just learn bookkeeping. The benefits of being a Solar Sister Entrepreneur go far being just being an agent—the women are building and developing skills. Solar Sister has also developed partnerships with grassroots organisations, savings and loan groups, as well as internationally through ENERGIA.

There has been a substantial impact in all areas of women's lives as a result of the work Solar Sister have done with local communities. These include: leadership, improved education, business growth, sisterhood and support, income and autonomy, business skills, women's leadership, community safety, communication and equality, and economic stability and health.

### **Akua Adu, PEG Solar**

PEG Solar is an asset financing company focusing on solar home systems and mobile money-based financing. The company is currently operating in Ghana.

Akua Adu noted that Ghana's overall electrification rate is 64% according to the World Bank, but the rural rate is estimated to be much lower. Potential customers in rural areas are currently using kerosene for lighting, which is expensive, bad for their health, dim, and dangerous. Solar power represents a solution, however, the high upfront cost remains a major challenge.

PEG Solar makes solar home systems affordable by selling them on credit; customers pay a deposit and then make payments for one year. All payments are made through mobile money sent through a SIM card inside the solar device. PEG's product, the M-Kopa IV, includes an 8 W panel, two bright lamps, a mobile phone charger, a radio with MP3, and a torch. In mid-2016, customers will also have the option of having a television as part of their PEG package.

In Ghana, the company has integrated with major cell phone service providers including MTN, Tigo, Airtel and Vodafone. PEG is the fourth largest bill pay partner of MTN Ghana Mobile Money. In only 18 months, PEG has emerged as the largest PAYG solar provider in West Africa with nearly 10,000 products sold in Ghana since November 2014. The company is selling around 1,000 products per month with month-on-month sales growth of 20%.

PEG operates 28 service centres in seven regions of Ghana. Their products have a two-year warranty supported by service centres and a seven-day-a-week call centre. Customers are also incentivised to pay on time as they can access future loans and also receive free hospital insurance.

### **Ifeanyi Orajaka, Green Village Enterprises Limited (GVE)**

Green Village Enterprises Limited (GVE) offers green affordable off-grid PV solar solutions through its Green Village Electricity Project. The company has executed six pilot projects since 2009. These projects include both mini-grid systems as well as solar home systems.

GVE completed its first pilot project in 2013. The project consisted of a 6 kW system for Egbeké–Etche in Rivers State, Nigeria and provided electricity to 480 people, created 20 jobs, and led to a US\$12 (45%) reduction in household energy expenditure. The second pilot project, completed in March 2015, was a 9 kW system built in the same area and provided electricity to 720 people. It created 36 jobs in the local community.

The company has also been involved in two larger pilot projects, each with a capacity of 34 kW, in Bisanti–Katcha, Niger State, Nigeria and Kolwa–Kaltungo LGA, Gombe State, Nigeria. Both of these projects provide electricity to around 1600 people and have led to job creation in the local community. GVE has also installed 200



solar home systems in Onono–Anambra West LGA, Anambra State, Nigeria.

To date, the company has worked on projects that have had a positive impact on energy access for more than a 1000 households which translates into 12,240 people. These projects have also collectively created 145 street lighting points along the main streets of four beneficiary communities. This means that people have enhanced security at night and extended business operating hours. Moreover, 420 jobs were created during and after the implementation of these projects, and local people have benefited from knowledge transfer.

GVE has been supported by USAID and GIZ to improve energy access in Nigeria. The company aims to develop a scalable business model which can meet specific community needs, and can have a positive socio-economic impact.

Ifeanyi Orajaka noted that there is great demand for electricity and this demand is growing in areas where they have installed mini-grid systems. Demand is being driven by productive uses and refrigeration. Despite the opportunities, there are four major risks faced by GVE:

- Arrival of the national grid in areas where the mini-grids have been installed: GVE aims to mitigate the risk by selling the electricity generated to the national grid and transforming the system into a hybrid grid-tied system.
- Pervasive regulatory risk: To deal with this risk it is important that the government implements national laws and the master plan on renewable energy which has been approved. Continued engagement of the government with stakeholders working in the renewable energy eco-system is important.
- Lack of political patronage: GVE is pricing its projects at lower costs than other energy sources including Power Holding Company

of Nigeria energy supply. GVE's proposed constant power supply for rural energy supply will act as an incentive for continued political support

- Technical risks: These require the development and implementation of robust training programmes for local support personnel and operators.

### Ron Acquah, Solarkiosk

Solarkiosks are powered by solar energy, and they are tailored to the needs of rural Africa. The kiosks can be imported as flat packed units that are easy to transport and assemble. A kiosk comprises of integrated 1-4 kW solar panels that can harvest 3-20 kWh of solar power, and the batteries inside the kiosk allow for 24/7 operation. They are expandable, sturdy, safe, sustainable, and beautiful.

Solarkiosk is expanding its operations in Ghana but they are also operating in six other African countries, primarily in East Africa. The company aims to become the energy gateway to new markets and become a driver for economic growth and human development in rural off-grid areas worldwide. The vision of Solarkiosk is to provide off-grid regions with sustainable energy, communication, and business and the company is coupling technically superior products with an inclusive BoP business model tailored for rural off-grid areas. Solarkiosk has developed standardised, simple, and efficient processes for scale-up and roll out.

Talking about the traditional small scale retail sector in rural Africa before Solarkiosk, a local shop owner ran a shop with no electricity, which meant no light, no cooling, and very few services. It had to close at dusk. In the community, people depend on biomass, candles, and dirty fuels for lighting and cooking. People have mobile phones but cannot charge them. They have no access to the internet and communication; they cannot cool drinks, food, or medicine.

In contrast, in the first year of Solarkiosk, the shop owner becomes a franchisee of the company. Solarkiosk offers mobile phone and battery charging, internet, a fridge for cooling, satellite TV, solar product, and carefully selected products of fast moving consumer goods (FMCG) companies. The franchisee usually employs two people from the community. School children, families, and other businesses now have access to clean solar lighting and other sustainable products and energy solutions. The community is socially active after dusk.

By the second year, it is envisaged that the Solarkiosk franchisee will expand the business services to hair cutting, a movie theatre, a restaurant, and a repair shop. The Solarkiosk also aims to introduce a solar mini-grid solution, providing energy to a school, a health centre, other businesses, and a telecom tower. In this way, the Solarkiosk will become the centrepiece of sustainable economic and social development.

## Discussion

The entrepreneurial case studies were followed by a lively question and answer session that teased out additional details of the business models. It also helped shed light on the broader development impact of projects and initiatives.

Initial discussion focused on lessons learned from the early phases of building markets in rural communities. Barefoot Power did not at first localise business operations, which was a mistake as local people did not trust the outsiders. It was important therefore to involve local people who were trusted by the local economy to market the products. Another mistake was not training local electricians which meant that maintenance of installed solar systems was difficult and the company incurred additional costs. Barefoot Power subsequently invested in training local electricians to service these systems which avoids the delays that arise if equipment otherwise has to be shipped to the nearest city for service.

When Solarkiosk began operations in East Africa they learned to group kiosks within two hours travel time of each other to reduce complications in the supply chain and transportation costs. Learnings from East Africa were also implemented in Ghana and kiosks were placed at similar distances which worked well there too.

Solar Sister started by offering credit inventory to their entrepreneurs. Each entrepreneur was supposed to return the capital cost and keep the profit. However, this system was difficult to manage: the mentors' role was shifting from mentor to debt collector, which caused mission drift and hampered progress. Solar Sister now follows a zero credit model and looks for out of the box solutions to get over credit constraints.

The discussion then moved to the possibility of manufacturing products in Africa. Respondents noted that for some companies, it simply is not possible to do so because of the high cost of manufacturing. Several other respondents commented that a majority of their products, like improved cookstoves, are manufactured locally and are certified. Others noted that they are trying to build the requisite manufacturing skills in their countries to ensure that products and components can be manufactured locally.

The next topic covered was the question of loans and credit for consumers. Akua Adu of PEG Solar responded that while lending money is not always easy, it is important to have a system and a repayment schedule that is realistic for the customer. If you understand your market and customers, it becomes easier to collect payments. Consumers also begin to see that they are paying less per day for your product than they did for kerosene.

In Nafa Naana's experience, the main principle is enabling a happy and long life, whether in a city or a village. Nafa Naana begin their work in local communities by creating awareness. They actively communicate with people about the way they live and life expectancy as it relates to indoor

air pollution. During these initial discussions, local people are also shown the product and are allowed to use it. In this model, local people have agency and can help solve some of the problems as opposed to only hearing about the solutions. It is extremely important to know the target community if an intervention is being planned. In the case of PAYG systems, it is also important to understand whether the primary source of income is seasonal or year-round.

Turning to the issue of collaborations with NGOs, one speaker commented that NGOs usually like to subsidise products, which has a negative impact on market development. NGOs usually do not invest well in training and development of their staff. Solar Sister noted that it is a social enterprise that works with NGOs, which helps with introduction in the areas where they operate and in the initial acceptance by local people. It is important that each type of organisation understands their strengths as well as their weaknesses. NGOs are typically good at awareness, education, and making linkages, but they are usually not strong in terms of market creation and developing viable business models.

