

Energy Digest

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A PUBLICATION OF THE KENYA RENEWABLE ENERGY ASSOCIATION

ISSUE 3 / 2015



Conforming to the Energy (Solar Water Heating) Regulations, 2012

- Africa largest wind power project achieves full financial close
- Asset financing of solar PV systems
- The potential for ethanol fueled stoves in Kenya
- KEREA voluntary accreditation project for suppliers, vendors and technicians of Solar PV

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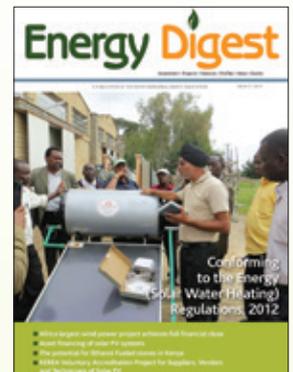
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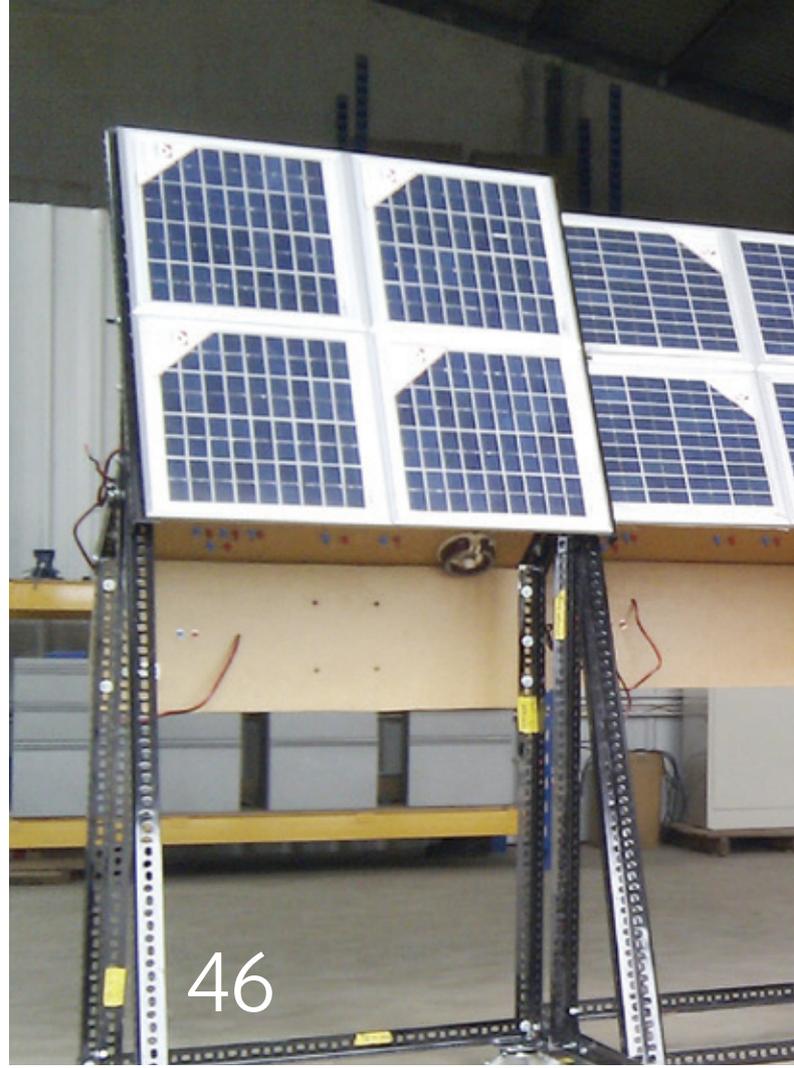
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Letter from the industry



*Mr. Charles Muchunku,
Chairman, Kenya
Renewable Energy
Association*

Is 100% on-grid renewables achievable? Is it worth aspiring to? ... Cape Verde is a small African country with an ambitious plan to achieve the 100% penetration of renewable energies by 2020. Their justification; simply comparing the projected expenditure on fuel for electricity generation over the next 20 years and the cost of investing in an equivalent capacity of renewable energy generation.

If this principle was applied to the Kenyan context, based on the current installed capacity of thermal generation (228MW) and a historical 5-year average annual increase of 11% in the fuel costs, Kenya's cumulative fuel bill for electricity over the next 20 years would be 30 billion US\$. This amount does not consider the Government's '5000MW by 2016' plan which proposes to increase thermal generation to 432MW, introduce 960MW generation from imported coal and add a further 1,050MW generation from imported natural gas.

100% on-grid renewables does present technical challenges; high grid penetration of solar PV and wind based generation is accompanied by high volatility, low reliability and predictability which are difficult to manage. Energy storage and reserve power are key to addressing these challenges. Pumped storage hydroelectricity is a type of energy storage used by electric power systems for load balancing; it is a method of storing energy simply by pumping water from a lower elevation reservoir to one at higher elevation. Low-cost off-peak electric power is used to run the pumps and during periods of high electrical demand, the stored water is released through turbines to produce electric power. Pumped storage is the most economical way of conserving large quantities of energy at efficiencies of 70-80%.

Kenya has the unique advantage of hydropower resources which can be used for pump storage. The Seven Forks hydro stations are a series of five hydropower stations with an installed capacity of 543.2 MW; to generate electricity, water is cascaded from one station

to the next, taking advantage of the head created by each dam to produce power. An additional station, 700MW High Grand Falls, is also planned along the river. In principle therefore, if this energy storage potential could be tapped, Kenya could achieve 100% renewables.

100% on-grid renewables does appear to be a vision based on sound principles, and it could be technically achieved within the boundaries of economic pragmatism. What we need to do is develop a technical plan for the energy and storage mix and create a conducive environment to encourage private sector investment to meet this goal.

In addition to being a means to energy self-sufficiency, 100% on-grid renewables also creates interesting investment opportunities for small-medium scale grid-tie renewable energy systems. In December 2014 electricity tariffs in Kenya ranged from 0.14 US\$/kWh for large industrial consumers to 0.226 US\$/kWh for household consumers. With the ability to generate electricity from grid connected solar PV systems in Kenya at about 0.16US\$/kWh (and dropping) solar PV (without storage) is now competitive with the grid; especially if you also consider that during power outages industrial and commercial consumers revert to using backup diesel generators which cost them at least 0.40US\$/kWh. With a number of commercially financed investments in small-medium scale grid connected solar PV systems in 2014, this appears to be the new market solar PV in Kenya. As this market segment grows the question for both the utility and investors will be what to do with the surplus; considering there is no net-metering or grid-tie policy/regulation currently in place. The answer... pumped storage.

We hope you find this edition of the Energy Digest both interesting and useful. Our sincere thanks go out to those who have contributed to the publication through articles and advertisements.

