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AFRICA ELECTRIFICATION INITIATIVE (AEI) WORKSHOP

June 9-12, 2009, Maputo, Mozambique

CONTENTS

ABBREVIATIONS

AEI	Africa Energy Initiative
BMZ	German Federal Ministry for Economic Cooperation and Development
CDM	Clean Development Mechanism
DRC	Democratic Republic of Congo
ESMAP	Energy Sector Management Assistance Program
ESPs	Energy Services Platforms
EUEI	Partnership Dialogue Facility
FEMA	Forum of African Energy Ministers
GTZ	German Technical Cooperation
INGES	Income Generation through Complementary Services
kWh	Kilowatt per hour
KPLC	Kenya Power Lighting Company
LV-Tariff	low-voltage tariff
M&E	monitoring and evaluation
NRECA	National Rural Electric Cooperative Association
MT	medium tariff
OSINERGMIN	Energy and Mining Investment Supervisory Body, Peru
PoAs	program of activities
PU	productive uses
PV	photo voltaic
RE	rural electrification
REA	Rural Electrification Agency
REF	Renewable Energy Foundation
SEEDS	Sustainable Environment and Ecological Development Society
SHS	solar home system
SSA	Sub-Saharan Africa
TaTEDO	Tanzania Traditional Energy Development and Environment Organization
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Background

Sub-Saharan Africa's (SSA) low level of household electrification is well documented. Less than 10% of Sub-Saharan rural households have access to electricity and the overall access rate is below 25%. The causes are multiple and range from economic impediments and lack of funding to sub-optimal policies and electrification program designs. One major obstacle is that it is difficult for SSA practitioners to obtain practical and timely knowledge on how to overcome existing economic, technical, institutional and political barriers to electrification in their day-to-day work. Even where laws, regulations and necessary institutions are in place, relevant and recent operational experiences and techniques are not easily accessible.

Objective

The objective of the three year AEI project is to create and sustain a living body of practical knowledge and a network of SSA practitioners in the area of design and implementation of rural, peri-urban and urban on-grid and off-grid electrification programs. Emphasis is placed on how to overcome time and cost barriers by acquiring and developing practical information and disseminating this information in a user friendly form through simple and sustainable channels of communication. The principal target audience is African practitioners. These include individuals who work for electrification agencies and funds, government ministries, regulators and state, community or privately-owned utilities.

Implementation

The project is being organized in two phases using complementary approaches to produce and disseminate information:

Phase I was launched with a Kick-Off Workshop in Maputo from June 9-12, 2009 for practitioners, where ground level techniques related to rural, peri-urban and urban electrification were presented and discussed. More than 170 individuals from 42 countries attended the workshop. Included among the attendees were 130 representatives from African ministries of energy and power, local and national utilities, energy and electricity regulatory entities, rural electrification agencies, research centers and non-governmental organizations representing 32 African nations.

The workshop achieved the following: (i) share practical information on ground level implementation issues relating to rural, peri-urban and urban electrification; (ii) create a network of electrification practitioners; (iii) refine the topic areas where SSA practitioners face

the most constrains and that are of greatest interest to them; and (iv) define the AEI follow up activities and the most appropriate long-term information dissemination mechanisms.

Organized over six months under the guidance of the Advisory Committee, the workshop mix of formats aimed to maximize discussions among participants. The agenda of the workshop included 50 presentations by experts and practitioners given in 12 plenary sessions, 17 breakout discussion sessions designed to allow participants to pursue follow up questions and three structured half-day clinics for hands-on and in-depth follow up activities. In addition, more than 20 participants took the time before the workshop began to create posters that described the successes and failures of their own electrification projects. These posters were displayed and discussed informally in the hallways outside the workshop meeting rooms.

The number of issues and topics covered was intentionally broad. The workshop was designed to be the equivalent of an "intellectual buffet." The rationale for "going wide" was to give participants an opportunity to sample from a large number of implementation issues. This allowed them to choose issues that were genuinely relevant for their own work, as well as, new and unfamiliar issues so as to be able to give informed recommendations on possible follow-up

activities of the AEI project in years 2 and 3. On their own initiative, a number of participants convened and conducted unscheduled follow up sessions after the formal workshop ended on access subsidies, microfinance, carbon finance, prepaid meters, and alternative service and maintenance models for ongrid/offgrid electrification.

The impact of the workshop was perhaps best summed up in the words of one individual participant: "The topics discussed touched on issues that relate to most of the projects being implemented in Africa today. The workshop was very enlightening. Sharing experiences with other practitioners "opens" up one's mind, such that as we plan/execute projects, we can have reference based on experience from other practitioners."

Building on the workshop, Phase II will create long-term dissemination mechanisms such as a living Internet Web site with an interactive component that allows participants to share information on issues of interest (4-page series); to interact via a blog; and access an archive of operational documents for practical use. It also produces technical papers on key implementation topics. While the focus is on Sub-Sahara African experiences, other international experiences are illustrated if they are found to be relevant. Finally, it establishes Thematic Groups of participants who want to actively contribute to the future AEI work on topics defined at Maputo workshop.

This project is being implemented in partnership with other organizations (both local and international) with an emphasis on local knowledge sharing. The key partners for Phase I included the Energy Sector Management Assistance Program (ESMAP), the Africa Renewable Energy Access Program (AFREA), the EUEI Partnership Dialogue Facility, the Forum of African Energy Ministers (FEMA), the German Technical Cooperation (GTZ), the DGIS/BMZ-funded Energizing Development Program (EnDev) and the World Bank. Involvement of other organizations for the upcoming activities will be actively pursued.

INTRODUCTORY REMARKS

REPÚBLICA DE MOÇAMBIQUE

MINISTRO DA ENERGIA

GABINETE DO MINISTRO

SEMINÁRIO DE PERITOS DA INICIATIVA PARA ELECTRIFICAÇÃO DE ÁFRICA

Discurso de Abertura

por

Sua Excelência Dr. Salvador NAMBURETE

Ministro da Energia da República de Moçambique e Presidente do Fórum de Ministros de Energia de África (FEMA)

MAPUTO, 9 DE JUNHO DE 2009

Digníssimos Representantes dos Estados Membros do FEMA,

Senhor Representante do Banco Mundial,

Senhor Representante da GTZ

Distintos Convidados,

Minhas Senhoras e Meus Senhores,

Constitui para nós motivo de satisfação acolher a todos vós, digníssimos participantes em Maputo, cidade das acácias, por ocasião da realização deste Primeiro Seminário de Peritos sobre a Iniciativa de Electrificação em África.

Quero pois, em nome do Governo da República de Moçambique, do Fórum dos Ministros Africanos de Energia e em meu nome pessoal, estender as mais calorosas saudações de boas vindas a todos os presentes, e, de modo especial, aos participantes estrangeiros, provenientes de vários países.

Gostaria igualmente de manifestar a nossa apreciação aos parceiros de desenvolvimento que muito têm contribuído para o impulsionamento de iniciativas e programas de desenvolvimento do sector de energia em África.

Que as experiências variadas que cada um dos participantes traz do seu próprio País e que terão oportunidade de partilhar ao longo dos próximos 3 dias, contribuam na definição de modelos e estratégias mais apropriados para a electrificação no Nosso Continente.

Distintos Participantes,

Minhas Senhoras e Meus Senhores,

O grande desafio que somos chamados a enfrentar é a expansão do acesso à electricidade no nosso continente, de modo a estarmos cada vez mais próximos de uma cobertura territorial de 100 % nos nossos países.

É neste contexto que este Seminário, dedicado à discussão em busca dos melhores caminhos e dos factores que concorrem para a expansão do acesso se reveste de grande importância para os Nosso Continente e para o FEMA em especial.

Devemos fazer do acesso a electricidade um poderoso instrumento de luta contra a pobreza, contribuindo para impulsionar o desenvolvimento económico e social e melhorar a qualidade de vida dos nossos cidadãos.

África é um Continente provido de um elevado potencial de recursos energéticos. Paradoxalmente, continua a registar baixos índices de acesso a serviços de fornecimento de energia moderna, perpetuando deste modo a dependência excessiva dos recursos de biomassa tradicional, cujas consequências são bem conhecidas, no que concerne à saúde humana - afectando principalmente as mulheres e crianças - e degradação ambiental, principalmente à volta dos grandes centros urbanos.

Este desafio é ainda maior em face dos problemas persistentes com a cobertura dos custos de investimento e operação na produção e fornecimento de electricidade, considerando que, em vários países, as tarifas não reflectem ainda os custos reais, por motivos sociais.

Minhas Senhoras e Meus Senhores,

O Fórum de Ministros de Energia de África, foi criado em 2005 como uma plataforma de diálogo e concertação de políticas no sector de energia; para colaboração e troca de experiências e para advocacia política no provimento, acesso, utilização e gestão dos recursos de energia em África.

Reconhecendo o importante papel da energia como motor de desenvolvimento, e factor crucial para o alcance das Metas de Desenvolvimento do Milénio, o Fórum de Ministros de Energia de África estabeleceu as seguintes metas para o sector de energia em África:

- Duplicar o consumo de energias modernas incluindo o aumento de energia para uso produtivo;

- Aumentar o acesso a serviços de energias modernas para cozinhar, a 50% dos utilizadores de combustíveis tradicionais nas zonas rurais;
- Acesso a serviços de energias modernas para cobertura das necessidades básicas a 75% dos pobres nas zonas urbanas e peri-urbanas; e
- 75% das escolas, centros de saúde e centros comunitários devem ter acesso a energias modernas para as necessidades básicas; e
- Electricidade para usos produtivos deve estar disponível em todas as zonas rurais.

Em Março de 2007, neste mesmo Centro Internacional de Conferências Joaquim Chissano, os Ministros Africanos de Energia reunidos no quadro do FEMA, acordaram no desenvolvimento de um conjunto de acções visando o alcance das metas de energia, dentre as quais gostaria de destacar a resolução de apoiar e endossar o lançamento de iniciativas em colaboração com os parceiros de desenvolvimento, para o acesso e segurança de energia em África.

É neste contexto que o Fórum de Ministros Africanos de Energia decidiu incluir no seu Plano de Trabalho a Iniciativa de Electrificação em África, que visa a criação e manutenção de uma infra-estrutura de conhecimentos práticos, conhecida por "body of knowledge" e uma rede ampla e activa de peritos na área de electrificação, como uma forma de dinamização dos esforços de electrificação do nosso Continente.

Gostaria de exprimir o Nosso reconhecimento aos membros do Comité de Assessoria (*Advisory Committee*) pelo papel determinante que souberam desempenhar, permitindo a consolidação dos conteúdo e estruturação deste importante sobre electrificação em África, cientes que continuaremos a contar com o Vosso valioso apoio.

Minhas Senhoras e Meus Senhores,

Apraz-nos notar os progressos que temos vindo a registar em muitos dos nossos países que se traduzem no aumento do nível de acesso a electricidade em resultado dos

esforços do Governo, parceria público - privada, incluindo a contribuição dos nossos parceiros de desenvolvimento.

Contudo um aumento substancial dos esforços de electrificação será necessário nos próximos anos para conseguirmos reduzir o número de habitantes da África Subsaariana sem ligação a uma fronte de electricidade.

A este respeito gostaria de partilhar a experiência de Moçambique nesta área, onde a taxa global de acesso a electricidade passou de 7% em 2005 para cerca de 14% em apenas quatro anos o que se traduz em 340 000 novos consumidores.

A Estratégia de Energia 2009-2013, aprovada recentemente pelo Governo, preconiza a ligação de pelo menos 90.000 consumidores novos por ano, a concretizar-se este propósito o número de moçambicanos beneficiados passaria para cerca de 3.500.000, passando a taxa global de acesso à energia no País para mais de 17%.

Minhas Senhoras e Meus Senhores

Aproveito esta oportunidade para reiterar a nossa apreciação aos nossos parceiros de desenvolvimento pela valiosa assistência que nos têm vindo a prestar, permitindo desenvolver o sector de energia e elevá-lo ao estádio em que hoje se encontra. Queria salientar em particular o papel de relevo desempenhando pelo Banco Mundial, GTZ, e da Iniciativa Europeia para Energia, em apoio às actividades do Fórum de Ministros de Energia de África e na organização deste Seminário.

Estamos certos que no decurso dos 4 dias de trabalhos deste Seminário os participantes, através das suas experiências práticas e da partilha de conhecimentos e ideias, terão encontrado as melhores opções e definidas acções concretas de seguimento no âmbito desta Iniciativa permitindo replicar em cada um dos nossos países os casos de sucesso.

Distintos Participantes,

A concretização dos objectivos que se pretendem alcançar com este Projecto dependerá da contribuição de cada um de vós e da abertura e franqueza com que

forem abordadas todas as questões relativas à problemática de electrificação em África.

Esperamos que encontrem, ao longo da vossa estadia entre nós, um espaço para desfrutarem da beleza da nossa Cidade Capital, da simpatia e hospitalidade dos moçambicanos e da sua famosa gastronomia.

Com estas palavras declaro aberto o Seminário de Peritos sobre a Iniciativa de Electrificação em África, renovando os nossos votos de bom trabalho.

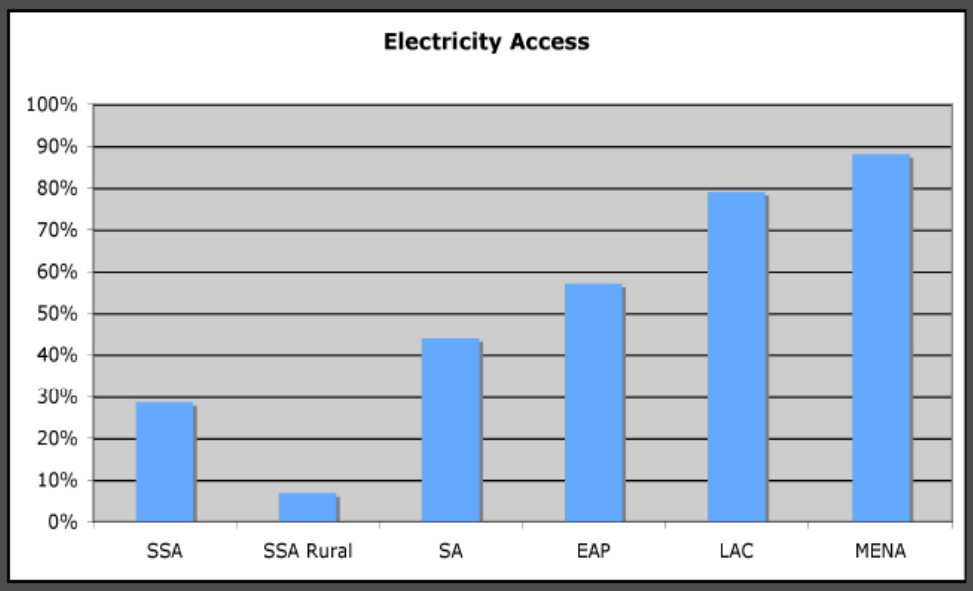
Muito Obrigado,

Africa Electrification Initiative
What the data show

Dana Rysankova, Kilian Reiche, Witold Teplitz, Raluca Golumbeanu
AEI
The World Bank

1

Part I – What we know…
SSA: 29%, average dev. countries: 64%



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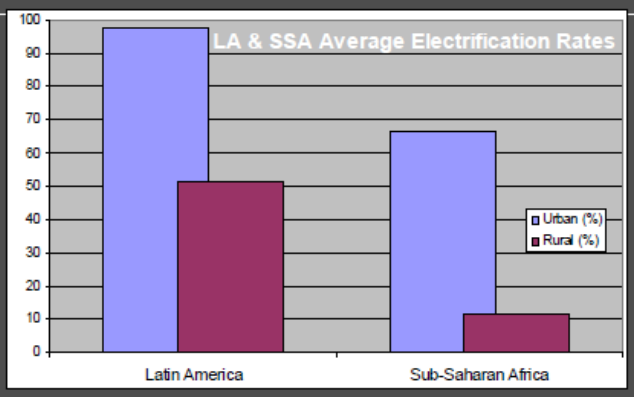
Part I – What we know…

Electrification Rates [%]	Urban	Rural	Total
North Africa	99.3	79.9	90.3
SSA	**66.8**	**11.3**	**29.1**
South Asia	68.2	30.1	40.8
Latin America	98.0	51.5	86.6
East Asia/China	98.5	81.0	86.9
Middle East	98.5	76.6	91.1
Developing countries	**85.6**	**51.1**	**64.2**
World	91.2	56.9	72.8



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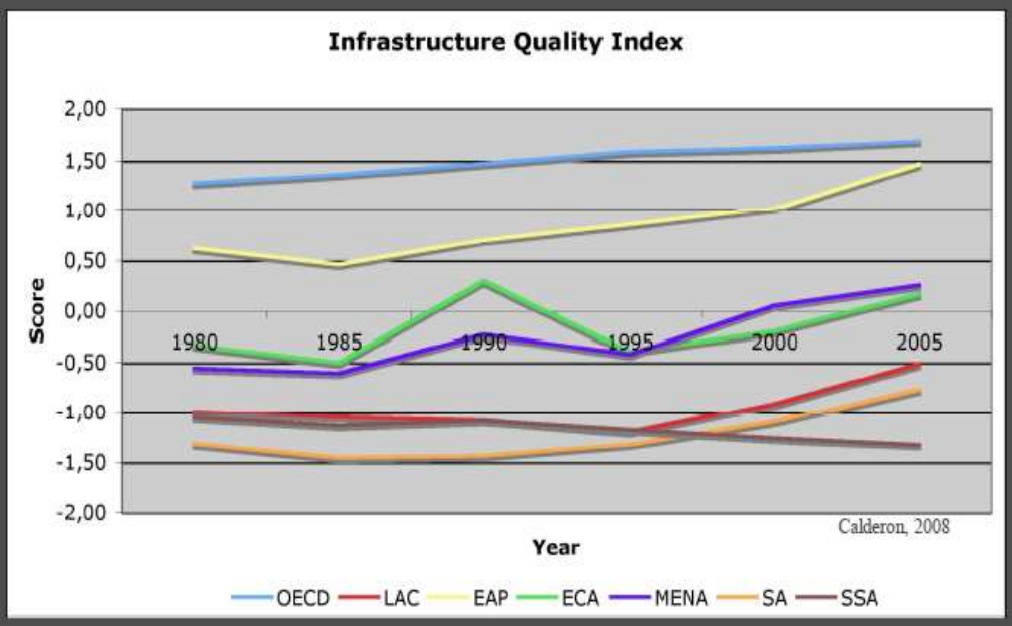
Part I – What we know…
Lost opportunity of 1990s



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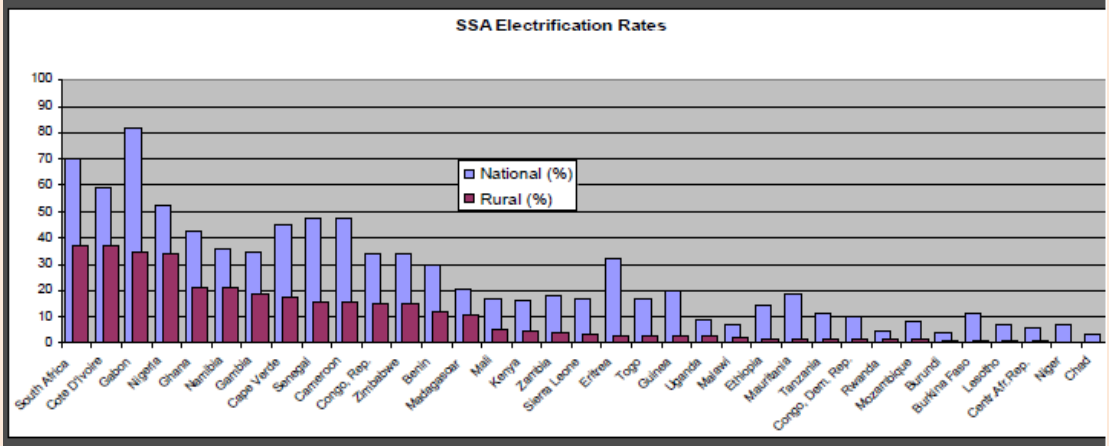
Part I – What we know…

Access rates vary across the continent



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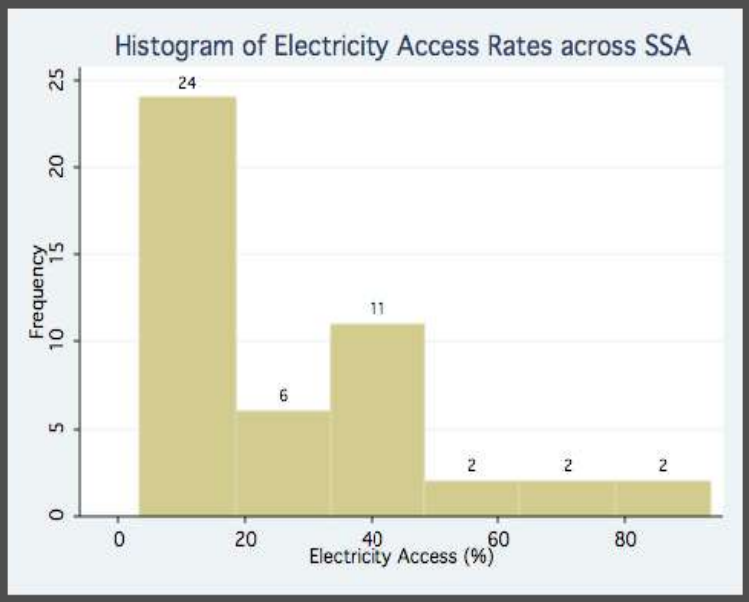
Part I – What we know…

Access rates vary across the continent (2)



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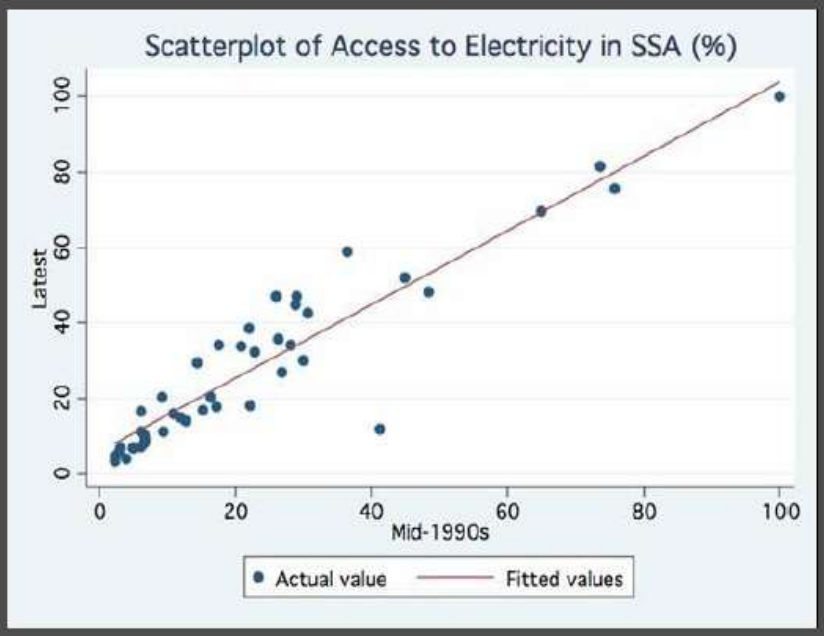
Part II – Emerging trends…

Catching up is possible



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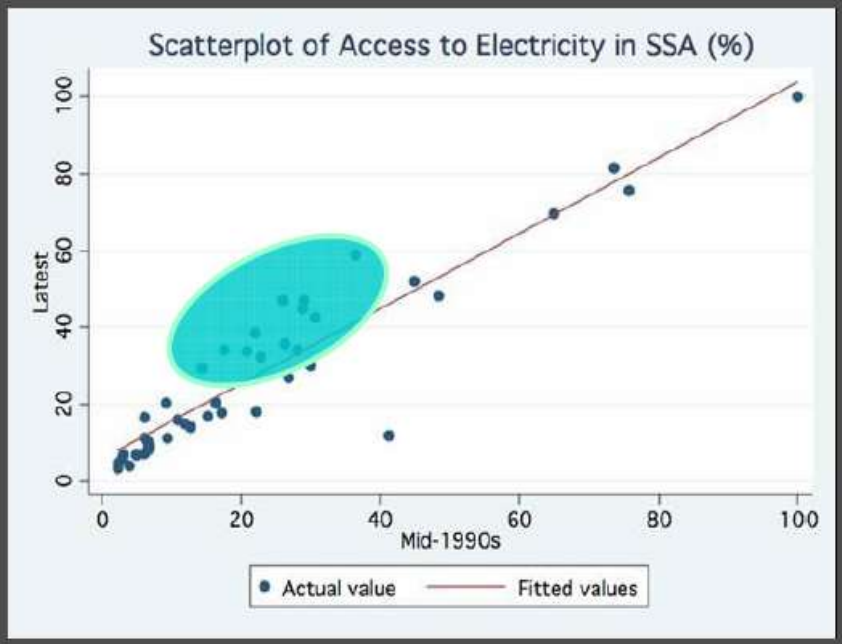
Part II – Emerging trends…

Drivers of access growth – the magical 20%



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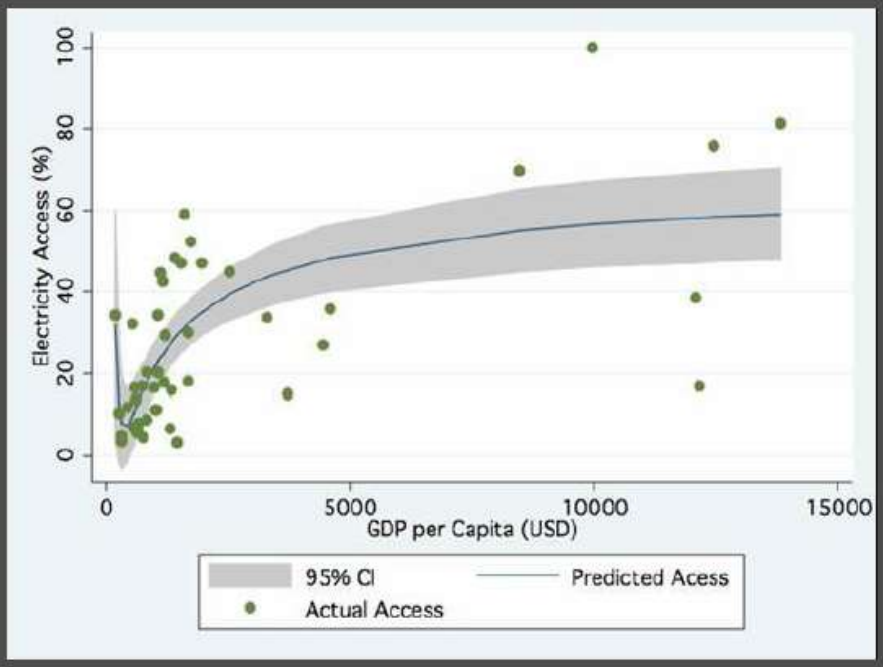
Part II – Emerging trends…

Low GDP not an excuse for relative improvements



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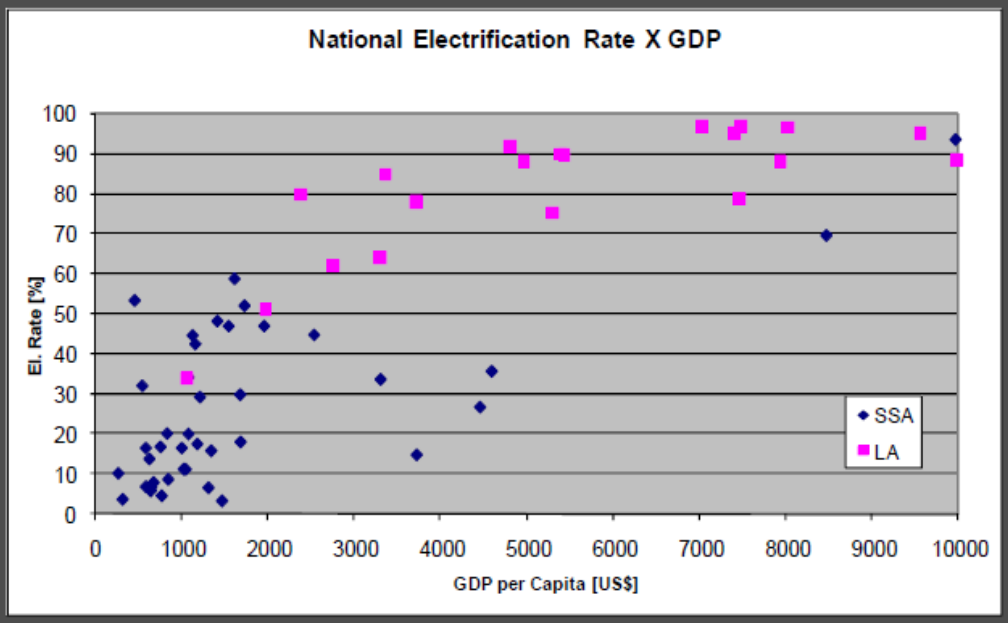
Part II – Emerging trends…

Catching up with Latin America



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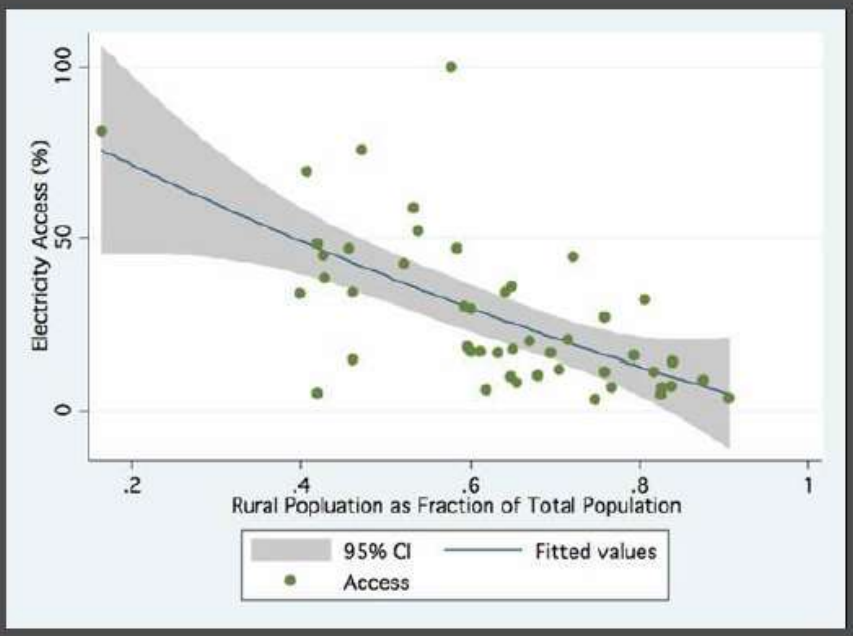
Part II – Emerging trends…