The audience also had questions regarding mini-grids, aimed especially at Green Village Enterprises, regarding the financial and technical stability of the system as well as the immediate impact of the micro-grids on the local economy. Ifeanyi Orajaka responded that the payment of an initial connection fee for two months of electricity helps ensure that there is minimal default initially. In terms of the impact of electricity access on the local economy, giving the example of a health centre, he noted that there has been an 80% reduction in cases of malaria because of access to fans. The health centre has also experienced enhanced productivity from staying open later. Businesses have improved and some have witnessed substantial revenue growth rates thanks to access to electricity. He noted it is important to try to combine profit-making

and development. Mini-grids do require a certain level of education and training due to their complexity compared to smaller systems.

The audience and speakers also discussed micro-finance, noting that micro-finance institutions are not aware of the off-grid energy sector. It was agreed that more awareness of the sector will be important for accessing finance at all levels. Banks have started to be interested, but government support is also required. A lower interest rate is going to be essential for businesses and the government has to work with central banks to lower interest rates. Guarantees as opposed to subsidies also appear to be a potential solution to this issue.

### **Recommendations from the day's sessions** **Howard Alper, University of Ottawa and Smart Villages Initiative**

Howard Alper returned to the six principles that John Holmes mentioned at the beginning of the first day. He noted that the presenters talked about access to affordable finance and support to entrepreneurs. He encouraged panellists and audience members to reflect on certification, education, women, and empowerment. However, he noted that topics regarding young people and leadership were not discussed, and capacity building had received limited attention.

Howard Alper asked the audience about the conditions to improve energy access, productivity, etc. He observed that the NGO-entrepreneur dialogue is very similar to university and industry partnerships. Rather than looking at NGOs in isolation, the private sector could develop a synergistic relationship with these stakeholders.

He also commented that he was pleased to hear so much about community engagement by entrepreneurs. Entrepreneurs recognise that there are many disadvantaged communities and involving them in these enterprises is essential to ensuring a sustainable future for each company.



## PANEL SESSION 2: SUPPORTING ENERGY ACCESS IN OFF-GRID AREAS: THE ROLE OF PUBLIC, PRIVATE AND MULTI-LATERAL INVESTMENT

### Ensuring energy access for bottom of the pyramid consumers

Godfrey Mwindaaire, Acumen Fund

Godfrey Mwindaaire explained that Acumen is a non-profit global venture fund with around 15 years of experience. It is currently supporting 95 companies globally with a capital investment of US\$100 million. The fund aims to help inspiring entrepreneurs to start their businesses by offering seed capital and financial solutions. Examples of innovative entrepreneurial energy solutions in Africa funded by the Acumen Fund include d-light and M-KOPA.

To have an impact at the bottom of the pyramid (BoP), Godfrey Mwindaaire indicated that there is a need to develop efficient cooking enterprises and promote access to off-grid electricity. Currently, there is a lack of scalable business solutions that can be offered to consumers at the BoP market in these areas. In order to overcome the bottleneck of access to finance, the Acumen Fund has established an energy fund in East Africa with a capital of US\$50

million. The fund aims to target businesses that have developed viable solutions for BoP energy needs. Acumen Fund is now looking to expand this initiative into other regions across Africa, including West Africa.

For villagers to adopt new innovative energy solutions, the advantages that new energy technologies can offer to the villagers need to be demonstrated and financing mechanisms should be introduced to make products or services affordable to end-users. This is particularly important as a number of low quality energy solutions confound the uptake of new technologies and confidence of the market.

Three key areas require attention:

- There is a need for the private sector to work with local governments to avoid conflicts of interest. Talking about the practical implications of such a conflict, Godfrey Mwindaaire described an incident where the government extended the national grid to a village that had recently benefited from an off-grid energy initiative, thereby jeopardising the



Participants at the Smart Villages West Africa Regional Workshop



sustainability of the off-grid energy intervention. The government in the region needs to act as an anchor between private sector projects and local institutions like schools and hospitals whereby the private sector delivers the electricity and the government offers technical services, for example providing a refrigerator to the hospital to store vaccines.

- It is paramount to ensure that bottlenecks for medium-scale renewable energy solutions are overcome, such as access to land, a necessity for wind farms, solar farms, and hybrid systems. For example, GIZ had a project to implement a 20MW solar PV project, but because of the difficulty of procuring the necessary land the project was discontinued. Governments need to facilitate access to land and activities to overcome other bottlenecks.
- There is a need to facilitate and foster links between the private sector and financial institutions. In order for the private sector to penetrate the energy market, it is paramount that financial institutions take a portion of the risk, as the private sector is not able to meet the upfront capital alone. To do so, it is necessary to identify key players in the sector and work together to improve energy access.

Nevertheless, there has been much progress in the past 10 years as technologies have become increasingly more robust, certified, and suppliers offer warranties and repair services. Most importantly, the BoP is no longer hesitant to buy into new energy sources.

### EnDev Benin

Peter Förster, EnDev

Based on his experience with EnDev Benin, Peter Förster presented his perceptions on the roles of public, private, and multi-lateral organisations for promoting the use of off-grid solutions in

villages in Benin. EnDev Benin is part of the EnDev global initiative which is currently active in 25 countries. EnDev's objective is to provide cheap access to modern forms of energy to rural customers. Their approach is to work with the private sector to achieve this objective. In Benin, EnDev's intervention focuses on three main areas: improved cook stoves, grid extension and SHS densification to rural areas, and result-based financing to develop the market for quality photovoltaic products (pico PV lamps, solar pumps, and solar street lights). Peter Förster identified a number of key areas to achieve market penetration in these areas.

Governments should offer tax exemptions to entrepreneurs for the import of quality pico PV products and should introduce industry standards. This will help the private sector offer quality PV products to end-users at lower prices. This has been the case in Benin, where EnDev worked in collaboration with governmental institutions to lower taxes on PV products, which had a positive impact on the dissemination of quality PV products in rural areas of the country. To date, they have installed 600 solar home systems, have imported more than 66,400 quality pico PV lamps, and established an effective distribution system for these products in collaboration with the national postal system. Apart from market development, there is also a need for the government to set and enforce environmental standards, which are missing at present.

There is a need for multi-lateral institutions to offer credit schemes to develop the market for off-grid energy products. A major constraint and reason for the slow development of the PV market is the lack of a vibrant private sector. Furthermore, there is a need for multi-laterals to help develop the competencies of the local private sector by improving their management skills capability to assess their finances and technical capacities. It is paramount for businesses to offer warranties and after sales services to their end-users. Moreover, PV businesses should

invest in the right promotion strategies (such as demo kits). However, this is not the priority of many private sector businesses as the benefits of these intangible competencies are not well understood.

Other points highlighted by Peter Förster included:

- Governments should invest in education and training programmes for the off-grid solar sector to improve product quality.
- Governments and multi-lateral agencies should back credit schemes for end-consumers in rural areas thereby making products more accessible.
- Local banks and financial institutions need to provide credit at lower interest rates to the private sector. At present, local banks and financial institutions do not understand the sector well and hence are unable to lower interest rates as the risk is not well understood.

### **The role of public, private and multilateral investment** **Bokar Ture, Akon Lighting Africa**

Bokar Ture started his presentation by highlighting the need for off-grid energy solutions. He pointed out that the national utilities will likely be unable to meet the energy needs in the near future. In Ghana, estimates suggest that it would take approximately 20 to 30 years to extend the national grid to all rural off-grid villages. Similarly, in Nigeria it could take more than 100 years to electrify the 90% of villages currently not connected to the national grid. A major reason for the lack of progress in extending the national grid to rural areas is the substantial investment required to do so. The high cost of traditional grid extension means that there is a need for multinational organisations to invest in the off-grid energy space. Bokar Ture identified a number of key challenges with regards to affordable tariffs, bankable projects, and the need for guarantors.

He observed that that the best way for government to further energy access in rural areas is by letting the private sector take the lead. Instead of governments spending their energy budgets on costly grid extensions, this budget could be utilised to subsidise tariffs for energy access of rural communities. This could help energy providers working in rural areas recoup their costs and lower the cost of electricity access for rural consumers. At present, it is not financially feasible for the private sector to provide energy access to the rural poor.

Another major issue in Africa is the ability of the private sector to tap into existing funds due to a lack of bankable projects. For example, the African Development Bank has a billion-dollar fund for green projects, but most Africans are unable to access these financing mechanisms as they are unable to develop proposals that meet the standards of the Bank. There is a clear need for multi-lateral organisations to provide technical assistance to stakeholders to help them with developing bankable projects. This will enable the private sector to tap into the funds provided by multinational organisations like the International Finance Corporation.

Furthermore, many local businesses also fail to provide guarantees necessary to acquire project capital. It is paramount for multi-lateral organisations to assist the private sector to access these funds by providing guarantees which can spur private sector development in off-grid energy provision.