Charles Muchunku

The proposed new energy policy

Adapting to a devolved form of government

By Kenya Renewable Energy Association

One of the key objectives of reviewing the energy policy was to align it with the new constitution, which provides for a devolved government based on a two tier structure (i.e. the national and county governments) and distributes the functions and powers between the two levels. Devolution is effectively meant to facilitate the decentralisation of state organs, their functions and services, from the capital of Kenya.

The constitution allocates to the national government the functions of energy policy, including electricity and gas reticulation and energy regulation, and to the county governments the functions of county planning and development, including electricity and gas reticulation and energy regulation. This statement clearly suggests that overlap and contradiction will be unavoidable. The new energy policy is intended to minimize this.

The proposed policy provides guidance as to the specific functions of the two levels of government.

- At a policy and planning level, the national government would be responsible for formulation of the National Energy and Petroleum Policy and the preparation of an integrated National Energy Plan (incorporating fossil fuel, renewable energy and electricity master plans) whereas the county governments would be responsible for preparing their own county energy plans and undertaking physical planning relating to energy resource areas (e.g. dams, wind farms, bio-energy plantation, landfills etc.)

- At regulation level, all regulations and licensing relating to fossil fuels, renewable energy, and electrical energy will be developed and enforced at national level as will approval of power purchase agreements. The counties will be restricted to regulation and licensing of biogas, biomass and charcoal.

- At operational level, the national government will be responsible for exploration, production and processing of energy based natural resources (e.g. fossil fuels and geothermal), electricity generation,

transmission and distribution, management of the rural electrification fund, implementation of the rural electrification programme and the administration and management of energy related funds. The national government also has the key role of providing technical and capacity building support to county governments. The county governments are, on the other hand, primarily limited to electricity and gas reticulation, implementation of county electrification projects and establishment of centres to promote renewable energy, energy efficiency and conservation

One thing is clear from the proposed distribution of functions; the key functions have not been decentralized. In this regard the proposed policy is not aligned with the spirit and aspirations of the Constitution.

It would be correct to argue that the county governments still lack the technical capacity to manage these functions; however, the same argument could be made against devolution. There is little justification as to why licensing and enforcement of regulations should be centralized while energy businesses are typically decentralized. Similarly, although there is justification for centralizing the administration and management of the rural electrification fund, the same cannot be said about the implementation of the rural electrification programme. Furthermore the policy should provide guidelines on the boundaries within which county governments can work to promote investment for the delivery of energy products and services in their counties.

A period of transition will be required for true devolution to be achieved and perhaps the policy should be less about defining specific functions for national and county governments and more about managing a transition to where county governments have sufficient capacity and knowledge to effectively facilitate the delivery of modern energy products and services to their respective populations.

Supporting development of solar water heating training curriculum for local technical training institutions

By Kenya Renewable Energy Association



In April 2012, the Energy (Solar Water Heating) Regulations came into effect. The regulations make it mandatory for all premises with hot water requirements of a capacity exceeding 100 liters per day to install and use solar water heating systems. The regulations are enforced by the Energy Regulatory Commission (<http://www.erc.go.ke/>).

Under the regulations, new buildings are required to install solar water heating systems during construction and existing premises have been given until April 2017 to comply with the regulations. In

addition, only persons licensed by the Commission shall undertake solar water heating installation; similarly a business cannot be licensed as a solar water heating system contractor without having a licensed solar water heating system technician in their employ.

The regulations therefore present significant potential for growth of the solar water heating sector in Kenya. However, this growth must be matched by adequate competency of local manufacturers, dealers and technicians to carry



our design, installation, troubleshooting and maintenance of solar water heating systems; as well as training capacity to impart the necessary skills.

Currently there is no publicly available solar water heating technical training course at any public or private training institution in Kenya. Through support from GIZ (the German Society for International Cooperation) KERA coordinated the following activities which were implemented by Global Sustainable Energy Solutions (<http://www.gses.com.au/>), an Australian company specializing in solar training.

- The development of a solar water heating training curriculum
- The development a detailed training package (i.e. lesson plans and a technical training manual). Copies of the manual are available from GSES through KERA at a fee.
- A solar water heating training of trainers course
- Developing of skills based testing guidelines; to be used by the National Industrial Training Authority and ERC to assess the skills of solar water heating system technicians.

The curriculum was developed through a consultative process with the actors and stakeholders in Kenya's solar water heating sector. The consultative process did raise a number of valid discussions around: the technical challenges with retrofitting for existing homes or commercial buildings (roof space availability, where to put additional storage etc.) and the possible implications this will have on wide scale uptake of SWH, the possible challenges related to enforcement of the regulations and the shortcomings of the existing regulations with regard to omissions in the qualification criteria for

solar water heating technicians.

The curriculum is targeted at technical training institution or organizations offering plumbing courses, with the intention of augmenting the solar water heating training curriculum onto existing plumbing curriculum at the institutions. Participants of the training of trainers' course were selected on the basis of having demonstrated their ability to develop and provide a publicly available solar water heating technician training course at their institutions or companies. In order to do this, applicants were required to:

- Demonstrate prior experience with solar water heating or a plumbing background as a minimum requirement.
- Be affiliated to an institution or company committed to offer a solar water heating technician training course
- Demonstrate ownership of or commitment to procure the equipment necessary to deliver a solar water heating course.

The institutions and companies trained were: Steelstone (K) Ltd, Hosanna Institute of Professional Studies, the National Industrial Training Authority, Nairobi Technical Training Institute, University of Nairobi, Star-Delta Institute, Chloride Exide, Energy Regulatory Commission, Machakos University College, Kenya Industrial Training Institute, Kenya Technical Teachers College, Kiambu Institute of Science and Technology, Clean Power (K) Ltd., Solimpex Africa Ltd. and Davis & Shirtliff.

Local companies - Davis & Shirtliff, Solimpex and Steelstone also materially supported the training of trainers' course by offering training and demonstration equipment and facilitating a commercial site visit as part of the training.

New enhanced improved cookstove launched in Kenya

By GVEP International

GVEP International, a non-profit organization working to alleviate poverty in developing countries through increased access to sustainable and renewable energy, has been working with local stove entrepreneurs in Kenya to develop new cookstove designs for domestic use. The stoves are aimed at offering greater efficiency, reducing emissions, and improving safety and durability compared to other local models. This initiative is supported by the Global Alliance for Clean Cookstoves.

GVEP has been working with a group of experienced local stove makers to develop an improved cookstove design with much higher performance at a price consumers can afford. Manufacturing of the stoves is within the capabilities of the local businesses. Technical redesign work was carried out by Kenya Stove Works and prototypes were tested by users and in the lab. The designs went through several iterations until the best balance between user acceptability and efficiency were struck.

All of the companies making the stove are large by Kenyan stove making standards. GVEP deliberately sought out businesses with the capability of manufacturing the new stoves in significant volumes and with distribution channels in place to get the product to the market. Some of the businesses had already been receiving support

from the organization under an earlier program, helping them grow from small beginnings to their current scale of production.