Drivers of access growth - urbanization



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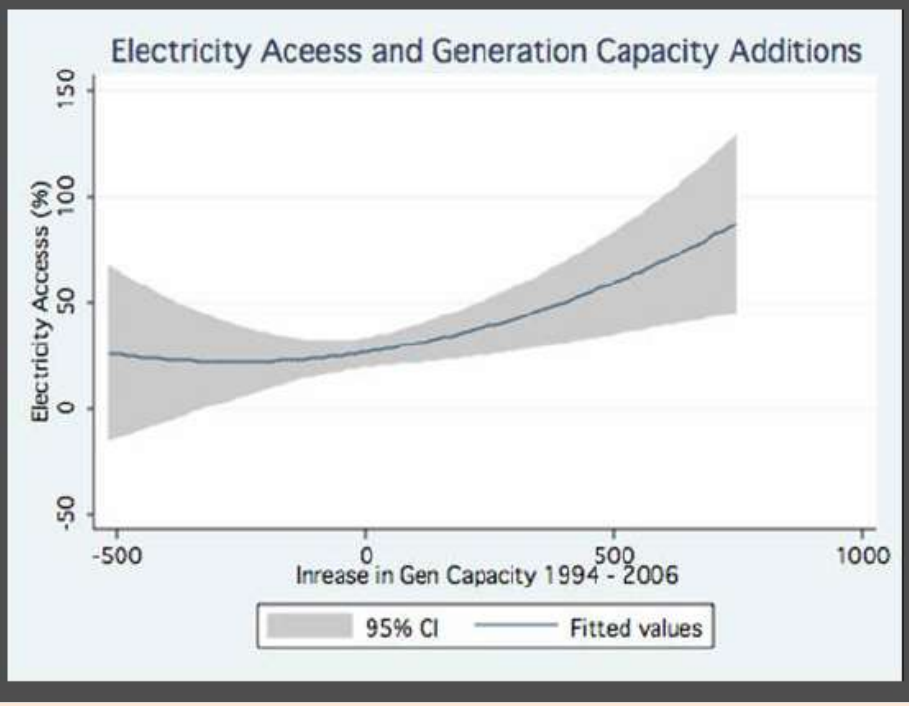
Part II – Emerging trends…

Drivers of access growth – generation capacity matters



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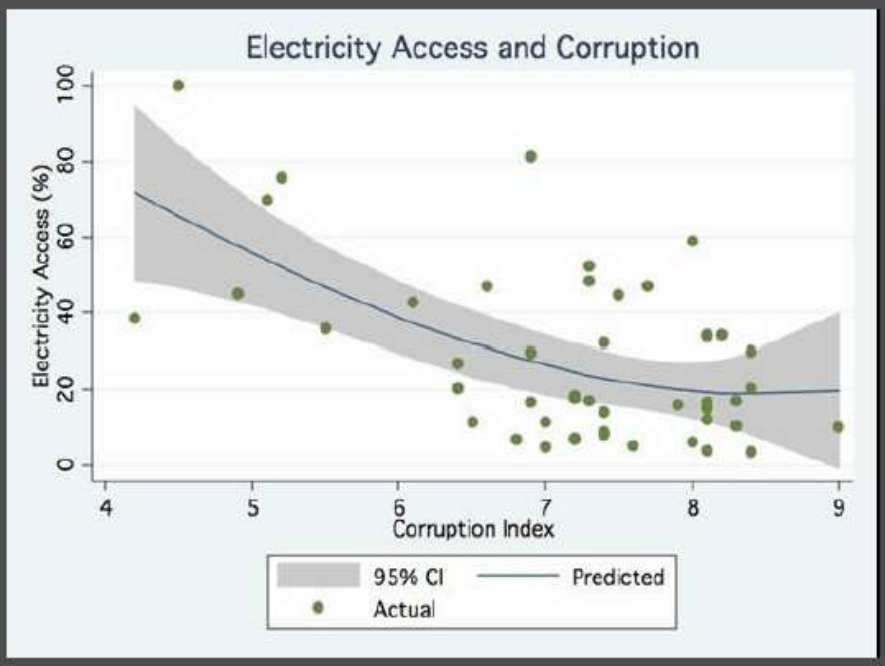
Part II – Emerging trends…

Drivers of access growth – good governance matters



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Part III AEI Why are we here?

- **The objective** is to create and sustain a living body of practical knowledge and a network of SSA practitioners in the area of design and implementation of rural, peri-urban and urban on-grid and off-grid electrification programs.

- **Emphasis** will be placed on how to overcome time and cost barriers by acquiring and developing practical information and disseminating this information in a user friendly form through simple and sustainable channels of communication.

- **The principal target** audience will be African practitioners. These include individuals who work for electrification agencies and funds, government ministries, regulators and state, community or privately owned utilities.

- Financed under **AFREA** - Africa Renewable Energy and Access trust fund (ESMAP – World Bank)

- Partnership with **GTZ, EUEI, FEMA**…. others welcome

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Part III AEI Why are **YOU** here?

1. What has been achieved and learned from and for SSA Electrification over the last decade?
2. What kind of solutions are **practitioners** looking for - to make their job even better?
3. Work with 200-300 AFR practitioners for 2+ years
4. Cooperate with IFIs and donors on **working level**
5. Workshops and Clinics in AFR to define needs
6. 5-10 Thematic Groups on practical solutions for **day-to-day work**
7. AEI discussion papers and background papers, e.g. on:
   - *AFR Data*
   - *Densification*
   - *Low-Cost Technologies for AFR Access*
   - *Pro access Regulation*
   - *Better Subsidies*
   - *... TBD by Practitioners and TGs*

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PROCEEDINGS

(Includes links to presentations and bios)

Session 1: Grid Extension

Tuesday, June 9, 2009

Undoubtedly, access to modern forms of energy plays an important role in stimulating economic development and poverty reduction in the rural areas of Sub Saharan Africa and other developing countries. Unfortunately, to date there has been little progress in extending grid electricity to rural areas in Africa. There are several reasons for this. Rural settlements in many Sub Saharan Africa countries are sparsely populated as compared to their urban counterparts. The low population densities in rural areas result in high capital and operational costs for electricity companies. Because of low incomes and high levels of poverty in the rural areas, customers' electricity consumption rates are also low leading to low cost recovery. Although this poses a difficult task for utilities in Africa, there are some good examples of countries that have successfully faced these problems and have programs that have been successful. In this session a comparative overview of the most successful programs in the developing world was followed by a detailed overview of programs in Cote d'Ivoire and Tunisia.

An institutional overview of the challenge of rural electrification indicates that despite the problems rural electrification programs can be successful in most if not all countries. There is reason for optimism, even among countries about to embark on electrifying their poorest populations. But rural electrification is a dynamic, problem-solving process. Countries must discover solutions consistent with their geography and natural resources; demographics; and socioeconomic, cultural, and political realities. Problems change as programs evolve, but a worldwide review of developing country programs indicates that there are a set of underlying principles that guide successful programs. They include:

- Sustained government commitment. National commitment must be reflected in effective institutional structures that exhibit a high degree of operating autonomy and accountability, strong management, and dynamic leadership with the capacity to motivate and train staff.
- Effective prioritization and planning. Clear criteria based on market research are required for prioritizing areas to obtain a supply. Key factors include capital investment costs, level of local contributions, numbers and density of consumers, institutional capacities, and likely demand; for off-grid

systems, it is important to identify markets that can benefit most for grid electricity extension.

- Reducing construction and operating costs. Careful attention to system design and sizing systems to meet actual energy demand can reduce construction costs up to 20–30 percent for grid systems and lower the cost of renewable-energy systems, thereby accelerating a program's pace and widening its scope.
- Sustainable financing. When cost recovery is pursued, most other program elements fall into place.
- Customer focus. To be effective, distribution companies must lower the barriers to obtaining a supply and involve local communities in promoting electricity use; this is true for both grid and off-grid systems.

Côte d'Ivoire is a leader in both electricity sales and purchases in the ECOWAS area of Africa. The objectives of the Société d'Opération Ivoirienne d'Électricité (SOPIE) an electrical company in Côte d'Ivoire are to build electrical systems that are of high quality, competitive, meet existing demand for electricity and ensure the transparency of investment operations. SOPIE plans the expansion of electricity systems, oversees the distribution of electricity and implements public investments rural electrification.

Cote d'Ivoire's population has grown significantly over the last 20 years. The achievements of electricity companies in Cote d'Ivoire to serve this population have been remarkable compared to other African countries. The population with electricity has grown from less than 1 million in 1960 to over 11 million in 2008 and the localities provided with electricity have grown from virtually none to over 2,500. In 2008, national coverage rates were 31.6 % of localities or 2686 total communities. The tariff for electricity is 0.072 $ US/kWh with 80 kWh per month average consumption. The electricity companies have paid attention to keeping cost low through the use of distribution techniques such as single phase and single wire earth return to lower costs.

The impacts of the program have been that for households with electricity there is better lighting, more access to information, better space condition including refrigeration, greater schooling and improved health care. Many new activities have resulted from rural electrification including more household activity during the evening hours, the conservation and processing of agricultural products and the modernization of homes. The government's objectives are to further the development of small village businesses and commercial establishments and to create new employment through informal businesses that may located in the home.

Despite the successes of the program, there is still a need to for continued progress. This can be achieved by the development of a plan for rural electrification, the provision of a subsidy to lower the cost of service for new customers, consideration of the adoption of prepaid meters, and the possibility for villages to consider rural electrification as a part of their integrated development programs . There also is a need to stress the greater use of electricity for both income diversification and for agricultural processing. If these outcomes are achieved, electrification can have a signficant impact on rural economic development.

In Tunisia, when the rural electrification program was launched in earnest in the mid 1970s, only 30,000 (or 6%) of rural households were electrified, even though half of the Tunisian population lived in rural areas. At that time, rural electrification became the third pillar of an integrated rural development drive that also emphasized education and basic health (especially family planning, in support of women's social equality). The Government of Tunisia has given top priority to rural electrification in the country's social and economic development plans, as evidenced by the significant level of investments amounting between 1977 and 2000, of which the majority was provided by the national government. By 2000, 88% of rural households (and 95% of all households) had been electrified, and as of today 99% of all households have access to electricity.

Rural electrification has been implemented primarily by a public utility, the Societe Tunisienne de l'Electricite et Gas (STEG). STEG is known as a "model enterprise" in the country, with a high level of human and technical competence. STEG introduced into the rural electrification program at an early stage efficient commercial, computerization and technological innovations such as the MALT. MALT is a three-phase/single-phase distribution system that reduced costs dramatically, enabling greater investments in distribution and thus repeated overshooting of targets for connections. Overall system losses of 13.4% (3.1% non-technical) compared favorably with loss levels of utilities in developed countries.

A unique feature of Tunisian rural electrification has been its balancing of an essentially business-oriented utility operation, with substantial state finance and explicit support for rural development. Close coordination of rural development zones and infrastructure provision by regional governments ensured that electrification would be provided at the same time as investments in schools, clinics, roads and public lighting. Tariff policies, negotiated with the Ministry of Industry, have not diverged greatly from STEG's long term marginal costs. In addition, low consumption consumers and agricultural electricity users benefited from tariffs that involved cross subsidies.

As saturation of the Tunisian market approaches, the question arises of how the considerable technical expertise built up in STEG and its external contractors and suppliers can be maintained and used, perhaps through technical assistance to other rural electrification programs in Africa. The STEG experience in Tunisia owed its success to a number of factors - the strong government policy and financial commitment to rural electrification, gender and social equity, the institutional "esprit de corps," the high level of technical innovation, and uniquely enabling political and economic conditions - that may not be replicated in other African countries where such conditions do not exist. Nonetheless, the STEG experience can provide useful lessons even in unpromising situations through its emphasis on adaptive technology, robust finances and an open and transparent system for selecting villages for electrification.

Presentations:

The Challenge of Grid Rural Electrification: Experience of Successful Programs: Douglas Barnes (World Bank Consultant) and Voravate Tuntivate (World Bank Consultant).

Rural Electrification and the Political Approach in Cote d'Ivoire. Eugène Botto, Chef de service Distribution, Société d'Opération Ivoirienne d'Électricité (SOPIE).

Institutional and Financial Aspects of a Rural Electrification Experience: The Case of Tunisia. Ahmed Ounalli ADB Consultant.

Grid Extension and Densification Activities of the Dutch-German Partnership Programme Energizing Development.

Bios:

Ahmend Ounalli; Eugene Boto; Douglas Barnes; and Voravate Tuntivate.

Session 2: Offgrid Business Models

Tuesday, June 9, 2009

Many national utilities in SSA are unable to expand their grid fast enough, due to financial, technical and capacity constraints. Even where this is not an issue, social fairness requires solutions for remote regions with dispersed users who cannot be connected to the national power grid at reasonable costs (only 7% of SSA's rural population has access to electricity today, compared to 23% overall access rate in the region). For such cases, offgrid options - such as village hydro power, diesel generators or solar home systems (SHS) - are an important alternative for providing basic electricity access at relatively low cost.

As offgrid technologies are mature and costs are coming down, the interest of public and private players across SSA in offgrid electrification is growing. However, past offgrid electrification efforts have often been slower and less sustainable than expected. This is because they require appropriate (private sector) business models and (public sector) market development schemes which differ from traditional grid extension approaches. National utilities and governments are often unfamiliar with these alternative business approaches. Session Two presented examples of successful (often public-private) business models for the most important offgrid market segments: (i) solar home systems and battery charging for dispersed households, and (ii) diesel and hydro power for village grids and productive uses. The growing interest in offgrid options for SSA was confirmed by the AEI workshop, where offgrid electrification was rated the issue of highest import by the participating practitioners.

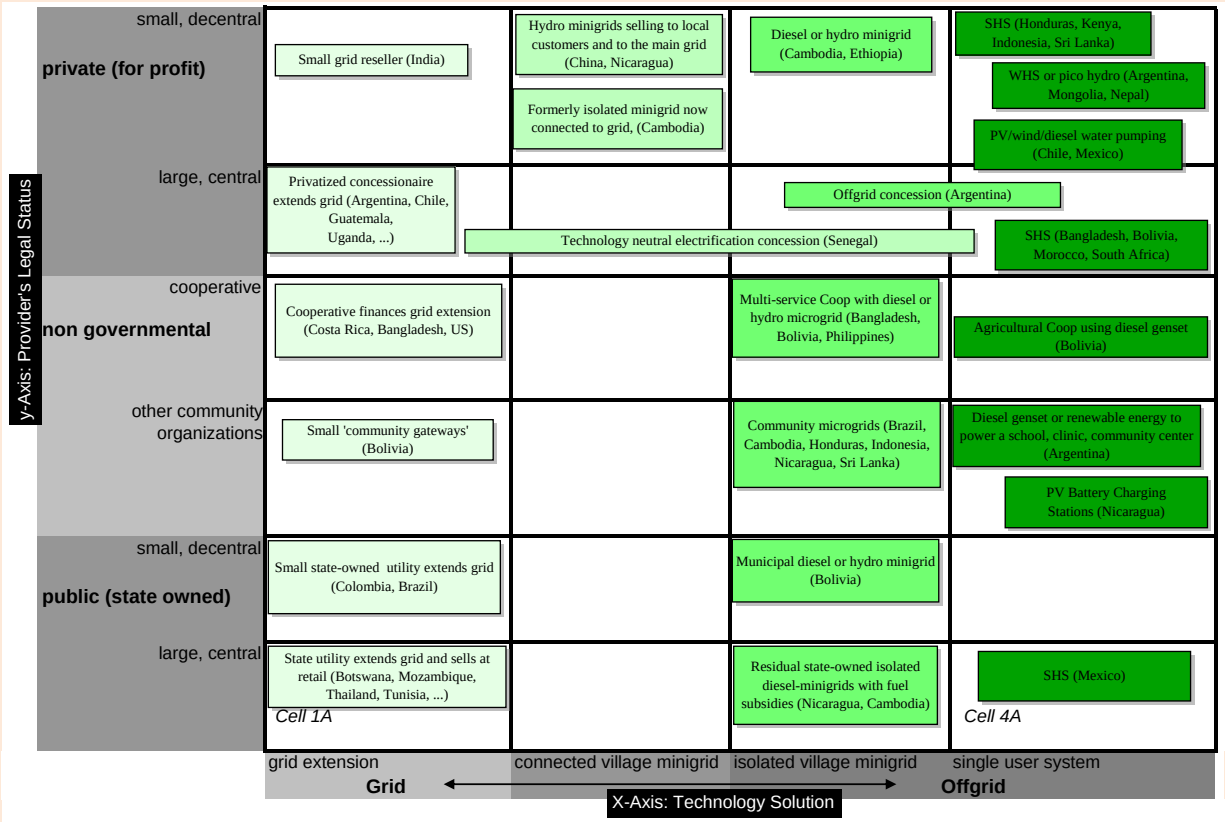
The appropriate business models for electrification vary with technology, user segment and market stage. Table 1 presents the most relevant offgrid technologies and the corresponding presentations of Session Two. Table 2 gives an idea of the vast diversity of business models which have been applied for electrification to date (with varying success).

Table 1: Prevalent offgrid technologies and presentations of Session Two.

Table 1: Prevalent offgrid technologies and presentations of Session Two.

OFFGRID OPTIONS	*Energy Source:* **Diesel**	**Water**	**Sun**	**Wind**
Typical User: a **person**			**Battery charging & Pico PV**: Mr. Sow	
a **household**			**SHS**: Mr. Adelmann	
a **village and/or SME**	**Diesel Grids**: Mr. Touré	**Village Hydro**: Mr. Raats		

Table 2: Overview of electrification business models.



Diesel Generators are the most widely spread offgrid technology in use today. They are easy to install, have low investment costs and are often the quickest solution for providing villages with 4-6 hours of lighting or powering productive uses such as water pumps for irrigation. However, due to volatile and increasing fuel prices, their operation in rural areas is often unreliable in the long run or requires ongoing subsidies. Besides, the potential of diesel village grids can be hampered by the fact that the (often informal) operators lack financing and/or technical capacity, and are inadequately regulated. In Guinea, the national electrification strategy supports both diesel and renewable-energy based village power by creating "mini concessions" and strengthening local operators via training and partial investment subsidies (30% in the case of diesel). The program has created about 30 new village power operators to date and has reached over 6,000 new households with diesel grids (at about US$150 investment cost per household), pico hydro grids (at about US$900) and small solar home systems (about US$300 per household).

Hydro Power is the best way to power village grids and/or productive uses in cases where local hydro power supply (i.e., the potential of a river nearby) meets local power demand of a similar magnitude. In such cases, local generation costs can be lower than for the national grid. Therefore, it is advisable to develop all good rural hydro sites as a core element of electrification strategies, even though only a relatively small number of appropriate sites may exist, compared to the enormous total of un-electrified households. Keeping regulatory burdens low and helping private sector developers and (community-based or private sector) operators with training, technology transfer and access to financing (as done by the DGIS/BMZ-funded EnDev projects in Indonesia and Rwanda) are necessary conditions in order to unlock this potential. In sites where the hydro potential is larger than local demand, economic viability can sometimes be reached by charging batteries for dispersed users (in micro and mini hydro plants) and/or by combining feed-in to the grid with access for local villages. Often, the viability of a hydro development hinges on a few local productive uses with regular daytime energy needs. In such cases the typically high commercial risk of rural productive SME directly translates into a cost recovery risk for the local energy provider.

Solar Home Systems are the most universally applicable renewable energy solution for dispersed users, as they are less site-specific than hydro or wind. A typical SHS of 20-100 Wp can power 2-6 lights, radio, TV, cell phone batteries and small fans. There are some 3M SHS installed worldwide, mostly in Asia. Prices in SSA (typically US$600-1000 for a medium sized system) are much higher than in other regions (Asian SHS of the same size cost about US$300-500). Several promising new business models may be well suited to change this situation and allow for faster scale-up of the SSA solar market. They include (i) the down-sizing of systems towards sizes under 20Wp (which is possible due to significant efficiency increases and price drops of LEDs and may allow SHS end-user prices well under US$200 in SSA), (ii) modular SHS (which can be bought step by step, allowing clients to adapt payments to their typically small and seasonal savings) and (iii) fee-for service models using pre-paid meters or battery charging stations.

Battery Charging and solar lanterns are the logical complement for SHS at the low-cost end of the market. Most of the households without electricity belong to the lowest income

strata – they are part of the "bottom of the (income) pyramid" and cannot afford traditional offgrid systems even where governments decide to subsidize those in part. For these households, battery charging stations (powered by grid, diesel, hydro or solar) and low-cost solar lanterns are affordable alternatives to wick lamps, candles and kerosene – for which even the poorest households often spend US$2 to US$5 per month. The rapidly falling prices for LED and intelligent battery charging circuits will soon allow for end-user sales prices of high quality solar lanterns (also called "PicoPV" in two recent World Bank and GTZ pilots) well under US$50. At this point such small systems would beat the specific lighting cost of most traditional devices and become affordable for a large part of the poorest segment of the "access market" (possibly in combination with small microcredits). A business model from Burkina Faso starts with energy kiosks in which users can charge batteries and lamps instead of buying kerosene – and after a while some of the clients can afford their own module for charging it at home. However, there are many low-quality PV lamps on the market in SSA today, so that quality control as well as market development support will be needed to protect customers.

Presentations:

Offgrid Introduction - Issues and Options. Kilian Reiche, Senior World Bank Consultant.

Africa SHS Markets.Prof. Peter Adelmann, University for Applied Science, Ulm.

Hydro Village Grids. Marcel Raats, SenterNovem.

Village grid – Local View: Design and Implementation Challenges. Nava Toure, Director of Decentralized Rural Electrification Office (BERD), Guinea.

Bios:

Kilian Reiche; Nava Toure; and Peter Adelmann.

Session 3: Hybrid Electrificati on Models

Tuesday, June 9, 2009

This session focused on "hybrid" electrification models. Under a traditional electrification business model, the national, state-owned utility builds medium and low voltage grids in previously unserved rural locations. The state-owned utility provides a "complete electrification package" from extending the national grid to villages combined with selling at retail to newly connected customers in these villages. In contrast, the hybrid approach usually involves a partnership between at least two entities: the national state-owned utility (or provincial utilities) and local distribution entities. Under this hybrid arrangement, the national or provincial utility typically constructs medium and low voltage lines and then sells power at wholesale to local distribution entities (LDUs) who then resell it at retail. The LDUs may be private operators, cooperatives or affiliates of the national utility. The first two presentations described how hybrid models have been implemented in Vietnam and Bangladesh. The third presentation focused on a different hybrid model known as "top down" concessions. This model, which is being implemented in Mali and Senegal, involves competition by private companies for concessions to serve large geographic areas through both grid and off-grid electrification.

Electrification in Vietnam

- The basic business model was EVN (the national government owned utility) selling at wholesale to LDUs. The LDUs, each typically serving about 1,000 households, are cooperatives, private companies or EVN affiliates. Using this approach, Vietnam's household electrification jumped from 14% in 1993 to 97% in 2008.
- Where an LDU was operated by EVN, EVN typically hired a local person as a "service agent" to prepare bills, collect payments and perform basic maintenance. The service agent, who is an independent contractor, typically earns about US$30 to 120 per month. This arrangement often produces cost savings for EVN of about 30 to 40% compared to the alternative of using EVN's own employees to perform the same services. Service agents also seem to be more effective in providing good customer service because they live in the area where they work and their contracts with EVN contain strong performance incentives.

- Overall connection costs per household for new customers connected to EVN's main grid have ranged from US$297 to 400 so far. These capital costs have been shared between EVN, provincial governments, LDUs and the new customers. EVN's share of connection costs has been increasing in recent years.
- Non-uniform tariffs were allowed up to this year. Beginning in March 2009, the national government has required a uniform national tariff. LDUs are subsidized through bulk power tariffs that apply to their wholesale purchases from EVN.
- LDU collections are close to 100% and technical losses are down to 7 to 10%.
- EVN, like REB in Bangladesh (see below), has standardized construction standards and installation methods.

Rural Electrification Cooperatives in Bangladesh

- Bangladesh has created 70 rural electricity coops (known as PBSs). The typical PBS functions as a local distribution utility by buying electricity at wholesale off the main grid from BPDP and then reselling it at retail. Collection rates are close to 100%. The size of PBSs range from 35,000 to 270,000 customers. Seventeen PBSs have reached a financial breakeven point.
- The Rural Electricity Board (REB) provides one-stop assistance to PBSs in the form of subsidized financing, grants, training (technical and commercial), construction, staffing in early years and ongoing performance monitoring.
- As in Vietnam, initial capital costs have been lowered through construction standardization by the REB (design, installation and central purchasing of materials). Other operational activities, both commercial and technical, are standardized through guidelines known as the "REB Instruction Series." (The "mother of all manuals").
- The REB has been the conduit through which more than US$1.3 billion in donor financing (loans and grants) from 18 donors has been channeled.
- The REB has detailed performance agreements with PBSs that include financial rewards and penalties. REB also conducts bi-annual management audits.
- Bangladesh's new national electricity regulator approves an overall tariff band for the PBSs but the REB sets tariffs for each PBS based on a detailed, individualized cost of service analysis. Hence, the REB is the *de facto* regulator of the PBSs. To minimize regulatory burden, the national regulator has given an umbrella license to the REB rather than separate licenses to individual PBSs.

Top-Down Concessions for Private Operators in Mali and Senegal

- Mali uses both a "top down" and "bottom up" approach to rural electrification. Under the top down approach, the country has been divided into 10 concession areas based on socio-economic characteristics rather than administrative or political boundaries. Through the REA, the Government of Mail will give grants to top down and bottom up operators of up to 80% of connection capital costs. Operators must provide 20% equity. Disbursement of the grants is closely tied to success in achieving connections.

- The award of "top down" concessions is still in process in both countries so there are no functioning "top down" concessions. The subsidies for top down concessions are attractive but there has been political instability and questions about the fairness of the bidding process.
- At the same time, Mali has had considerable success with spontaneous bottom up concessions in smaller geographic areas (i.e., one or more villages). This success has helped to test the viability of regulatory and financing models and the development of workable technical standards. Most "bottom up" concessions are small isolated mini-grids that use diesel energy to produce electricity only during the evening hours. A few are connected to the main grid and buy electricity in bulk (i.e., at wholesale) and then resell the electricity at retail to domestic and small commercial customers. (This is similar to the hybrid business models that exist in Vietnam and Bangladesh).

Presentations:

Electrification in Vietnam, Hung Van Tien, World Bank.

Rural Electrification Cooperatives in Bangladesh, Nazmul Chowdhury, Rural Electrification Board.

Top-Down Concessions for Private Operators in Mali and Senegal, Koffi Ekouvei and Reto Thoenen, World Bank.

Bios:

Koffi Ekouvei; Nazmul Chowdhury; and Reto Thoenen.

Session 4: Rural Electrification Agency and Rural Electrification Fund

Tuesday, June 9,

2009

Many countries in SSA have established a new institutional framework supporting rural electrification through establishing rural energy agencies and funds. The session analyzed the experiences with this model, compared different institutional approaches for REA and REF and identified key lessons learnt, and challenges. The main question raised by this session was: what are the key drivers of successful REA/REF programs?

REFs/REAs: When and Why?

Wolfgang Mostert defined an REA/REF as "a specialized institution which manages multi-year grant funds on a transparent and non-discriminatory basis to support implementation of rural electrification projects by a multitude of actors." He argued that the central empirical question is: are *economies of scale and scope* or *entrepreneurial competition* the most effective performance drivers in rural electrification?

Mostert took the position that a centralized approach to rural electrification (typically led by the national utility) is more likely to be successful because of economies of scope and scale in planning, financing, tendering and investment. He pointed to successes in Morocco, Tunisia and Ghana as evidence of the effectiveness of a centralized approach led by the national utility.

Mostert argued that a weakness of the decentralized approach, usually implemented by some combination of Rural Electrification Agencies or Funds, is that it requires too much coordination between separate entities and that the transaction costs are likely to be very high. He asserted that little private investment has been mobilized by REAs/REFs in Africa with the possible exception of Senegal and that banks were still reluctant to lend to private operators even if the operators have received significant grants from REAs.

His preliminary recommendations were that the national utility should take the lead on grid electrification and that REAs/REFs should take the lead in off-grid electrification. He also observed that the REA/REFs are not likely to be successful unless they are able to offer dedicated refinancing and partial risk guarantees for commercial loans to rural electrification operators. In other words, grant financing, by itself, is not likely to be sufficient for a sustainable program.

While favoring the centralized approach led by the national utility, he recognized that it may not always be feasible if the national utility is not well-managed or has weak finances.

REA and REF: How To?

- Gerard Madon argued that a decentralized approach which relies on a REA and an REF is likely to be more productive because it harnesses local entrepreneurial talent and benefits from "checks and balances." He suggested that the ideal institutional arrangement for rural electrification requires a separate REB, REA, REF, Energy Ministry, and an independent regulator. He also described the functions of these different entities.
- He recommended that countries use two complementary and simultaneous approaches: top down and bottom up electrification (see Ekouvei and Thoenen presentation in Session 3).
- The success of the ideal institutional arrangement requires certain key documents and manuals including: a glossary, a reference cost table, a service equivalent table, an environmental and social standards manual, a standard business plan and a manual for service providers on how to present projects and financial projections.
- He concluded by describing an ongoing project that will undertake in-depth studies of rural electrification funds in 8 African countries (Cameroon, Uganda, Ghana, Mali, Mozambique, Tanzania, Senegal and Zambia). The project is being financed by the European Union.