### **Private capital investment to improve energy access** **Eluma Obibuaku, Africa Finance Corporation**

Eluma Obibuaku informed participants that the main focus of the African Finance Corporation (AFC) is to provide financial assistance to infrastructure projects. These include telecommunication, power provision, roads, transport, heavy industries, and oil and gas. The aim is to

provide working capital for large scale initiatives and projects. The average size of these projects ranges from US\$75–100 million and the AFC's focus is on higher end private sector projects that impact a large number of people.

One of his major concerns was that while the focus on off-grid communities is important, in Nigeria there is also a major problem with regards to reliability of grid supply. Peri-urban regions are connected but do not have power most of the time. There are huge inefficiencies in being connected and not having access to electricity, and the problems faced by those living in such communities are similar to those of rural communities. Hence it is important to provide functional infrastructure in peri-urban areas without losing sight of rural off-grid communities.

In line with this, in the space of small-scale energy provision the AFC in Nigeria provides working capital to enable private sector organisations to expand their operations. Eluma Obibuaku described a partnership where they have been working with an international private company focusing on the disseminating of 80 W SHS in Nigeria. Because of the increase in working capital through the AFC, the company was able to sell more than 4,500 SHS units per month since January 2016. The project is targeting customers in peri-urban areas where customers would normally buy a small portable fuel powered generator.

## Discussion

The panel was followed by a discussion session where participants delved deeper into some of the points made by the speakers.

The session started off with a question regarding whether the AFC finances off-grid energy projects. Eluma Obibuaku informed participants that the corporation funds larger power projects, and its focus is currently on grid

connected generation projects. There was also a question regarding solutions for people who are connected to the national grid but have poor quality of electricity supply. Peter Förster informed the participants that in this scenario, which is common in Benin, EnDev can provide a list of entrepreneurs who could be approached to buy quality solar home systems.

In terms of political interference and the negative impact on the market for off-grid participants, he observed that during the elections in Benin last year, one of the candidates imported 50,000 low-quality street lamps and flooded the market with these low-quality products. During this period EnDev had a contract with the government for the sale of 2000 high quality street lamps. The subsidisation of low-quality lamps meant that the enterprise that had to sell the high quality lamps could not do so and suffered losses. To deal with such situations, EnDev works with village committees and uses these as a channel to communicate with rural communities. These village committees are vital for consumer outreach and to ensure that there is a higher adoption of quality products. EnDev is now barcoding each PV solar lamp to ensure that the quality of the product can be monitored. This serial number is also on the receipt that is given to customers. Furthermore, there are periodic visits and phone calls as part of the after sales services to ensure that the product is working as per specifications, and there are no maintenance issues.

Similarly, Godfrey Mwindaare observed that the adoption and sustained use of home-based energy solutions, be they PV lamps or solar home systems, depends on effective monitoring and the ability to provide technical assistance to consumers at the bottom of the pyramid. Acumen Fund is actively engaged in monitoring progress to learn from mistakes and to not repeat them going forward. Eluma Obibuaku also highlighted the importance of working with the government as opposed to working in isolation, which could jeopardise the chances of project success.



Sara Dourado, TESE, Guinea-Bissau, chairs the session on entrepreneurs' elevator pitches

Participants also queried the panellists about tariffs and the issue of affordability, especially in Nigeria. Bokar Ture observed that there is a clear need for feasible tariffs to enhance the profit for the private sector in the energy space. If a country decides to increase its tariffs, the key is to ensure communication with consumers. Regarding such tariff increases, Eluma Obibuaku was of the opinion that in Nigeria there has been a long period of subsidisation of electricity supply and there is no economic basis for current low tariffs. To attract desperately needed private capital, there is a need to show investors that the tariff is viable as cash flow for them is fundamental. In many cases there is no shortage of good ideas but a problem with the execution of these policies. The solution for long-term subsidised supply is to increase tariffs gradually which minimises political pressures.

Responding to questions about access to finance for small and medium-sized enterprises working on the provision of off-grid energy access for those based in rural areas, Peter Förster observed that EnDev is striving to support local entrepreneurship in Benin and they support companies that have been operating in the country for at least two years. EnDev provides subsidies to these companies and, over time, the expectation is that these subsidies will be phased out. Godfrey Mwindaare informed participants that Acumen Fund supports smaller enterprises that focus on underserved consumers at the BoP. Traditional loans provided through the Acumen Fund are in the form of 80% equity. It is more of a partnership as opposed to a loan. The majority of the projects undertaken by Acumen are in the range of US\$1 million.



## BREAKOUT SESSION 1

After the morning session, the participants divided into three groups for a breakout session. The groups were asked to deliberate on three pre-set questions. These were:

- How can financing bottlenecks facing off-grid energy projects be alleviated?
- What are the mechanisms through which co-ordination between different local, national, and multi-lateral financing agencies can be improved for off-grid energy projects?
- How can investment be promoted in the production and dissemination of improved cookstoves?

On the question of financing bottlenecks for off-grid energy projects, the discussion can be summarised with respect to the role of four main stakeholders, these are: the government, financial institutions, the private sector, and end consumers. Participants observed that while finance is available, the time horizon of most financial institutions or sources of funding is quite short because financial institutions do not want to invest in off-grid energy projects and prefer investing in projects that give them a quick return. This highlights the importance of the government as a source of funding for SMEs working in this sector. Most financial institutions also lack awareness about the off-grid energy sector and they are unable to offer the appropriate financial instruments required by the sector. There is therefore, an urgent need to build capacity within banks and other financial institutions regarding the off-grid energy space.

In case of the multi-lateral banks, they need to provide training to local SMEs about the tendering process, as they often do not have the necessary expertise to access available funds. Participants further observed that banks are risk

averse and are especially reluctant to offer credit to new firms which creates issues of liquidity for them. Here, too, the role of the government is very important. For its part, the private sector has to understand the causes of why banks and financial institutions are reluctant to engage with small and medium enterprises. SMEs have to share more evidence of their creditworthiness and potential revenue streams to demonstrate project viability. There is also an inherent currency risk in many developing countries, which has a negative impact on the operations of projects.

In the case of off-grid energy projects aimed at remote rural communities, one of the major problems is the lack of villagers' ability to pay higher tariffs. For the private sector, it is perhaps better to start with villages that are less remote and have access to resources. This could help SMEs develop a project portfolio and enable them to access capital. Furthermore, involving customers at the project design stage could make projects more sustainable. Communities could also provide capital in the form of sweat equity to support the successful completion of projects, which could lower demand for credit.

On the question of improving coordination between financing agencies, participants observed that there needs to be better communication and coordination between national and multi-lateral financial institutions. In many cases, they are all competing with each for projects instead of supporting one another. Capacity building for local financial institutions can be one area of cooperation that can help them develop more efficient systems and develop the quality of human capital. Off-grid energy companies can improve cash flows by working with microfinance institutions to improve bill collection.

At the institutional level, coordination between the government and the financial sector has to be improved. This can be done by reducing bu-

reaucracy and developing “one-stop shops” to coordinate between the various ministries and financial institutions. Civil society organisations could also play a positive role in creating pressure through national and international policy advocacy. Moreover, participants discussed the role of the community and stated that village level committees could play an important part in improving communication between financial institutions and the local community.

In case of cookstoves, participants were unanimous in stating that, first and foremost, standardisation and quality assurance of improved cookstoves is essential to promote investment. The Global Alliance for Clean Cookstoves provides a good example of such standardisation criteria for improved cookstoves. Moreover, it must be verified that these standards are being implemented at the local level and that products are accessible to rural customers.

Governments should facilitate the deployment of improved cookstoves through measures such as limiting the availability of old and sub-standard technologies on the market and by phasing out or banning old technologies. There is also a need to develop innovative approaches for investment. It is imperative to develop better awareness campaigns about the negative health impacts of cooking with biomass on traditional cookstoves. Awareness creation has to be organised at a local level, making use of widely available media such as radio or through the involvement of local community members who can act as

local champions. Furthermore, working with women or young people to advocate improved cookstoves can have a positive impact on the adoption rate at a local level. Schools in village communities can also be an important channel for raising awareness on such issues.

Further to this, more villagers have to be made aware of the environmental consequences of continued dependence on biomass in the form of localised deforestation. Participants also highlighted the importance of developing a local value chain for improved cookstoves. The availability of locally constructed cookstoves means that maintenance can also be done locally, which can have a positive effect on adoption. Products also need to be in sync with the cooking habits and preferences of local consumers.

Moreover, a big issue in the case of imported cookstoves is the high rates of taxes. In Nigeria for example, import tax on cookstoves is 10%—making the product more expensive for end users, especially those at the bottom of the pyramid. Cookstoves have to remain affordable to consumers in rural areas who often have little money to pay the upfront costs. It was also noted that some government interventions can greatly damage the cookstove market. In Nigeria the government started a US\$9.5 million programme through which it aimed to provide improved cookstoves at no cost to consumers. Such grants can jeopardise the development of a sustainable cookstove businesses.