But even these larger local businesses still use manual processes. The metal cladding and the pot rests are cut and shaped by hand which is slow and arduous, and the heavier gauge metals used in the enhanced stoves present a challenge. Working with these businesses to find locally available machinery for cutting and shaping metal was a priority, and what were once artisan workshops became small, highly organized factories.

Companies which import stoves from abroad generally face a challenge with 'last mile distribution'. By working with an existing local value chain, GVEP hopes to circumvent these problems. The stove manufacturers already have established relationships with various wholesale customers and retail outlets - they also sell them directly at local markets. The new stoves are already in demand. At KES 2500, the stove is not cheap - but the price is significantly less than what someone might pay for an imported stove.

Production is now underway is not just in Central Kenya but also in Kisumu, West Kenya. The next phase of the project is tooling up these businesses to improve efficiency of production, and a big marketing push to help the new stove find a market.

In laboratory tests the stoves demonstrated higher levels of thermal efficiency than locally available stoves. The woodstove in particular shows a significant level of improvement. Both stoves meet the standard of a Tier 2 stove in the classification of stove performance promoted by the Global Alliance for Clean Cookstoves; zero being the lowest tier and 4 the highest. Further field tests are now underway to assess the performance in a real kitchen setting. We expect the stoves to show big reductions in emissions of particulates.

"The new stoves are already in demand. At KES 2500, the stove is not cheap - but the price is significantly less than what someone might pay for an imported stove."



Key strategies for sustainable building design in the tropics

By UNHABITAT

Over 70% of the world energy generation is consumed in human settlements (mainly cities), resulting in an emission of more than two thirds of CO₂ that contributes to climate change. Widespread energy poverty and the increasing cost of fossil fuels are impacting negatively on the economic development and the living conditions of people.

The way buildings are planned and designed today has a direct implication on their energy bills.

To address the global challenges of climate change and the high cost of energy, it is essential to adopt urban planning and building design methodologies that are energy conscious and environmentally friendly. As you read this article, the strategies outlined should serve as a guideline to provide some of the mandatory criteria that should be taken into consideration when designing and building in tropical countries.

The design of an energy efficient built environment involves: minimizing the wastage of resources (land, water, energy, material, etc.) and maximizing the use of passive building design options and renewable energy sources. Here is a checklist of 21 key strategies to help both future building owners and practitioners to ensure that their building design follows the building sustainability and energy efficiency in the tropics.

1 Site selection: Use or retrofit existing buildings wherever possible to reduce energy required to put up new buildings. Also where possible, select brownfield sites (reclaimed land, formerly developed land) over undeveloped greenfield sites.

2 Building footprint: Ensure that the building conforms to county regulations. Undeveloped areas in the property should be left permeable to ensure rainwater infiltration.

3 Building orientation: Buildings should be designed such that the long axis is along east-west axis. The main facades should face North and South.

4 Building form and shape: Buildings that are narrow in plan allow maximum natural light penetration and effective cross ventilation.

5 Allocation of spaces within the building: Building services such as toilets, staircases, lifts, lobbies, etc. should be on the east and west facing facades. They act as buffer zones against heat gain. Livable spaces should be placed in the North and South facing facades.

6 Openings: Windows should be placed on the North or South facing walls for easier sun control. They should be designed according to prevailing micro climatic of the area and their sizes carefully calculated to suit the climatic zone. Fully glazed buildings are not recommended for tropical climates, unless the glazing is made of special thermal insulated glasses. The window to wall ration should not exceed 45% as to prevent overheating.

7 Daylighting: Narrow plans aid in daylight penetration into the building. In deep rooms and buildings, clerestory windows, atriums, solar tubes etc. can be used to enhance natural daylighting. Staircases, toilets and kitchens should always be provided with daylighting.

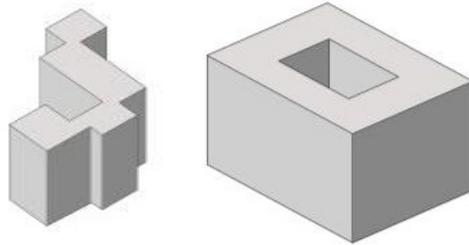
8 Sun shading and solar control: All glazed surfaces in the tropics should be shaded against the sun. Roof overhangs, vertical and horizontal sun shading elements, balconies should be incorporated in design to provide shading against excess heat gain. Horizontal shading devices are appropriate for north and south facing facades, vertical shading devices are appropriate for east and west facing facades and egg crate shading devices are appropriate for South west, North West, South east and North east facades.

9 Ventilation and cooling: Provide manually operable windows in all habitable spaces to allow for natural ventilation and subsequently cooling. Narrow building plans also allow for cross ventilation across spaces. In case of artificial cooling using air conditioning, ensure the rooms are properly insulated to avoid cool losses and additional heat gain.

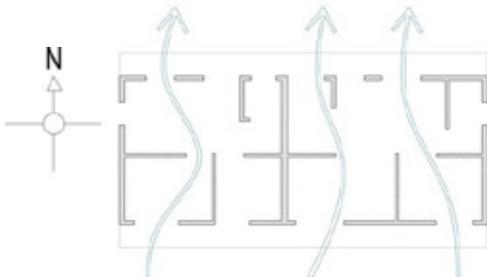
10 Heating: Building design should allow for penetration of solar heat during the cold season especially in the highland climates without causing excess heat gain during the hot



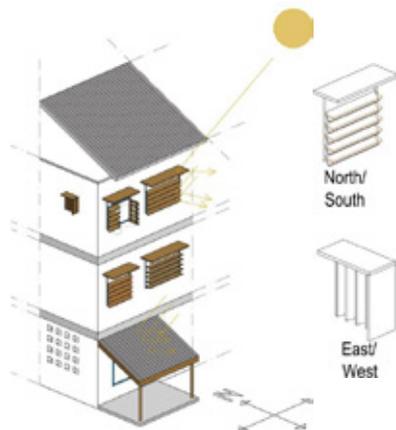
Optimal orientation in tropical countries



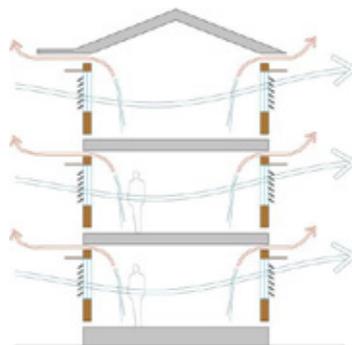
Open and closed configuration adequate for hot and humid/ hot and dry climates respectively



Opposite openings facing North South promoting crossed ventilation



Appropriate sun shading devices for North South East West orientation



Natural ventilation:
Crossed ventilation and stack effect

The design of an energy efficient built environment involves: minimizing the wastage of resources (land, water, energy, material, etc.) and maximizing the use of passive building design options and renewable energy sources.

seasons. Uses of high thermal mass on walls (thick walls) in colder climates like the highlands enable internal spaces to retain heat during the day and release it inside the building in the evening and night, when the temperatures drop. In case of artificial heating using air conditioning, ensure the rooms are properly insulated to avoid additional heat losses.