Mali's Rural Electrification Fund

- Amader promotes both top-down and bottom-up forms of rural electrification. Top down involves competitive solicitations to serve a large geographic area. Amader specifies the grant per connected household and bidders bid on the basis of lowest tariff. Bottom up projects tend to be smaller, spontaneous projects serving individual villages. In both cases, Amader will currently not finance more than 80% of the capital costs and a maximum of US$500 per connected household.
- Most of the bottom-up projects are small private operators who use diesel generation to serve particular villages. Their customers are both metered and unmetered. While Amader gives grants, most of these operators still have difficulty obtaining access to loans from commercial financial institutions.
- Amader uses commercial banks to handle the disbursement of its grants.
- Amader is the *de facto* regulator for the grant recipients in that it sets a maximum allowed price as a condition for receiving a grant. This maximum allowed price is based on a cost of service financial model that has been developed by Amader. Amader also establishes quality of service standards.
- Amader provides multiple services to rural electricity service providers including: direct and indirect grants, engineering and commercial technical assistance, project feasibility studies and master plans.

During the discussion, there was no clear resolution of the debate on the relative merits of centralized versus decentralized institutional approaches to electrification. Moreover, one participant pointed out that the phrasing of the question implied that both options are always available to policy makers. This participant argued that in the absence of a strong and competent national utility, the decentralized institutional approach may be the only option available to

policymakers. Several participants raised additional questions that suggested the need for a more nuanced approach. These included:

- Does the centralized approach always imply that national utility will sell at retail in newly electrified villages or can it also be implemented through bulk sales to local private or community providers (as in Vietnam)?
- Does the national utility always have to be the lead entity in a centralized approach? For example, the Bangladeshi rural electrification effort (described by Nazmul Chowdhury in Session 3) seems to have been led by an independent Rural Electrification Board rather than the national utility.
- Does the choice of institutional model depend on starting conditions and the type of electrification that is being pursued? Strong versus weak national utility? Initial level of rural electrification (e.g., greater or less than 20%)? Whether the electrification will be conducted through grid or off-grid electrification?
- Can some of the benefits of centralization be obtained through standardization of technical and financial standards?

*This summary is based on presentations in Session 4 and follow up discussions in a related breakout session.

Presentations:

REFs/REAs: When and Why? Wolfgang Mostert, Independent Consultant.

REA and REF: How To? Gerard Madon, Director, MARGE.

Mali's Rural Electrification Fund, Alassane Agalassou, AMADER.

Rural Energy Access Through Off-grid Renewables: A Perspective from Tanzania.

Bios:

Alassane Agalassou; Bengiel Humphrey Msofe; Gerard Madon; and Wolfgang Mostert.

Session 5: Grid Intensification, Innovation and Cost

Wednesday, June 10, 2009

Population growth rates in peri-urban areas in SSA increase much faster due to rural-urban migration placing a strain on utilities to provide services to these areas. Utility companies will therefore need to rollout new technologies and innovative systems that would intensify grid expansion at a lower cost within their existing networks. However, given the fact that these areas are so congested, the right of way becomes an issue. It is important to note that high rate of losses due to the use of substandard conductors and power theft through illegal connections poses a greater challenge to utility companies.

The workshop received practitioners who presented various models on grid intensification using technical and managerial innovations for grid expansion, with special focus on peri-urban electrification. The workshop also discussed the type of technical solutions, innovations and business models that can be deployed to make access expansion more affordable and sustainable for users and utilities alike.

Grid intensification in peri-urban areas needs more innovative ideas to cope with the numerous challenges in grid expansion. Utility companies have to device smarter ways of recovering the cost of their investments. Customers within these settlements are often low income earners, and as such, are unable to afford the initial service connection. In Kenya, where the largest slum in Africa is found, the Kenya Power and Lighting Company (KPLC) customers are highly subsidized as a motivation for increase access.

Losses both technical and non-technical coupled with low revenue collection are outstanding features of utilities operating in urban and peri-urban areas in developing countries. The workshop presented models such as remote metering, prepayment metering and smart grids as innovations and techniques to minimize non-technical losses which are basically through power theft and meter tempering. This problem can be tackled by involving the communities in power distribution which will create trust between consumers and the utility companies.

Grid intensification models presented at the workshop varied from country to country depending on their experience, level of technology and management of the electricity network. Models are customized to match the type of challenges peculiar to the country or peri-urban settlement. In some countries, while their biggest challenge to grid intensification is the reliable supply of electricity, for others is right of way to expand grid infrastructure.

Theft and loss management techniques are costly and could benefit from cost-effective mechanisms to make them work sustainably in peri-urban areas. There are pros and cons of single-phase systems (MALT/SWER) as a low cost approach used for peri-urban areas. There is a conflict between low cost and limitations for economic development of these areas, and political interference or regulatory rejection in some countries can severely limit their productive uses.

Barriers to grid expansion in general include lack of electricity supply for grid expansion, lack of acceptance and even reversals of single-phase systems, old neighborhood with old networks leads to high cost of providing service and this should be recognized by regulators and donors. Grid expansion is a moving target as urban and peri-urban areas keep expanding faster than electrification can be expanded.

Prepaid systems are quite prevalent, used in different ways (urban vs. rural or middle class or low income depending on the reason for using them.) The experience of EDM Mozambique with pre-paid systems shows improvements in the collection ratio and the quality of service (more transparency and reduction of complaints) and reduction of the administrative loses compared to the postpaid systems. In addition, the pre-paid systems facilitate the debt recovery.

Some older systems lack the best features of prepay (e.g., reducing theft, providing instant read-out on usage for customer control purposes, communication systems to allow company easy tally of kWh sold vs. delivered, etc.). Obtaining these features may mean total replacement of the management system and possibly the meters too). Failure to provide an accurate rate and the utility life of the equipment is also a problem, particularly for older systems.

Smart grid technologies (AMR, two way communication) are probably inappropriate for use in grid expansion. There may also be barriers related to integration with existing prepayment systems and protocols.

Presentations:

Ahmed Ounalli: Overview of Low Cost Grid Electrification Methods.

Maboe Maphaka, Senior Manager, Distribution Energy Trading, ESKOM & Connie Smyser, Independent Consultant, World Bank: Slum Electrification: What Technologies Can and Cannot Do.

Shahid Mohammad, Kenya Power Lighting Company (KPLC), Peri-urban Electrification: The Success Story of Group Scheme and Challenges of Kibera, the Largest Slum in Africa.

Masengo Kealotswe, Botswana Power Corporation: Botswana Intensification: Involving Women.

Antoine Graillot, Technoambiental (TTA), Spain: Smart Grid Technologies for Africa.

Luis Amado: On Grid Intensification. ELECTRICIDADE DE MOÇAMBIQUE, E.P.

Bios: Ahmed Ounalli; Antoine Graillot; Connie Smyser; and Shahid Mohammad.

Session 6: Offgrid Technology and Lighting Africa

Wednesday, June 10, 2009

Currently, 500 million people in Sub-Saharan Africa (SSA) are estimated to live without electricity. Although grid electricity is gradually being extended, its reach is still primarily limited to urban and peri-urban areas. Electrification rates in rural areas, where the majority of the SSA population lives, are below 10%.

Off-grid solutions can effectively complement grid electrification efforts. For remote and dispersed populations, in particular, the only way to access modern, clean and affordable electricity is through off-grid technology. Major advances in off-grid energy technologies provide new opportunities for cost effective service provision models.

Lighting is often the most expensive energy item for African households. Lighting is typically provided by inefficient fossil fuels, such as kerosene. One person in three obtains lighting from fuel-based sources – this represents 17% of global lighting costs, but only 0.2% of the actual lighting output received. Fuel-based lighting is not only expensive, but is also polluting (and indoor pollution often leads to serious health problems) and potentially hazardous (safety/fire issues). Its poor quality also limits its impact in education and other productive activities.

Technological advancements are resulting in rapidly increasing efficiency and falling prices of modern off-grid electricity products, like solar home systems and LED lamps. Therefore, for the first time in history it may be possible to offer energy services that are clean, efficient and reliable, and at price points that are comparable to typical expenditures for kerosene.

Even the lowest-cost products, however, represent significant investment expenditures for poor households. The quality and durability of these products, therefore, is of the utmost importance. Unfortunately, rapid innovations result in constant modifications and upgrades of these products and a wide spectrum of products offered as well. While this is generally beneficial for the customer, it also makes quality monitoring and enforcement very difficult. The session provided an overview of new technologies and trends in off-grid electrification, both for mini-grids and stand-alone systems, and discussed the current

efforts in determining and promoting quality standards, particularly for low-cost solutions, such as solar or rechargeable lanterns.

The **hybrid mini-grids** are a promising solution for remote villages, but their potential in rural electrification is often not fully recognized. Hybrid mini-grids rely on a combination of different but complementary energy generation systems based on renewable energies or a mixture of renewable and conventional energy sources (e.g. renewable energy and a diesel genset). Hybrid mini-grids providing steady community-level electricity service, such as village electrification, also offer the possibility of being upgraded through grid connections in the future.

The session provided insights into the mini-grid powered by solar PV technology. The session presented examples of PV mini-grids from **Senegal, Morocco and Ecuador**. The session showed that hybrid mini-grids are a cost-effective solution for remote communities and are superior to grid-extension and fossil fuel alternatives. The falling prices of PV panels and the availability of better tools for load management and improved efficiency make this alternative even more attractive.

Pros and cons in comparison to stand-alone PV systems were discussed. One of the key benefits is the provision of AC electricity. In terms of usage, PV mini-grids can provide the same services as stand-alone solar home systems, but they are better suited for productive uses and some community applications, such as village water pumping and public lighting.

On the other hand, they require the sharing of available energy among community members, which may be a challenge. Good social organization and load management are essential. Other challenges include relatively high investment costs, more sophisticated maintenance requirements, and the collection and management of funds for maintenance and spare parts. Experience recommends a fixed tariff and an operator for long-term security.

In **Mozambique,** new and old technologies meet in a GTZ-sponsored project which takes advantage of the existing **maize hydro-mills** and retrofits them with new, repaired and/or upgraded equipment for power generation.

Maize mill owners produce and sell power to households via mini-grid or battery-charging, collect the connection fee and the tariff, and are responsible for improvement and maintenance of the turbines, water system and power houses. They are required to repay their loan for mill upgrading within two years into a community revolving fund. The mill owners form part of the community committee for the management of the fund and are trained in business management. Households pay 50% of the in-house installation (or battery) through monthly payments for up to two years, contribute with poles and labor for the establishment of the mini-grids, and select young people to be trained as electricians for maintaining the grid and in-house installations.

As a result of these activities, demand for more micro-hydro projects is generated in the region. Productive use of electricity is now starting and the number of local shops is

increasing. There is now good potential for the local manufacture of runners and turbines, although the market is still very limited and services are rather expensive. The market is, however, expected to grow as others are now copying this approach, lots of publicity is given to the existing projects.

The session also discussed the latest trends in the **solar PV industry**, with a particularly focus on **solar home systems** and its implications for Sub-Saharan Africa. The session on "wireless power" put forward two provocative questions: Why doesn't PV grow faster in the rural areas while, other technologies like cell phones have conquered a large market in a shorter time?, and "Is PV second-class electrification?." The session showed that even in developed countries, PV is becoming a part of the energy supply, fueled by falling costs and environmental concerns. The presentation draws the parallel with cell phone technologies which have overcome the need for a hard wire network (often available only in densely populated areas) and has rapidly become the technology of choice in Europe, Africa, and elsewhere.

Similarly, power grids in Africa are available only in big cities and high density areas. At the moment, kerosene and candles are used for lighting in rural areas, while dry cell batteries are used for radio. Both are expensive (1 liter of kerosene cost at least US$1 and lasts for one week or about 20 hours. A radio costs about US$0.05 for one hour of use). PV systems can offer superior solutions. Since PV systems can be sized to demand, they are well suited to be a technology of choice in rural Africa. For example, a solar home system may be sized to power a larger house with a refrigerator and TV (costing US$1,000) or a large TV and 3 lamps (for US$250) or a small TV, 3 lamps and a radio (for US$100) or a lamp, radio and cell phone charger (for as low as US$50 – about the same cost as a cell phone!). Factors to reduce cost include efficient loads, innovative batteries, and lower module cost.

Lighting is typically the most expensive energy item of an African household. In total, US$17 billion is spent annually in Africa for fuel-based lighting, which offers a huge market for modern lighting products. Although the market has low profit margin, its strength is in the high number of clients (if the right product for the right price can be offered). The GTZ-sponsored pico-PV program and World Bank Group's Lighting Africa are examples of two initiatives that aim to transform the lighting market from fuel-based products to clean, safe and efficient modern lighting appliances.

The **Lighting Africa** initiative, an innovation of the World Bank and IFC, works with the private sector, governments and NGOs in Sub-Saharan Africa to develop and disseminate low-cost, clean and efficient modern lighting solutions for the 500 million Africans who currently rely on kerosene or other forms of inefficient and polluting fuel-based lighting. The activity exploits new technical innovations, such as the latest LED, fluorescent and solar technologies. Lighting Africa's goal is to accelerate the market transformation and to ensure that affordable quality products reach Africa.

Lighting Africa is therefore addressing a number of barriers currently constraining a higher penetration of good quality products on the continent, including market information,

quality assurance, innovation, policy and regulatory issues, market aggregation, information and networking and finance facilitation. The long-term goal is a rapid scale-up of access to clean, reliable and affordable modern off-grid lighting services for 250 million people across Africa by 2030.

Quality of off-grid lighting products remains one of the key challenges. Rapid technological advancements and innovations, as well as a multitude of products available at the market, make quality control a difficult task. In this respect, **GTZ-sponsored quality and performance tests of pico-PV** systems provide valuable information and illustrate the challenges ahead. The consequences of bad quality products are (i) a reputation loss for a whole product range — endangering market development; (ii) waste of scarce resources; and (iii) environmental hazards.

The pico-PV program focuses on systems under 30Wp. These may be classic solar lanterns (for lighting) or multifunctional systems, offering lighting and additional appliances like radio use or cell phone charging. The objectives of the test were to (i) contribute to transparency in the dynamic pico-PV market, (ii) support development of a testing methodology, and (iii) start identifying pico-PV systems with good quality and affordability that are suitable for large-scale dissemination.

Fifteen systems from China, Laos, Great Britain, Germany and India were tested in a two-level procedure. Seven tests passed the level 1 test, and five of those passed the level 2 tests. The main problems at the first level were: insufficient luminance; broken components; bad mechanical design; and the poor quality of electric and electronic parts. The main problems at the second level were poor electrical and electronic design; solar panels and batteries not showing their nominal values; light degradation of the LED; and bad quality of the battery and solar panels.

The test confirmed that the quality of solar lanterns on the market is mixed, and that only a few products of acceptable quality are affordable for the target market. However, market growth is expected due to price reductions and additional technological developments. The products are therefore expected to keep evolving. In this process, continued monitoring of lantern quality and dissemination of information to potential customers is needed to ensure transparency.

The session concluded with two presentations demonstrating both the potential and the implementation challenges for pico-PV and other low-cost lighting products. A project in Liberia (a Lighting Africa Development Market Place winner) aims at supplying improved lighting products for at least 500 low-income households and 300 street vendors in rural Liberia. The project uses a two-fold business model to remove the affordability barrier, including (i) cash sales for social institutions, small businesses and other more affluent customers; and (ii) a microfinance credit facility for low income and poor consumers — for example, 500 Glowstar solar lamps are offered for a US$12 monthly fee.

The project's key challenges were a delay in the project's kick-off date; the long procurement process due to a lack of suppliers on the local market; the lengthy legal

processes involving in getting a micro-finance and loan guarantee agreement signed with the local bank; and limited awareness on improved lighting products amongst rural residents.

The path towards sustainability consists of identifying, selecting and training potential community based distributors and sales agents (solar entrepreneurs); developing effective supply chains locally; working with the local bank to include solar PV in its loan portfolio; and partnering with institutions such as E+Co to ensure financial viability through energy enterprise development.

Similarly, in **Burkina Faso**, solar charging stations have emerged as a response to rural demand. 80% of the rural population in Burkina Faso has no electricity and about 10% have a cell phone (with 15% annual increase in penetration rates). Cell phone holders face difficulties like long journeys and high costs in recharging their phones. Therefore, the NAFORE project has started offering solar charging stations. One station, operated by a micro-entrepreneur, has the capacity to charge about 780 cell phones per month at a price of 0,22€ FCFA. Currently 24 stations in 22 localities are in operation. The key challenges include growing demand (surpassing the capacity of the charging stations), difficulties in pre-financing the stations, and the difficulty of obtaining a bank loan despite the business' high profitability. In the future, NAFORE plans to increase the capacity of the charging stations, including that for portable lanterns, LED lamps and battery charging. NAFORE is a winner of 2009 UN SEED Award.

Presentations:

Prof. Peter Adelmann, University for Applied Science, Ulm, Germany – Wireless Power.

Anil Cabraal, Lighting Africa Program Manager, World Bank Group.

Carsten Hellpap (GTZ), Quality and Performance Tests of PICO-PV -Systems.

Augustus Goanue, Private Entrepreneur – Lighting Africa and pico-PV: Challenges on the ground, Lighting Africa Development Market place.

Antoine Graillot, Trama Technoambiental (TTA), Spain – Smart PV and Hybrid Mini-grids for Africa.

Klaus Homberger, GTZ Mozambique – Mozambique Micro Hydro Mill Retrofits.

Nafore. l'energie Solaire au service du monde rural.

Bios:
Antoine Graillot; Augustus Goanue; Carsten Hellpap; Klaus Homberger; Kilian Reiche; and Peter Adelmann.

Session 7: Can masterplans work?

Wednesday, June 10, 2009

Masterplans have been useful in many countries that have decided to develop programs on rural electrification. The diversity of energy resources in SSA, coupled with the peculiar challenges of rural electrification, leave policy makers with flexibility to decide which policy approach would better deliver the goals of rural electrification. An appropriate masterplan can set the policy direction and a roadmap for the rural electrification program. But the questions are, do masterplans really work or do they stifle both flexibility and creativity in the planning process?

The presentations emphasized various ways in which master plans are developed to address the problem of rural electrification based on the strengths and weaknesses of the sector. In Mozambique for instance, the priority of the government is to scale-up rural electrification by 20% by the year 2020. Hence a master plan that was developed aimed to address issues that would facilitate capital mobilization for the power sector and also build the capacity of the sector to facilitate the implementation of power projects that would provide efficient low cost, environmentally friendly electricity to the people.

Despite the problems associated with master plans, they are still necessary to guide policy implementers as a constant reminder of the sector issues even if they are outdated. In Uganda for instance, the master plan shows various approaches that can best increase electricity access. For example the master plan will determine the choice of whether to embark on grid or off-grid technology, whether subsidies should be provided for a certain category of customers and which areas must receive electricity first.

In Uganda the general objective of the master plan (IREMP)was to enable Government promote the rural electrification programme through public and private sector participation in a coordinated manner, with a clear idea on future options available for accessing electricity services to different areas, regions, communities and economic activities. More specifically they would package at least five grid connected short-term rural electrification projects (PREPs) for private sector development through a competitive process. In addition they would gather information on regional demand profiles and the costs on-grid, isolated grid and stand alone projects for inclusion in rural electrification database for use by the various stakeholders. This p;lan would establish priorities for public and private investments in underserved rural areas, including for “regional equity projects”. Finally, the plan indicates a 10-year least cost investment plan for expansion of the national distribution network in rural areas. The results if the plan have been somewhat

mixed. The original purpose of IREMP was to have an instrument for private sector initiative to invest in rural electrification. However, the first wave of projects (PREPs) and simulations on priority lines have indicated that private sector upfront investment remains low. Also, bilateral funding partners (Sida, Norad, JICA, etc.) that are giving grants insist on public financing and ownership of infrastructure other than the private sector. There has been Notable interest in IREMP by bilateral and multi-lateral partners with a view to providing assistance to projects that bring in "value for money." Despite the IREMP, local funding (budget from Government) still tends to favor politically oriented projects. The conclusion is that master plans can work provided that they are updated regularly to capture
changing circumstances, resources are available in time, and political influence in project choice.

In Mozambique, the master plan focus was on the development and extension of the grid supply system. The plan is based on a Least Cost Investment Plan (LCIP) for the power sub-sector in Mozambique. The idea is to take advantage of the valuable national hydropower energy resources that are in all parts of Mozambique. This needs to be done by continuing the least cost approach and extending the national grid and undertaking the rehabilitation needed. The main objective of this master plan was to prepare a comprehensive LCIP for the power sub-sector and thereby contribute to poverty reduction, facilitate implementation of power projects on a rational basis;, increase access to efficiently priced electricity (20% by 2020), and facilitate mobilization of capital to power sector projects. Areas selected for electrification are based on both social and economic factors. The program has been somewhat successful in that connections have increase from 12,000 in 2002 to 100,000 in 2008, but the goals were somewhat higher. The conclusion is that the master plan constitutes a important tool in the electrification process in the country. It can provide guidance of the electrification in the country for all the stakeholders including donors. In fact, the experience of the past years indicates that the selection criteria and the priority of the projects proposed by master plan were correct. However, there are now projects that have been developed that are not part of the master plan. Within the country development priorities have changes and the master plan is in great need of being updated to keep up with the countries priorities.

In Rwanda, the master plans were not the focus of the development of rural electrification. Instead the idea was to create a sector wide approach for the energy sector (SWAp). The idea was to coordinate the support of the government and donors to advance the Rwandan energy sector as a whole. The object was to harmonize all efforts toward a common objective, to coordinate planning, as well as monitoring and evaluation of all activities, to strengthen partnership and national ownership, and o develop a common and well defined program of work.

The government commitments were to assume leadership and set up a sector secretariat for donor coordination and coordinate with all other relevant ministries, as well as districts, to organize sector working group meetings at agreed intervals, to organize the joint energy sector review every year, and consult regularly with development partners. The obligations of partners was to appointing a lead donor representative, who will be coordinating donor

positions, co-chairing in meetings, to provide budget support, to harmonize their own planning, and to plan future support to the energy sector together with the government. The approach has yielded significant plans for electricity extensions, but as of yet there the process is just in the beginning stages and there have been challenges. They include management of a multi donor fund with different administrative procedures, the management of bulk procurement, and the creation of a new directorate dedicated to this program within the utility.

In Madagascar, the master plan focuses on grid extension and the use of renewable energy (hydro, biomass, wind and solar energy). The master plan was launched in 2001 for a period of 15 years. The objective for the period 2004-2012 is to increase the access of rural population to electricity from 3.9% to 10%. The implementation of the master plan has been challenging due to limited public and private funds for energy projects, lack of favorable regulatory framework and political influence resulting in the selection of projects that are non-profitable for private operators. Therefore, in order to be effectively implemented, the master plan requires government commitment to the development of the energy sector, promotion of private investment in rural electrification projects, adequate financial mechanisms involving the banking sector and micro -finance institutions, participation of local communities in the decision making process.

The conclusions are that the master plan approach is vital because it serves as a guiding principle in implementing rural electrification policies in developing countries. But master plans sometime can become outdated and to make them work, they should be subject to periodic review in order to reflect changing circumstances of the society.

Presentations:

Godfrey Turyahikayo, Executive Director, Rural Electrification Agency: Indicative Rural Electrification Master Plan for Uganda.

Yusif Uwamahoro, Sector coordinator – Rwanda Electricity Access Scale-up Program and SWAP Development.

Namisoa Rakotoarimanana, Technical director, ADER – Madagascar ADER planning.

Luis Amado, EDM – Mozambique EDM-Master Plan.

Bios:

Namisoa Rakotoarimanana and Soren David.

Session 8: Pro Access Regulation

Wednesday, June 10, 2009

Lack of agreement on the meaning of key terms regarding regulation often leads to non-productive discussions. A working definition of regulation is: "the rules and institutions which set, monitor, enforce and change maximum and minimum allowed tariffs and minimum allowed service standards for electricity providers."

In designing and implementing a new regulatory system, the two principal components are:

- *regulatory governance* (the *how* of regulation)—examples: the processes and procedures of the regulatory entity; how it makes its decisions; degree of transparency and stakeholder involvement in the consultation and decision making process; how regulatory responsibilities are shared with other parts of the government.
- *regulatory substance* (the *what* of regulation)—examples: specific decisions on maximum and minimum tariff levels and tariff structures; criteria for issuing licenses; level and timing of automatic cost pass through; and periodic reporting requirements

The two major universal substantive tasks of all economic regulators are: setting maximum and minimum prices and minimum quality of service (technical and commercial) standards. The basic question for this session and any follow up AEI work is: how should these two universal regulatory tasks be performed to promote both grid and off-grid electrification? The often expressed goal is "light handed" regulation but what specifically does this mean?

Regulating Isolated Mini-grids In Peru

- Approximately 70% of Peruvian rural households do not have electricity. Investment costs for connecting new rural customers are approximately 2 to 5 times higher than the cost for connecting new urban and peri-urban customers.
- The Government of Peru has made the political decision that "All Peruvians must be treated equally." This, in turn has been interpreted to mean that rural tariffs (even for the most isolated communities) must be no higher than comparable urban tariffs in Lima.
- Three types of subsidies are required to implement this political decision. #1—*Initial capital cost of subsidy*-about USD$100 million/per year. #2—*Operating cost subsidy* to reduce both the distribution and generation costs of operating isolated mini-grids (about USD$36 million per year). #3—*Consumption cost subsidy*—to reduce tariffs for some portion of the consumption by poor rural customers (About

USD$31 million per year). Source of subsidies: #1—the national government budget; #2 and 3—mostly urban customers with monthly consumption greater than 100 kWH per month

- Like other Latin American countries, the basis for setting tariffs are the costs of a "model efficient firm" rather than an enterprise's actual costs.
- OSINERG (the Peruvian electricity regulator) has developed different technical and commercial quality of service standards for serving grid connected rural and urban customers. Differing standards apply to both MV and LV system component of main grid systems. To date, OSINERG has not developed comparable standards for customers served by isolated mini-grids.
- Isolated mini-grids smaller than 500 KW of installed capacity receive capital cost subsidies (i.e., Subsidy #1) with a cap of US$1000/household connected. Typically, once constructed, the isolated mini-grid is transferred to a municipality with no direct regulation by OSINERG. Isolated mini-grids typically provide electricity for 6 to 13 hours per day under fixed monthly charges of about US$3 to US$10 per month. About 368 mini-grids are operated and regulated by municipalities. Problem: municipalities do not have an incentive to perform maintenance because the municipalities expect that the national government will pay for entire cost of future plant replacements.

Tanzania: Regulating Grid and Off-Grid Small Power Producers

- The Government of Tanzania is promoting small power producers (SPPs) to further both electrification and renewable and cogenerated energy.
- EWURA, Tanzania's national water and energy regulator, is responsible for developing rules and procedures for implementing the government's SPP policy.
- EWURA's goal has been to create a "light handed" regulatory system to promote SPPs. By light handed, EWURA means three things: a. minimize the amount of information that is required; b. minimize the number of separate regulatory decisions and actions that are required; c. use standardized documents and rely (to the extent possible) on the decisions of other government agencies (e.g., the REA).
- EWURA has developed a suite of documents:
    - Guidelines for Developers of SPP projects in Tanzania. (completed)
    - Guidelines for Grid Interconnection of Small Power Producers in Tanzania. (completed)
    - Standardized Power Purchase Agreements For Purchase of Capacity and Associated Energy for Grid and Off-Grid Connected Small Power Producers. (completed)
    - Standardized Tariff Setting Methodologies for the Sale of Electricity By Grid-Connected and Mini-Grid SPPs. (completed)
    - Rules to implement. (in process)
- The rules deal with four cases: Case 1—an SPP selling at wholesale to the operator of the main grid; Case 2—an SPP selling at wholesale to an existing operator of an isolated mini-grid; Case 3—an SPP selling at wholesale to the operator of the main grid and to retail customers on the connected mini grid; and Case 4—an SPP selling at just at retail to its customers on an isolated mini grid.

- To date, no PPAs have been signed between TANESCO (the national government owned utility) and SPPs despite the fact that negotiations have gone on for several years for several proposed SPPs. This, then, raises the question of what can a regulatory commission do if the buyer is reluctant to buy. Traditionally, regulation has focused on regulating "sellers."

Presentations:

Regulation: What Do We Mean, Bernard Tenenbaum, Consultant, World Bank.

Regulating Isolated Mini-grids In Peru, Miguel Revolo, OSINERGMIN.

Tanzania: Regulating Grid and Off-Grid Small Power Producers, Anastas Mbawala and Norbert Kahyoza, EWURA.

Bios:

Anastas Mbawala; Bernard Tenenbaum; Norbert Kahyoza; and Miguel Revolo.

Session 9: Monitoring and Evaluation

Wednesday, June 10, 2009

Electrification scale-up in Africa will require rigorous, yet low-cost and practical monitoring and evaluation to guide the programs, plan and measure impacts, and collect lessons learned for improvements. Monitoring, evaluation, and impact evaluation are vital in determining whether development initiatives, such as rural electrification effectively reduce poverty. In the past there have been many claimed benefits from rural electrification - including gains in productivity, learning and health. This clinic on the impact of rural electrification investments focuses on development outcomes, and whether the assumed benefits can be quantitatively verified. The session presents monitoring and evaluation tools and components that work and typical conclusions that can be drawn from evidence-based evaluation.

In recent years there has been quite a bit of work on rural electrification monitoring and evaluation by the World Bank and developing countries. This emphasis has partly been the result of the need to create objective indicators to measure the benefits of projects involving electrification. The World Bank has experienced three phases involving monitoring and evaluating of rural electrification. They are:

- Phase 1 or early approach. In the approach that was used before 10 to 15 years ago cost savings were measured by quantifying the value of displaced kerosene, candles or diesel fuel for irrigation and attributing this as a minimum willingness to pay.
- Phase 2 or consumer surplus approach. This approach has been extensively discussed and recently has been approved by the World Bank's Internal Evaluation Group as a way to measure the benefits of rural electrification. This method was adopted after the publication of a report on the evaluation of benefits of rural electrification in the Philippines. It calculated benefits from estimated demand curves developed from large surveys.
- Phase 3 or new approach for directly measuring income gains. While the consumer surplus approach estimates consumer benefits, new methods are being developed to measure the direct benefits of rural electrification on income levels. This approach requires surveys with detailed data on

income and analysis technique that deal with the joint influences of income on energy use and the impact of energy use on income.

The evaluation of rural electrification has come a long way in refining benefit measures and monitoring techniques for rural electrification. However, it should be cautioned that the consumer surplus approach must be based on actual demand as measured by consumer surveys and not just price and quantity estimates as has been done in some World Bank projects. Also there is a need for more work on impact of electricity on income generation. Finally, monitoring and evaluation components should be standard parts of both grid and offgrid rural electrification projects.