### SESSION 3: LINKING IMPROVED ENERGY ACCESS TO INCREASED OPPORTUNITIES FOR GAINFUL EMPLOYMENT

#### Implementing renewable energy projects to create gainful employment in sub-Saharan Africa

Eugene Ikejemba, University of Twente

Eugene Ikejemba talked about the role of renewable energy projects in creating gainful employment opportunities in sub-Saharan Africa. He observed that renewable energy is the way forward, and distributed renewable off-grid energy technologies could help Africa leapfrog the traditional grid extension system. This could have a number of positive effects for the region. However, the jobs created as a result of these projects are likely to be indirect and temporary. The challenge is to create sustainable jobs in the sector. However, most direct stakeholders, such as the government, have not been able to make policies that achieve this goal.

Developing this idea further, Eugene Ikejemba observed that there is a problem in the process through which the government awards proj-

ects. In many cases, companies that are awarded off-grid energy projects are unlikely to receive support during implementation. There is also limited or no engagement by the government with the communities in areas where these projects are being implemented. Companies selected do not have the capabilities to implement off-grid energy initiatives. This leads to serious questions regarding the long term sustainability of these projects. These issues limit the number of future jobs created in the project areas.

Talking about the role of the private sector, he observed that similar to the government, private organisations are guilty of not reaching out to local communities. The private sector does not see local communities as stakeholders in off-grid energy projects. During the project construction phase, jobs created during the implementation of renewable energy projects by these companies are mainly low-skilled and temporary. Post-construction, local people are not provided with the requisite training to run projects. This points



Benjamin Palliere (l) and Kalifa Koulibaly (r) of GERES answer questions from the audience.

towards a lack of alignment between the interests of the private sector and the locals living in these areas. Furthermore, the business models of most of these companies are also flawed. Instead of supporting growth, these projects end up negatively impacting on local development.

Eugene Ikejemba went on to talk about some of the potential solutions to improve the creation of sustainable jobs in the case of public sector-funded renewable off-grid energy projects. This would entail a fundamental rethinking of the process of awarding projects. Developing adequate planning and implementation strategies in conjunction with the local community could have a positive impact on sustainable job creation. It is necessary to involve the local community and to educate them about the operation of the introduced technology and its benefits. These steps will ensure that community members see themselves as stakeholders in the development process. In the context of Nigeria, it is the responsibility of the federal government to create opportunities for local manufacturing of energy products such as solar.

In case of the private sector, as stated earlier, involvement of the community is paramount. Training locals to operate and maintain the system has obvious benefits for both the local community and the private sector. For the local community, this allows local job creation. For the private sector, making communities stakeholders means better protection of their infrastructure as the communities have a sense of ownership of the project. Providing people with the tools to perform various maintenance and repair tasks is essential to build their skill sets as well as to reduce operations and maintenance costs for the implementing company.

Four different types of business models can be implemented in the renewable energy sector and help create sustainable jobs:

- Organisation-owned (private sector): Trust is built with the local community and develop modes of co-construction, involving local labour. Sustainable management involving local people is likely to create jobs and help protect the infrastructure.
- Shared partnership with local community: Locals are not only involved in the construction but are also involved in managing the project as well as its maintenance.
- Community-owned: This model is likely to have the most positive impact on the local community. Members are involved at each stage of the project's construction and post construction management. It leads to the creation of both permanent jobs and maximises the indirect effects through an increase in business activities.
- Publicly funded: The community is involved at the construction stage and has a greater say in the maintenance as well as management of the project.

Based on monitoring and evaluation of a number of renewable energy projects in Nigeria, projects that are implemented with a top-down strategy by the government are more likely to fail as compared to community run projects. Community engagement is vital for the creation of sustainable and gainful employment opportunities in rural areas.

### Renewable electrification incubator

**Benjamin Pallière and Kalifa Koulibaly, GERES**

Benjamin Palliere began the first part of his presentation by providing some background information about GERES. GERES is a French NGO working on issues of energy access, climate change, and mitigation strategies. They seek to improve the livelihoods of those living in rural areas. In West Africa, the NGO is operating in Benin, Mali and Senegal. Their work in the region goes beyond



simply providing energy access and focuses on the productive use of energy in rural areas.

GERES is currently involved in a project in South-East Mali being undertaken with the support of AMEDD, a local Malian NGO whose aim is to improve the living conditions of the local population. The NGO works with and facilitates inter-stakeholder dialogue and contributes to financing social and productive projects in local communities.

Talking about the importance of distributed off-grid renewable energy technologies for rural areas, Benjamin Palliere observed that these technologies present the ideal solution to meet the needs of local communities, both for local consumption and for productive use. Electricity is vital for development and studies have shown that there is a relationship between GDP levels and electricity access. However, he noted that energy access alone does not lead to economic development, it has to be linked to productive use. The quality of electricity supply is quite important for rural enterprises. In many cases they are able to pay for high quality electricity supply.

In Mali, solar energy is perhaps the best available technology as it enables rural businesses to operate throughout the day. It is extremely important to negotiate electricity rates with local businesses. Local businesses are willing to pay higher rates for electricity. However, if there is a problem with unpredictable supply or other quality issues related to electricity, it is likely that uptake by local businesses will be lower. Similarly, if the technology is not in sync with local requirements in rural areas, there might be a lack of uptake.

Kalifa Koulibaly of GERES pointed out that electricity supply to rural businesses is likely to be easier if they are located in close proximity to each other. Based on an extensive study of the problems and solutions of rural electrification, GERES and AMEDD have worked on the idea

of a rural renewable electrification business incubator—a dedicated energy solution for rural businesses. The idea behind the incubator is to have high quality supply of electricity, coupled with bioclimatic buildings and business service facilities. The goal at the start of the project was to have a proof of concept and establish ten rural businesses in the incubator that generate around 50 jobs for locals. Electricity supply was to be provided by solar-biodiesel mini-grid.

The results in the first eight months have been quite encouraging and five businesses have been established in the incubator. These include: a jatropha oil unit, a bakery, a women's group engaged in the trade of juices and ice cream, an IT centre and a chicken brooder. These businesses have created 24 jobs and the incubator has had a strong demonstration effect in the surrounding areas. The results up to now have been consistent with the idea that energy access has to be linked to productive enterprises. Moreover, the quality of electricity supply has to be maintained at a high level.

#### **Solar lantern project in rural Sierra Leone** **Kelleh Gbawuru-Mansaray, UNIDO Consultant**

Kelleh Gbawuru-Mansaray informed participants about a solar PV lantern project implemented by UNIDO in rural Sierra Leone. The project was implemented in the village of Kychom in Kambia District, Northern Sierra Leone. UNIDO implemented the project and received technical support during the project from The Energy Resource Institute in India and Sunlabob Renewable Energy Limited in Laos. The Ministries of Energy, Trade, and Industry and Local Government of the government of Sierra Leone were also involved. The project began in 2012 and is ongoing. It is a good example of South-South cooperation as it involved organisations from three developing countries, Sierra Leone, India, and Laos.

Rural electrification is a part of the overall development and poverty reduction strategy in Sierra

Leone. Despite being a part of the strategy, electrification rates in the country are dismal, only 5% of the population has access to electricity. In rural areas, less than 1% of people have access to electricity while in the urban areas the situation is a little better and 11% of those based in cities have electricity.

There is a high dependency in villages on traditional biomass-based fuels. However, similar to other traditional energy sources, these have a number of health implications, especially for women and children. To illustrate, in the village of Kychom the main sources of lighting prior to project implementation were traditional kerosene lamps, candles, and, in some cases, torches. As a result of these traditional sources of lighting, the population suffered from a number of health issues like eye irritation, coughing, and respiratory diseases. Moreover, dry cell batteries were disposed in open dumps. Only a small number of households and businesses in the village owned small generators, however, they could only be used when fuel was available.

The situation changed after the implementation of the project with six solar lantern charging stations set-up at different locations within the village. These charging stations also provide mobile phone charging services to residents. The project has had a significantly positive impact on the lives of those based in Kyochem. To ensure sustainability, as part of the project, people from the local community were trained as technicians to set up charging stations and to undertake operation and maintenance tasks of solar PV lanterns and SHS.

In terms of educational outcomes, evidence suggests that the availability of solar PV lanterns has improved education through night classes in the village school for illiterate adults. Teacher motivation has improved and students benefit from better study opportunities. The improved outcomes can be gauged from the fact that success rates of local students in the national ex-

aminations has also increased drastically, and enrolment has doubled in the previous year.

In the case of health outcomes, reducing the use of kerosene has lowered risk of food poisoning and decreased respiratory diseases and eye problems. The health centre in the village used to depend on kerosene light, dry cell battery-based torches, or generators for lighting. Getting fuel or batteries to the village was a logistical problem and hence the most commonly used fuel was kerosene. Since the introduction of solar PV lamps, it is now possible for the staff to deliver babies in a safer environment.