11 Building envelop: Materials with low U-values are more appropriate for hot and dry climates while materials with high U-value are appropriate for hot and humid climates. Light coloured exteriors reflect solar radiation and therefore reduce heat gains within the building.

12 Building materials: Select materials with low embodied energy and low energy construction systems. This means that the materials are easily available and can be locally sourced. The energy needed for their extraction, transport and manufacture is minimum. The building technologies used are local and transferable, the materials are durable and they are recyclable and reusable.

13 External finishes: Use light coloured external finishes to reflect unwanted solar radiation on both roofs and walls. This will reduce the overall temperature of the building.

14 Renewable energy: Onsite generation of clean energy from renewable energy sources is also a factor to consider when designing sustainable buildings. It can be generated through renewable energy technologies such as: solar photovoltaic, solar water heaters, wind turbines, bio-digesters, or even micro hydropower plants.

15 Water efficiency: Water can be used more efficiently in a building by harvesting rain water from the roofs, recycling grey water and use of water saving fixtures like dual flushing systems, low flow taps and water efficient showerheads.

16 Sanitation: Provide environmentally friendly toilets and sewerage systems such as sewer separation system, bio digesters,

oxidation ponds or reed bed sewage systems. In cities with no public sewage infrastructures, onsite sewage treatment should be given priority.

17 Solid waste management: Initial waste separation at the sources is very important. Provision for a dedicated waste transits place is very important to facilitate its removal or recycling. Non-biodegradable waste can be collected and recycled by the local recycling companies. Biodegradable waste can as well be used to produce compost or biogas, among others.

18 Landscaping: Use indigenous plants that require minimal irrigation. Ensure that hard landscaping uses porous and permeable paving material to slow rainfall runoff. Encourage water reuse for irrigation systems.

19 Storm water management: Have appropriate drainage making provisions for future expansion plans. Provide measures to mitigate storm water and rainwater run-off thus replenishing the water table. Such measures include but are not limited to permeable paving, rain gardens, soakaways, ponds, infiltration trenches etc.

20 Energy efficiency appliances and conscious behavior: Solar water heating systems, energy saving bulbs, light level sensors and overall behavioral changes go a long way in ensuring a building is energy and resource efficient.

Application of the above criteria can reduce up to 70% of the energy and resource consumption in building, and will lead to:

- Optimization of the structure's energy efficiency;
- Minimization of the energy demand of buildings;
- Maximization of the efficiency of energy supply;
- Maximization of the share of renewable energy sources.

Promoting Energy Efficiency in Building in East Africa is an initiative of UN-Habitat, UNEP, GEF and the five East African countries: Kenya, Tanzania, Burundi, Rwanda and Uganda. The aim of the program is to mainstream energy efficiency measures into building code, building practices, and building finance in order to reduce significant amount of GHG from buildings.

For more information, please contact us on:
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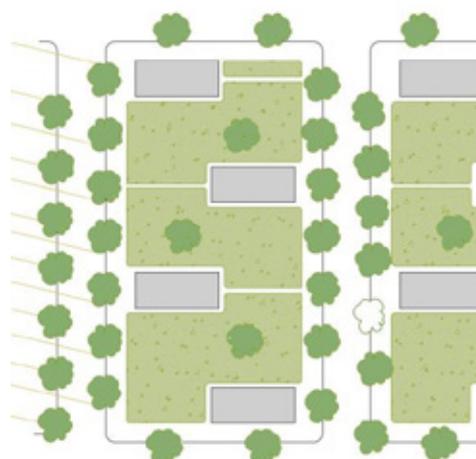
Example of roof ventilation



Light building materials, clear external finishes and high trees for hot and humid climates



Heavy building materials, clear external finishes and trees combined with bushes for hot and arid climates



Protection of east and west orientations with trees. The prevention of the heat island effect by maximizing vegetation areas in hot and humid climates



A new approach to scaling up access to energy

The energy access market

By Christine Eibs Singer, Sustainable Energy for All
Daniel Riley, Energy+ Technical Working Group
Caroline Narich, Accenture Development Partnerships

A change in approach is required to meet the target of universal access to energy by 2030. Innovative solutions and delivery mechanisms are required to enable the scaled investment flows that will lead to cost-effective and efficient access to energy for the 625 million people in Sub-Saharan Africa and the 35 million people in Kenya specifically, without access today.

To this end, the United Nations' Sustainable Energy for All Initiative (UN SE4All), the Energy+ Technical Working Group (E+TWG) and Accenture Development Partnerships, supported by funding from the Government of Norway, have come together to conceptually define a new model – the Energy Access Market Accelerator – to reduce the key challenges holding back enterprises from more rapid and efficient scale-up. Now, we are sharing that concept with market participants in order

to hear your views and solicit your participation as we try to refine and launch the concept in the coming months.

In-depth sector review and stakeholder engagement revealed that while the energy access market is witnessing increased innovation, four principle barriers continue to hold enterprises back: (1) access to affordable financing; (2) limited local capacity; (3) challenges in setting up effective local distribution channels; and (4) lack of consumer awareness of product affordability, availability and quality. These barriers further complicate market entry for new enterprises and contribute to the investor perception of the market as high risk, limiting the required investment flows to support growth.

While a range of actors have emerged to support energy enterprises in tackling these challenges at



on the existing ecosystem, identifying specific interventions and helping to channel public finance and donor funds to provide tangible value to new and established energy enterprises at various stages of maturity. By taking a rigorous approach to assessing information and services, the accelerator further aims to build investor confidence, supporting increased investment flows and more rapid market scale up. End-consumers would ultimately benefit from a more vibrant and efficient marketplace.

By way of example, imagine a start-up seeking to enter the market to distribute solar energy products to consumers at the base of the pyramid. In this scenario, the start-up in question would face a number of challenges including identifying high-quality products to sell onto consumers and negotiating a reasonable wholesale price given the likely low initial volumes required.

To support the start-up, the accelerator would facilitate access to information on high quality products (already largely available through Lighting Africa), and to service providers that may be able to support the procurement process through, for example, establishment of a shared procurement function. Where this type of service wasn't already available but there was sufficient demand to support it, the accelerator would seek to catalyse the creation of such a service. These efforts would help to lower costs for the start-up, savings which

“Energy Access Market Accelerator – to reduce the key challenges holding back enterprises from more rapid and efficient scale-up.”

the national and international levels, the provision of these services is far from the level needed to support scale. Services are uncoordinated across the ecosystem and many remain immature and non-specific to the requirements of the market. As such, energy enterprises are committing significant time and resources to independently tackle the market barriers identified, resulting in substantial inefficiencies and delays to enterprise scale up.