How to do monitoring and evaluation: Example from Laos

As in the rest of the developing world, the needs of Africa for access to rural electrification are of great importance. In order to achieve this, it is necessary to put in place monitoring and evaluation tools to improve service delivery, planning and the equitable allocation of resources for electrification based on demonstrable achievements of past performance. Monitoring and evaluation is necessary to help staff improve their ability to effectively monitor and evaluate their projects, thus strengthening the performance of their projects.

The presentation dealt with how to implement a monitoring and evaluation framework by concentrating on the following questions.

- What data do we need?
- How do we collect these data?
- How do we operationalize these data?
- How was monitoring and evaluation done in Lao PDR?

The answer to these questions is that we need fairly large household surveys and many questions on energy use. The data generally should be collected by government agencies or professional survey organizations that have familiarity with implementing households interviews based on random samples. To obtain useful operational data requires asking questions on quantity of energy consumed and the length of time various appliances including lights are use. The case study materials from Laos provide examples from an actual survey on how to ask the questions and analyze the results.

Monitoring and Evaluation: Pre and Post Project Surveys

Since its inception in 1996, the Rural Energy Development Program of the Alternative Energy Promotion Centre in Nepal has successfully implemented 243 micro-hydro (MH) projects in remote rural areas of Nepal till December 2008. In this context, the need to develop a comprehensive monitoring and evaluation framework comprising Key Performance Indicators to assess the impacts of various aspects of the program has been felt by the implementing

agency and other stakeholders. The proposed monitoring and evaluation framework is expected to provide the following:

- Support strategy formulation, budgeting and performance reviews.
- Help for the Government of Nepal in their policy development and analysis of effectiveness of policies in microhydro sector.
- Help Alternative Energy Promotion Centre / Rural Energy Development Program manage activities at the sector, program, and project levels.
- Enhance transparency and support accountability relationships within Alternative Energy Promotion Centre. Strong accountability can, in turn, provide the incentives necessary to improve performance.

The presentation discusses how we went about implementing the monitoring and evaluation framework. The key steps involved are the following:

- Assessing the readiness and existing capacity for monitoring and evaluation: This aspect includes assessing existing data and processes, adequacy of existing data sources, roles and responsibilities, structure in place for assessing performance, role of AEPC and its counterparts at regional and local levels, and identifying barriers to monitoring and evaluation along with the opportunities for strengthening it.
- Conceptualizing and designing the monitoring and evaluation framework: This work includes identifying the necessary information that underpins monitoring and evaluation. The ideas is to develop a set of key performance indicators in a logical sequence and establish a baseline against which future improvements will be tracked. It also is necessary to prepare time bound and realistic targets for the medium term and to respond to information needs of internal and external stakeholders.
- Developing a robust Management Information System: Such as system creates the ability to present data in a timely and concise manner to the relevant target audiences and to different levels within the implementing agency. It also is necessary to define reporting requirements and formats for standard reports that include the data to be collected, source of data, frequency of data collection, parties responsible for collecting, analyzing, reporting and using the data.

The presentation also gives a description of the household and enterprise survey that has been undertaken to assess electrification benefits for rural households in Nepal. Combining impact assessment with monitoring and evaluation framework is the major feature of this work, as it covers the whole lifecycle of monitoring and evaluation project.

Monitoring and Evaluation in Energising Development (EnDev) and INGENS

The M&E system of the Energising Development Programme comprises (i) a detailed semi-annual monitoring of performance indicators (=number of beneficiaries who got access to modern energy services) as well as costs, subsidies and cost efficiencies allowing a benchmarking between countries, regions, technologies and project approaches (this is crucial

for the overall approach of EnDev, as additional funds are assigned annually to the best performers, so that monitoring performance allows for an ongoing competition of ideas, approaches and players under the overall programme umbrella), as well as (ii) thorough impact evaluation to investigate the effect of modern energy usage on the well-being of its beneficiaries.

Among others, the research institute RWI has implemented combined baseline and ex-ante impact assessments in Benin, Ghana, Mozambique, Rwanda and Uganda. As these studies were conducted before the interventions, the idea in the first place was to provide data for rigorous ex-post evaluation. In addition to this, a new methodology to assess the expected impacts of electrification before the intervention was implemented. For this purpose, surveys were conducted not only in the yet non-electrified target region of the respective project ("no access area"), but also in a comparable region that has been electrified some years ago ("access area"). Thereby, the observed behavior of electrified households can be used to simulate the expected behavior of the target households to be electrified in the project. Early results from the above-mentioned surveys are summarized in the presentation.

Presentations:

Overview. Douglas Barnes, Senior World Bank Consultant and Presented by Voravate Tuntivate.

How to Do Monitoring and Evaluation: Example from Laos. Voravate Tuntivate, Senior World Bank Consultant.

Monitoring and Evaluation: Pre and Post Project Surveys. Hussain Samad, Senior Research Analyst, World Bank.

Monitoring and Evaluation in Energizing Development and INGENS. Florian Ziegler (EnDev/GTZ) & Jörg Peters (RWI).

Bios:

Douglas Barnes; Hussain Samad; Jorg Peters; Lucius Mayer-Tasch; and Voravate Tuntivate.

Session 10: Enhancing Impacts

Thursday, June 11, 2009

Productive use is defined (for the purpose of this session) as any use of electricity that results in income generation, or improves economic productivity from a public service. Implementation of productive use (PU) programs can benefit electricity providers as well as consumers. PU programs normally include a promotional component, technical assistance (TA) including business development services to end users (which can be microenterprises or SME), and a financing (and/or grant) component. If successful, PU programs can revolutionize rural economies but success does not come easy. Assessing PU potential should be part of the feasibility process for any electrification project.

TaTEDO's Jatropha oil/diesel powered Energy Services Platforms (ESPs) is a pilot project strongly supported by central and local authorities in Tanzania. The impact of the project has been reflected in better business performance, increased village security, and improved livelihood. The project is being scaled up, replicated and mainstreamed.

Success stories exist, but are not always well documented. Where documentation exists, it is often based on qualitative, anecdotal evidence as opposed to hard evidence from rigorous impact evaluation. Therefore, further investigation is needed to demonstrate the value of PU programs (as well as electrification at large – see Session 9). The Income Generation through Energy and Complementary Services (INGENS) study (funded by ESMAP and BMZ) presented a new tool for quantitative, in-depth analysis of the impact of access to and use of electricity (as well as complementary services such as microcredits and BDS) on the performance of micro, small and medium enterprises. The survey tool allows rigorous impact evaluation of PU components at reasonable costs (well under US$100k). The study's preliminary findings from applying this new tool to three case studies (Benin, Ghana and Uganda) found only a slightly positive impact of electricity access/use on the economic performance of local businesses. However, it must be noted that these early results were based on a limited number of cases, that they did explicitly not include ex post measurements (which will be possible only after a few years time) – and that the absence of evidence (for

productivity impacts of electrification in a few pilots) is not an evidence for absence (of such effects in general).

During the follow-up discussions, there were two distinct perspectives. Some participants raised the fundamental question whether productive use programs can result in enhanced benefits for the target communities at all. They cited evidence that when individual community members invest in productive use equipment and experience increased sales and income, other community members involved in similar entrepreneurial activities will likely suffer declines in revenue. Their basic concern was that there would be an income transfer rather than a net income increase for the community. This led to a discussion of how one should measure success of productive use programs – whether it should be measured solely on the basis of the number of participants who received electricity, or whether it was necessary to take account of the net benefits to the entire community served by the rural electrification project. A corollary to this view noted that rural electrification projects cannot in themselves create markets, nor can they enhance access to markets. Some participants pointed to past surveys which found no substantial evidence of new productive enterprise resulting from rural electrification projects.

An alternate viewpoint was that the process of evaluating rural electrification projects should be based upon evaluating energy loads – identifying where project benefits can be achieved to generate sufficient revenues to cover the cost of project implementation. In other words, it is not the goal or the purpose of rural electrification projects to create new commercial activity, but rather to provide opportunities for commercial and micro-industrial activities to gain access to less expensive and reliable electric service. Those who took this position tended to emphasize the cost reducing potential of electrification as well as its quality of life benefits as opposed to income generation benefits. These participants generally took the position that the end goal of electrification is not to create intra-community competition, but to enhance quality of life (electric access for schools and health clinics), improve security (through public lighting), reduce energy costs and improve the quality of goods produced for sale within and beyond the community.

*This summary is based on presentations made in Session 10 and related discussions that took place in the discussion session.

Presentations:

Overview of Past Practices in Promoting Productive Uses of Grid Electricity. Dan Waddle, VP, NRECA.

Productive Uses in Multifunctional Platforms. E.N. Sawe, TaTEDO.

Income Generation through Energy and Complementary Services (INGENS) - Preliminary Results. Lucius Mayer-Tasch, Coordinator Rural Electrification Component, Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP), GTZ Uganda.

Bios:

Dan Waddle; Estomih. N. Sawe; and Lucius Mayer-Tasch.

Session 11 Financing and Subsidies for Utilities

Thursday, June 11, 2009

Worldwide all rural electrification programs have involved both subsidies and sometimes innovative financing schemes. There have been a wide variety of mechanisms to finance rural electrification, but there are some common principles that have been involved. The first is that most subsidies have been for part of the capital costs necessary for the construction of new systems. Generally, operating costs are not subsidized in rural electrification programs. The range of subsidies for capital cost has been fairly wide, ranging from as low as 25% in some countries to as high as 80% or eve 100% in other countries. In some cases national entities actually do the construction, and then turn over lines to be service to distribution utilities financed by debt. This session presented an overview of financing issues for utilities with country specific examples, including Ghana, Botswana and Peru.

In Ghana, the electrification programs consist of the national electrification scheme and a self-help electrification program supported by the government to encourage developmental initiatives of communities. Under the self-help scheme, communities can move to the "front of the queue" for grid connection if they can supply a portion of the cost of distribution equipment and are able to provide labor for the installation of distribution poles. The poverty level of the rural people, the lack of funding and the inadequacy of the Rural Electrification levy have been the main challenges of Ghana's rural electrification programs. There are continuing financial problems because lines are built under the rural electrification program funds and transferred to the distribution utility, but the tariffs for electricity are inadequate for covering even operating costs in many instances. A rural electrification fund has been set up to offset the capital costs of construction, but there are continuing issues involving the tariff charges to consumers.

In Botswana, most of the financing for rural electrification has come from bilateral or multilateral donors. The result is that the rural electrification program is quite dependent on outside sources of funds and as a result the level of rural electrification in the country is quite low. The low level of

rural electrification is attributable to village selection procedures, high capital costs, low investment benefits, low customer connections, high maintenance costs and vandalism and the inappropriate use of technology.

The Peru system of rural electrification is complicated by the geography of the country. Most of the population lives along the coast and this area is served by regional and in most cases private grid companies. However, the Andes Mountains also run through the central part of the country and in this is served by the connected grid system. Finally, in the northern part of the country you have the Amazon region which is comprised of communities with isolated small grid systems. In Peru, three types of subsidies have been adopted in order to ensure all low-income Peruvians equal access to electricity and the three subsidies are the investment subsidy, internal tariff subsidy and consumption subsidy. The first subsidy is for capital costs of new distribution and is funded by the national government. The second type of subsidy recognizes that isolated system generations costs can be very high, and there is a scheme to transfer subsidies to the isolated small grid systems from the interconnected grid system. The final type of subsidies is a cross subsidy from urban high electricity use consumers to rural customers who generally use low levels of electricity. A political decision was made that tariffs paid by new rural consumers would be no higher than the maximum regulated urban tariff. The Peruvian scheme was created through a series of political responses codified in law to address equity issues involving access to and use of electricity. This shows that it is possible to implement different types of subsidies depending on the necessity of its use in order to cover social, economical and political issues. It important that the model of subsidy applied in Peru is based on recognizing the economic cost of service. Cross subsidies are the main vehicle used to make electricity affordable in more remote areas, and are based on charging high prices to urban consumers connected by the national grid system.

The main topic of discussion involved social tariffs, increasing block rate tariffs, and the differences between urban and rural areas. Most participants reported that high political sensitivity to urban-rural differences in electricity tariffs. Politicians were under considerable pressure for everyone to be treated equally (i.e., charged the same tariffs) even if the costs of supply differed markedly.

TANESCO, Tanzania's state owned utility, operates the interconnected national grid and 11 isolated rural grids. All its customers are on the same tariff schedule. A social tariff is provided for consumption below 50 kWh/month. The 11 isolated grids are supplied by diesel fired generation. The cost of generation on these isolated grids is considerably higher than the prices charged to the grids' customers. TANESCO is able to subsidize these isolated grids by charging higher prices to industrial customers. New local suppliers, whether a private or cooperative operator, would not have access to such cross subsidies. Tanzania's national electricity law permits non-uniform electricity tariffs and future off-grid operators in rural areas may seek local tariffs higher than the national tariffs.

Nevertheless, some countries have differentiated urban-rural tariffs. With an investment subsidy of 60-80%, Mali has been able to implement rural tariffs keyed to the capacity-to-pay of

40-50% of the rural population. Mali's "urban national tariff" has a social tariff for consumption below 50 kWh/month. In Sierra Leone, the tariffs in provincial grids are lower than those adopted for "national grid". The national utility in Guinea has a social tariff for the first 60 KWh/month. Uganda has differentiated tariffs but the implementation raises some issues. The new RE consumers through Government financed grid-extensions from the inter-connected national distribution grid given in concession to a private operator receive the same tariffs as all other consumers.

One participant observed that: "All our tariffs are social tariffs." This was an indirect way of saying that many of the allowed national tariffs are not cost reflective. For example, in Angola the average national tariff is below cost. The current government policy is to increase this tariff in order to cover the operating and maintenance costs. An even lower social tariff exists for consumption below 100 kWh/month. Swaziland has no isolated grids. The social tariff is for consumption below 150 kWh/month. DRC has three large interconnected networks and a number of small grids. The average national tariff is below cost, and the LV-tariff is lower than the MT tariff. Côte d'Ivoire's CIE distribution monopoly has a social tariff for consumptions below 40 kWh/month. The tariff policy for Namibia's national utility operates on full cost coverage, giving the utility a credit rating. The country is divided into five regional networks and tariffs are the same.

Nigeria's average national tariff is considerably below cost. The national tariff is the same everywhere. NERC, the national electricity regulator, has proposed moving towards cost recovering tariffs using a multi-year tariff setting system with the national government covering the shortfall during the transition years. However, the proposal has yet to be implemented even though it was approved by the President. Throughout Africa, there is widespread resistance to tariff increases by the general public. Customers are opposed to tariff increases because they argue that service is poor and therefore the utilities should not be rewarded with higher tariffs. In contrast, utility officials argue that service is poor because they have insufficient funds to replace needed parts and to perform basic maintenance.

In Peru, the Government subsidy and transfer policy provide the same social tariff for consumption up to 30 kWh; consumers from higher category of consumption pay full cost. The Republic of South Africa has municipal tariffs and social tariff for consumption below 150 kWh/month. The first 50 kWh are provided for free.

A separate, specific financing issue that came up is the regulatory framework on how to handle non-paying customers. In some countries, utilities are not allowed to disconnect a household customer who refuses to repay a loan provided to cover the connection cost.

Presentations:

Ghana Case, Andrew Barfour, GEDAP Coordinator.

Botswana: Partnering for Access Expansion. Masego Kealotswe, Rural Electrification Coordinator, Botswana Power Corporation.

Mechanism of Subsidies Applied in Peru, Mr. Miguel Revolo, Manager of Distribution Regulation, OSINERGMIN, Peru.

Bios:

Miguel Revolo.

Session 12: Financing (and subsidies) for Small Providers and Renewable Energy

Thursday, June 11, 2009

The experience of SenterNovem and E+Co in developing private entrepreneurship for operating renewable energy projects reveals a number of typical issues faced by small providers. Their financial, managerial and technical expertise is often very low. Also, there is little experience with regulatory frameworks for small providers (however, see the presentation of the Tanzanian regulators in Session 8.) In addition, commercial banks are generally not willing to finance small scale (typically offgrid) projects mainly due to a lack of experience and a related perception of higher risk. In some developing countries outside of Africa, the financing bottleneck has been alleviated to some extent through specialized lines of credit or partial guarantees established with the assistance of the World Bank and other donors as well as specialized financing companies.

The approaches presented at the workshop aim at decreasing the need for public sector subsidies (and increasing private sector equity) through the participation of venture capitalist investors. One of the key challenges regarding the involvement of venture capitalist partners is their need for higher returns demand because of actual or perceived risks (notably the country and foreign exchange risks).

Small providers need technical and business support. Entrepreneurs require guidance in transforming general proposals into "bankable" business plans of sufficient quality. The business plan should explicitly demonstrate the viability, identify specific risks and formulate mitigation measures. AMADER, Mali's REA, has developed model business plans for use by new private operators seeking grant money (see Session 4).

The African Biofuel and Renewable Energy Fund example emphasizes the role donors can play in developing national renewable energy markets in SSA. In addition to support for renewable energy initiatives, donors can also provide financing to municipalities and communities. Donors can support renewable energy investment facilities with major local banks and initiatives aimed at minimizing the risks faced by the banks

with regard to renewable energy projects. The banking sector should build capacity to reduce the risks of financing renewable energy.

A recent survey of renewable energy executives presented by the newly established UNEP RE Finance Centre confirms the importance of strong government commitment to scaling up electrification and a friendly investment climate for an increased financing flow to innovative energy enterprises. In the context of the current financial crisis, investments in rural energy power projects have slowed down and many developers have abandoned business. The financial crisis has also led to higher cost of borrowing and shorter repayment periods. Large transactions have been more successful than smaller deals.

Presentations:

Commercial Funding for Small Scale Providers. Kofi Nketsia-Tabiri, Regional Manager, E+Co.

ConCap: Building a New Fund for SSA Access? Dr. Fritz-Morgenthal, UNEP Renewable Energy Finance Centre & Connective Capital AG.

Subsidy for Private Sector MHP. Case study in Rwanda. Marcel Raats, Energizing Development/SenterNovem.

Bios:

Kofi Nketsia-Tabiri; Sebastian Fritz; and Thierno Tall.

Session 13: User Financing via Micro Finance Institutions (MFI) and Utility Bills

Thursday, June 11, 2009

Affordability of electricity is clearly a key issue in Sub-Sahara Africa (SSA). High connection fees, in particular, are a main barrier for the many low income households. Both grid and offgrid electrification schemes are looking for new ways to make connections more affordable. This may include targeted subsidies or a variety of deferred payment options when a connection fee is paid over time, pre-financed directly by the utility/service provider or through cooperation with a microfinance institution. The session discussed various innovative deferred payment schemes, via microfinance institutions and utilities.

Micro Finance Institutions (MFIs) address the gap between the high initial capital cost of a new electricity connection and low capacity to pay of typical SSA households. MFIs are usually private sector entities with specific visions and business approaches. They have experience in developing networks in regions with weak infrastructure and low incomes. Typically, MFIs provide capital loans to urban or rural small and medium enterprises (SMEs), but they can also finance electricity connections for SMEs as well as households. MFIs are particularly involved in offgrid electrification, e.g., offering loans for solar home systems.

From end user perspective, two business models are relevant for microfinance and off-grid energy:

- The One-Hand-Model/One-Stop-Shop Model is based on a single micro-energy provider who provides the services of an MFI and an energy service company. This model ensures microfinance (various financing options), installation (solar home and other micro-energy systems) and maintenance. This model has been implemented in Bangladesh. Favorable regulatory framework, standardized products, knowledge of microfinance at the managerial level and engineering at the operational level has ensured the success of the model in Bangladesh.
- The Two-Hand-Model/Multiple Stakeholder Model includes cooperation between two separate companies: the MFI and an energy service company. The MFI provides various financing options while the energy company provides system integration, installation and maintenance. A strong partnership among the entities involved is required. This model has been implemented in Sri Lanka, amongst others. Shell Solar was involved in the initial phase of the SHS installations.

About 20-30 MFIs worldwide offer specialized energy loans. Only 5-8 of these have a presence in SSA. Micro Energy International's experience in Africa shows that microfinance is advancing because important banks such as Eco Bank and Equity Bank are getting involved in microfinance. However, microfinance is still underdeveloped in terms of outreach, infrastructure, sustainability, product diversification, and human resources. For example, MFIs have strong networks in Uganda and Kenya but they are still underdeveloped in many other countries, including Tanzania and Burundi.

Specific strategies for the poor and the very poor need to be developed for urban, peri-urban and rural areas, for crowded and informal slums and for remote areas with highly disbursed households. MFIs need incentives especially to develop rural programs, to address the high transaction costs and low user densities. Formal participation in an electrification program with explicit compensation can provide such an incentive.

The experience of FINCA Uganda and PRET Tanzania highlights common challenges and lessons learned. The financing needs for energy products are significant (especially for renewables) and require longer-term lending instruments. Public awareness, training on the use of technology, quality assurance for equipment and service are important elements of the MFIs' strategy and outreach. MFIs often lack the technical knowledge to assess electricity needs. The partnership among sector stakeholders needs to be innovative and "win-win" for all parties. Smart subsidies can help catalyze access to clean energy to those that need it most.

The utility pre-finance scheme is another model for increasing affordability of connections, used particularly in grid electrification.

In Kenya, KPLC, the national distribution company, has designed a number of approaches to increase affordability of connections. KPLC has initiated a partnership with a financial institution (Equity Bank), offering jointly "Stima" loans for electricity connections. Stima loans target customers within a transformer radius of 600m. Customers pay 20% upfront and the balance in 12, 24 or 36 months; the annual interest rate is 15%. For customers beyond the 600m radius, KPLC offers "group schemes" which encourage customers in peri-urban and rural areas to apply jointly, thereby reducing individual connection fees. These schemes are an important step in increasing affordability, but they are not available to all customers. Therefore, KPLC is preparing a launch of a more comprehensive deferred payment scheme (a pilot is being financed by AFD), which would allow all customers to pay connection fees over time, as a part of the electricity invoice. Customers pay 50% upfront and the balance over 12 or 24 months; the interest rate charged to these new customers is set at 0%.

In Ethiopia, a deferred payment scheme is already offered by EEPCo, a state owned national utility, but a new scheme, using output based aid (OBA), is under development with the objective of making connections even more affordable. The OBA scheme would help EEPCo to finance the connection costs of poor customers in rural areas, thereby increasing the connectivity in rural electrification schemes. The proposed project would provide five-year loans to poor strata of the population who get connected to the electricity grid; and each new

customer receives two energy efficient Compact Fluorescent Lamps (CFLs), to promote energy conservation and reduce electricity bills. A credible monitoring and verification system needs to be in place to ensure that the project really targets the poor. At the same time, the operation should be as simple as possible to minimize transaction costs.

Emerging lessons from micro- and user-finance stress the importance of a good legal framework, as well as the experience and knowhow for recovering funds in case of loan failure. Therefore, formal partnerships with experienced MFIs are important. Financial institutions will be reluctant to provide loans unless there is a clear and enforceable legal remedy in the event of sustained non-payment. Similarly, for the utility-managed deferred payment schemes, utilities require a (readily enforceable) legal framework which allows them to disconnect customers who fail to pay their connection fee installments.

MFIs are service oriented and can contribute to quality assurance and consumer protection. Since MFIs are interested in their loan repayments, they also have a vested interest in promoting good quality and sustainability of the products and services that they finance – e.g. solar home systems. Hence, they can be attractive partners for the implementation of consumer protection and certification strategies.

The Namibia experience shows that inter-sectoral cooperation and coordination is an important success factor. The electrification stakeholders have regularly invited the MFIs and stakeholders from the agriculture and telecommunications sector to their discussions and workshops to involve them in planning and implementations as much as possible. There are also interesting opportunities to institutionalize energy solutions within housing programs (UN Habitat).

Approaches differ from case to case. There is a need to share experiences and transfer lessons learned from East to West Africa on micro- and other forms of user finance for electricity connections.

Presentations:

Issues and Options for Different Technologies and Institutional Models. Noara Kebir, Microenergy International.

MFI in Africa. Felistas Coutinho, Microenergy International.

MFI Finca Uganda. Patricia Kawaga, FINCA.

Innovative Financing for Grid Connections by the Utility. Ato Shiferaw, EEPCo.

Enhancing Affordability – Deferred Payment Methods. Shahid Mohammad, General Manager, Operations. KPLC.

Bios:

Felistas Coutinho; Noara Kebir; Patricia Kawaga; and Shahid Mohammad.

Session 14: Climate Change and New Financing Instruments

Thursday, June 11, 2009

The purpose of the session was to (i) demonstrate the existence of CDM/carbon finance opportunities in Africa, (ii) explore some of the recent approaches and methodologies that could facilitate Africa's greater participation in CDM (e.g. Program of Activities –approach) with some emerging examples in Africa and worldwide; and (iii) explore other financing opportunities for electricity access arising from the increased global focus on climate change.

A World Bank funded study in 2008 identified huge opportunities for CDM projects in Sub-Saharan Africa (SSA) – 3227 potential projects and Program of Activities (PoA) with potential GHG reductions of 740 $MtCO_2$/year. The CDM potential projects are not only in large power generation or efficiency improvement projects, but also in energy access. For example, the annual expenditure of kerosene for lighting in Africa is about US$17 billion and the CO_2 emissions are equivalent to that of a 5000 MW coal-fired power plant.

CDM benefits provide an additional revenue stream. Moreover, the CDM process promotes access to clean energy technologies and a low carbon energy path. But in most instances, this additional revenue stream, by itself, is an insufficient incentive to promote clean energy investments. For CDM projects to be developed, countries need the right policy, regulatory environment and access to investment capital, as well as developers with capability and experience.

Therefore, despite the potential for carbon emission reduction, Africa accounts for less than 3% of total CDM registered projects (and 90% of those projects are in South Africa). The CDM barriers in Africa include

- Discriminatory nature of the CDM rules (exclusion of land-based projects, high transaction cost for small projects);
- Lack of underlying finance, a conservative credit market;
- Lack of awareness among the policy makers and political leadership about the carbon market and mitigation activities;
- Lack of institutional capacity and technical resources able to develop good quality mitigation projects in a cost effective manner;
- Regulatory and political risks.

REAs or other agencies in SSA countries must take the lead in making the low carbon energy project potential identified in the World Bank study a reality. They need to support an enabling environment, project development and CDM project aggregation.

The Program of Activities (PoA) has a potential to make CDM more relevant for Africa. The PoA aggregates a large number of small homogenous greenhouse gas abatement activities, which would not be viable as individual projects, but can contribute to significant greenhouse gas reductions as a whole. The activities can be dispersed both geographically and over the years. The PoA has significant benefits such as

- Reduced transaction costs;
- Reduced CDM registration risks;
- Program dissemination need not be fully determined at the start of the project. Regular CDM requires unique identification of each activity at registration; PoA can be registered without such information.

In Senegal, the PoA has been designed to promote the use of energy efficiency light bulbs in newly-electrified households in rural areas. According to the program, 1,724,000 CFLs will be distributed to rural areas. The proposed PoA would reduce electricity consumption by 552 GWh during the ten-year crediting period of the 12 CPAs and would avoid the emission of 463,000 tons of CO2eq. The PoA has been an opportunity for CDM development since it ensures a lower transaction cost and a flexible approach that allows gradual inclusion of each CPA. The lessons learned from this case study emphasize the importance of the capacity building program and of a good institutional and legal framework.

Recent changes in PoA requirements such as allowing different CDM methodologies to be used within one PoA and the acceptance of regional (i.e., multi-country) PoAs potentially make this approach more useful in SSA. While regional PoAs are attractive in concept, they may be complicated in implementation because of the need to create a central policy or regulatory position across participating countries within the region.

The end of the first commitment period in 2012 under the Kyoto Protocol should not stop CDM project development in SSA. The SSA region will remain a priority given the sustainable development co-benefits that clean energy projects will generate. However, reform of the current framework will be needed to (i) broaden the carbon market's scope by including land-use, forestry and agricultural projects within CDM, (ii) simplify rules and provide for exceptions for LDCs, and (iii) reform and kick-off a program of activities. SSA must become more engaged in the climate negotiations so those rules and procedures that benefit SSA are adopted.

In addition to CDM, the voluntary carbon market should be seriously considered by SSA. In the case of voluntary carbon markets, the emission reductions are defined on the basis of accepted standards and contractual arrangements. The generation and measurement of emission reductions are outside of a regulatory framework. While the voluntary market has a lower carbon price, the requirements for verification are less stringent. The voluntary carbon markets lead to reduced transaction costs, increased flexibility and broader scope. The voluntary carbon

markets more than doubled between 2007 and 2008, from 65 million tons of credits traded in 2007 (US$331 million) to 123 million tons in 2008 (US$705 million). The most popular project types (by transaction volume) in 2008 were renewable energy projects (51%), mostly hydro, wind and biomass.

Presentations:

Potential for Low Carbon Energy Development in SSA. Felix Dayo, Director, Triple "E" Systems Inc.

Small Scale CDM Methodologies. Gajanana Hegde, Program Officer, UNFCCC Secretariat.

CDM and Other Financing Options. Charlotte Streck, Director, Climate Focus.

Public-Private Partnership (Senegal). Ousmane Fall Sarr, Directeur des Etudes et du Système d'Information, Agence Sénégalaise d'Electrification Rurale.

Bios:

Charlotte Streck; Felix Dayo; Gajanana Hegde ; and Ousmane Fall Sarr.

Session 15: An Energy Subsidy Clinic: How to Design and Improve Access Subsidies

Thursday, June 11, 2009

Subsidies typically reduce welfare by creating market distortions and GDP losses. A classic example are fuel subsidies and low "social" tariffs in developing countries which are meant to help the poor - but largely profit better-off users (because the poorest don't have access to grid power and use less fuel) and lead to inefficient use (by distorting the price signals). However, energy subsidies are often impossible to abolish (for political reasons) or needed to meet prominent government promises (such as the inclusion of remote regions) – and they can actually make economic sense in specific cases, for instance when they reduce existing market inefficiencies. Independently of their economic rationale, energy subsidies can be expected to remain a mainstay of public policy in the medium term.

Given the low access rates and low capacity to pay of unconnected users in SSA on the one hand, and the fact that the marginal costs of grid roll-out to rural areas increase with falling population density on the other hand, national electrification programs usually have to provide investment subsidies to make new connections affordable. Such access subsidies have a better potential to actually reach the poor than lifeline tariffs. However, many real-life electrification subsidies are unnecessarily ineffective and/or not efficient due to poor design. It is possible to (re)design them in a way that minimizes damage and maximizes performance.