From a commercial point of view, shops are open for a longer period of time and income generation has also improved. The project has also improved skill levels in the community: there are now three operation and maintenance technicians. Apart from the indirect impact, fourteen direct jobs have also been created at the solar charging stations.

In terms of the long term sustainability, Kelleh Gbawuru-Mansaray stressed that capacity building and training of local people as technicians is extremely important. This means that solutions are available in the village. If there is a problem with the system, it can be fixed on the spot. Income is generated through the renting of solar PV lanterns and mobile phone charging, which is then used for paying salaries and for periodic maintenance of the system. The success of the project has meant that the government of Sierra Leone is keen to replicate such projects in other rural areas in future. The project has also received accolades at a global level and is seen as a successful model of cooperation between developing countries.

### **Energy access and gainful employment** **James Robinson, SNV Ghana**

James Robinson talked about the experience garnered from various projects implemented

by SNV in Ghana. The projects focus on the dissemination of commercial-scale improved cookstoves for value addition in agricultural products. These projects are aimed at improving the productive use of energy in rural areas and increasing income generation.

He observed that like other developing countries, in Ghana, there is a high dependence on traditional biomass like firewood. There is a serious problem of deforestation in the country, in part because of this dependence. A lot of the commercial activities that depend on cooking or drying agricultural produce are labour intensive and have multiple health impacts. Many of these activities are strongly gendered, and women often both own and operate these businesses. The value chains for these agricultural products are already well established at various levels, i.e., local, national, and regional. These activities are critical for rural livelihoods and contribute to employment in the non-agricultural rural economy. Their importance can be gauged from the fact that there are 800,000 producers carrying out activities such as fish smoking, Gari roasting and other agro-processing sub-sectors.

SNV is currently executing five productive use of energy projects focusing on agricultural products. James Robinson delved into greater detail about one such project that aims to improve fish smoking. Fish smoking is an important sector, and smoked fish from Ghana are exported to countries in the region. He observed that as part of a World Bank project in the 1980s, there was an effort to improve the quality of fishing canoes. The project was quite successful, and many of the canoes from that era are still used. There has also been an increase in fishing, which has meant that the size of catches is reducing. The upstream intervention did not contribute to improvements downstream in post-harvest activities. While the value chain is developed, the actual market mapping has not been done. To improve post-harvest activities, SNV worked with women in local communities to disseminate

improved cookstoves that have better ventilation and can improve productivity.

Similar projects are also being undertaken for other agricultural commodities like gari roasting and pito brewing. Instead of working with individual women, SNV works with women-only producer groups. Improved cookstoves have better combustion and contribute to fuel savings. This implies that more income can accrue to producers, though this is of course not the only factor impacting margins.

SNV has undertaken an extensive study of these sectors to understand them in detail before starting their interventions. As part of this work, there has been an effort to map the existing cookstoves eco-system. SNV has also been involved in technology development in partnership with local companies and to test the efficiency of these stoves in comparison with legacy cookstoves. At a commercial scale, ensuring that costs are low, quality is maintained, and the product is affordable for the consumers are extremely important. Furthermore, SNV Ghana is working with the government to develop regulations that govern the improved cookstoves sector. The project aims to improve the linkages between government, suppliers and agricultural processors/producers.

James Robinson observed that the basic philosophy of SNV is to understand a particular sector before undertaking any intervention. Rather than playing a central role, SNV sees its role more as a facilitator of market growth for improved cookstoves. One of the key constraints that they are trying to overcome is access to finance. This is particularly important in the Ghanaian context—local interest rates are quite high. In the case of nascent cookstove producers, access to capital at affordable rates is extremely important as it is quite a cost-conscious market. He noted that there has to be a better understanding of the various market segments. Based on this understanding, a basket of products can be developed along with the financing instruments. Targeted

and smart subsidies will be an important tool for the dissemination of improved stoves. The pricing of these products has to match the liquidity and productivity levels of the small and medium sectors who are the target consumers. On successful proof of concept during the pilot, moving to the next stage of a full-scale project is extremely important for long-term sustainability and impact.

### Q&A Session

The panel presentations were followed by a discussion between panel members and workshop participants.

There was an enquiry about the relationship between GERES and the Malian government agency for Development of Household Energy and Rural Electrification (AMADER). Benjamin Palliere informed the audience that AMADER is working in the area of rural electrification and is also responsible for quality assurance of equipment like pico PV and solar home systems. GERES works with the agency to develop regulatory frameworks. GERES also provides its expertise to provide training and improve the quality of human capital in the sector. This is especially true for young people in rural areas. He informed participants that grants will be an important source of capital to replace equipment after 3 years.

Responding to questions regarding the creation of sustainable jobs in the renewable energy sector in rural areas, the panellists had mixed responses. Kelleh Gbawuru-Mansaray stated that increasing education has a positive impact on jobs in the renewable energy sector the challenge for many organisations is how to retain trained human capital. One of the ways to improve participation of young people is by training high school leavers how to install, operate, and maintain equipment like solar home systems.

Eugene Ikejemba stated that even though many projects are being implemented, sustainable job

creation is low. The limited emphasis on creating local jobs means that sustainable employment sources remain missing. A way to improve this sustainability is through smart subsidies that do not affect the functioning of the market. These types of subsidies could be provided to the producers and distributors instead of being disseminated at the consumer level similar to results based financing.

The constraints of moving from a crony-based model of awarding renewable energy projects towards a more merit-based approach were also discussed. Eugene Ikejemba opined that there is a problem of both direct and indirect nepotism—this is a difficult problem to address. Dealing with the issue requires concerted efforts from the top. This can be done by setting-up a high level independent committee to vet projects both before and after.

### Discussion

The panel sessions were followed by an open discussion between workshop participants that focused on the following questions:

- What are the framework conditions necessary for improved energy access to contribute to improved livelihoods and productivity increases in rural areas?
- How can women gain from improved energy access?
- What is the role of credit in promoting rural enterprises in these areas?

In terms of the framework conditions, participants observed that national and local governments across the region have to support initiatives aimed at linking energy access to its productive use. This can act as a catalyst for growth and poverty alleviation in rural areas. The government can support energy access projects by investing in the provision of improved social services, which can help in developing the requisite skill in rural



areas. The government can also support off-grid energy provision by reducing duties on quality products in order to make them more affordable. As stated in the earlier session, participants agreed that for rural enterprises, ensuring access to quality electricity supply is very important. This can help improve the productivity of these enterprises and play a positive role in increasing incomes. Developing expertise at the village level to provide operations and maintenance for products like solar home systems can also provide avenues for gainful employment and help improve adoption rates.

Women have an important role to play in the rural economy and energy access can have a positive impact on their economic and social position within the household. Development agencies, NGOs, and the private sector should involve women throughout the planning and execution of projects aimed at improving energy access. Women can act as catalysts in promoting the uptake of these products in rural areas. Participants also observed that some interventions have to focus entirely on improving women's livelihoods and improving their skill-sets. Giving examples of such interventions aimed at women, one of the participants highlighted that her organisation is trying to improve the productivity of agricultural processing activities that are undertaken entirely by women. To do so, they are developing improved cookstoves reduce the harmful health impacts of traditional cookstoves.

Access to credit plays an extremely important role in developing rural enterprises. In some cases, subsidised credit is provided to rural enterprises for the duration of the project and is withdrawn once the project ends. This means that although jobs are created for a certain period, they are not sustainable and most businesses close after the end of the intervention. Kalifa Koulibaly observed that experience from rural Mali shows that access to credit can help spur growth in rural enterprises. Access to energy coupled with finance has proved to be an important catalyst for growth

for some of these enterprises. The challenge is to improve access to credit for women based in these areas as they are often the poorest and banks are unwilling to lend to them. For these consumers, micro-finance institutions can be important sources of training and mentoring.

Abdoul Dosso noted that in Senegal and the areas where GVEP is working, women-led enterprises do not like taking out lines of credit as the interest rates are quite high, which makes these loans unaffordable. Most SMEs that are operating in rural areas are unable to meet the lending conditions of banks. For their part, GVEP is trying to train women so that they can access loans.

The affordability of credit from formal sources also came up for discussion. Participants noted that access to subsidised credit is extremely important for the growth of rural enterprises. On the short time horizon of lending by banks, Kalifa Koulibaly observed that many of the productive activities in rural areas are seasonal and lending for one year alone can create problems for rural entrepreneurs. To deal with this issue, they are trying to ensure that rural enterprises get loans for a longer three-year period so that they can properly develop a revenue stream before worrying about repayment issues.

### **Recommendations from the day's sessions** **Howard Alper, University of Ottawa and Smart Villages Initiative**

Howard Alper observed that the day's deliberations showed the importance of taking into account local differences when designing and implementing off-grid energy projects. While energy access itself is important, it is a means to an end. Framework conditions have to be created that help those based in rural areas take advantage of this access by promoting the productive use of energy. Howard Alper further stressed the importance of stakeholder and community engagement in off-grid energy projects implemented in the region.