To address this identified market gap, SE4All, E+TWG and Accenture Development Partnerships have conceptually defined a new model: the Energy Access Market Accelerator. By facilitating increased collaboration across the ecosystem, the model aims to aggregate existing information and services, articulate where there are gaps and work with partners to close them. In doing so, the accelerator aims to complement and build

could be passed onto the consumer. Furthermore, ensuring the start-ups were distributing high-quality products at reasonable prices would provide investors with a boost of confidence.

As we begin the detailed planning to launch the accelerator in East Africa, SE4All, E+TWG and Accenture Development Partnerships are seeking to expand our partnership through broad stakeholder engagement, cross-sector collaboration and most importantly, through the active inclusion of the innovators, entrepreneurs and business leaders who will ultimately deliver the solutions for universal access. Please reach out to Daniel Riley from the Energy+ Technical Working Group at daniel.riley@wwfus.org for more information.

Short Message Service (SMS) as a remote control tool for renewable energy solutions

By Graham Muhanga, Africastalking

Integration of SMS into technological solutions is increasingly becoming attractive. SMS allows for short messages to be delivered through mobile telecommunications network to a destination of choice, as long as a controller is present at the terminal destination.

SMS integration is convenient to use for a number of reasons; such as reliability, low cost and instant transmission of information. These advantages have therefore attracted significant interest in developing new ways of using SMS. Application of SMS to remotely control devices has gained popularity and is now the most common innovative use.

Remote controlled devices are configured with various functions that can be triggered by specific SMS commands sent by the operator of the device. SMS commands are sent via the GSM networks – standard mobile telecommunications network.

The control unit of the device then acts on the instructions to trigger specific functions or commands in the devices. For a heating unit, that could be providing heating to certain temperatures for a period of time, while for car tracking devices, it could be switching of the vehicle's engine.



Controlling remote devices via SMS

In the agricultural sector for instance, irrigation systems can be remotely controlled via an application that collects information from weather servers, on the time and temperatures for a region. On the basis of the data, the system then activates or deactivates the water valves in the field. This is an example of implementation of an SMS controlled device.



“The use of SMS controlled devices is therefore limitless, and could hugely support human efforts to run smarter businesses, homes, farms and other processes.”

The use of SMS controlled devices is therefore limitless, and could hugely support human efforts to run smarter businesses, homes, farms and other processes. A renewable energy system installed at a commercial or residential site can be configured to build in a Global System for Mobile communication (GSM) switch that changes between the on and off positions after receiving instructions via SMS.

SMS can be sent to renewable energy solutions such as solar systems and biogas systems, with a controller integrated into the control unit or meter respectively, to activate or deactivate the system. SMS can also be used particularly by businesses offering pay as you go (PAYG) schemes to consumers, or businesses supplying metered energy services to a number of users. In practice, a meter that is remotely controlled via a GSM switch would be installed at each user's location. When a bill is due, an SMS would be sent to deactivate energy supply to the defaulter. This lowers the risk of bad debts and reduces costs incurred in meter reading, billing and payment collection.

AFRICA'S LARGEST WIND POWER PROJECT ACHIEVES FULL FINANCIAL CLOSE

Lake Turkana Wind Power receives first disbursements of funds

By LTWP

Nairobi, Kenya, 19 December 2014. Following the financial close of Lake Turkana Wind Power Project (LTWP) on 11 December 2014, LTWP has received the first disbursement of funds pursuant to financing agreements signed in March 2014.

"Reaching this important milestone today caps a year of major achievements by LTWP," said Mugo Kibati, LTWP's Chairman of the Board. "This includes signing the financing agreements in March, issuing notice to proceed by KETRACO to the transmission line construction contractor in August, financial close of the LTWP equity partners in September, as well as notices to proceed to LTWP's contractors in October."

The LTWP project, Kenya Shillings 70 billion (KSh623 million), is the largest single wind power project to be constructed in Africa and is, to date, the largest private investment in the history of Kenya and arguably one of the most complex and challenging project financing undertaken in the renewable energy space in sub-Saharan Africa. The project is a key deliverable under the Government's commitment to scaling up electricity generation to 5,000MW and is a flagship project within the Vision 2030 program. The LTWP project will provide cost effective renewable power to the Kenyan consumer and will comprise approximately 20% of Kenya's 2014 installed generating capacity.

The LTWP consortium is comprised of KP&P Africa B.V. and Aldwych International as co-developers and investors, and Finnish Fund for Industrial Cooperation Ltd (Finn Fund), Industrial Fund for Developing Countries (IFU), Norwegian Investment Fund for Developing Countries (Norfund), Vestas Eastern Africa (VEAL) and Sandpiper as investors. Aldwych Turkana Ltd, an affiliate of Aldwych International, will oversee construction and operations of the project on behalf of LTWP.

The support, interaction and uplifting of local communities is a high priority for LTWP. As such, LTWP adopted a Corporate Social Responsibility (CSR) Program which will be implemented by the Winds of Change Foundation (a wholly owned subsidiary of LTWP). This foundation aims to uplift local communities through programs such as the CHAT HIV awareness campaign, water, sanitation, electrification, sustainable development of agriculture as well as the education of boys and girls.

Initially, activities will be concentrated around the wind farm communities (Loyangalani, Korr and Laisamis divisions, with South Horr). CSR activities will gradually

expand to the wider project area.

The financing agreements were signed in March 2014 with the African Development Bank (AfDB), European Investment Bank (EIB), Nederlandse Financierings Maatschappij Voor Ontwikkelingslanden N.V. (FMO), Société De Promotion Et De Participation Pour La Coopération Economique (Proparco), Eastern And Southern African Trade And Development Bank (PTA Bank), Nedbank Capital, The Standard Bank of South Africa, Eksport Kredit Fonden (EKF), Deg – Deutsche Investitions - Und Entwicklungsgesellschaft Mbh, East African Development Bank and Triodos.

After eight years of development with the full support of the Government of Kenya, Kenya Power, the Energy Regulation Committee (ERC) and Kenya Electricity Transmission Company (KETRACO), utilization of the funds signifies the completion of the project's financing stage, which will allow the project to move towards implementation and to commence producing electricity in 2017.

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Please also visit: www.ltwp.co.ke for further information.

Notes to Editor:

The wind farm site, covering 40,000 acres (162km²), is located in Loyangalani District, Marsabit West County, in north-eastern Kenya, approximately 50km north of South Horr Township. The project will comprise 365 wind turbines (each with a capacity of 850 kW), the associated overhead electric grid collection system and a high voltage substation. The project also includes upgrading of the existing road from Laisamis to the wind farm site, which is partly financed by the Dutch Government and is a distance of approximately 204km. In addition, the project will build an access road network in and around the site for construction, operations and maintenance. The Kenya Electricity Transmission Company Ltd (Ketraco), with concessional funding from the Spanish Government, is constructing a double circuit 400kV, 428km transmission line to deliver the LTWP electricity along with power from other future plants to the national grid.