However, literature provides not much advice on the pragmatic design of sound electrification subsidies in real life. Practitioners are often left alone with very general caveats (such as "subsidies should be sustainable and efficient"), or idealistic mantras (such as "all subsidies should be abolished right away") which are of little help in real-life contexts. Session 15 provides some practical answers to the question "How to Design Electrification Subsidies?"

The "Subsidy Matrix" was presented as a simple new tool for policy makers and practitioners in charge of designing or improving access subsidies (see Table One). The matrix approach applies a systematic process to identify all relevant options for the subsidy set-up in a given local context and compare their probable effects on subsidy performance. The basic idea is to visualize the causalities between (A) nine categories of "subsidy design variables" which policy makers can influence (Subsidy Objective; Funding; Institutional

Setup; Recipient & Beneficiaries; Type; Selection Criteria & Competition; Amount & Exit; Regulation; and Monitoring & Adjustments) and (B) seven "pragmatic subsidy performance criteria" (Effectiveness; Efficiency; Sustainability; Resilience; Private Sector Participation; Transparency; and Politics). The matrix can be used (i) in a step-by-step process to identify weaknesses of existing or planned subsidy mechanisms (the participants decided to immediately try out this process in an impromptu afternoon session with encouraging results - see Group Work Report 3.3.); (ii) as a training, decision-making or mediation tool for stakeholders of national electrification programs; and (iii) for the production of quantitative score cards to benchmark the performance of subsidy programs.

One lesson from working with the matrix is that not all performance indicators can be maximized at the same time. A quantitative performance analysis of existing Solar Home System subsidies (which applied the new matrix approach) illustrates this important finding: when maximum installation speed is the number one priority, for instance, one usually has to compromise on cost efficiency and social or regional fairness. Table Two summarizes the main correlations between subsidy design variables and performance indicators that were identified by this study.

Participants agreed that a well-designed competition mechanism is one of the most important – and challenging – elements of sound subsidy design in practice. In particular, the design of subsidy tenders (competition for the market) for electrification concessions and the new SHS Medium-Term Service Contracts designed for an output-based aid scheme in Bolivia (which combine the main advantages of concession approaches with those of market-based dealer models) met strong interest for the SSA context (maybe because most participants were from public sector entities responsible for electrification who know the challenges of efficient procurement from first-hand experience).

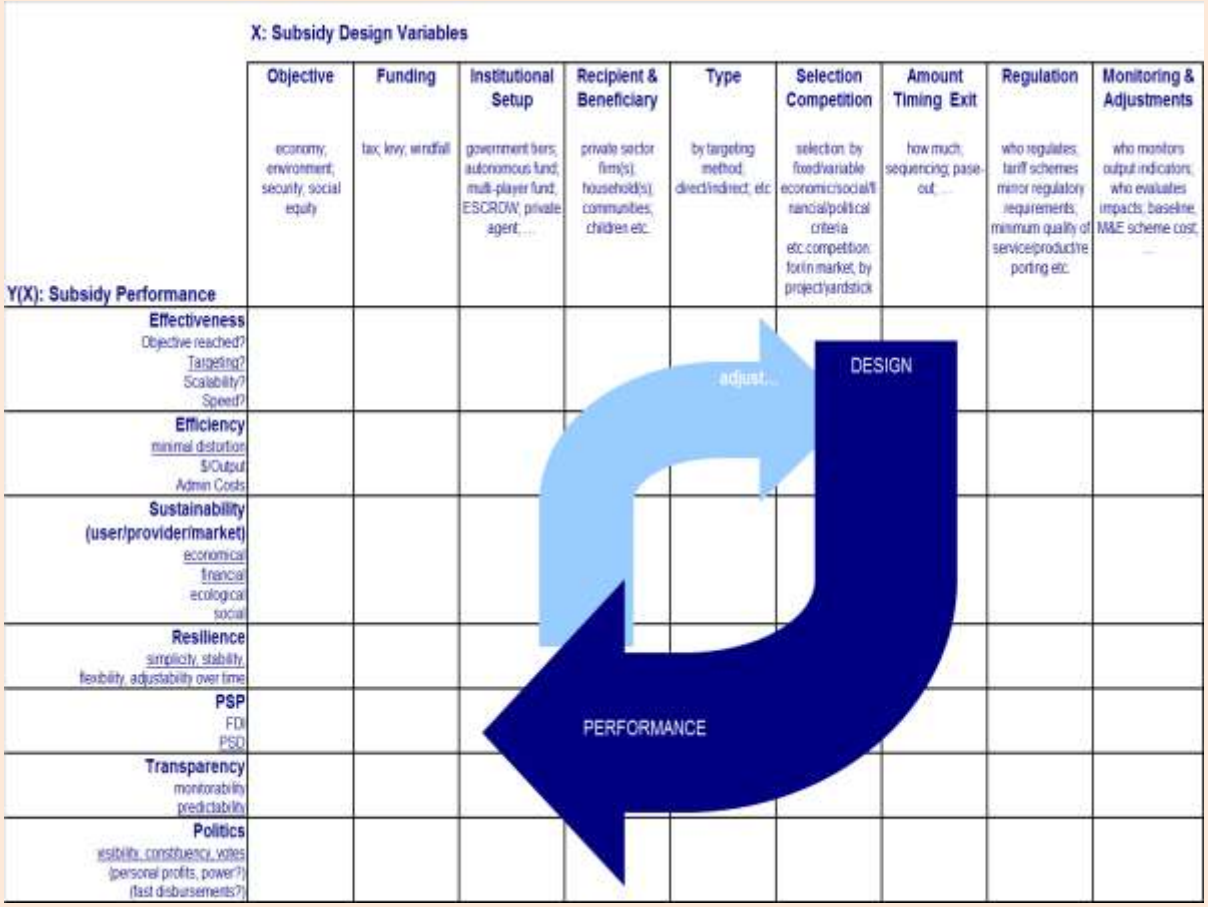


Table One: The new Energy Subsidy Matrix proposed by GTZ (Source: Presentations Reiche and Schweinfurth)

Subsidy Performance Indicators	**→ SHS Design Issues to watch out for**
1.a Effectiveness (program output)	*Local ownership*
	Supporting direct subsidies
	Provider recipients
1.b Effectiveness (implementation speed)	*End-user recipients*
	Shared ownership
2.a Efficiency (general**)**	*End-user recipients*
2.b Efficiency (cost-effectiveness)	*Mixed subsidies*
3. Sustainability (social)	*Supporting direct subsidies*
4. Resilience (adjustability)	*End-user recipients*

	Shared ownership
5.a PSP (PV provider)	*Sales model*
5.b PSP (financial intermediation)	*MFI credits*
	Service model
6. Transparency (general)	*Provider recipients*
	Local ownership

Table Two: Based on an analysis of real-life SHS Subsidy Programs, different design issues are of particular importance for each of the "pragmatic subsidy performance indicators" defined for the Matrix approach. There are trade-offs between those indicators: not all of them can be maximized at the same time.

Presentations:

How to Design and Improve Energy Subsidies. Kilian Reiche, World Bank Senior Consultant.

Tendering Subsidies for Electrification. Dana Rysankova, World Bank Senior Energy Specialist.

Evaluating the Performance of SHS Subsidies with a new "Subsidy Matrix". Arne Schweinfurth, iiDevelopment GmbH.

Concession for Rural Electrification in Senegal.

Africa Electrification Initiative: Practical Know-How for Scaling Up Electricity Access in Africa.

Bios:

Arne Schweinfurth; Dana Rysankova; Kilian Reiche; and Mamisoa Rakotoarimanana.

WORKING GROUP SESSION WRITE UPS

Africa Electrification Initiative: Breakout Session Summary Forms

1. Session Title and Coordinator	**"How to find the "best" institutional approach for electrification in a given situation?"** Note: The discussion in this session heavily overlapped with material that was presented in Session 4.
2. Session Objective	To discuss the "pros" and "cons" of different institutional arrangements to promote electrification
3. Facilitator	Ray Holland, EUEI at GTZ
4. Discussion points/ Questions from facilitator	
5. Topic and main message/s communicated in the discussion *(bullet points only)*	1. Much of the initial discussion focused on the relative merits of a "centralized" vs "de-centralized" institutional approach to rural electrification. (This was a continuation of the debate that took place in Plenary Session 4.) 2. Wolgang Mostert took the position that a centralized approach to rural electrification (typically led by the national utility) is more likely to be successful because of economies of scope and scale in planning, financing, tendering and investment.. He pointed to the successes of Morocco, Tunisia and Ghana as evidence of the effectiveness of centralized approach led by the national utility.. In support of Mostert's position, another participant cited Vietnam (described in Session 3) as a clear example of a successful centralized program by a national utility. Mostert argued that a weakness of the decentralized approach usually implemented by some combination of Rural Electrification Agencies or Funds is that it requires too much coordination between separate entities and that the transaction costs are likely to be very high. He asserted that little private investment has been mobilized by REAs/REFs in Africa with the possible exception of Senegal and that banks were still reluctant to lend to private operators even if they have received grants from REAs. His preliminary recommendations were that the national utility should take the lead on grid electrification and that REAs/REFs should take the lead in off-grid electrication. He also observed that the REA/REFs are not likely to be successful unless they are able to offer dedicated refinancing and partial risk guarantees for commercial loans to rural electrification operators. While favoring the centralized approach led by the national utility, he recognized that it may not always be feasible if the national utility is not well-managed or has weak finances. 3. Gerard Madon argued that a decentralized approach which relies on a REA is likely to be more productive because it harnesses local entrepreneurial talent and benefits from "checks and balances." He pointed to the close to 50 small electrification enterprises in Mali as a success story. Most of these enterprises operate stand-alone systems but a few are resellers of grid power. In the absence of a strong and effective national utility, he stated

	that the decentralize approach may be the only option that is realistically available. [more]
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	1. One participant said that REAs combine the best of both worlds: the technical assistance and grant giving is centralized but the actual implementation is left to local entities (either private operators or local communities). 2. There was some discussion of "jumping the queue" in grid electrification by certain villages in Ghana.
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	- There was no clear resolution of the debate about the relative merits of centralized versus decentralized institutional approaches to electrification. Moreover, the phrasing of the question implies that both options are always available to policy makers. However, in the absence of a strong and competent national utility, the decentralized institutional approach may be the only viable option, particularly for off-grid electrification.
8. Questions left unanswered and key follow up actions for AEI	1. Does the choice of institutional model depend on starting conditions and the type of electrification that is being pursued? Strong versus weak national utility? Initial level of rural electrification (e.g., greater or less than 20%)? Whether the electrification will be conducted through grid or off-grid electrification? 2. Can some of the benefits of centralization be obtained through standardization of technical and financial standards? 3. Does the national utility always have to be the lead entity in a centralized approach? For example, the Bangladeshi rural electrification effort (described in Session 3) seems to have been led by an independent Rural Electrification Board and not the national utility. 4. Does the centralized approach always imply that the national utility will sell at retail in newly electrified villages or can it also be implemented to bulk sales to local private or community distribution operators?
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	1. The 30-40 participants seemed engaged. Not surprisingly, some of the momentum of the discussion was lost because of the need to translate between French and English.
10. Your own observations and any other comments *(include estimated size of audience)*	

Rapporteur's Name and Organization: *Bernard Tenenbaum.*

1. Session Title and Coordinator	**What is the best way to facilitate community involvement?**
2. Session Objective	To identify key issues for AEI to in the coming years
3. Facilitator	Noara Kebir/Dan Waddle
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	1. Top 5 barriers to involve communities in rural electrification. 2. Which roles can the community play in RE? Which is most promising? 3. Which model works best – private company, cooperative, or village association?
5. Topic and main message/s communicated in the discussion *(bullet points only)*	• PV is usually best implemented by private sector. • Consensus that great emphasis is required on community involvement • Electrification need to complement other rural development interventions – this in itself engenders community participation
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	Balance of program effectiveness role of government (financing, policy, implementation) versus healthy/necessary community participation
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	AEI will need to identify key research elements – policy, capacity requirements, socio-economic -- related to the macro discussion of community involvement.
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	• How to facilitate community involvement for RE in areas of dispersed population • How to provide services to poorest HH • What has worked well/has not worked well. • For which RE technologies is community involvement most important
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	4
10. Your own observations and any other comments *(include estimated size of audience)*	20 participants; the session may have been more effective if we had used the initial observations as the basis of discussion

Rapporteur's Name and Organization: ___Dan Waddle, NRECA.

1. Session Title and Coordinator	**How to scale up in countries that have very low RE rates? (on June,09th 2009)**
2. Session Objective	
3. Facilitator	
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	The facilitator started asking participants to make proposals from five basic questions and to agree on the most relevant ones. Finally, the discussion commenced in giving an opportunity to each over to evoking identified problems and cases for their country and that opened debates.
5. Topic and main message/s communicated in the discussion *(bullet points only)*	• Some countries have different situations and interests compared to other ones (geographical situation, political situation …) so approaches are not the same. • Highly cost tariff and connection fees resulted in an unwillingness of new customers to coming • Lack of sustainable financing mechanism and difficulty to access funds from local commercial banks • Some of the population in rural areas do not feel electricity as a priority need so integrated development should be considered • Need of local capacity building to carry out the RE projects • Governments should progress on policy reform and put the energy sector within its first priorities • Enhancing the revenue collection of the National Electricity Company by using new technology to handling the development of grid extension programs • Developing supply chains in Africa for solar PVs

6. Gist of the discussion *(provide a brief summary of the questions and answers)*	Participants raised the majority of their questions around the following aspects:
	
	• Technology
	• Financing
	• Policy and tariff
	  ➢ As far as on-grid technology is concerned, the group discussed about the single phase technology from the possibility of using guard cables of HV transmission lines to promote RE.
	  On the other hand, some countries explained that cross boarder projects like West African Power Pool, SAPP, EAPP are interested.
	  For off-grid solution, the question was how to putting in place supply chains for solar PVs in SSA.
	  Also, practitioners from Kenya and South Africa shared experience on the use of pre-payment meters.
	
	  ➢ Promoting micro credit solutions with simple but effective models for Africa to funding RE programs. The challenge is to convince

	those Micro Finance Institutions to working with RE projects. The case of Kenya and Uganda were discussed. Levy of tax from electricity bills is a sustainable source of generation of fund for the government to supporting the national RE program as per the experience of Morocco, ➢ Government policy including master plans, guidelines, global approach, … have to be in place and well executed to determine the best technology to de adopted (off-grid, on-grid…), the adequate financial model…
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	➢ The thematic group would like AEI to setting in place an information system to networking practitioners and to allow them sharing knowledge, good practices, guidelines, technical data sheets…
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	➢ How to setting in place supply chains of solar PVs in Africa? ➢ How to develop micro finance solutions for RE business models in SSA?
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	5 It was a warmly discussion with a high level of involvement of members of the group from different countries.
10. Your own observations and any other comments *(include estimated size of audience)*	

Rapporteur's Name and Organization: Vonjy RAKOTONDRAMANANA, AFTEG/ World Bank.

1. Session Title and Coordinator	**How to deal with the political dimension of electrification? What are the minimum sector requirements for successful electrification?**
2. Session Objective	To discuss different ways political interference affects projects and to brain storm on mitigation measures
3. Facilitator	Ahmed Ounalli
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	What is the political dimension of electrification- is it political or technical issue, how can political and technical aspects be merged? Is it possible to avoid political interference in electrification? Is there a relationship between sector reform and electrification? Does sector reform help or hinder electrification efforts?
5. Topic and main message/s communicated in the discussion *(bullet points only)*	Political interference could be positive for a project if it is in the form of a strong political commitment to project objectives. Political interference is here to stay. Need of technical tools to minimize and managed political interference. Need to use good planning, costing of different project options, and optimization tools to show politicians pros and cons of their decisions. Sector reform hindered electrification efforts because it was not tailored to country conditions and deep enough to address root causes of problems.
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	Overall, the discussion focused on the need to clarify the type of political interference that occurs throughout the project cycle (assessment and identification, strategy formulation, defining of operational objectives, targeting of operations, implementation, and impact assessment). Examples were provided on how some countries integrate political interference in the financing approach to electrification. The case of Tunisia on a presidential fund for electrification was discussed. Similarly, the case of Ghana with MPs common funds was discussed. The expectation is that by setting up clearly these specific funds, politicians will have less interference with the main funding to electrification. Regarding sector reform issues, it was agreed that the reform agenda was not country specific enough and failed to address fundamental sector issues such as tariff setting and tariff levels, rate of return to operators, effective implementation of regulatory measures.

7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	Technicians working on electrification need to be smart, realistic and develop good communication with politicians to create breathing room to develop their projects.
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	There were discussions on preparing a paper that will layout specific country experiences on pre-requisites for program success or failure. These notes should be widely disseminated in the countries to enable the civil society to use factual information to support or to reject a project. There was no decision on how to pursue this idea. The relatively weak statistical data situation in the energy sector was discussed. No clear agreement was reached on how to tackle this issue. It will be useful if AEI creates an ad-hoc group to look closely into these two points.
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	Participants were highly engaged in the discussion- 5 This ranking is probably due to the very small size of the group and the overall high level of experience of participants.
10. Your own observations and any other comments *(include estimated size of audience)*	Very interesting session prompting the existence of knowledge at the local level to explore further. The participants were in the number of 7.

Rapporteur's Name and Organization: K*offi Ekouevi, World Bank.*

Session Topic: Are Master Plans necessary? How can they be made more usable?

Facilitator: Ray Holland

Rapporteur: Wolfgang Mostert

1. Impression from Plenum Presentations on Topic

Countries use widely different approaches to rural electrification planning.

- Mozambique presented the conventional approach of a state owned, integrated power company.
- Uganda, which uses a state owned power company for transmission and private companies for distribution, elaborated a very data-intensive, comprehensive RE Master Plan,
- Rwanda uses project specific plans that are undertaken within a cross-sectoral approach.
- Madagascar's planning is very much concentrated around the exploitation of its small scale hydropower resources, for grid-connected systems as well as for isolated grids. Madagascar prepares its regional plans within the framework of the overall national plan; proposals by private investors must correspond to the latter.

The differences can be traced back to the different environment: Uganda being a large, relatively scarcely populated country, needs careful regional planning to identify appropriate regional balances and least cost rural transmission investments. Because Rwanda is one of the world's most densely populated countries, a direct project planning approach makes good sense.

Uganda's REA/REF encountered two surprises with the preparation of the RE Master Plan.

- One was the unexpectedly long time span – five years – which it took to prepare the plan from the time the first draft-TOR were prepared till the plan was finalised.
- The other was that RE/REF needed to very closely monitor the work and the data collecting methodology of the consultant.

Yet, the large amount of data that was generated made the effort worthwhile. It enabled REA/REF to quantify the cost of a national rural electrification program with larger certainty. The estimate in year 2003 prices is US$ 385 million, and a subsidy requirement of US$305 million. The key objective of the Re Master Plan was to identify priority areas for private sector concessions, the immediate priority was to identify five such areas. In addition, it enables Uganda to present regional investment plans to donors: some donors prefer to stay away from politically insecure regions.

2. Discussion points for work-group:

Why?

(i) Purpose of RE master plans. The following were identified by participants:

- Optimise and prioritise investments (as a side aspect of this: to minimize political ad hoc and project specific interference with infrastructure development)
- Attract private investment and donor funding

- Coming up with a systematic way to approach rural electrification
- Safeguarding regional equity balance in investments
- Minimize ad-hoc political interference in infrastructure development

Why not implemented?

(ii) *Why are RE Master Plans not implemented?* The two target groups for the RE Master Plans are “private investors” and “donors”; both have disappointed.

- Donors are slow to fund new projects and change priorities frequently when a new donor planning cycle begins. Donors have been moving away from electrification during the last decade, expecting private investments to pick up.
- Private investments have in most countries not been forthcoming with the expected speed and scale.
- Changes in RE paradigms lead to delays in implementation

How?

(iii) Integrated approaches to development.

- The mining sector offers the possibility to exploit hydropower potential. The link of that to rural household electrification is underexploited. But there is a tendency to force mining companies to provide development services to surrounding communities; RE-zones around mines are identified.
- Rwanda uses NGOs to provide energy for health and education. The Ministry of Agriculture prepares action plans that require energy inputs.

(iv) Load forecasts – how long? Load forecasts need frequent updating. Rwanda has experienced that loads surpass the projections in the feasibility studies because an area, once it is electrified, attracts migration from neighbouring areas. RE Master Plans also have to be updated regularly; developments and priorities change over the years.

(v) Methodologies for prioritization.

1. The least cost per expected sold kWh
2. Uganda uses in addition a point system, where connected household gives one point, a school x, rural enterprise y points, etc. But as the points more or less reflect the size of annual power demand, the point system gives a similar result as the least cost per sold kWh.

(vi) GIS is of tremendous value in RE; it:

- facilitates integration
- is a communication to the public about progress
- increases the accuracy concerning the identification of the best option to use
- is a monitoring and reporting tool
- is the main tool for customer management

3. Follow-up Issues for AIE

A case can be made for two EIA follow-up (short) issue studies:

- One on key lessons learned from the preparation of larger scale RE Master Plans, with specific attention to what to include in TORs, and organisation of the preparation of RE Master Plans (consultant – agency – rural administration interaction)
- A short note on methodologies for prioritization

1. Session Title and Coordinator	**Offgrid Technology continued: How can low cost solutions be integrated into offgrid projects?** Coordinators: D. Rysankova and K. Reiche
2. Session Objective	Originally planned as a separate Group Work Session, the demand during the two morning sessions on offgrid was so strong, that the afternoon group work was used to continue the vivid discussions and provide additional short presentations on the open questions that had been identified in the morning sessions.
3. Facilitator	Facilitator: A. Cabraal and C. Hellpap
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	4. Continuation of the very lively morning session (Offgrid Technologies) 5. Least Cost comparisons between different low cost offgrid technologies (diesel, biomass, hydro, PV, hybrids) – where will the trend go? 6. More information on the PicoPV / low-cost lighting&ICT products now available for the bottom of the pyramid ("poorest of the poor) who will not be reached by the normal SSA electrification programmes over a long time.
5. Topic and main message/s communicated in the discussion *(bullet points only)*	1. Low-cost offgrid technologies are ready to use and could address a significant part of the SSA access challenge. 2. Participants want to know more about offgrid RE technology options and especially about their costs today
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	1. We have learned quite a lot on offgrid to date, and how to develop offgrid markets, but this know-how is not shared between countries. 2. Technology costs for offgrid RE products such as solar lanterns are coming down very fast.
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	1. Interest by day 2 participants seemed very strong for these offgrid solutions (most participants, request for extension of discussions etc) – that was not to be expected because (i) the participants were SSA practitioners for overall electrification (not for offgrid) and (ii) current SSA electrification programs focus very strongly (and often exclusively, with exception of small pilots) on grid extension. 2. Prices are coming down fast so that offgrid solutions have become a serious alternative to be mainstreamed into the SSA access agenda (both low-end low-cost products as covered by Lighting Africa and EnDev and high-end least-cost village grids such as presented during the session)
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	1. More info on offgrid hybrid systems. If they are ready now, why are there so few large scale proghrams implementing them in LDCs or MICs? 2. Need to understand better the broad pattern of users at the "bottom of the pyramid" 3. What are the exact differences between "lighting" and electrification – and what are the implications of these for national policies and market development efforts?
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	1. Rank 5
10. Your own observations and any other comments *(include estimated size of audience)*	40 participants

Rapporteur's Name and Organization: A. Cabraal, C. Hellpap, D. Rysankova, K. Reiche_(GTZ/WB).

1. Session Title and Coordinator	**What is the role of regulators? (GW2.5)** **The dilemma of cost reflective tariffs (GW 3.2)** Bernard Tenenbaum (Note: This summary combines the discussion relating to regulatory issues in these two breakout sessions.)
2. Session Objective	To discuss the regulatory issues that arise in rural, peri-urban and urban electrification
3. Facilitator	Elijah Sichone, RERA (GW 2.5) Wolfgang Mostert (GW 3.2)
4. Discussion points/ Questions from facilitator	1. Should there be uniform or non-uniform tariffs in rural and urban areas? 2. Lifeline rates: What should the size of the first block and the price level for the first block of tariffs for retail tariffs? 3. What is the meaning of light handed regulation in the context of grid and off-grid electrification? 4. How should tariff setting be coordinated with grants received from REAs/REfs?
5. Topic and main message/s communicated in the discussion *(bullet points only)*	(See the points below in #6.)
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	1. Regulators face constant pressure to equalize urban and rural tariffs. Most African countries have uniform national retail tariffs even though the costs of supply may be very different between urban and rural areas. Two countries (Mali and Vietnam) that have non-uniform rates are now moving towards uniform rates. Most politicians support uniform national tariffs. 2. Uniform national tariffs require that there be a workable cross-subsidy systems: there is sufficient money to subsidize rural systems and the money reaches the targeted customers without "leakage." Peru seems to have considerable success in developing a cross-subsidy system that satisfies these conditions. 3. Most people believe that it is not fair that the poorest people in rural areas should pay the highest tariffs even if the cost of serving them is high. 4. Subsidized or "social" tariffs are not limited to just lifeline rates. Domestic tariffs in Africa are generally not at cost reflective rates. ("Our overall national tariff is a social tariff.") 5. Regulators face different problems depending on who is the electricity provider. The regulatory problem for private operators is getting prices down to costs. The regulatory problem for communities and cooperatives is getting prices up to cost. 6. Light handed regulation needs to be better specified.
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	A follow up session limited to regulators and REA officials would be worthwhile. But the success of the session would require doing more detailed work on ongoing regulatory initiatives within Africa (e.g., the Tanzanian SPP work, the Malian cost of service calculations performed by AMADER and Nambia's resale regulations). See #8 below for some possible issues for such a workshop. Mali has offered to host future AEI workshops. Such a workshop could be combined with site visits. This is desirable because Mali is generally recognized to have had more success in rural electrification than almost any other country in Africa.

8. Questions left unanswered and key follow up actions for AEI	Six major follow up questions were raised in the two sessions: 1. What is an efficient division of responsibilities between a regulator and electrification promotion agencies like REAs that may be performing quasi-regulatory functions in the course of giving grants and loans? Can the regulator delegate (either formally or informally) regulatory functions to other entities (e.g., an REA or an agency that promotes and supports cooperatives)? 2. What are the costs and benefits of promoting uniform national tariffs for retail customers on grid and off-grid systems? 3. What are reasonable commercial and technical quality of service standards for rural providers operating grid and off-grid systems? 4. How can "light-handed" regulation be applied in practice for small private operators of grid and off-grid systems? 5. What is the best tariff setting approach for isolated mini-grid systems? 6. Should regulators adopt a "hands-off" approach for community or cooperative systems? 7. In setting tariffs, should operators that receive capital cost grants be allowed to charge for depreciation on facilities that were built partially or totally with the grants?
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	GW 2.5 attended by about 20 people had to be held in the main auditorium. This was a barrier to good discussion. GW 3.2 became livelier when the participants were asked to describe the level and structure of tariffs that existed in their own countries.
10. Your own observations and any other comments *(include estimated size of audience)*	Discussion sessions should not be "free form." They should be structured. 1. Use the first 15-20 minutes to allow the audience to ask follow up questions of speakers who spoke on related issues. 2. Ask people to describe how their country deals with a particular issue or to describe current practices (e.g., lifeline tariffs) 3. Present hypothetical mini-cases with specific questions for discussion. (See sample handouts that were used to give structure and focus to two of the discussion sessions.) Discussions tend to be disjointed and non-productive because people usually do not listen closely to what other people are saying. Instead, most people are thinking what they want to say when they get to speak. **Recommendation:** a short training session at the beginning of the workshop on how to listen.

Rapporteur's Name and Organization: Bernard Tenenbaum.

1. Session Title and Coordinator	**HowDoYouEncouragePUofElectricity**
2. Session Objective	Address how to encourage PU of electricity
3. Facilitator	Noara Kabir; Dan Waddle
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth. Ask your participants on which of these ten are the most important.)*	1. Successful experiences demonstrating PUs & factors contributing to success. 2. What are potential technologies that can be used for PUs? 3. What stimulates PUs? For whom do rural businesses produce? 4. Can PUs contribute to project sustainability? 5. Is it always financially attractive to connect to rural electric service? 6. How does one promote PU for SHS to increase benefits? 7. How do we define success w/r/t PU programs? 8. What works, & how to promote PU in micro hydro & SHS? 9. How to integrate PU programs on a programmatic scale?
5. Topic and main message/s communicated in the discussion *(bullet points only)*	Insufficient documentation on best practices. What constitutes success – some agreement. For whom do we produce – for net community (project area) benefit. Many/most RE projects do not include PU programs – guidelines, success stories, could be helpful for those programs that choose to employ PU programs. Insufficient evidence that demonstrates the value of PU programs – needs to be verified through further study.
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	Success stories exist, but are not well documented. Further verification is needed to demonstrate value of PU programs. Basic questions remain regarding PU programs, although ample anecdotal evidence exists in support of PU programs.
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	1. Successful PU programs are measured by: a. Increased income by businesses benefited by PU program – or is by the entire community? b. Health centers, schools, public lighting, other loads benefiting the community. c. PU applications help to pay for the RE project. d. If the income of the village increases; if the employment increases; and, if the PU contributes to the viability of the RE project – these are contributing factors to success of PU programs.
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	1. What are potential technologies that can be used for PUs? 2. What stimulates PUs? For whom do rural businesses produce? 3. Is it always financially attractive to connect to rural electric service? 4. How does one promote PU for SHS to increase benefits? 5. What works, & how to promote PU in micro hydro & SHS? 6. How to integrate PU programs on a programmatic scale?
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	4??
10. Your own observations and any other comments *(include estimated size of audience)*	

Rapporteur's Name and Organization: _____

1. Session Title and Coordinator	**What is necessary to develop an M&E? (Share session with: How (and when) do you encourage productive use of electricity?**
2. Session Objective	Encourage M&E component in rural electrification project
3. Facilitator	Voravate Tuntivate (Tig)
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	• What is necessary to develop M&E component for a project? • Is it worth the cost? • Who should finance M&E?
5. Topic and main message/s communicated in the discussion *(bullet points only)*	• Commitment of all stakeholders and financial support are first two necessary keys to develop M&E. Other necessary key for M&E include proven methodologies/techniques, simple and easy to understand research methods and techniques, manageable size of key performance indicators. • M&E is worth the cost, it is the evidence to show success or failure. • All stakeholders should share financial burden for M&E component of the project.
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	Discussion only focused on the pre-defined three questions.
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	The cost of M&E tends to be very high since M&E especially impact evaluation of RE project requires an extensive household survey.
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	None
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	Rank 5 Participants who attended the session have had experience in conducting M&E.
10. Your own observations and any other comments *(include estimated size of audience)*	Time was very short. M&E session shared with productive use session, they are both unrelated only those who are interested in M&E stay on (wait) to attend M&E Group Work. The M&E Group Work must rush to finish on-time, Only about five participants attended M&E Group Work, Attendants actively participated in the discussion and answer the questions.