## PANEL SESSION 4: LINKING IMPROVED ENERGY ACCESS TO INCREASED ACCESS TO ESSENTIAL SERVICES (MARKETS, HEALTH, EDUCATION, DEMOCRACY)

### The role of renewable energy in improving energy access to rural areas

Yusuf Mohammad Ganda, Sokoto Energy Research Centre

Yusuf Mohammad Ganda began his presentation by talking about the importance of energy access for sustainable development and poverty alleviation. On the energy situation in Nigeria, he observed that the country has an installed capacity of 6000 MW and approximately 40% of the national population has access to electricity. But the situation is much worse in rural areas where almost 80% of the population has no access to electricity. It is important to develop alternatives for rural energy supply—renewable energy is a strong option. Renewable energy is already being used to provide household lighting and for other household uses like communication. There have also been moves to develop productive uses of energy using renewable energy.

Furthermore, he reflected on the increasing trend towards rural-urban migration in developing countries. One of the reasons for high levels of migration is the lack of access to energy in rural areas. Improvements in energy access can decrease the flow of people towards urban centres. Renewable energy access in rural areas can have a positive impact on people's living standard in rural areas and have a positive effect on local development.

On the barriers to energy access in rural areas, he stated that there is a mixture of political, financial, and technological barriers. On the policy side, there is a lack of clarity in terms of the regulatory frameworks that are being developed by the government at the federal and the state level. The lack of standards and quality assurance is also a major issue that has not been adequately addressed. On the financial side, there is a lack of access to finance, especially for small-scale

distributed energy projects. Investors are not very interested in making investments in areas where the ability of customers to pay is low and hence the return on investment is low. On the technology side, there is a lack of scientific assessment about resources that are available for renewable energy generation. There are barriers related to the local development and fabrication of products like solar home systems.

Yusuf Mohammad Ganda gave a number of concrete recommendations to increase energy access in rural areas. These are:

- The Federal government has to emphasise development of renewable energy through budgetary allocations. There is also a need to adopt the various draft policies related to renewable energy such as the Renewable Energy Master Plan.
- Legislative frameworks dealing with renewable energy have to be approved without delay by the national legislature.
- At the regional and local level, governments need to integrate the use of renewable energy especially for rural areas.
- A trust fund could be established by the government to provide low cost financing for the promotion of off-grid renewable energy solutions in the country.

In conclusion, he observed that there are immense opportunities to develop rural areas in the country. In the past, successive governments have ignored the needs of these areas and this has contributed to unsustainable rural-urban migration. Increasing energy access through off-grid renewable energy could help reduce the impact on over-stretched urban areas and contribute to sustainable development in rural areas.

## Scaling up energy access through women's economic empowerment

**Abdoul Karim Dosso, GVEP**

Abdoul Karim Dosso from the Global Village Energy Partnership (GVEP) began his presentation with an overview of the organisation. GVEP is a London-based organisation launched in 2002 as a World Bank initiative. In 2006 it was registered as an NGO. The organisation provides support to businesses that aim to accelerate access to energy in developing countries. GVEP's basic philosophy rests on the premise that as opposed to direct donations, business development is likely to be more sustainable. Since its inception, GVEP has supported more than 260 small and medium enterprises and 2,800 micro enterprises. It has also raised capital of US\$86 million and helped create 7,800 jobs in rural areas. Over 10 million people have been provided with improved access to energy through these projects.

GVEP has been partnering with ENERGIA, an international network founded in 1996. ENERGIA has members in 22 countries and has ongoing programme activities in 12 countries in Africa and Asia. ENERGIA's activities focus on mainstreaming gender issues in energy projects being executed in developing countries. Women are seen as being central to the development process and as catalysts for development. They can play an extremely important role in expanding energy access. The Women Economic Empowerment Programme seeks to help women-led micro- and small enterprises engaged in delivering energy services scale up proven business models and strengthen their capacity. It is expected that investment in women's economic empowerment will help in improving gender equality. It is also likely that such projects will also contribute to rural poverty alleviation and will promote inclusive economic development.

Over three years, in Senegal GVEP aims to support the development of 250 women's groups and enterprises and contribute towards increased

productive usage of electricity among women across the value chain. It is expected that 150 of these groups will be provided training in the sale of improved cookstoves and solar home systems. The rest of the groups will be provided support in developing enterprises that use energy productively, especially in the agricultural production and processing sector. The project is being implemented in two regions: Tambacounda and Kedougou, where there are high levels of poverty. Both these regions also have low levels of electricity access, and there is low penetration of improved cookstoves.

Abdoul Karim Dosso informed participants that consumers in West Africa have low awareness of off-grid energy solutions like solar home systems. In the absence of alternatives, most people in the region are forced to use kerosene and candles for lighting. Not only are these more expensive, but they are also highly polluting. Another problem is of affordability, most consumers are quite poor therefore paying upfront for solar home systems and improved cookstoves is extremely difficult for the local community. The lack of a viable supply chain in these areas also means that firms prefer to focus on urban and suburban areas. SEM Fund, a social enterprise working in the two regions, has an impressive network of 1,300 women groups in these regions. However, a lack of business as well as technical expertise and capital has a negative impact on the growth of these businesses.

Giving further details about the approach adopted for the project, Abdoul Karim Dosso observed that the idea is to identify potential challenges to growth and develop appropriate strategies to deal with them. Implementing support enterprise packages—that address specific bottlenecks faced by these enterprises—has a positive impact on the development of rural enterprises. To facilitate last mile delivery financing and develop a functioning supply chain, GVEP has developed innovative partnerships as part of the Women's Empowerment project with commercial enterprises and

suppliers. An example of such a partnership is the agreement with Total Awango. GVEP will deliver more than 14,000 pico PV systems with mobile phone charging facilities. These products will have a two-year warranty. It is envisaged that 75 women's groups will distribute the PV systems by the end of the project in 2017. Sale of the systems is based on credit with the project providing initial credit to purchase the product. Total Awango promotes these solar products through marketing events. GVEP understands that access to finance is extremely important for the success of rural enterprises, therefore within the project there is a lot of emphasis on ensuring the availability of credit at lower interest rates.

Agriculture is the main productive activity in the project area, and a majority of the people in these areas depend on it as the main source of income. To support agriculture, GVEP has developed partnerships to improve agricultural practices by working with PAPIL, a project supporting small local irrigation schemes, and the National Agency of Rural Council Agriculture (ANCAR). Through this partnership, women are provided appropriate technical training. GVEP also provides guidance regarding appropriate on-farm energy solutions. For their part, PAPIL and ANCAR provide their technical expertise in agriculture, irrigation, and post-harvest processes that are in sync with the energy solutions provided by GVEP. This partnership has had a positive impact: women have access to inputs required to increase productivity. It also enhances synergies with programmes being implemented by other agencies, which helps improve harmonisation of projects at the local level. It also helps to transfer knowledge at the local level.

Talking about the immediate results of the project, Abdoul Karim Dosso told the participants that GVEP is working with 224 enterprises and women's groups in this project. Of these, 146 are involved across the value chain of pico PV systems and improved cookstoves, while the rest focus on the productive use of energy in rural areas.

Under the mentorship component of the project, 211 of these organisations are receiving coaching. Almost 11,000 women have directly benefited from the project either by being involved in the distribution of solar PV systems and improved cookstoves, or through their involvement in enterprises that aim to use energy productively. Women have emerged as active decision makers in these businesses and also have an enhanced say in decisions regarding household expenditures. The various partnerships that have been fostered as part of the project have helped improve access to finance for women's groups.

Projects aimed at increasing access to energy in rural areas have to capitalise on women and promote their involvement in micro- and small enterprises. Women can play a pivotal role in the supply chain. Moreover, if the community trusts these women, it can galvanise support for products aimed at improving energy access. There is also a need to develop broad based partnerships with other organisations working in the field. A holistic approach towards rural development that combines mentorship, access to finance, and customised solutions is likely to be sustainable and contribute to the success of energy access projects.

### **Implementation off-grid energy projects in rural Nigeria**

**Ifeanyi Orajaka, Green Villages Enterprises Ltd.**

Ifeanyi Orajaka from Green Village Electricity Projects Limited gave a summary of their experience of implementing off-grid projects in rural Nigeria. He stated that there is a relationship between electricity access and improved outcomes in areas such as health, services and education. Green Village Electricity Projects Limited has received awards from the Institute of Electrical Engineers and the United Nations Development Programme for their work in improving energy access in Nigeria.

From 2013–2016, the company has been involved in six pilot projects in four different states of



Nigeria. These projects have been implemented with the support of a number of different stakeholders including the Bank of Industry, Nigeria. An example of one of their projects is a 37.8 kW mini-grid project that supplied electricity to 200 households. The project also helped improve the local economy as access to electricity helped farmers access groundwater for irrigation. Local processing of agricultural commodities also received a boost.

The experience of different pilot projects has helped the organisation gain a better understanding of the linkages between energy access and development in rural areas. Prior to implementing these projects, commercial activities usually ended by 6pm-7pm. Shopkeepers used kerosene and candles as the primary lighting sources. For those who could afford diesel generators, working in remote rural areas away from urban centres meant that the availability of diesel fuel also remained a problem. Availability of off-grid energy has helped alleviate some of these constraints and has had a positive impact on livelihoods in these areas.