Asset financing of Solar PV systems

By AECF

The example of SolarNow

The search for solar PV systems energy development across the world has been gathering pace in recent years. As Africa modernizes, solar energy is playing a fundamental part in Africa's electrification. The use of solar energy in areas across sub-Saharan Africa has increased over the years. In Kenya, more rural households get their electricity from solar energy than from the official rural electrification program (REP). With tech advances, the cost of solar PV systems is dropping to affordable levels, which is allowing their use to proliferate. The costs of solar photovoltaic systems have fallen considerably over the last few years. SolarNow is one of the companies in East Africa that is solving the inability of the current energy system to satisfy the energy needs of the poor by making solar energy affordable and accessible in rural Africa.

Established as a social enterprise in May 2011, SolarNow grew out of the Rural Energy Foundation, a Dutch run NGO providing distribution and training support for the use of Solar Home Systems across Africa. It has developed an effective distribution model combined with consumer financing model, an 18-month credit facility, known as the "PayPlan".

This has enabled the company to maximize potential reach across rural communities and to enable access for those at the bottom of the pyramid. In this way, products that were previously unavailable or unaffordable are now within reach of its target customers who receive the many financial and social benefits of electricity in their homes or places of work. It has since gone on to provide solar home systems to 1000s of customers and its monthly growth is largely constrained by its available financing.

SolarNow, like any asset financing business is cash intensive. Funds are required for the financing of its credit portfolio and its supply chain which extends back into China where the majority of the hardware is sourced. The business has been on a journey relating to the types and amounts of financing it has raised and this journey continues today. Highly concessional funding combined with the founders' and seed investors equity was appropriate as the company sought to experiment with a number of different business models; searching for the right combination of product, price, and promotion that would enable the company in time to achieve a strong financial return on its capital, service the rural mass market

in Uganda and also reach considerable scale across the EAC.

Once this business model had been established, SolarNow looked to broaden its base of funders initially with small loans which were provided over 2 to 3 years from increasingly commercially focused providers. Often looking to mix commercial funders with concessional funding to achieve the right balance of risk to the lenders and interest cost to the company. In 2014, the company closed a new equity round from two of East Africa's leading impact venture funds once it could demonstrate that its main constraint to profitable growth was availability of funding.

SolarNow stands out for its ability to combine ambition with an appreciation for the scarcity and cost of capital. The senior management team has a highly commercial approach in a market which has the opportunity to have enormous social impact – bringing electric power to households that have never had it before. But the company knows this opportunity will only be realized with an obsessive approach to margin optimization and risk management. The team has worked to get an understanding of the types of risks investors and lenders are willing to take and those risks that they will not take. This knowledge has been built into the business plan and led to a number of very successful fundraisings.

“It has since gone on to provide solar home systems to 1000s of customers and its monthly growth is largely constrained by its available financing.”

AECF provides funding to a number of businesses within the solar PV systems energy sector. Below are some tips they provide to CEO's who are looking to raise funds.

- Fundraising takes time, at least 9 months if not more. This should be considered when doing financial planning.
- Do not exclude equity when looking for funds. Pumping too much debt into a business may not be a good idea. An equity partner can be beneficial in a number of ways: know-how, networking and more.
- Planning, reporting and governance is important to investors. Ensure these are in place if looking to raise funds. It will also help speed up the fundraising process.
- Whilst we all want money cheaply, it is important to remember investors require returns. Work with them to help them realize these returns.



Mibawa solar solutions transform lives.

Mibawa Solarpack 3

2 Years Warranty

- MaxBright LED
- SunBoost™ Solar Panel
- Lithium Battery (Twice the life of standard battery)
- Charges Cell Phones

Mibawa-Niwa Multi 100

2 Years Warranty

- Charges Cell Phones
- 5 Years Battery Life
- 100 Lumens

Mibawa-Niwa Uno 50

2 Years Warranty

- 50 Lumens
- 5 Years Battery Life
- 2 Brightness Settings

Mibawa Solar Radio

1 Year Warranty

- 3 Years Battery Life (2000mAh) 3.7V Lithium Battery

USB/MicroSD input socket for playing MP3

Can be charged by Mibawa Solarpack 3 & 10

Battery level indicator

Mibawa solar solutions have an innovative design to match the lighting and phone charging needs of small households in off grid areas.

They are packaged units with plug and play components for ease of assembly by the users. And all components are specifically designed for high performance and integrate the latest technology in lighting and battery storage for extended life and trouble free operation.

They are environmentally friendly solutions that eliminate the need for paraffin thus increasing savings for households and reducing health hazards associated with paraffin lanterns.

Mibawa Solarpack 10

1 Year Warranty

- 10W Solar Panel
- 4 x LED Light Tubes
- Lithium Battery (Twice the life of standard battery)
- Charges Cell Phones



Mibawa Suppliers Ltd.
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The 2014 renewable energy business and study tour to Bavaria, Germany

The pursuit of business linkages and learning from the German experience

By Kenya Renewable Energy Association

The 2014, Kenya Renewable Energy Association and Bavarian Employers Association (bfz) have been coordinating an annual renewable energy business and study tour to Bavaria, Germany, through the support of Bavarian Ministry of Economic Affairs and Media, Energy and Technology. The tours, which take place over one week each year, are aimed at supporting the establishment of contacts between Kenyan entrepreneurs, engineers, academics and government representatives and Bavarian companies and institutions in the renewable energy sector.

The study tour provides an excellent opportunity to:

- Learn from effective approaches and models to increase uptake of renewable (RE) and energy efficient (EE) technologies,
- Come across newly launched RE technology innovations applicable for the Kenyan market and,
- Establish business linkages with well-established Bavarian RE & EE companies developing and marketing high quality, cutting edge products.

The study tour is organized and coordinated by the Bavarian Employers Association (bfz); the Kenya Renewable Energy Association publicizes the tour to Kenya RE sector players and mobilizes participation.

Below are some highlights from the 2014 study tour.

Approaches and models to stimulate and increase uptake of RE & EE technologies

The District of Neumarkt's Action Plan for Sustainable Development

Agenda 21 is a global call on governments to adopt national strategies for sustainable development. It is a product of the UN Conference on Environment and Development (UNCED) held in Rio, Brazil, in 1992. It is a non-binding, voluntarily action agenda of the United Nations, multilateral organizations, and individual governments around the world that can be executed at local, national, and global levels.

Agenda 21 is based on the premise that humanity stands at a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend. Integration of environment and development concerns and greater attention to them will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future.

The German Federal Environment Ministry established the National Climate Initiative (NKI) in 2008. Through the NKI, the ministry has initiated and supported projects on emissions reduction, energy efficiency and the expansion of renewable energies. The initiative is financed with budget funds and revenues from emissions trading.