Rapporteur's Name and Organization: Voravate Tuntivate (Tig) WB Consultant.

Session Title: Financing and Subsidies for Utilities

Facilitator: Tenenbaum
Rapporteur: Wolfgang Mostert

1. Impression from Plenum Presentations on Topic

The presentation during the morning workshop covered overview of financing issues and cases from Ghana, Botswana and Peru. All presentations attracted interest. The presentation of Peru arose particular interest because it presented a scheme for how a comprehensive scheme for how "total" regional and rural-urban cross subsidisation for a "national social tariff" can be set up in a liberalised, decentralised multi-actor scheme for rural electrification. The Peruvian scheme reflects that it was set up by ad-hoc political responses (individual laws) to equity issues; if it were re-designed from the scratch, the Peruvian authorities would implement a simpler scheme fo the financing of required transfers. Otherwise, the presentations showed the "classical picture" of heavy reliance on donor grants and concessional loans for RE finance; and disappointment with the size of private finance that has been attracted so far.

The subject indicated by the heading for the seminar (one would have expected discussion of the roles of concessional finance. RE levies, private equity, commercial bank loans, etc.) was not fully reflected neither in the presentations, nor in the workshop discussions.

2. Discussion points at workshop

The following points were suggested for discussion:

1. Tariff equalization urban-rural
2. Financing up-start SMEs
3. Attracting commercial finance to RE: credit enhancement instruments
4. Financing grid-connected renewable energy
5. Where can we get TA and facilitating finance?

The first subject swallowed up all time. It revealed the high political sensitivity of urban-rural differences in electricity tariffs. The workshop, therefore, started with a round table, where country representatives shortly introduced the situation in their countries.

A number of countries (of those being represented at the workshop) have *differentiated urban-rural tariffs.*

- Mali can with a 60-80 % investment subsidy experience obtain rural tariffs that reflect the capability-to-pay of 40-50% of the rural population. The "urban national tariff" has a social tariff for consumptions below 50 kWh/month
- Sierra Leone is due to the previous civil war in a special situation with hardly any RE outside the main capital. Tariffs in provincial grids are lower than for "national grid"
- Guinea: all private operators operate at full cost coverage. The national utility has a social tariff for the first 60 KWh/month
- Cameroun. The isolated grids are operated by private operators that are not regulated
- Uganda has differentiated tariffs; but implementation gives difficulties – e.g. tariffs for new RE consumers through Government financed grid-extensions from the inter-connected national distribution grid given in concession to a private operator, receive the same tariffs as all other consumers.
- Tanzania's state owned utility operates the interconnected as well as isolated rural girds, all its customers face the same tariff schedule, social tariff for consumptions below 50 kWh/month. Small private operators and missionaries have separate tariffs. There is a 3% RE levy on national electricity consumption

Other countries have a national tariffs, most include a "social tariff", some have below cost tariffs for all:

- Angola: average national tariff is below cost, present policy is to increase it to cover costs of O&M; social tariff for consumptions below 100 kWh/month

- Swaziland: has no isolated grids. Social tariff for consumptions below 150 kWh/month
- Congo has three large interconnected networks and a number of small grids; 90% of supply is hydro-power based. The average national tariff is below cost, and the LV-tariff is lower than the MT tariff
- Côte d'Ivoire's CIE distribution monopoly has social tariff for consumptions below 40 kWh/month
- The tariff policy for Namibia's national utility operates on full cost coverage, giving the utility a credit rating. The country is divided into five regional networks; tariffs are the same.
- Nigeria's average national tariff is below cost. The tariff is the same everywhere, as Nigeria has moved towards pre-paid meters.

Two countries are in an in-between situation:

- In Peru, the Government subsidy & transfer policy provides the same social tariff for consumption up to 30 kWh; higher and other consumer category consumptions pay full cost. More precisely: the average tariff for consumers having a consumption higher than 100 kWh is above cost, meaning that these consumers cross-subsidize
- RSA has municipal tariffs, social tariff for consumptions below 150 kWh/month, first 50 kWh are given free of charge for all in the country.

A separate, specific financing issue that came up is regulatory framework for how to handle non-paying customers. In some countries, utilities cannot disconnect a household customer who refuses to repay a loan given to cover the cost of connection.

3. Main Messages, Gist of Discussion

All countries, including those that at present have urban-rural differentiated tariffs face steep pressures for tariff equalization.

4. Follow-up Issues for AIE

It is suggested to initiate the preparation of the following short papers:

- Integration of pre-paid meters with life-line tariff policies
- Short political communication paper on trade-offs in aligning rural and urban tariffs: between equity and high connection rates in electrified areas, on the one hand, and lower number of electrified villages on the other hand. Observations in the paper should be supported by quantitative estimates of the size of the trade-offs, based on modelling.

- Ways to combine rural-urban equity with competition for lowest subsidies

1. Session Title and Coordinator	**Finance and Microfinance for Africa Electrification**
2. Session Objective	Discussion of the opportunities and challenges around the topic enduser financing through utilities and microfinance and finding out how AEI can support former enhancing activities
3. Facilitator	Noara Kebir, MicroEnergy International, Felistas Coutinho, Tujijenge Africa
Discussion points/ Questions have been collected from participants – and in brief the answers (if they have been mentioned)	Question Block 1: Approaches • What is the best approach to enhance electrification in rural areas? • How is outreach possible • How can we persuade the MFIs to start energy loans? • How can we learn from others especially from the Kenyan experience? • How can West-Africa learn from East Africa? Question Block 2: Practice • How can we add value to the system which is getting a much higher price through micro-financing? • How can capacity building look like for better quality assurance through MFI • How can we do capacity building within MFIs to enable them to evaluate the quality of products Question Block 3: Legal Framework • How can we implement an MF mechanism in an ongoing project – What is the ideal legal framework, especially regarding the possibilities of credit recovery? • How can we address the legal problem of removing the grid connection because of not paying the connection fee Question Block 4: Financing • What are sources of fund for MFIs if they are willing to develop an energy product • How can we combine end-user finance with carbon finance mechanism to get the price down? • How can we get commercial banks to lend for RE projects
4. Topic and main message/s communicated in the discussion *(bullet points only)*	• Financing through Utilities, Equity Bank and MFIs • Financing On-Grid Access, • Financing Off-Grid Access • The role of MFIs • How to empower MFIs to get on board
5. Gist of the discussion *(provide a brief summary of the questions and answers)*	• See page down
6. Most important, key message that you would like to be included in the closing session (*one bullet point*)	• Financing mechanisms if well customized to suit the needs will potential speed up the access to electrification since upfront costs tend to be high thus a stumbling block for electrification – So there is a need for a practical implementation plan.
7. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	5, participants were all eager to share their views even if it was to emphasize what an earlier idea had expressed. This even stretched the meeting to take up much more time than was provided for.

8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	5. Gist of the discussion
	• The financing aspect is crucial to electrification and we have to develop different strategies for the poor and the very poor (who are even not reached by the MFIs)
	  ○ in urban,
	  ○ peri-urban,
	  ○ slums,
	  ○ rural
	  ○ and remote areas.
	• The experience and know how of recovering in case of loan failure is crucial, this is why a partnership with a financial institution like the Equity Bank, TMF or FINCA is important
	• The legal conditions of disconnecting in case of failure in paying the connection fee still a problem to address – It is an important instrument for financing grid connection as financial institutions need it as an enforcing measure
	• MFIs need incentives to develop rural programs – The participation in an electrification program can be such an incentive
	• MFI should start looking for the opportunity of grid connection
	• There is a need to share experiences and to transfer lessons learned from east to west Africa.
	• There is a tremendous need of coordinating the financial resources in the sector to close the existing gaps in providing finance for RE companies and enduser financing through utilities or through Banks/MFIs
	• What can be done? Case by Case / Country by Country support through
	  ○ identification and
	  ○ structuring of resources,
	  ○ capacity building and
	  ○ Exchange of experiences
	• There are interesting opportunities to institutionalise energy with housing programs (UN Habitat)
	• Inter-sectoral cooperation is an important success factor, as the experience in Namibia have shown – The electrification stakeholders have regularly invited the MFIs and stakeholders from agriculture and telecommunication sector to their discussions and workshops to involve them as much as possible
	• The network of MFIs can be helpful to implement service and maintenance structures who hence represent the added value of the higher price.
	• Energy Efficiency should also be addressed and need financing aproaches
	• A step by step guide for parties to follow if they want financing for rural electrification / Policy can be helpful.

9. Your own observations and any other comments *(include estimated size of audience)*	Estimated size of audience was 34 participants. Most participants believe easily accessible finance products to the off-grid population would go a long way in supporting electrification be it for rural or urban areas and the audience repeatedly voiced their concern on lack of knowledge concerning financing options.

Rapporteur's Name and Organization: _____

1. Session Title and Coordinator	**Subsidy Clinic continued: How can low cost solutions be integrated into offgrid projects?** Coordinators: D. Rysankova and K. Reiche
2. Session Objective	During the Subsidy Clinic, there was strong demand from several group members to discuss in more detail and then actually apply the "Subsidy Matrix" that was presented as part of the clinic. The afternoon Group Work session on which we report here answered this demand.
3. Facilitator	Facilitator: A. Schweinfurth and K. Reiche
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	The group of the morning session (Subsidy Clinic) had decided to focus the on-demand afternoon Group Work on three topic s only: 1. Answer the many detail questions to the matrix and decide if useful for SSA. 2. Can the Matrix be applied as is to SSA cases and what would need changes? 3. Apply the Matrix together to an example case proposed by the Group (in this case, a real-life case of donor-funded shs subsidies by a large utility in North Africa)
5. Topic and main message/s communicated in the discussion *(bullet points only)*	3. The Subsidy Matrix can indeed help policy makers and practitioners; it should be developed further and applied in more countries. 4. Tendering subsidies intelligently is a typical challenge for most of the participants; the discussion reflected that participants have many open questions re clever design of tenders, contracts and subsidies – it was asked that further work should focus on better subsidy tenders.
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	1. Market conditions and policy aims differ with countries, so one needs to look at each situation one by one to find good subsidy designs. 2. It takes some time even for experienced practitioners to understand new set-ups or views from other countries (for instance during the group discussion). 3. The matrix seems to be a good tool for such structured analysis. 4. The Group Work looked at the real-life SHS subsidy case selected by the group (and explained by two group members) and tried to come up with possible adjustments to this subsidy design by using the matrix. Several features of the design were analyzed one by one, the group identified a main reason for the weak performance and suggested a design adjustment for improvements. The results of this group work are shown by the powerpoint slide used during the session (see PPT attached).
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	1. Good subsidy design requires a systematic analysis of market conditions and policy priorities; therefore structured approaches to subsidy design such as the subsidy matrix are an important tool for practitioners and policy makers. 2. The Group work actually applied the matrix and finished a difficult job (identify options for improvement of an existing SHS subsidy scheme selected by the group) in only one hour.
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	4. Apply matrix in more SSA countries and on other access types 5. More information on clever tender design for access subsidies

9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	Rank 5 (highest): Very engaged participants and heated but constructive discussions - especially, when working on the case study with the matrix tool.
10. Your own observations and any other comments *(include estimated size of audience)*	~20 participants, held in French as all participants happened to speak and prefer French language and there was no translator in the room for this impromptu session.

Rapporteur's Name and Organization: K. Reiche (World Bank)

THE WAY FORWARD
RECOMMENDATIONS FROM THE MAPUTO WORKSHOP 9/12 JUNE 2009

A working group at the AEI workshop discussed possible future activities for the initiative, to follow from the first workshop. Below is a brief summary of the findings and recommendations of that working group, which were presented at a plenary session.

OBJECTIVES OF THE INITIATIVE

As proposed in the concept note for the initiative the main objective of the initiative is "to create a living body of practical knowledge and a network of African practitioners (of electrification activities)". The following more specific objectives were noted.

- To capture and share experience,
- To facilitate information exchange,
- To make information available, including information on "how to do it" and "how to overcome barriers".
- Capacity development.

STAKEHOLDERS

Stakeholders of the initiative – those who would either take an active part, or for whom the findings would be relevant include:

- Staff of Rural Electrification Agencies, Rural Energy Agencies, Rural Electrification Funds,
- Electrical Utilities,
- Power Pools
- Governments – ministries of energy in particular,
- Regulators with responsibility for energy,
- Financial Institutions – national, regional multi-lateral, bi-lateral,
- Private sector – developers, power sector construction companies, private power providers, equipment suppliers,
- Universities,
- International Agencies.

INFORMATION AND KNOWLEDGE PRODUCTS

Information from the workshop – presentations, papers, reports, manuals, guidelines will be shared electronically after the workshop. The coordinators of the initiative will seek to assemble and share the following types of information:

- Knowledge gaps, identified through questionnaires and discussion with stakeholders,
- Study tours to be arranged to locations where there are examples of good practice,
- Specialist workshops on priority themes identified by stakeholders,
- "Yellow Pages" – identifying sources of information on specialist subjects – who knows what.
- Advisory service and mentoring,
- Key success factors in African Electrification,
- Technology and technology transfer information,
- Internet site with key documents, blog space, chat rooms, links (to be designed).

1. Session Title and Coordinator	**Climate Change and Access**
2. Session Objective	1. Demonstrate the existence of CDM/carbon finance opportunities in Africa 2. Explore some of the recent approaches and methodologies which could facilitate Africa's greater participation in CDM with some emerging examples in Africa and worldwide 3. Explore other financing opportunities for electricity access from increased global focus on climate change
3. Facilitator	Marijm Palm, SIDA (Session Chair) Anil Cabraal Facilitator and Moderator for Follow-up Session
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	1. With less than 3% of CDM projects in Sub-Saharan Africa (less than 1% outside South Africa), what can be done to increase Africa's share? 2. With 2012 fast approaching, is there any value to developing new projects 3. How can CDM credit aggregation be done efficiently and with lower transactions costs, given the small size of typical electricity access projects? 4. What role can government agencies such as REA play?
5. Topic and main message/s communicated in the discussion *(bullet points only)*	• A World Bank funded study in 2008 identified huge opportunities for CDM projects in SSA – 3200 projects with the potential capacity of 170 GW. But CDM projects are not only in large power generation or efficiency improvement projects, but also in energy access. For example, annual expenditure of kerosene for lighting in Africa is about $17 billion and the CO2 emissions are equivalent to that of a 5000 MW coal-fired power plant • The four speakers discussed this potential and described new methodologies that have been approved by the CDM Executive Board as well as the Program of Activities approach that can facilitate SSA CDM projects. • However, CDM benefits are an additional revenue stream and as such by itself is insufficient incentive to lead to clean energy investments. For CDM projects to be developed, countries need the right policy and regulatory environment and access to investment capital, together with developers with capability.
6. Gist of the discussion *(provide a brief summary of the questions and answers)*	• The end of the first commitment period under Kyoto should not stop CDM project development in SSA as this region will remain a priority given the sustainable development co-benefits that clean energy projects will generate. • In addition to CDM, the voluntary carbon market should be considered seriously SSA. While the voluntary market will have a lower carbon price, the requirements for verification etc will be less stringent. • The REAs can play a very important role in both supporting the creation of an enabling environment and as a leader in carbon market aggregation, especially for PoA projects. • The recent changes to PoA requirements such as permitting different CDM methodologies to be used within one PoA and the acceptance of regional PoA makes this approach more useful in SSA. • Regional PoA, while attractive in concept, may be complicated in implementation due to the need to reach a central policy or regulatory position across the participating countries with respect to the regional PoA. • SSA must become more engaged in climate negotiations so that rules and procedures that benefit SSA are adopted. SSA negotiators are far too passive.

7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	• REA or other agency in SSA countries must take the lead in making the low carbon energy project potential identified in World Bank study a reality with help in creating enabling environment and supporting project development and CDM project aggregation.

8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	• Technical assistance facility to support pre-investment work in SSA CDM projects. Discuss with CF-Assist if they can support this pre-investment facility as its current focus on CDM training is of limited value unless projects can be developed.
	• Support for creating market enabling conditions in countries
	• Transfer of methods or approaches and best practices from other countries. E.g. Bangladesh 1 million SHS CDM project.
	• Develop an approach for REA to take leadership in a country/regional PoA. Examples cited were:
	  ○ Rwanda: CDM for its 400,000 CFL project and a proposed micro-hydro and rural biogas. Lake Kivu gas project could have replicability in other countries bordering Lake Kivu.
	  ○ Uganda 800,000 CFL
	  ○ Tanzania grid and mini-grid renewables and off-grid PV.
	• Collaborate with Norway who is helping identify CDM projects in SADC countries.

9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	4
10. Your own observations and any other comments *(include estimated size of audience)*	~50

Rapporteur's Name and Organization: Anil Cabraal, The World Bank

List of Handouts, Presentations attached:

- Felix Dayo, Director, Triple "E" Systems Inc., "Potential for low carbon energy development in SSA".
- Gajanana Hedge, Program Officer, UNFCCC Secretariat, "Small Scale CDM Methodologies".
- Charlotte Streck, Director, Climate Focus, "CDM and other financing options".
- Ousmane Fall Sarr, Directeur, des Etudes et du Système d'Information, Agence Sénégalaise d'Electrification, "Public-private partnership (Senegal)".

1. Session Title and Coordinator	**Prepayment Systems/Connie Smyser**
2. Session Objective	Learn more about the pros and cons of prepayment systems and experience in the field with them.
3. Facilitator	None
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	Questions were not prepared. Rather EdM gave a PPT presentation on their prepayment program and this engendered questions.
5. Topic and main message/s communicated in the discussion *(bullet points only)*	>Prepay systems are quite prevalent, used in different ways (urban vs. rural or middle class or low income depending on the reason for using them.) >Customers in general like the meters. The main problem, access to vending stations, has largely been solved in newer instances. >Most companies report significant reductions of non-technical losses as a result of implementing the system. >Some older systems lack the best features of prepay (e.g., split meter technology for greatly reducing theft, providing instant read-out on usage for customer control purposes, communication systems to allow company easy tally of kWh sold vs. delivered, etc.) Obtaining these features may mean total replacement of the management system and possibly the meters too.) >Failure rate and life of the equipment is also a problem, particularly for older systems. >There may be incompatibility of prepay systems with basic utility management systems such as SCADA. Once a particular system is adopted, despite STS standardization of meter technology, the rest of the data management system may be proprietary and therefore difficult to change without changing out the whole management system.

6. Gist of the discussion *(provide a brief summary of the questions and answers)*	Participants asked follow up questions about their system, how it works, what problems they have encountered, and related their own experiences with prepayment.
7. Most important, key message that you would like to be included in the closing session (*one bullet point*)	Prepayment systems have improved vastly over the last decade and offer many advantages but are more costly, may have integration problems with existing utility management systems, and need to be carefully planned to optimize features available without excessive cost.
8. Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)	Tariff issues, such as incorporating fixed fees, and ways to reduce the barrier of connection fees, could use further elucidation so that potential users or those upgrading their systems know what the options are now that technology has improved significantly. Rules of thumb on costs of different aspects of the prepayment system and what benefits are gained by including features, such as two way communication, vs the cost of those features.
9. Participant engagement *(Rank 1-5, 1 being least engaged, 5 being the most, and indicate your reasons for the ranking)*	5, well attended for a Friday supplemental session; no-one left early, many questions and much interchange.
10. Your own observations and any other comments *(include estimated size of audience)*	35 minimum

Rapporteur's Name and Organization: Connie Smyser.

1. Session Title and Coordinator	**Quality Assurance, Service, Maintenance and Consumer Protection**
2. Session Objective	Discussion of three hypothesis around the topic and finding out how AEI can support former enhancing activities
3. Facilitator	Noara Kebir, MicroEnergy International
4. Discussion points/ Questions from facilitator *(Prepare ten questions of which 3-5 are to be discussed in depth.* *Ask your participants on which of these ten are the most important.)*	Introduction to the theoretical view of *product service systems* looking at services as activities who complement the product to fulfill all the requirements Discussed hypothesis 1 – The product and the services complement each other in fulfilling all the requirements expected by the user - The more the artifact is adapted, the less service is needed - No artifact is so perfect that no service is needed • It is a question of cost structure and willingness to pay if a company emphases more on product or on service quality – In general you invest one time in a product but services create running cost who are more expensive on a longer term – For private, profit oriented companies, the first case can be more attractive – The second case can be more attractive for public stakeholders as it has a job-creating effect. • Competition of services is helpful (see example of utilities with monopoly) • Service is a the first thing where companies try to save Discussed hypothesis 2 – There is a mindset challenge because service is often associated with serving – which is traditionally not a valued task (neither valued by money neither by respect), furthermore, a majority of addressed poor customer in rural electrification, are often not considered as customers worth to get a respectful service (specially in programs where they don't pay for it) Hypothesis 3 – On one side, typical On-grid-Utilities are used to services, but they don't value the customer enough because he do not have a choice (monopolistic behavior), on the other side, Off-Grid Supplier have more knowledge in engineering, product development and design. Service know how is not existing and something they have to learn – Specially how to include those costs in their calculations.

5. Topic and main message/s communicated in the discussion *(bullet points only)*	• We need a more analytic and systematic discussion on service and maintenance in electrification initiatives and not only the remark "service and maintenance is important"
	  • More theoretical background,
	  • Documentation of existing best practice
	  • Experiences from other sectors

6. Most important, key message that you would like to be included in the closing session (*one bullet point*)	The value of service has to be increased – In mindsets as well as in pricing.
7. Your own observations and any other comments *(include estimated size of audience)*	See below
8. Your own observations and any other comments *(include estimated size of audience)*	See below

9. Gist of the discussion (provide a brief summary of the questions and answers)	• Service need to be valued – On a social-cultural level and by pricing:
	  • Low cost – low service
	  • Price competition in tenders make companies save on services – new tendering strategies are required (e.g. tenders with focus on energy services and not on component price)
	  • Services mainly become a challenge at the end of the projects
	  • In general, consumer don't want to pay for service if they have the choice so different ways of valuing service should be evaluated:
	  i. Directly by the customer – as usual for micro-financed energy services, empowering the customer with the opportunity to refuse to pay back to loan if the service is not satisfying.
	  ii. Connecting the subsidies to better services: Disbursing the usual subsidies for the product not after installation but after x years of running the energy unit.
	  iii. Controlling the pricing of the energy service companies to make sure that "service" is included.
	• Macro programs of capacity building are needed – Not only on technician level but also company managers have to learn about organization and pricing of services.

Questions left unanswered and key follow up actions for AEI (*in Thematic Groups*)

- In which areas do we need more service, in which less?
- There are also a lot of challenges in controlling the supply chain (plagiarism, fake products etc.) – How can we deal with that?
- How to deal with the mind set problems on servicing?
- What is the price for service? And how can we create the willingness to pay for it?
- How can regulators play a better role in assuring the quality of services?
- How can we implement quality assurance mechanism that is not only focusing products but also services and supply chains?
- A better access to technical information and to norms is required
- Studies on best practice in the energy field and in other sector are needed

Your own observations and any other comments *(include estimated size of audience)*

Around 20 people have been in the session – 11 of them have given me their business cards as they are interested in an active follow up process of the topic.

Furthermore the participant MRO Shimweefeleni G. Hamutwe - Jr. will send some documents on the successful training program on service and maintenance in Namibia and the participant Nava Touré from Guine have provided a presentation from a study they have done to find out the typical problems of energy appliances.

Rapporteur's Name and Organization: Noara Kebir, MicroEnergy International

CLOSING REMARKS

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO DA ENERGIA

GABINETE DO MINISTRO

SEMINÁRIO DE PERITOS SOBRE A INICIATIVA DE ELECTRIFICAÇÃO EM ÁFRICA

Discurso de Encerramento

pelo

Engº Pascoal Alberto Bacela

Director Nacional de Energia Eléctrica e

Presidente do Comité Directivo do (FEMA)

MAPUTO, 11 DE JUNHO DE 2009

Digníssimos Representantes dos Estados Membros do FEMA,

Senhor Boris Utria, Representante do Banco Mundial,

Senhor Ray Holland, Representante da Iniciativa de Energia da União Europeia do GTZ,

Distintos Convidados,

Minhas Senhoras e Meus Senhores,

Chegados a esta fase conclusiva dos trabalhos do I Seminário de Peritos, inserido no âmbito da Iniciativa de Electrificação em África, cabe-me, em nome do Governo de Moçambique e do Fórum dos Ministros de Energia da África (FEMA), a honra e o privilégio de exprimir o nosso apreço a todos vós digníssimos participantes, na certeza de que nestes três dias de intensos debates, tenham sido atingidos os objectivos definidos.

Como temos todos presente, constituíram temas principais deste Seminário, o **Quadro Institucional**, incluindo **Aspectos de Regulação** no concernente à Electrificação; a **Planificação e as Opções Tecnológicas** mais apropriadas, bem assim as **Questões de Financiamento e Alocação de Subsídios**.

Estas questões, no seu conjunto ou em parte constituem os desafios centrais na busca de soluções mais ajustadas para o continente africano, na prossecução do objectivo de aumento do acesso aos serviços modernos de fornecimento de energia, com impacto directo na melhoria da qualidade de vida dos cidadãos dos nossos Países.

O nível e o conteúdo das apresentações, intervenções e debates que tivemos no decurso destes 3 dias, permite-nos avaliar positivamente os resultados do Seminário, porquanto conseguimos atingir os objectivos a que nos propusemos e até mesmo ultrapassar as expectativas.

Com efeito, as valiosas experiências transmitidas pelos participantes, oferecem um conjunto de conhecimentos e informação relevante na

construção de modelos para electrificação, correspondentes às condições e realidades específicas de cada um dos nossos Países.

Foi para nós particularmente encorajador depreendermos que, de entre os modelos aplicáveis e as opções relativas ao quadro institucional, o sector público, como instrumento do Governo na materialização de políticas de desenvolvimento, mantém o papel determinante na expansão do acesso, em especial nas zonas rurais. Porém, há igualmente que reconhecer o papel relevante que o sector privado desempenha neste âmbito.

Minhas Senhoras Meus Senhores,

Um aspecto que gostaria de sublinhar é a necessidade de, ao adoptarmos os modelos que se afiguram mais apropriados no processo de electrificação nos nossos Países, tomarmos em linha de conta a importância de assegurar a sua sustentabilidade a longo prazo.

O Fórum dos Ministros de Energia da África assumiu este projecto da Iniciativa de Electrificação em África, não só pela sua relevância, mas sobretudo pela certeza de que o mesmo irá gerar um fluxo de conhecimentos, baseado em experiências concretas que irão fortalecer e estimular a convergências das abordagens dos principais intervenientes.

A este respeito, refiro-me particularmente aos Governos, os parceiros de apoio ao desenvolvimento, sector privado, instituições de financiamento e as instituições de pesquisa.

Caros participantes,

Não gostaria de terminar sem antes renovar o nosso reconhecimento pelo esforço empreendido na concepção e estruturação deste projecto, confirmado como pudemos testemunhar, pelos resultados que logramos alcançar.

Neste contexto, queria reiterar os nossos agradecimentos ao Comité de Assessoria, cujo papel foi determinante na consolidação do projecto, incluindo a identificação de temas bastante pertinentes, que foram objecto de debate neste Seminário e que se traduziram nas importantes recomendações que acabamos de receber.

Neste sentido, permitam cumprimentar de modo individual os membros do Comité de Assessoria e que passo a nomear:

- **Alassane Agalassou, do Mali;**
- **Nava Touré, Guiné**
- **Lutengano Mwakahesya, Tanzânia;**
- **Ousmane Fall Sarr, Senegal;**
- **Jabesh Amissah-Arthur, Ghana;**
- **Luís Amado, Moçambique.**

Aos oradores, pelo esforço e tempo que se dignaram dedicar na preparação dos materiais e pela forma eloquente como souberam transmitir os seus conhecimentos e, a todos os participantes pelo dinamismo que conferiram aos debates, manifestamos o nosso maior apreço.

Aos nossos parceiros de cooperação, em especial o Banco Mundial, a Iniciativa Europeia de Energia e o GTZ, queremos expressar a nossa sincera apreciação por terem apostado no projecto e, depositado confiança ao FEMA através da sua presidência actualmente exercida por Moçambique, na pessoa de Sua Excelência o Ministro da Energia, Dr. Salvador Namburete.

Finalmente, em nome do Governo de Moçambique e do Fórum dos Ministros de Energia da África (FEMA), queremos reafirmar o nosso cometimento em prosseguir na implementação deste importante projecto.

Com estas palavras declaro encerrado o I Seminário de Peritos sobre a Iniciativa de Electrificação em África, formulando votos de que, os resultados das discussões havidas possam contribuir para o crescimento do sector energético.

Votos de um bom regresso.

Muito obrigado

ANNEX 1: RESOURCES IN THE WORKSHOP BAG

Sample Operational Documents

Master Plans and Prospectuses for Seeking Donor Funding

1. Rwanda—Castalia Strategic Advisors, Prospectus for Rwanda Electricity Sector Access Programme—Volume I (March 2009, Final Working Draft, 89 pages) and Volume II, Technical Annex Containing Least Cost Master Plan (March 2009, Final Working Draft, 34 pages)

Rural Electrification Agencies/Funds

- **Laws**

  2. Cambodia--Statute of the Rural Electrification Fund of the Kingdom of Cambodia (November, 2005, PDF, 7 pages)
  3. Tanzania—The Rural Energy Act (2005, 26 pages)

- **Operation Manuals**

  4. Cambodia—Operational Manual For Rural Electrification Fund (January 2007, 81 pages)
  5. Nigeria—Proposed Rural Electrification Manual (2005, 52 pages)

- **Information Packages For Investors**

  6. Uganda-- Renewable Energy Policy: Information Package for Investors (2006, 71 pages)
  7. Bolivia SHS Medium Term Service Contracts - Teaser for Tender Package (2004, 14 pages)

- **Pre-Investment Surveys**

  8. Tanzania-Pre-Investment Survey For Sustainable Solar Market Packages Project (Undated, 42 pages)

- **TORs for Consultants**

  9. Sri Lanka—Village Hydro/Biomass Economic Benefits Verification (2002, 2 pages).
  10. Sri Lanka—Village Hydro/Biomass Installation Verification (2002, 2 pages).
  11. Sri Lanka—Post Completion Audit of Sub-Projects (2002, 2 pages).