There has also been a positive effect on women who have been able to use the energy available for various productive activities like refrigeration and agro-processing. He gave the example of a shop owner who doubled her income because she had the ability to sell chilled drinks. Learnings from the area have shown that access to electricity has had a positive impact on socio-economic conditions, and the ability to run fans has reduced the cases of malaria in the area. Ifeanyi Orajaka also stressed the importance of promoting information and communication technology use in off-grid communities and to incentivise people to use these solutions for productive uses.

### **Productive use of energy in Ghana**

**Samuel Adoboe, EnDev, GIZ**

GIZ's portfolio in Ghana is multi-faceted, and they are involved in a number of different in-

terventions at various levels in the country. The energy portfolio of GIZ aims to support the Ministry of Power to increase the use of renewable energy in the country. At the macro level, GIZ has been involved in developing and strengthening policy and regulatory measures in a project called C-SIREA. These measures include passing of the Renewable Energy Act, development of a licencing manual, net metering code, guidelines for a renewable energy fund, and framing a local content policy. They have also been actively involved in trying to understand the impact of renewable energy and informing decision making at the national level regarding the costs of incorporating such solutions in the national generation system and the setting of tariffs. GIZ has been involved in supporting the Ministry of Power in the facilitation and design of tender transaction of power purchase agreements. Developing feed-in-tariffs and renewable energy purchase obligations have also fallen under the purview of this macro level support. Finally, GIZ has been actively involved in trying to develop the human capital at the Ministry of Power through the provision of technical and business training.

At the grass-roots level, GIZ is involved in the EnDev programme, which is a global energy access partnership programme. In Ghana, EnDev aims to promote the productive use of energy especially for small and medium-sized enterprises to support the growth of local economies. They hope this use of energy will have a positive impact on job creation, improve food security, and help address concerns regarding the water-energy-food nexus. EnDev aims to be a holistic project that targets people, social institutions and enterprises. Gender equality in terms of improved access to energy and its use is a very important part of EnDev. One of the key areas of intervention in EnDev's project portfolio is related to health: they introduce improved cookstoves that have a positive impact on household health by reducing smoke and soot.

In Ghana, EnDev has been involved in projects aimed at the productive use of energy. These projects are aimed at those areas that are grid-connected as well as off-grid areas. In agriculture, 250 farmers have been provided access to grid-connected water pumps to enhance productivity. Currently, there are 123 connections that have been given to farmers. Grid-connected electricity helps replace costly petrol and diesel motors and has a positive impact on farmer incomes. EnDev has also helped develop light industrial zones that are connected to the national grid. More than 1,000 micro-, small- and medium-sized enterprises have either been established or have relocated to these industrial zones. There has been considerable job creation in the surrounding areas, and 10% of the enterprises in the zones are women led.

In off-grid areas, there have been moves to promote solar pumping using the market development approach. Through EnDev's efforts awareness has increased about the use of solar based irrigation solutions. It is expected that micro-finance institutions will support the installation of solar pumps. While initial costs of solar pumps are high, access to water has a positive impact on profitability, especially as it allows for the cultivation of high-value products like vegetables. The first solar irrigation system has been installed at Nsawam and benefits 30 small farmers in the area.

The final area of intervention for EnDev in Ghana is in the development and dissemination of improved cookstoves. Samuel Adoboe observed that there is a high demand for improved cookstoves and under the programme they have installed 50 improved stoves for commercial use. These stoves are 40% more efficient than traditional stoves. These stoves also have a number of health benefits including lower smoke emission. They are easier to operate as users can sit on the stove and operate it while roasting gari. There is a business model already in place for commercial-scale production of these stoves. It is expected that funding will be provided by micro-finance institutions.

Samuel Adoboe informed participants that just providing access to improved energy sources will not help in the development of poor rural communities. Energy access has to be linked to productive uses as it can stimulate the local economy and increase incomes as it provides the opportunity for employment generation along the value chain. Rising local productivity has a knock-on effect as it increases affordability as people have greater disposable incomes. Over time there is likely to be demand for more access to better energy services which can ideally lead to better access to social services.

In this entire process it is extremely important to engage with broader stakeholders in the local area and engage with the community. There is a need to engage local governments and the district assemblies as there are a number of benefits to the local economy, both direct as well as indirect. These positive benefits can help local governments increase their incomes and improve service provision. Despite the benefits, energy access, especially off-grid and improved cookstoves do not appear to be high up on the agenda of local governments. Distributed energy solutions are not seen as the solution and the emphasis remains on extension of the central grid. This mind-set needs to be changed.

**Food and energy challenges: how *Jatropha curcas*, *Ricinus communis* and sweet sorghum could be a solution in rural area?**  
**Thierry Tovignan, CERAAS**

Thierry Tovignan indicated that there had been a lot of emphasis on distributed energy solutions, especially solar, throughout the workshop but very limited discussion about biofuels. His presentation looked at the potential of *jatropha* and sweet sorghum as sources of biofuel and considered their impact on the local economy as well as food security. He observed that while Benin has low local electrification rates, the local agro-ecological conditions are suitable for the cultivation of energy crops. There is also abundance of land

availability in the country which is equivalent to 8.3 million hectares. There is a great deal of agro-diversity in the country and a number of crops that can be used for biofuel use are grown in the country. For biodiesel, these crops include jatropha, castor oil plants, and palm oil, while for bioethanol potential crops include maize, sweet sorghum, sugarcane, etc.

The study looked at the possibility of cultivating energy crops on a large scale without affecting food security. For biodiesel, the study focused on jatropha and castor oil plants. Both plants have high energy potential but are locally neglected. In the case of bioethanol, the project looked at sweet sorghum which can be grown in areas with lower water availability as compared to sugarcane. Sweet sorghum can also be used to produce sugar. Seeds were collected from three regions in Benin in order to understand how agro-ecological conditions affect the quality of oil in the case of jatropha. While the oil quality index was a little lower than the ideal quality required, the overall

results were quite encouraging. Results of similar tests undertaken for castor oil also showed promising results. Castor oil has to undergo further transformation before being used as biodiesel.

There are multiple opportunities for growing sweet sorghum across West Africa. The lower water requirement of the crop means that it can be grown in countries that are drought prone. The plant has dual uses and can be utilised both for food (sugar) and fuel (bioethanol) uses. Results of the research undertaken shows that there is great potential for planting varieties that have dual purposes across the region. There has to be better awareness regarding the date of planting and extension services will play an important role in this regard. Varieties of sweet sorghum developed have been quite successful in field testing and there are moves to disseminate these seeds in Senegal. There are also moves to utilise energy crops to revitalise the agriculture sector and the economy of countries that have been negatively affected by Ebola.



Faustina Boakye, Gender consultant, Ghana



## BREAKOUT SESSION 2

After the morning session, the participants divided into three groups for a breakout session. The groups were asked to deliberate on three pre-set questions. These were:

- How can improved energy access contribute to broad-based socio-economic growth in rural communities?
- Can community ownership of off-grid energy access projects be improved and does it increase long-term economic sustainability of these projects?
- What steps can be taken to increase local women's participation in the design and implementation of improved cookstove interventions?

A summary of the discussion of the three groups is given below:

Regarding the contribution of energy access to improved socio-economic growth in rural areas, participants observed that a positive impact can be generated through a number of channels. Firstly, the impact depends on the size of the project and whether the intervention focuses on pico PV solar solutions, solar home systems, or mini-grids. Linking energy access to productive enterprises is likely to have a positive impact on the local economy, which implies that people will have more disposable income and will be able to invest in improving services such as health and education. As most of the local population in rural areas is engaged in agriculture, improved access to energy can help farmers to be more productive—irrigation can drastically improve crops. Improvement in agricultural productivity is “low hanging fruit”. An increase in agricultural incomes due to access to water is likely to contribute to sustainable development in rural areas.

A key consideration in the design of any energy access scheme should be how it can contribute to the creation of new jobs in the village. Such consideration should include identification of other complimentary initiatives that need to be undertaken to support job creation. New jobs at the village level help to stem rural to urban migration. Energy access initiatives need to be integrated with other initiatives on job creation, provision of local services etc. Too often, a silo approach is taken in which the various development communities focus only on their particular issue. Initiatives should carefully evaluate the activities within the village which might lend themselves to increases in productivity or spin-off activities enabled by energy access. A bottom-up approach is needed, building on what is already there. Increasing agricultural productivity and capturing more of the agricultural value chain should be focal areas.

To support the creation of jobs and the improved provision of services, financial services need to be available to villagers and village-based organisations, including loans at rates that they can afford. Systematic monitoring and evaluation needs to be put in place to track the development benefits that arise through energy access initiatives. The training of local artisans should look beyond their current activities to broader opportunities and to give them the business skills needed to scale up.