“Agenda 21 is a global call on governments to adopt national strategies for sustainable development.”



The National Climate Initiative aims at a successful transformation of the energy system through tapping existing potential for emissions reduction in a cost-effective way and promoting innovative programs for climate protection. The goal is 40% reduction of greenhouse gas emissions in Germany by 2020, a 55% reduction by 2030 and an 80-95% percent reduction by 2050 (compared to 1990 levels).

At national level the Federal Environment Ministry supports effective climate protection measures through programmes and projects in municipalities, in industry, and in schools and educational institutions. The National Climate Initiative's programmes promote:

- Climate protection in municipalities, and in social and cultural institutions
- Innovative projects in industry and in the consumer, education and municipal sector
- Highly efficient small combined heat and power systems (mini CHP systems) and commercial cooling and air-conditioning plants.

At district level, the District of Neumarkt finalized its Climate Protection Concept in 2011. The district covers an area of 134,000 hectares and comprises 19 municipalities, 37,500 residential buildings and 120,000 inhabitants.

The process of developing the District's Climate Protection Concept comprised of:

Determining the current energy consumption and CO₂ emissions balance and trends

This comprised of collecting historical data (from 1998) on energy use in the district i.e. electrical

energy, thermal energy and energy for transport. This data was primarily collected from companies supplying electricity, natural gas, central heating, industrial fuels (fuel oil, coal, LPG, petroleum coke, coal dust etc.), biomass (wood chips, pellets etc.) and transport fuels (diesel, petrol etc.). This data was collected and disaggregated into 3 end-user categories i.e. (1) private households, small business and municipal properties (2) commercial, industrial and special consumers (3) transport.

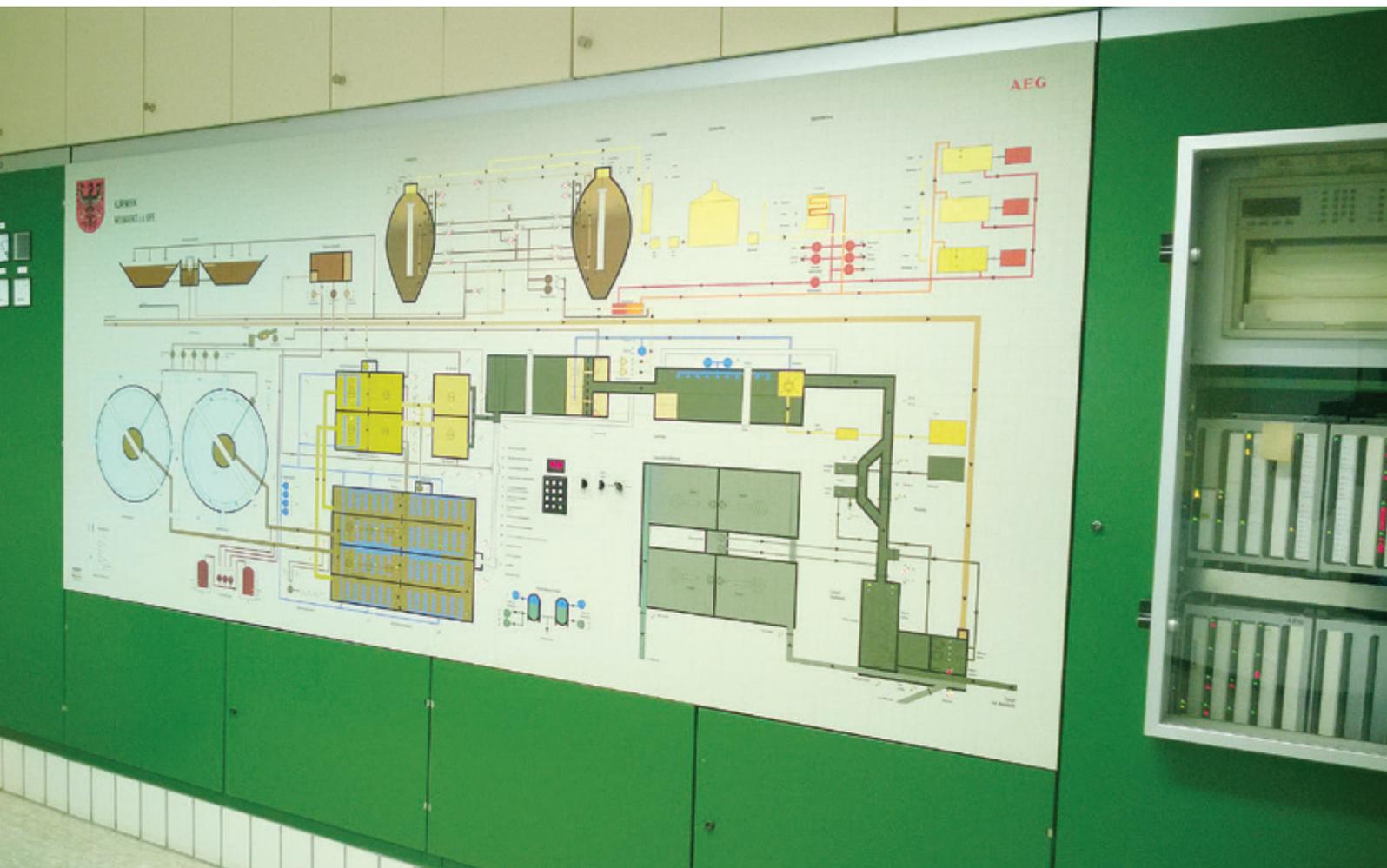
The energy use equivalent in the district in 2010 for the 3 categories above was determined as 1,375GWh, 1,750GWh and 1,055GWh respectively with thermal energy representing 82% and 79% of the energy demand for categories (1) and (2) respectively. With regard to the percentage share of renewables; 38% and 49% of electrical and heat power respectively was from renewables. CO₂ emission reductions were determined to be 8tCO₂/inhabitant per year.

Identifying energy saving potential

Thermal energy saving potential for category (1) is estimated at 344GWh/y based on a retrofitting (e.g. to improve insulation) rate of 2% of private households, small businesses and municipal properties each year. In addition, electrical energy savings of 55GWh/y (20%/year) are estimated as the saving potential for category (1) based on implementing measures such as: reducing standby losses, switching to energy saving lamps, modern fridges, freezers, washing machines and dish washer and using output regulated pumps.

For commercial, industrial and special consumers

Presentation of the City of Neumarkt's Master Plan for 100% Climate Change Mitigation to the Kenyan Delegation at their Municipality Offices



Schematic of Nuemarkt's Sewage Treatment and Combined Heat and Power plant

(category (2)), thermal saving potential is estimated at 199GWh/y (15%/year) from implementing measures such as: heat insulation of pipe works, adaptation of heating technology to required process temperatures, use of radiant heaters (e.g. using underfloor heating, wall heating or radiant overhead panels as opposed to conventional convection heating), optimized dimensioning of boilers, use of modulating burners (designed to control the burner output (size of flame) to match the boilers variable load requirements) and use of waste heat. Electricity saving potential for this category is estimated at 123GWh/y (30%/year) from measures such as: optimization of pneumatic systems, optimization of ventilation, cooling, air conditioning systems, optimization of lighting, use of controlled pumps and introduction of central building control systems.