- **Subsidy/Grant Applications and Agreements, Conditions of Service and Concessions**

  12. Sri Lanka—Project Application Form (October, 2005, 3 pages).
  13. Mali—AMADER-Cahier de Charges (Undated, 15 pages, in French).
  14. Mali—AMADER—Contrat d'autorisation (Undated, 11 pages, in French).
  15. Mali—Convention de Financement (Undated, 10 pages, in French).

Connecting Entities

- **Contracts With Village Level Agents**

  16. Vietnam—EVN: Contract with Service Agent (2008, 12 pages).

- **Technical Standards**

  17. Vietnam—Principal Technical Standards For Electrical Materials and Construction Structures Part I (MV and LV) (2006, 62 pages) and Part II (2006, 37 pages).

Regulatory Entities

18. Tanzania—EWURA, Guidelines For Grid Interconnection of Small Power Projects in Tanzania (Part A—Mandatory Requirements and Test Procedures (38 pages), Part B—Technical Guidelines (33 pages), Part C—Appendices- Studies To Be Conducted, Islanding and Protection(44 pages) (March 2009, Working Draft For Public Consultation)(Short title: Interconnection Guidelines)
19. Tanzania—EWURA, Guidelines for Developers of Small Power Projects in Tanzania (March 2009, Working Draft for Public Consultation, 53 pages) (Short title: Process Guidelines)
20. Vietnam, Regulation on Organization and Operation of Electric Power Retail Service/Network (Undated, 24 pages)

Background Reports and Studies

ESMAP Administrative Reports

1. ESMAP Annual Report CY2007-FY2008.

ESMAP Flagship Reports

1. Restoring Balance: Bangladesh's Rural Energy Realities. ESMAP Special Report 006/09.

2. People and Power: Electricity Sector Reforms and the Poor in Europe and Central Asia. World Bank Directions in Development Series. ISBN 0-8213-6633-5.

3. Energy Services for the Millennium Development Goals: Achieving the Millennium Development Goals. This book is Joint Publication by ESMAP, UNDP, Millennium Project and the World Bank, 2005.

4. Energy and the Millennium Development Goals in Africa: The Forum of Energy Ministers of Africa. ESMAP, 2006.

5. Energy Development Report 2000: Energy Services for the World's Poor. Chapter 7, The Role of Energy Subsidies by Douglas F. Barnes and Jonathan Halpern.

6. Energy Development Report 2000: Energy Services for the World's Poor. Chapter 10, A Case Study on Exclusive Concessions for Rural Off-grid Service in Argentina. Alvaro J. Covarrubias and Kilian Reiche.

ESMAP Formal Reports

1. Maximizing the Productive Uses of Electricity to Increase the Impact of Rural Electrification Programs. ESMAP Formal Report 332/08.

   CD Contents to Report 332/08.

2. Lao: Institutional Development for Off-grid Electrification. ESMAP Formal Report 215/99.

3. India: Access of the Poor to Clean Household Fuels. ESMAP Formal Report 263/03.

4. The Electricity Law for Vietnam Status and Policy Issues The Socialist Republic of Vietnam. ESMAP Formal Report 259/02.

5. The Impact of Energy on Women's Lives in Rural India. ESMAP Formal Report 276/04.

6. India: Household Energy, Indoor Air Pollution and Health. ESMAP Formal Report 261/02.

7. Peri-Urban Electricity Consumers: A Forgotten but Important Group: What Can We Do to Electrify Them? ESMAP Formal Report 249/01.

8. Peru Rural Electrification. ESMAP Formal Report 238/01.

9. Power Sector Reform In Africa: Assessing the Impact on Poor People. ESMAP Formal Report 306/05.

10. Reducing the Cost of Grid Extension for Rural Electrification. ESMAP Formal Report 227/00.

11. Rural Electrification and Development in the Philippines: Measuring the Social and Economic Benefits. ESMAP Formal Report. ESMAP Formal Report 255/02.

12. Rural Electrification in Tunisia: National Commitment, Efficient Implementation and Sound Finances. ESMAP Formal Report 307/05.

13. Sri Lanka Electric Power Technology Assessment Vol. III. ESMAP Formal Report 262/03.

14. Zimbabwe Rural Electrification Study. ESMAP Formal Report 228/00.

15. Best Practice Manual: Promoting Decentralized Electrification Investment. ESMAP Formal Report 248/01.

ESMAP Technical Reports

1. Technical and Economic Assessment of Off-grid, Mini-grid and Grid Electrification Technologies. ESMAP Technical Paper 121/07.

2. Brazil: How do the Peri-Urban Poor Meet their Energy Needs: A Case Study of Caju Shantytown, Rio de Janeiro. ESMAP Technical Paper 094/06.

3. Ghana: Poverty and Social Impact Analysis of Electricity Tariffs. ESMAP Technical Paper 088/05.

4. Household Energy Use in Developing Countries A Multicountry Study. ESMAP Technical paper 042/03.

5. Household Fuel Use and Fuel Switching in Guatemala. ESMAP Technical Report 036/03.

6. Kenya Portable Battery Pack Experience: Marketing an Alternative for Low-income Rural Household Electrification. ESMAP Technical Paper 012/01.

7. Meeting the Energy Needs of the Urban Poor. ESMAP Technical Paper 118/07.

8. Nigeria: Expanding Access to Rural Infrastructure: Options for Rural Electrification, Water Supply and Telecommunications. ESMAP Technical Paper 091/05.

9. Opportunities for Women in Renewable Energy Technology Use in Bangladesh (Phase I). ESMAP Technical Paper 055/04.

10. Sector Reform and the Poor, Energy Use and Supply, in Four Countries: Botswana, Ghana, Honduras and Senegal. ESMAP Technical Paper 095/06.

11. Stimulating the Picohydropower Market for Low-Income Households in Ecuador. ESMAP Technical Paper 090/05.

12. Tanzania: Mini Hydropower Development Case Studies on the Malagarasi, Muhuwesi, and Kikuletwa Rivers. ESMAP Technical Paper 024/02.

13. Brazil Background Study for a National Rural Electrification Strategy: Aiming for Universal Access. ESMAP Technical Paper 066/05.

14. Mini-Grid Design Manual. ESMAP Technical Paper 007/00.

ESMAP Knowledge Exchange Series Notes (KES)

1. KES#2: Transformative Power: Meeting the Challenge of Rural Electrification.

2. KES#3: Four Regulatory Principles to Promote Diverse Electrification.

3. KES#5: Primer on Consumer Surplus and Demand: Common Questions and Answers.

4. KES #10 Electricity Beyond the Grid: Innovative Programs in Bangladesh and Sri Lanka.

5. KES#11 Scaling up Renewable Energy in China: Economic Modeling Methods and Application.

6. KES #12: Easing Investment Barriers: Nicaragua's Renewable Energy Potential.

Energy and Mining Sector Board Paper Series

1. Operational Guidance for World Bank Group Staff. Designing Sustainable Off-Grid Rural Electrification Projects: Principles and Practices. November 2008.

2. Electrification and Regulation: Principles and a Model Law. Energy and Mining Sector Board Discussion Paper No. 18. July 2006.

3. Reforming Power Markets in Developing Countries: What Have We Learned? Energy and Mining Sector Board Discussion Paper No. 19. September 2006.

Lighting Africa Initiative

1. LIGHTING AFRICA YEAR 1: Progress and Plans Annual Report. September 1, 2007. August 31, 2008.

2. Catalyzing Markets for Modern Lighting Brochure.

World Bank Independent Evaluation Group (EIG)

1. The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits EIG, 2008.

World Bank Working Paper Series

1. Energy Policies and Multitopic Household Surveys Guidelines for Questionnaire Design in Living Standards Measurement Studies. World Bank Working Paper No. 90.

2. Assessing Markets for Renewable Energy for Rural Areas of Northwestern China by V. Susan Bogach, Douglas F. Barnes, Tuntivate Voravate. Draft.

Policy Research Working Paper Series (formerly the Energy and Industry Department)

1. Domestic Lighting. Van der Plaas. November 1988. WPS 68.

Energy, Poverty, and Gender Project (EnPoGen)

1. Rural Electrification in Indonesia and Sri Lanka: From Social Analysis to Reform of the Power Sector by Michel Matly.

2. Energy, Poverty, and Gender: A Synthesis by K. V. Ramani and Enno Heijndermans.

3. ENERGIA News, vol. 5, no. 3, November 2002. Special edition on the World Bank's Asia Alternative Energy Program (ASTAE) and ASTAE's Energy, Poverty, and Gender Initiative.

Global Partnership on Output Based Aid (GPOBA)

1. OBApproaches #10: Output-based aid in the Philippines Improving electricity supply on remote islands. 2006.

2. OBApproaches #12: Output-based aid in Bolivia: Balanced Tender Design for Electricity Access in Difficult Markets. 2007.

3. OBApproaches #14: OBA in Senegal – Designing Technology-Neutral Concessions for Rural Electrification. 2007.

Public Private Infrastructure Advisory Facility (PPIAF)

1. Trends and Policy Options # 5: Building Bridges. China’s Growing Role as Infrastructure Financier for Sub-Saharan Africa.

2. Trends and Policy Options # 6: Does Private Sector Participation Improve Performance in Electricity and Water Distribution?

3. Gridlines # 13: Financing infrastructure in Africa: How the region can attract more project finance.

World Bank Viewpoints

1. Promoting Private Investment in Rural Electrification-The Case of Chile. Note No. 214, 2002.

2. Network Expansion Using an Output-Based Scheme in Guatemala. Note No. 245, 2002.

World Bank Export Competitiveness Thematic Group

1. Solar Energy Answer to Rural Power in Africa. FPD No. 6, 1994.

Articles/Journals

1. Rural Energy and Development Improving Energy Supplies for 2 Billion People. A World Bank Best Practice Paper. July 1996.

Videos

1. Rwanda: A Brighter Future for Rwanda.

Related Links

Africa Electrification Initiative (AEI): **Africa Electrification Initiative (AEI)**

Energy Sector Management Assistance Program (ESMAP): **http://www.esmap.org**

The World Bank Independent Evaluation Group (EIG): **http://www.worldbank.org/oed/**

World Bank Publications: **http://www.worldbank.org/reference/**

Africa Lighting Initiative: **http://www.lightingafrica.org/**

The Global Partnership on Output-Based Aid (GPOBA): **http://www.gpoba.org/**

The Public-Private Infrastructure Advisory Facility (PPIAF): **http://www.ppiaf.org/**

ANNEX 2: WORKSHOP EVALUATION REPORT

WORKSHOP EVALUATION REPORT

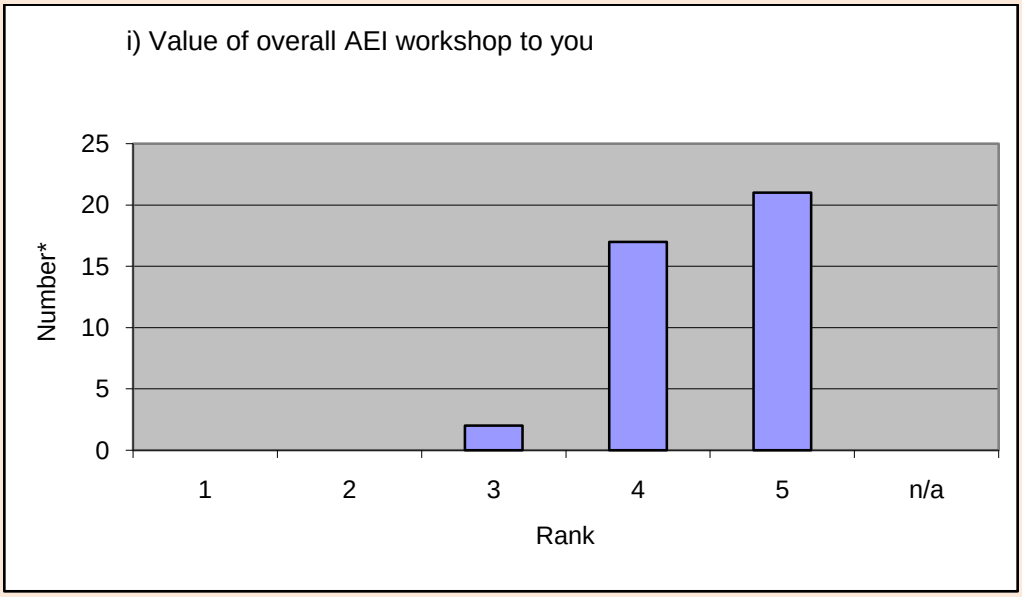
The purpose of the AEI workshop was to check and refine areas where practitioners face most constrains and that are of greatest interest to them in the area of design and implementation of rural, peri-urban, and urban on-grid and off-grid electrification programs in Africa.

In order to identify these areas and to develop and improve the AEI approach for the future, the participants of the workshop were asked to complete a questionnaire and to comment on the workshop's organization and content as well as possible AEI foci.

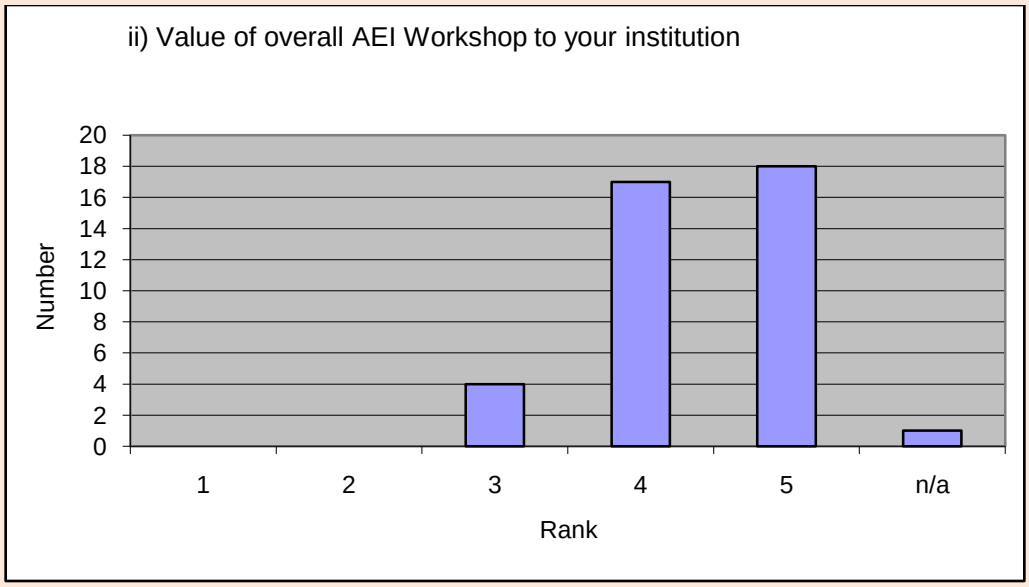
The present evaluation – based on 40 questionnaires (paper/digital) – illustrates the responses and summarizes the most important comments and suggestions.

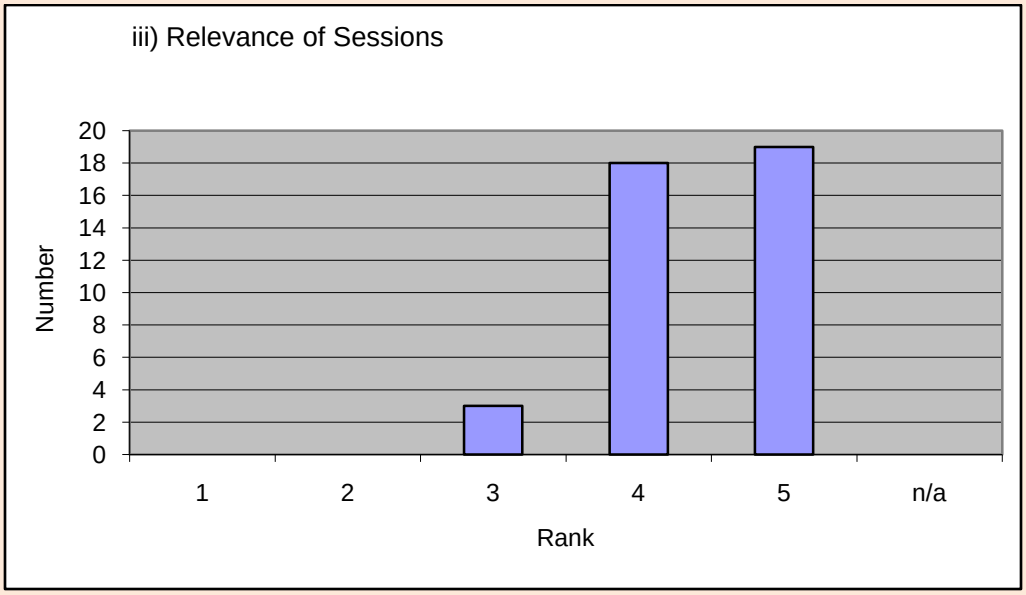
1. Overall Valuation of the Workshop (Question 1)

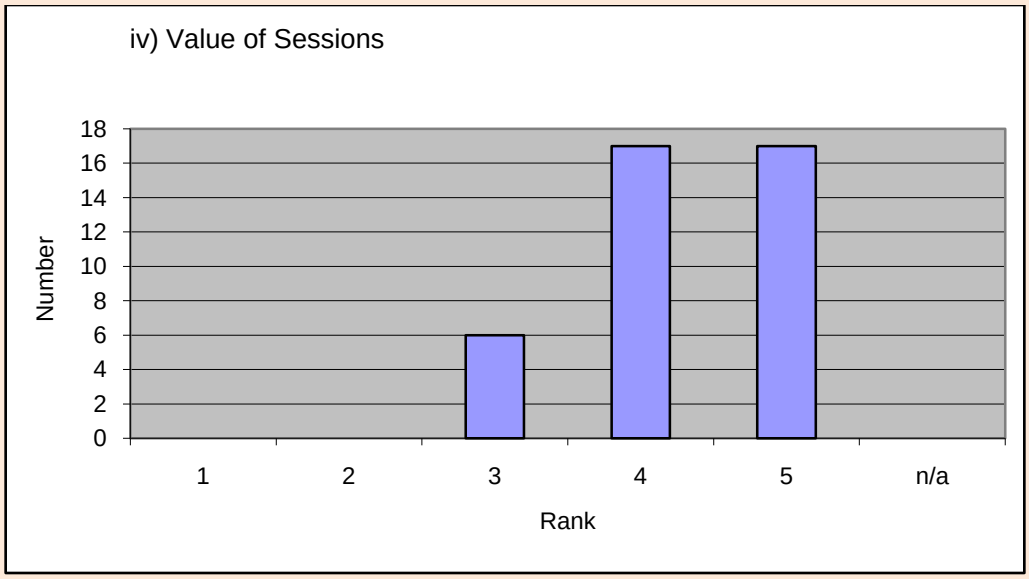
The overall valuation of the workshop by the participants is positive in every respect. Regarding the four questions on *"Value of overall AEI workshop to you*," "*Value of overall AEI Workshop to your institution*," "*Relevance of sessions,"* and "*Value of sessions*," the large majority of participants gave a positive feedback (rank 4 and 5). Only few participants gave a medium ranking of (3).



* If not stated otherwise, 'Number' refers to the number of participants (i) choosing the same rank (question 1,2), (ii) having the same preferences (question 2,3,5), (iii) making the same suggestions (question 4,6), or (iv) making the same comments (question 7).


ii) Value of overall AEI Workshop to your institution
Number
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
n/a
Rank

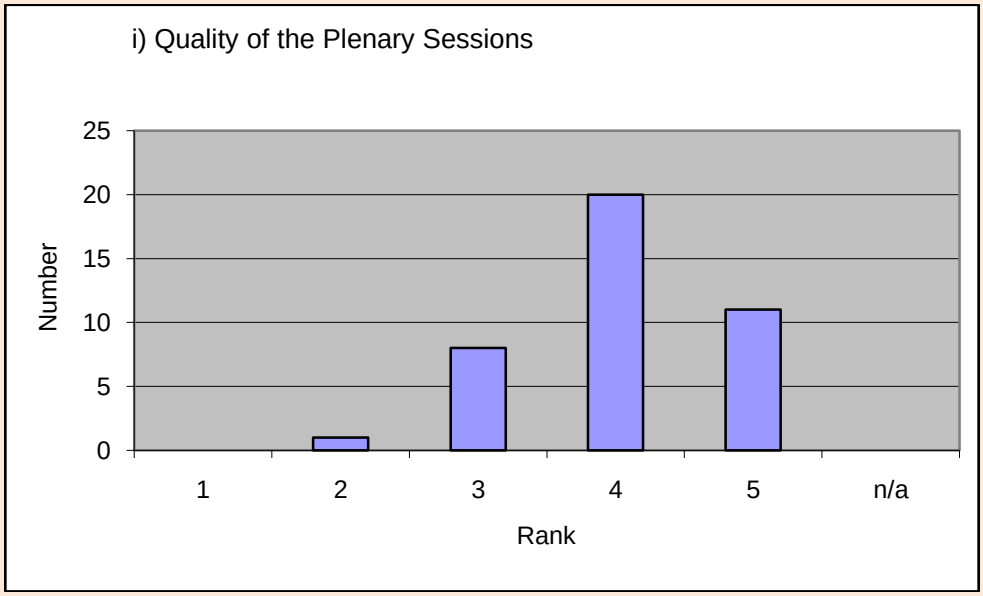

iii) Relevance of Sessions
Number
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
n/a
Rank

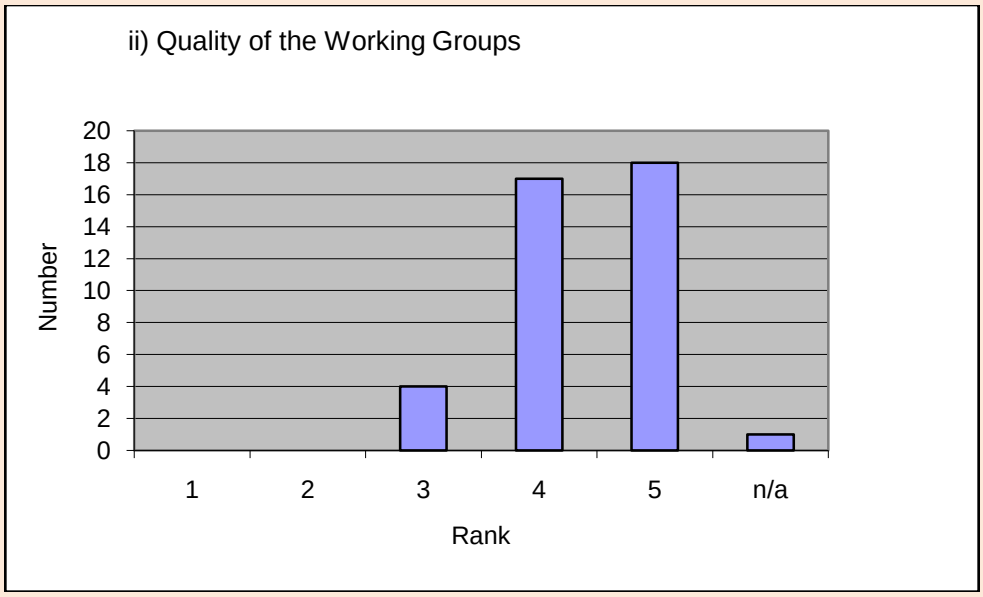


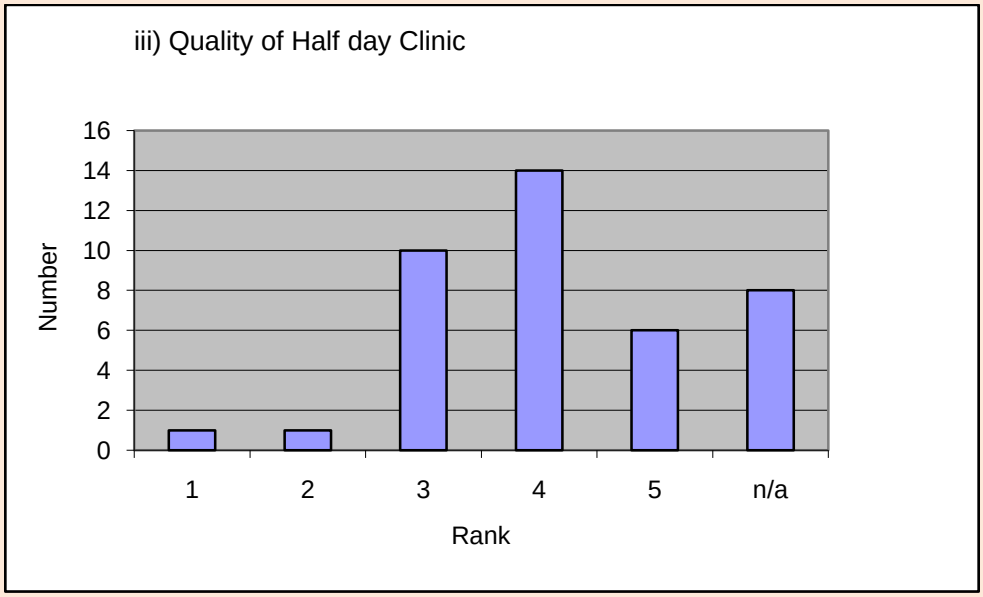
2. Quality of sessions (Question 2)

Regarding the quality of the sessions, the plenary sessions as well as the workshops got a very positive feedback. 31 out of 40 participants rated the quality of the plenary sessions 4 or 5, in the case of the working groups the rating is even better: 35 out of 40 rated 4 or 5. Only few participants rated medium or bad.

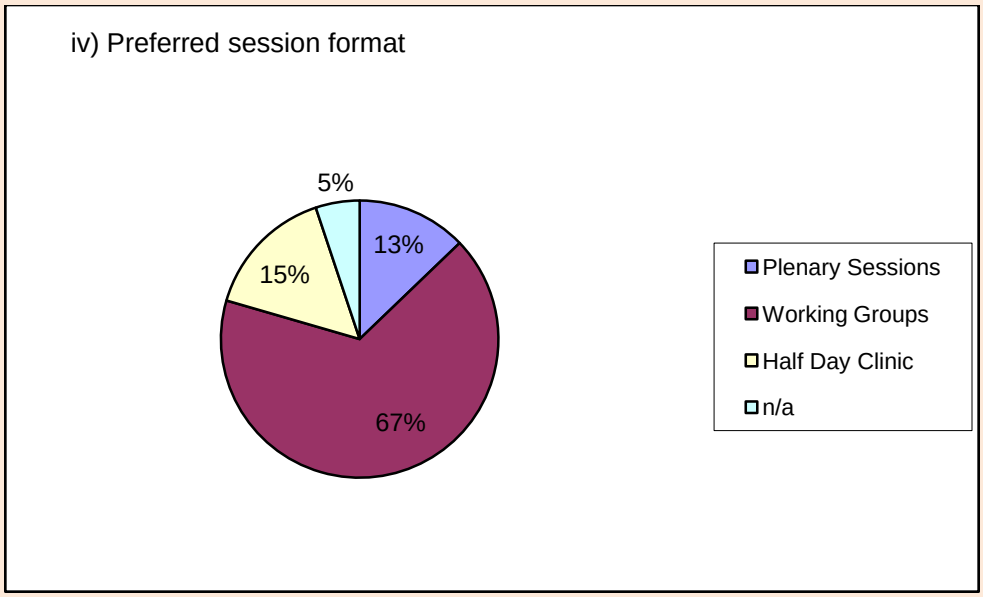
The half day clinic, on the contrary, is rated less positively. Only 20 out of 40 participants rated it positive (4 and 5), 10 medium and 2 bad or very bad. Moreover, 8 participants did not rate the half day clinic at all.



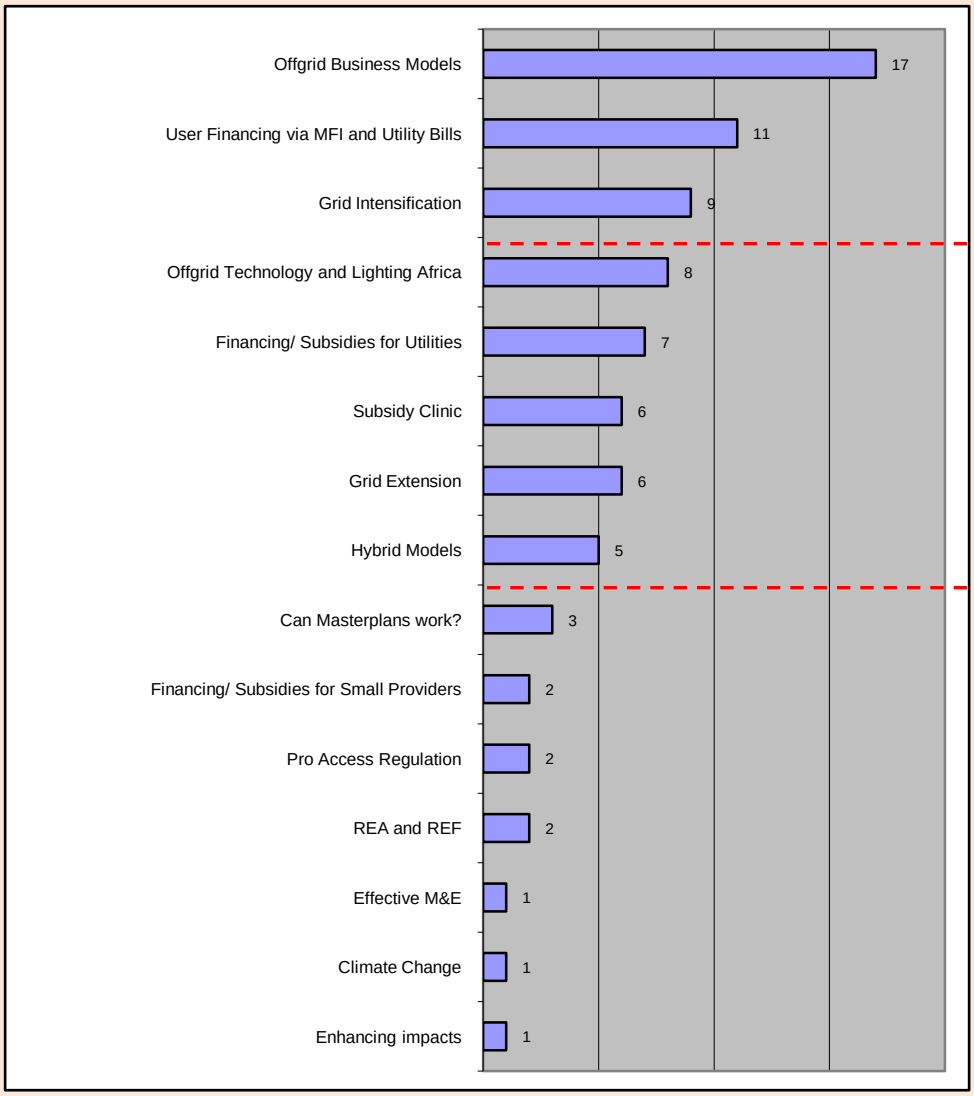




As for the preferred session format, 67% of the participants voted for working groups, 15% for the half day clinic and 13% for plenary session. 5% did not have any preference or did not answer to this question.