There was broad agreement that improvements in energy access are likely to have a positive impact on health and education outcomes, which will improve human capital. Commercial activities will also receive a boost as it will be possible for shops to remain open for longer. The importance of good local governance was also highlighted. Participants observed that local governments can play an extremely important role in helping to ensure that the positive impact of energy access reaches the local level. Some participants expressed concerns



about the increase in individualism rather than a community-driven vision for development. Others voiced the challenge of ensuring that local people do not fall into debt because of the demand for electrical appliances. Participants also called for researchers to communicate their results to government and to the communities themselves and make their work understandable to a wider audience. Technology transfer will also play an important role in promoting socio-economic growth in rural communities.

On the issue of the long-term sustainability of off-grid energy projects and the importance of community ownership, there was overall agreement regarding the need to engage local people. Project developers should engage with the local community at the project planning stage. Engagement needs to include village leaders and other key figures whose support for the project will be essential. But it also must give a voice to all villagers.

Building local capacity is important and needs to be reinforced so that the people living in rural communities understand the various priorities and can make an informed choice between them. Community participation is also necessary in providing land for off-grid projects.

Various models of ensuring community ownership are available, even in the case that locals cannot contribute in monetary terms. One such model is through sweat equity where local people provide labour during the project construction phase and become shareholders in the project. Local industries as anchor loads can also improve the sustainability of off-grid projects. For example, palm oil plants can provide stable electricity demand. Local government should also be involved. They may be able to provide in-

frastructure and support (the parallel was drawn with the community water concept).

Participants also highlighted the need for appropriate legal frameworks to ensure that project handover to the local community has the appropriate legal cover, and there is no ambiguity in the ownership of such projects after completion.

On involving women in the design and implementation of improved cookstove interventions, some participants highlighted the need for market development in this area. Women can then engage across the value chain which will have a direct positive impact on their incomes. There was broad agreement in the groups that prior to developing improved cookstove designs, women have to be involved in the assessment of needs as they are the primary users of cookstoves. Local women's perspectives are essential to designing and implementing improved cookstove interventions as they understand best the needs and everyday cooking practices. In line with this, the final design should take into account women's requirements.

For this sort of community outreach, development agencies need to utilise women as facilitators who can go into villages and engage with the local women. Participants also highlighted some of the constraints facing women's participation. One of the groups observed that in some areas women are not allowed even to attend group meetings organised by NGOs. It is important to ensure that men understand that women are an essential part of the success of energy initiatives. Involving local women will help to avoid failures and mistakes in the design and marketing of the cookstoves, and they will help the manufacturers to understand the specific needs of women when cooking.

## CLOSING REMARKS

### John Holmes, Smart Villages Initiative

John Holmes thanked presenters and workshop participants for their valuable contributions. The three days of the workshop had provided much information and lively discussion, generating new insights which will be taken forward in the

Smart Villages engagement programme in West Africa. A workshop report and policy brief will be produced which will be sent to participants who are encouraged to share it with contacts and colleagues.



## ANNEX 1: LIST OF PARTICIPANTS

Aaro Nyarkotey	SNV, Ghana
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Kwabena Otu-Danquah	Energy Commission, Ghana
Kwasi Broni-Sefah	Kwame Nkrumah University of Science and Technology, Ghana
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Yuri Lima Handem	ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), Cape Verde

## ANNEX 2: WORKSHOP PROGRAMME

### Smart Villages, West Africa Regional Workshop

23-25 May, 2015

Mensvic Grand Hotel

Accra, Ghana

#### Monday, 23 May

- 0900 Registration
- 0930 Welcome address  
James Robinson, Country Sector Leader, Energy, SNV Ghana
- 0945 Introduction to the Smart Villages Initiative  
Dr. John Holmes, University of Oxford and Co-Leader, Smart Villages Initiative
- 1015 Keynote address  
Kwabena Otu-Danquah, Director, Renewable Energy & Energy Efficiency Promotion, Energy Commission, Government of Ghana
- 1045 Workshop objectives  
Dr. Bernie Jones, Co-Leader, Smart Villages Initiative
- 1100 Tea Break
- 1130 Panel Session 1: Opportunities for improving energy access in West Africa  
Yuri Lima Handem, ECOWAS Renewable Energy Entrepreneurship Support Coordinator, ECOWAS Centre for Renewable Energy and Energy Efficiency  
Allwell Nwankwo, Lighting Africa Programme, International Finance Corporation  
Abdulmutalib Yussuff, Head, Research Unit and Senior Research Officer, National Centre for Energy Efficiency and Conservation, Energy Commission of Nigeria  
Kwabena Otu-Danquah, Director, Renewable Energy & Energy Efficiency Promotion, Energy Commission, Government of Ghana
- 1230 Discussion
- 1245 Findings of the Smart Villages engagement programme in East Africa  
Dr. John Holmes, University of Oxford and Co-Leader, Smart Villages Initiative
- 1300 Lunch
- 1415 Entrepreneurs in the off-grid energy ecosystem in West Africa: Elevator pitches  
Kwasi Owusu Gyeabour, Barefoot Power, Ghana  
Fatima Oyiza Ademoh, Ajima Farms and General Enterprises Nigeria Limited  
Sayouba Guira, Nafa Naana, Burkina Faso  
Sokhna Khadidia Thiam, Consortium Sahélien d'Energies Renouvelable (COSEER), Senegal

Kofi Tandoh, Azuri Technologies, Ghana

Olasimbo Sojinrin, Solar Sister, Nigeria

Akua Adu, PEG Solar, Ghana

Ifeanyi Orajaka, Green Village Enterprises (GVE) Limited, Nigeria

Ron Acquah, Solarkiosk, Ghana

1515 Tea Break

1545 Plenary Session: Discussion on entrepreneurial case studies

1645 Recommendations from the day's session

Professor Howard Alper, Distinguished Professor, Department of Chemistry, University of Ottawa, Chair, Science, Technology, and Innovation Council (Canada) and Member Advisory Board, Smart Villages Initiative

## Tuesday, 24 May

0915 Panel Session 2: Supporting energy access in off-grid areas: The role of public, private and multi-lateral investment

Godfrey Mwindaare, West Africa Director, Acumen Fund

Dr. Peter Förster, Chargé de Programme, EnDev Bénin

Bokar Ture, Chief Operating Officer, Solektra International

Eluma Obibuaku, Vice President (Power), Africa Finance Corporation, Nigeria

1030 Discussion

1100 Tea Break

1100 Breakout Session 1:

How can financing bottlenecks facing off-grid energy projects be alleviated?

What are the mechanisms through which co-ordination between different financing agencies at the local, national and multi-lateral be improved for off-grid energy projects?

How can investment be promoted in the production and dissemination of improved cookstoves?

1230 Report back to Plenary

1300 Lunch

1400 Panel Session 3: Linking improved energy access to increased opportunities for gainful employment

Eugene Ikejemba, PhD Candidate, University of Twente, Netherlands

Benjamin Palliere and Kalifa Koulibaly, GERES West Africa

Dr. Kelleh Gbawuru-Mansaray, Consultant, UNIDO, Sierra Leone

James Robinson, Country Sector Leader, Energy, SNV Ghana

1545 Tea Break

- 1615 Plenary discussion:  
What are the framework conditions necessary for improved energy access to contribute to improved livelihoods and productivity increases in rural areas?  
How can women gain from improved energy access?  
What is the role of credit in promoting rural enterprises in these areas?
- 1730 Recommendations from the day's session  
Professor Howard Alper, Distinguished Professor, Department of Chemistry, University of Ottawa Chair, Science, Technology, and Innovation Council (Canada) and Member Advisory Board, Smart Villages Initiative

### Wednesday, 25 May

- 0915 Panel Session 4: Linking improved energy access to increased access to essential services (markets, health, education, democracy)  
Yusuf Mohammad Ganda, Sokoto Energy Research Centre, Usmanu Danfodiyo University, Nigeria  
Abdoul Karim Dosso, Project Manager, GVEP, Senegal  
Ifeanyi Orajaka, CEO, Green Village Electricity Ltd.  
Samuel Adoboe, EnDev, GIZ Ghana  
Dr. Thierry Tovignan, CERAAS, Benin and Senegal
- 1015 Breakout Session 2:  
How can improved energy access contribute to broad-based socio-economic growth in rural communities?  
Can community ownership of off-grid energy access projects be improved and does it increase long-term economic sustainability of these projects?  
What steps can be taken to increase local women's participation in the design and implementation of improved cookstove interventions?
- 1200 Report back to Plenary
- 1230 Closing Remarks  
Dr. John Holmes, University of Oxford and Co-Leader, Smart Villages Initiative
- 1300 Lunch











# **SMART VILLAGES**

New thinking for off-grid communities worldwide

The Smart Villages initiative is being funded by the Cambridge Malaysian Education and Development Trust (CMEDT) and the Malaysian Commonwealth Studies Centre (MCSC) and through a grant from the Templeton World Charity Foundation (TWCF). The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Cambridge Malaysian Education and Development Trust or the Templeton World Charity Foundation.

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