Asked for the top 3 sessions, a large majority of participants named "Offgrid Business Models" (17 times named as one of the top 3 sessions), followed by "User Financing via MFI and Utility Bills" (11) and "Grid Intensification" (9).



3. Main Take-away from the AEI workshop (Question 3)

The main takeaway from the workshop was the sharing of information and experiences (26), followed by new contacts and networking (4) and fruitful discussions (3). Other main takeaways were more content-related as for example insights in subsidies or financing.

General		
Topic	**Number**	**Comments**
Sharing of information/experiences	26	▪ Sharing of experiences (18); ▪ Access to (new) information (8);
Contacts and Networking	4	▪ Good networking opportunity (2); ▪ New contacts (2).
Discussion	3	▪ The participants' interaction on the subjects discussed (2); ▪ Good exchange and discussion.
Content-related		
Subsidies	3	▪ S. are a key success factor; ▪ Subsidy management; ▪ Check-list for subsidy definition/implementation.
Financing	2	▪ Measures to facilitate access to electricity for rural areas through various financing mechanisms; ▪ Enhancing access to electricity through increased credit facility and donor funding.
Role of REA and REF	1	
SHS lamp testings	1	
Ongrid electrification	1	▪ Learning about ongrid electrification and identifying common challenges.
Stakeholders	1	▪ There is a lot of stakeholder will to improve on all fronts, so it is a hopeful situation
Upscale	1	▪ Some African countries have good scale up plans (Kenya, Ethiopia, South Africa). We face the challenge of putting in place concrete plans to scale up.
CDM discussion	1	
Cooperatives	1	▪ Measures to facilitate access to electricity for rural areas through cooperatives.
Microfinance	1	▪ M. is a key success factor.
Marketing	1	▪ M. is a key success factor.
Cost-effective solutions	1	▪ C. are key success factors.

4. **Follow up activities for AEI** (Question 4)

i) Thematic Groups

The participants made numerous suggestions for thematic groups of future AEI activities. Most of the suggestions (13) propose an AEI focus on *financing and investment* issues, followed by *institutional aspects* (7), *governance/stakeholders* (6), *minigrids* and *offgrid technologies* (both 5). Also, *business models and plans* and the *subsidization* of electrification projects seem to be of particular interest for the participants.

Topic	Number	Comments/Details
Financing/Investment	13	▪ Mobilizing funds (2); ▪ Financing (7); ▪ Carbon financing; ▪ Investment by MFI; ▪ Donor involvement; ▪ AEI should focus more on off-grid initiatives and links with the banking sector in order to include RE in their financing/credit line in their portfolio.
Institutional aspects	7	▪ Pro-access regulation; ▪ REA and REF institutional scheme (3); ▪ Institutional setup and coordination (2); ▪ Multisectoral approach for access projects.
Governance and Stakeholders	6	▪ Governance issues (2); ▪ Cooperation with governments and donors (2); ▪ Community involvement; ▪ Role definitions for concerned stakeholders.
Hybrid and minigrids	5	▪ Sustainability issues; ▪ Potential for upscale; ▪ Electrification through minigrids (2); ▪ Evaluating operational costs of minigrids.
Offgrid technologies	5	▪ Offgrid technology (2); ▪ Alternative technologies for rural areas; ▪ Low cost technologies for rural electrification; ▪ Sustainable offgrid technologies.
Offgrid business models and plans	4	
Subsidies	4	▪ Finding ways of cost subsidies; ▪ Analysis of fiscal incentives; ▪ Subsidization of connections; ▪ Subsidy clinic.
End-user financing	3	▪ User Financing (1); ▪ Microfinance (2).

Generation and transmission	3	▪ Strengthening generation and transmission infrastructure to encourage rural electrification (2); ▪ Cost-effective reticulations.
Metering and billing	3	▪ Electricity tariffs; ▪ Prepaid metering (2).
Involving MFI	4	
Quality issues	3	▪ Tests/control for solar systems and components (2); ▪ Consumer protection (1).

Access	3	▪ Operationalize access; ▪ How to make access to electricity affordable to customers and service providers in poor countries; ▪ Financing grid connection.
Climate change	2	▪ Addressing climate change; ▪ CDM regional program.
Urban/peri-urban electrification	2	
Management	2	▪ Improvement of commercial activities of utilities; ▪ Capacity development.
Demand side management	1	
Enhanced electrification strategies	1	
Productive uses	1	
Grid and offgrid intensification	1	
Service and maintenance	1	
Using GIS in rural electrification projects	1	
Rural electrification impacts	1	
Regional market for SHS	1	
Awareness and marketing	1	
Cross-border rural electrification	1	▪ Conduct a study and give guidelines for cross-border rural electrification.
Grid extension	1	
Fighting corruption	1	

ii) Other activities

Besides these thematic groups, *information sharing, research, formation/training, workshops,* and *networking* are considered to be important for the success of AEI.

Topic	Number	Comments/Details
Sharing of information	13	▪ Documentation of best practices (2); ▪ Networking experiences on projects, methodologies, and subsidy structure (2); ▪ Provide access to (technical) documents from different countries; ▪ Information clearing house (2); ▪ Facility for posting papers and information-sharing documents by participants and partners; ▪ Regional Pilot Project Groups – Participants from various countries work on pilots and share ideas and expertise; ▪ Roster of experts and mechanism for financing their services; ▪ Need for having a “bridge” between good experiences and real implementation and dissemination in other countries. ▪ All possible participants should be invited to propose papers after which a selection of topics is done. The selected topics should then be prepared as full papers and presentations; ▪ Translation of important documents into French and Portuguese.
Research	10	▪ Coordination/funding of research; ▪ Study terms; ▪ Standard documents for RE; ▪ Determine the pros and cons in terms of factors leading to the success of a program, and compare with other programs that are not well performing; ▪ Survey questionnaire on different approaches in various countries on chosen issues; ▪ Analyses "drilling down" in a theme to expose range of options, pros and cons, where applicable using 'Subsidy Matrix' fo compare/test drive new options/solutions; ▪ Development of a quality assurance tool targeting services (eventually in cooperation with Lighting Africa); ▪ Evaluation and performance of different approaches adopted by different nations to achieve RE program. The evaluation would be made on the basis of key performance indicators; ▪ Development of a quality assurance tool targeting services (eventually in cooperation with Lighting Africa); ▪ Creation of a database of existing (offgrid) electrification projects in Africa (based on a simple questionnaire), enhancing communication between stakeholders.

Formation/Training	8	▪ Site visits (6); ▪ Study tours; ▪ Exposition of renewable energiy technologies.
Workshops	8	▪ Regional focused workshops/meetings (6); ▪ Workshops on specific issues; ▪ Workshop/exposition on renewable energy technologies for peri-urban electification, minigrids, and off-grid.
Networking	7	▪ Linking organisations working on rural electrification (2); ▪ Steering commitee needs to be formed with member countries at government or at AU level to due attention for electrifying Africa; ▪ Networking regions in experience sharing; ▪ Networking partners; ▪ National partnerships; ▪ Create a rural electrification forum of MFI.
Projects	2	▪ Kick-start rural electrification projects; ▪ Installation of a jury for new/promising projects.

5. Preferred means/tool for information sharing through AEI (Question 5)

The preferred means or tools of information sharing through AEI are cleary identified by the participants. Following the questionnaires, AEI should focus on *e-mail*, *online newsletters*, and *online forums*.

Besides the installation of a website, another suggestion for communication/information sharing is “conference backpacking,” meaning the organization of AEI side-events at other conferences (e.g. Offgrid Power Conference at Munich).

Means/Tool	Number
Email	**27**
Online Newsletter	**27**
Online Forums	**18**
Postings with Comments	9
Telefonconference	7
Interactive, same time web-telefonconference (Webinars)	6
Video Conference	3
Further suggestions	
Website	2
Conference Backpacking	1

6. **Suggestions for workshop improvement** (Question 6)

The participants were asked what they would do differently from the AEI workshop at Maputo (format, topics, participation, length of sessions, etc.). The table below summarizes the suggestions and presents comments and details as expressed by the participants.

Topic	Number	Comments (number)
Quality of sessions	8	▪ One-to-one discussion on cooperation option with preparation prior to the workshop; ▪ Longer interactive sessions with fewer topics; ▪ More interactive sessions where problems and best practices are shared; ▪ Working sessions with smaller groups; ▪ Select less presenters, but give them more time for impact. ▪ Some sessions tried to cover a too wide range of activities ▪ Some sessions did not correspond to titles; ▪ More time for the presentation of specific cases.
Timetable	7	▪ Reduce parallel sessions to maximum of 3; ▪ Allocate more time for the workshop (2); ▪ More time needed. Arrange this as an annual workshop; ▪ Programme was too full; ▪ Most of the topics were critical for all participants, thus split the topics in different times (2 workshops a year, too much information in a too short time); ▪ More time for one-to-one discussions/exchange during the workshop.
Quality of moderation	7	▪ More control of excessive comments from particular participants (3); ▪ No ppt at all - more well prepared and moderated discussions with the goal to create living working groups; ▪ Better introduction of participants. Some discussion groups started with introduction round while others did not; ▪ More use of video clips; ▪ Incoherence of debate in working groups.

Length of sessions	5	▪ Longer sessions (2); ▪ Length of sessions (2); ▪ Shorter sessions (1).
Preparation of participants and follow up	4	▪ Follow up notes can be enhanced; ▪ All papers should have been ready for dissemination before the end of the workshop; ▪ Preparation of full papers to be submitted to the organisers who prepare a booklet to be distributed to participants; ▪ Compile the various presentations to be used as a reference for participants (online)
Length of the workshop	3	▪ Allocate more time (3).
Quality of topics	3	▪ More focused subjects (2); ▪ Scope was to broad (topics like CDM were not necessary).
Number of sessions	3	▪ Less sessions (3).
Number of topics	2	▪ Less topics (2).
Choice of presentations	2	▪ Some of the presentations did not fit into the respective session; ▪ Select less presenters, but give them more time for impact.
AEI approach	2	▪ I would try and involve the regional groupings more and initiate action region by region; ▪ Regional workshops.
Overall organization	2	▪ Bad travel organization, lack of internet service in the workshop site and hotel; ▪ Perdiems were not consistent.
Exhibition	1	▪ Exhibition of sustainable energy systems.
Participants	1	▪ Key stakeholders such as customer representation were missing. People like Manufacturer Associations, Community Representatives and other NGOs should be involved as well.

7. **General Comments** (Question 7)

Comments	Relevance for follow-up
I hope this initiative will stay effective and last after the three years. It should be managed in a way that the platform stays alive for a long time.	**X**
Great workshop! Keep it up and look forward to more forums in the future.	
Very useful workshop, well organized. Thank you!	
It was a very good workshop putting electrification in Africa on a higher priority level.	

The 'clinics' have great potential. Great job!	
Well done! This is the World Bank at ist best in knowledge.	
The workshop was professionally organized.	
Organisation was done pretty well.	
Organisations administratives et accceuil sont bien faites.	
Good atmosphere.	
C'est une bonne initiative, qui mérite d'être bien organisée et poursuivie.	
This should continue! There is lot of value in the workshop. I very much appreciate the opportunity granted to be a participant in the workshop.	
I think the working groups will only succeed, if they have at least one champion who is pushing the topic forward.	**X**
Envisage regional goals such as enhancing connectivity by certain % by certain time	**X**

ANNEX 3: WORKSHOP AGENDA

Africa Electrification Initiative Workshop

May 9-12, 2009, Maputo, Mozambique

Agenda

Tuesday June 9: Institutional Issues

8:30-9:00	Welcome- H.E. Salvador Namburete, Minister of Energy of Mozambique; Boris Utria, Acting Country Manager, World Bank Office, Mozambique. Ray Holland Manager EUEI PDF *Plenary Room*	
9:10-9:45	AEI Objectives- What the data show, Workshop methods. World Bank, GTZ, FEMA *Plenary Room*	
9:45-11:15	**Session 1- Grid Extension** An institutional overview of the challenge of rural electrification and how progress has been achieved in SSA and other developing countries. Several illustrative cases will be presented by practitioners, including an analysis of lessons learned. *Plenary Room*	**Session 2- Offgrid Business Models** Many national utilities in SSA are unable to expand their grid fast enough, due to financial, technical and capacity constraints. Even where this is not an issue, social fairness sometimes requires solutions for remote regions with dispersed users who cannot be reached by the grid. The session presents working technology solutions and business models for low-cost offgrid alternatives for such cases, often based on PPPs. *Room 2A*
	Moderator: Pascoal Bacela, National Director of Energy	**Moderator: Kilian Reiche, AEI Lead Advisor**
	1.1 Overview of best practice institutional issues worldwide and applicability to Africa.	2.1 Africa SHS markets - overview. *Prof. Peter Adelmann, University for*

	Vorvate Tuntivate, Consultant, Electrification Experts, World Bank	*Applied Sciences, Ulm*
	1.2. Organization, Government Utility Approach in Cote d'Ivoire. *Eugène Botto, Chef de service Distribution, SOPIE*	2.2 SHS and PicoPV - local view. *Souleymane Sow - SEED Winner 2009*
	1.3. Government Utility and Subsidy Approach in Tunisia. *Ahmed Ounalli*	2.3. Village grid - overview. *Marcel Raats, SenterNovem*
	1.4. Hellpap: Grid Densification in EnDev.	2.4. Village grid - local view: design&implementation challenges, a case of Guinea. *Nava Toure, Director of Decentralized Rural Electrification Office (BERD), Guinea*
10:45-11:00	Coffee Break	
11:30-13:00	**Session 3- Hybrid Models** This session focuses on alternatives to government-led electrification undertaken by ministries, state-owned enterprises or combinations of the two which were the focus of Session 1. These alternatives include private sector operators bidding for large regional concessions, electricity cooperatives buying at wholesale from a national utility and local and regional power companies working with a national utility.	**Session 4- REA & REF** Many countries in SSA have established a new institutional framework supporting rural electrification through establishing rural energy agencies and funds. The session will analyze the experiences with this model, compare different institutional approaches for REA and REF and identify key lessons learnt, and challenges. The main question is: what are the key drivers of successful REA/REF programs?

	Plenary Room	*Room 2A*
	Moderator: Bernard Tenenbaum, World Bank	**Moderator: Ray Holland**
	3.1 Electrification in Vietnam: The Government's Role in Supporting Provincial Electricity Companies. *Van Tien Hung, Senior Energy Specialist, World Bank*	4.1 REF/REA when and why? *Wolfgang Mostert, Independent Consultant*
	3.2 Rural Electrification Cooperatives in Bangladesh, Mr. Nazmul Chowdhury, Member (Engineering), Rural Electrification Board, Bangladesh	4.2 REF/REA how? *Gerard Madon, Director Marge*
	3. 3. Top down concessions for private operators: the cases of Senegal, Mali and Uganda. *Koffi Ekouevi and Reto Thoenen, World Bank*	4.3 REF/REA - deeper analysis - Mali diesel minigrids. *Alassane Agalassou, AMADER, Mali*
		4.4 REF/REA - deeper analysis - Tanzania offgrid renewables. *Bengiel Msofe (Director Technical Services) and Justina Uisso (Project Manager), REA, Tanzania*
13:00-14:00	Lunch	
14:00-16:30	**Group Work** *GW 1.1. How to find the "Best" Institutional Approach for electrification in a given situation?* *GW 1.2. How to deal with the political dimension of electrification? What are the minimum sector requirements for successful electrification?* *GW 1.3. What is he best way of involving communities in planning and implementation of grid and offgrid*	

	electrification projects? *GW 1.4. How to scale up in countries that have very low RE rates?* *GW 1.5. Offgrid business models - how to ensure sustainability?* *Rooms 1A, 2A, 3A, 4, 5A*
16:30-16:45	Coffee Break
16:45-18:00	Plenum: Results *Plenary Room*
18:00-18:30	Video- Vietnam-"The Last Mile" *Rooms 3A (French) and 5A (English)*
18:30-20:30	Cocktail Reception

Wednesday June 10: Technology and Planning

8:30-9:00	Tasks and Overview *Plenary Room*			
9:00-10:45	**Session 5- Grid Intensification, Innovation and Cost** This interactive 3.5 hour-workshop will discuss technical and management innovations for grid expansion, with a special focus on peri-urban electrification, low-cost technologies and densification of existing networks (also known as intensification) . What technical solutions, innovations and business models can be deployed to make access expansion more	**Session 6- Offgrid Technology and Lighting Africa** Currently 500 million people in Sub-Saharan Africa are without electricity; 90% of the rural population has no access. Among the poorest of the poor, lighting is often the most expensive item among their energy uses, typically accounting for 10% of total household income. New "breakthrough" advancements in lighting technologies (such as LEDs, cheaper solar home systems, etc.) promise to deliver lower-cost, clean,	**Session 7- Can Masterplans work?** What is the application reality of Masterplan planning approaches? Are Masterplans appropriate at all, given that PPI follows price signals and Master plans are often outdated by the time they are published? Could there be quicker, more flexible, less expensive or more participatory alternatives for RE planning? This session will review cases from different countries and explore the planning processes and	**Session 9- Effective M&E** Electrification scale-up in Africa will require rigorous, yet low-cost and practical monitoring and evaluation (M&E) to guide the programs, plan and measure impacts, and collect lessons learnt for improvements. The session will present M&E tools and components that work and typical conclusions that can be drawn from evidence-based

	affordable and sustainable for users and utilities? A mixture of short structured presentation, participant slides and discussions. *Room 2A*	durable and higher-quality lighting for areas not served by the utility. The 3.5h session will explore the latest technological advancements in offgrid electrification and lighting solutions and explore the opportunities - and challenges - they present for marketing strategies, electrification policies and quality control. *Room 3A*	subsequent implementation. *Plenary Room*	evaluation. *Room 1A*
			Moderator: Ray Holland, Lucius-Mayer-Tasch	**Moderator: TBD (FEMA)**
			7.1. Uganda IREMP. Godfrey Turyahikayo	9.1. Overview - Voravate Tuntivate, Senior Consultant
			7.2. Mozambique case, EDM (Luics Amado)	9.2. Monitoring and Evaluation Pre and Post Project Surveys. *Hussain Samad, Senior Research Analyst, World Bank*
			7.3. Rwanda sector-wide approach. *Yussuf Uwamahoro*	9.3. How to do monitoring and evaluation . Example from Laos. *Voravate Tuntivate, Senior Consultant*
			7.4. Madagaskar ADER Planning. 10 Min. *Namisoa RAKOTOARIMANA - Technical Director ADER*	9.4. M&E in Energising Development and INGENS. *Lucius Mayer-Tasch (EnDev/GTZ) & Jörg Peters (RWI)*
10:45-11:00	Coffee Break			
11:00-12:30	**Session 5, continued**	**Session 6, continued**	**Session 8- Pro Access Regulation** he two universal tasks of	**Session 10- Enhancing Impacts** Electrification

			economic regulation are setting maximum and minimum prices and establishing minimum technical and commercial quality of service standards. Since the economics of rural electrification are often precarious, it is generally agreed that regulatory systems applying to electrification activities must be "light handed." This session presents case studies on different approaches to light handed regulation.	programs should pay special attention to the uptake, usage and impacts of new electricity access and include socially and economically productive uses as integral program elements. Complementary services such as access to roads, information technologies, finance or traning may increase electrification impacts and demand density in specific cases. The session presents practical ways in which electrification projects have fostered productive uses or complementary services and identify lessons and limitations.
	Room 2A	*Room 3A*	*Plenary Room*	*Room 1A*
	Moderator: Marcel Raats, Senior Energy Expert SenterNovem / EnDev	**Moderator: Dana Rysankova, Senior Energy Specialist, World Bank**	**Moderator: Elijah Sichone, Executive Secretary, RERA**	**Moderator: Thierno Bocar Tall, Director of the African Bio-fuels and Renewable Energies Fund, ECOWAS Bank of Investment and Development**
	5.1. Overview of low cost grid electrification methods. *Ahmed Ounalli*	6.1. Future small PV technologies for Africa. *Prof. Peter Adelmann, University for Applied Sciences, Ulm*	8.1. Regulation: what do we mean?	10.1. Overview of past practices in promoting productive uses of grid electricity. *Dan Waddle, VP, NRECA*
	5.2. Slum electrification. What Technology can	6.2a. WBG Lighting Africa initiative. *Anil Cabraal,*	8.2. Regulating Isolated Mini-Grids in Peru, *Mr.*	10.2. Productive uses in Multifunctional

	and cannot do. *Maboe Maphaka, Senior Manager – Distribution Energy Trading,ESKOM and Connie Smyser, independent consultant, World Bank*	*Lighting Africa Program Manager, World Bank*	*Miguel Revolo, Manager of Distribution Regulation, OSINERGMIN, Peru*	Platforms. *E.N. Sawe, TaTEDO*
	5.3. Kenya - peri-urban electrification -the success story of Group Schemes and the challenges of Kibera, the largest Slum in Africa, *Shahid Mohammad, Kenya Power Lighting Company (KPLC)*	6.2b Pico PV (GTZ LET and ESMAP). *Carsten Hellpap (EnDev) [plus Poster on Labtest]*	8.3. Tanzania. Regulating grid and offgrid small power producers. *Messrs. Anastas Mbawala and Norbert Kahyoza, Director and Commercial Manager, Electricity, EWURA*	10.3. INGENS, International cases and complementary services. *Lucius Mayer-Tasch, PV Specialist, GTZ Uganda PREEP*
	5.4. Mozambique densification and prepaid meters, EdM (to be confirmed)	6.2c Lighting Africa and pico-PV: challenges on the ground. *Lighting Africa Development Marketplace winner - Gus Goanue, private entreprenneur, Liberia*		
	5.5. Botswana intensification: involving women. *Masego Kealotswe, Botswana Power Corporation*	6.3a smart PV and hybrid mini-grids for Africa. *Antoine Graillot, Trama Technoambiental* (TTA), *Spain*		
	5.6 Smart grid technologies for Africa. *Antoine Graillot, Trama Technoambiental (TTA), Spain*	6.3b Namibia PV hybrid village grid. *G.S. Hamutwe, NAMREP*. (to be confirmed)		
		6.4: Mozambique micro hydro mill retrofits. *Klaus Hornberger - GTZ Mozambique*		
12:30-13:15	Lunch			
13:15-14:00	Poster Session & Marketplace			
14:00-	**Group Work** *GW2.1 Are Master Plans necessary? How can they be made more usable? Can GIS planning methods*			

16:30	*help?* *GW 2.2 How (and when) do you encourage productive use of electricity? Is it possible for utilities/offgrid?* *GW2.3How can low cost solutions be integrated into planning for grid and offgrid projects?* *GW2.4What is necessary to develop an M & E component for a project. Is it worth the cost? Who should finance?* *GW 2.5 How to assess the role of regulators? What is "light handed regulation"?* *GW 2.6. Peri-urban electrification –what institutional and business models are appropriate?* *Rooms 1A, 2A, 3A, 4, Plenary*
16:30-16:45	Coffee Break
16:45-18:00	Plenum: Results *Plenary Room*
19:30-21:00	Dinner and Cultural Event; Jardim dos Namorados; Av. Friedrich Engels 150; Maputo

Thursday June 11: Financing and Subsidies

8:30-9:00	Tasks and Overview *Plenary Room*		
9:00-10:45	**Session 11- Financing (and Subsidies) for Utilities** This session looks at specific cases of utilities and their financial and subsidy issues. It also discusses the issues of tariffs, subsidies and cross-subsidies.	**Session 13- User Financing via MFI and Utility Bills** Affordability of electricity service is a key issue in the Sub-Saharan Africa context. How to close the gap between high costs of the service and low capacity to pay? This session will present promises and limitations of microfinance solutions and utility pre-finance schemes for electrification. It will cover grid extension as well as different offgrid technologies as the design of successful user financing schemes differs from	**Session 15- A Subsidy Clinic: How to design and improve access subsidies** This interactive 3.5 hour session will show the practical steps involved in designing and evaluating subsidies in real cases, using a new tool – the Subsidy Matrix. Specific cases for grid and offgrid subsidies will be presented and discussed. In addition, you will have the opportunity to start discussing your own subsidy design questions, for your

		technology to technology.	ongoing or future access programmes.
	Plenary Room	*Room 3A*	*Room 2A*
	Moderator: Abel Didier Tella, Secretary General, UPDEA (to be confirmed)	**Moderator: Noara Kebir, Microenergy International**	**Moderator: Kilian Reiche, AEI Lead Advisor**
	11.1. Ghana case, *Andrew Barfour, GEDAP coordinator*	13.1a Issues and Options for different technologies and institutional models. *Noara Kebir (Microenergy International)*	15.1. Energy Subsidies: How? *Kilian Reiche, World Bank*
	11.2 Botswana - partnering for access expansion, *Masego Kealotswe, Rural Electrification Coordinator, Botswana Power Corporation*	13.1b. MFI in Africa. F*elistas Coutinho, Microenergy International*	15.2. Tendering Subsidies for Electrification. *Dana Rysankova, World Bank*
	11.3 Mechanism of subsidies applied in Peru, *Mr. Miguel Revolo, Manager of Distribution Regulation, OSINERGMIN, Peru*	13.2 MFI Finca Uganda - *Patricia Kawaga, FINCA*	15.3. Evaluating the performance of SHS subsidies. *Arne Schweinfurth, iiDevelopment*
		13.3 Innovative financing for grid connections by the utility. *Ato Shiferaw, EEPCo*	15.4 Concession d'electrification rurale au Senegal
		13.4. Deferred Payment Methods by KPLC	15.5. Preconditions pour le "scling up" des projects d'electrification rurale
10:45-11:00	Coffee Break		
11:00-12:30	**Session 12- Financing (and Subsidies) for Small Providers and Renewable Energy** Small providers face specific challenges: Financial and technical capacity is often low, and regulation frequently overlooks	**Session 14- Climate Change and Access** The purpose of the session will be to (i) demonstrate the existence of CDM/carbon finance opportunities in Africa, (ii) explore some of the recent approaches and methodologies which could	**Session 15, continued**

	their needs. On the other hand, they are close to the customers and sometimes more flexible than large utilities. At the same time, they often operate minigrids, charge batteries or sell solar home systems - and these technologies have specific requirements. Finally, their customers are usually poor while investment and M&O costs are usually higher than for grid extension. Thus, commercial funding is hard to obtain and subsidies are practically always needed to close the affordability gap for new users. How to improve the access of small providers to financing and subsidies?	facilitate Africa's greater participation in CDM (e.g. Program of Activities approach), with some emerging examples in Africa and worldwide; and (iii) explore other financing opportunities for electricity access arising from the increased global focus on climate change.	
	Plenary Room	*Room 3A*	*Room 2A*
	Moderator: Carsten Hellpap (EnDev)	**Moderator: Anil Cabraal, Lead Energy Specialist, World Bank**	
	12.1. Case study EnDev Rwanda. *Marcel Raats (SenterNovem)*	14.1. Potential for low carbon energy development in SSA. *Felix Dayo, Director, Triple "E" Systems Inc.*	
	12.2. Commercial funding for small scale providers. *Kofi Nketsia-Tabiri, Regional Manager, E+Co*	14.2. Small Scale CDM Methodologies. *Gajanana Hegde, Program Officer, UNFCCC Secretariat*	
	12.3. ConCap: Building a new fund for SSA access? *Dr. Fritz-Morgenthal, UNEP RE Finance Centre & Connective Capital AG*	14.3. CDM and other financing options. *Charlotte Streck, Director, Climate Focus*	

	12.4 Renewable energy for access expansion, *Thierno Bocar Tall, Director of the African Bio-fuels and Renewable Energies Fund, ECOWAS Bank of Investment and Development*	14.4. Public-private partnership (Senegal). *Ousmane Fall Sarr, Directeur des Etudes et du Système d'Information, Agence Sénégalaise d'Electrification Rurale*	
12:30-13:15	Lunch		
13:30-14:00	Webpage Demo		
14:00-16:30	**Group Work** *GW3.1 AEI - Financing and subsidies. Follow up discussions. Finance and microfinance for Africa electrification* *GW 3.2. AEI - Financing and subsidies. Follow up discussions. The dilemma of cost-reflective tariffs (high costs of provision, low capacity to pay)* *GW 3.3.. AEI - Moving forward. The participants will discuss key issues emerging from the workshop and recommendations for the AEI focus.* *Rooms 1A, 2A, 3A, 4, Plenary*		
16:30-16:45	Coffee Break		
16:45-18:00	Plenum: Results *Plenary Room*		
18:00-18:30	Video- "Lighter Burden, Brighter Future" Plenary Room		
18:30	Dinner		

Optional Friday June 12: Impromptu Work Groups and Side Events

10:00-12:00	GW 4.1. Carbon Finance *Room 1A*	GW 4.2. Prepayment Systems *Plenary Room*	GW 4.3. Alternative Service and maintenance models for ongrid/offgrid electrification *Room 2A*
12:00	Lunch		

ANNEX 4: ADVISORY COMMITTEE

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6. Luis Amado, Electrification Projects Director
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ANNEX 5: WORKSHOP LIST OF PARTICIPANTS

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