Fuel saving measures for the transport sector are identified as: switching to alternative fuels, more efficient fuel use, hydrogen technology, car sharing and electrical mobility.

Identifying the renewable energy potential

The district estimates that there is approximately 1,220,000m² of suitable roof area available (20% of total roof area) for solar PV or solar thermal. The solar PV and solar thermal potential based on roof suitability and supplying a percentage of the

thermal demand is estimated at 52,674MWh/y and 31,708MWh/y respectively. Wind energy potential is estimated at 300,000MWh/y from an additional 100MW. There is no evident potential for new hydro plants but it is anticipated that the existing plants can be extended or optimized to generate an additional 200MWh/y.

The thermal energy generation potential from forestry biomass is estimated at 100,000MWh/y while the thermal and electrical energy potential from agricultural biomass (i.e. through biogas plants) is estimated at 18,900MWh/y and 16,800MWh/y respectively.

Developing and implementing projects to realize the identified RE and EE potential

Based on the identified potential, a number of projects have been developed and implemented by the District of Neumarkt (e.g. by the municipalities) either as direct municipal investments in RE and EE projects, or incentives to leverage RE and EE investments by households, businesses and industry or activities to create public awareness on RE and EE and provide information or technical advice to the public. These projects include:

- The development of a net-plus-energy building that houses the municipal utilities in Neumarkt. A net-plus-energy building produces more energy from renewable energy sources, over

the course of a year, than it imports from external sources. This is achieved by integrating efficient building design (to maximize passive solar lighting, heating, cooling and ventilation), energy efficiency measures and renewable energy sources in a systematic manner to maintain comfort levels and maximize energy savings.

- Providing grants for retrofitting private buildings and for integrating energy efficient building design principles into buildings to be constructed.
- Providing information and advice to the public on energy efficiency in buildings.
- Implementing a 1.2MW grid-connected solar PV power plant.
- Implementing a combined heat and power plant using sewage gas; the sewage plant in Neumarkt handles 18,000m³/day of industrial and household effluent from which it produces 2,000m³/day of gas to generate 1,240MWh of energy per year (52% of which is used to meet the plant's needs). The sludge that remains after the waste treatment process is used in land reclamation.
- Implementation of an electric mobility campaign which includes procuring of electric cars and electric bikes for the administration in Neumarkt and building up a network of

charging stations for electric vehicles.

- Implementation of energy saving LED street lights.
- Organizing conferences for awareness raising and information exchange e.g. a conference on 'New Ways in Mobility' in July 2014.

Funds for these activities come from the National Climate Initiative (Federal Environment Ministry), federal state funds and municipal level funds.

The '50 Municipal Climate Partnerships by 2015' Project – An opportunity for collaboration between German and Kenyan municipalities

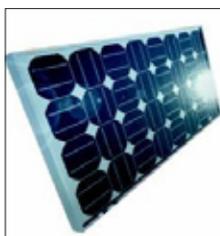
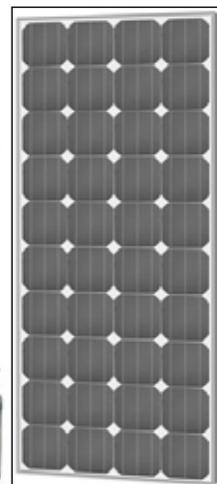
To facilitate international partnerships German municipalities and municipalities in developing countries, the German Federal Ministry for Economic Cooperation and Development (BMZ) commissioned the '50 Municipal Climate Partnerships by 2015' project. The project seeks to build on the extensive experience and expertise of municipalities in the fields of climate change mitigation and adaptation. It revolves around professional exchange among local government experts, particularly as part of mutual visits made by experts from each of the municipalities to their respective counterparts.



With 25 years of experience as a pioneer and thousands of successful installations Kenital Solar is the most experienced alternative energy firm in East Africa. Hotels, camps, hospitals, banks, insurance firms, religious organizations and NGOs among others have relied over the years on our energy solutions including Solar, Wind and Power Backup Systems, Solar Hot water systems, Solar pumping systems etc. etc.

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Sewage gas storage tanks at Neumarkt's Sewage Treatment plant. The gas is used to generate electricity and heat

The municipal partners spend 18 months developing joint programmes of action for climate change mitigation and adaptation that specify objectives, measures and allocated resources. Developing the programme of action lays the foundation for long-term, constructive and systematic cooperation between the partner municipalities.

The project is implemented by the Service Agency Communities in One World in cooperation with the North Rhine Westphalian Working Party on Agenda 21. The Service Agency publishes a call for declarations of interest. German municipalities that have already entered into a municipal partnership, or are interested in establishing a new climate partnership, are eligible to submit declarations of interest. The most important criterion for participating in the project is the willingness of the two partner municipalities to prepare a joint programme of action for climate change mitigation and adaptation, and to cooperate on a long-term basis. Each participating municipality signs a memorandum of understanding (MoU) with the service agency detailing the inputs that will be provided by the service agency, and the expectations placed on the municipality.

To obtain advice on joining the project without obligation, interested municipalities are welcome to get in touch with the Service Agency <http://www.service-eine-welt.de/en/home/index.html>

Jurenergie eG. – A cooperative model for grid connected RE project development

Jurenergie eG. was founded with the goal of increasing the share of renewable energies in the energy supply in the district of Neumarkt. Jurenergie is based on an innovative approach which enables common citizens to co-invest in renewable energy projects. Jurenergie was established on the principles of:

- A cooperative structure to enable participation

of citizens;

- A democratic structure; one vote per member irrespective of the number of shares and
- Voluntary management; the board and steering committees work on a voluntary basis to minimize administration costs.

Jurenergie was established in 2010 with an initial capital of 298,500€ (597 shares @ 500€) raised by 97 members. As at the beginning of June 2014 Jurenergie had 933 members, 17,731 shares purchased (an average of 18.7 shares per member), a share capital of 8.65 million € and a total invested capital of 22 million €.

Jurenergie's business comprises of:

- Independent establishment and operation of own renewable energy plants; Jurenergie does not sell the electricity it generates to the grid but to the final consumer via power wheeling.
- Investment in renewable energy plants (as a limited partner).
- Provision of energy consulting services to members and non-members.
- The long-term objective of marketing the electricity it generates as a regional power utility.

Jurenergie are currently sole investors in 850kWp of solar PV and 12MW of wind energy plants.

1.2 Newly launched technological innovations

1.2.1 protarget Solar Power Systems (<http://www.protarget-ag.de/>)

Protarget AG was founded in 2009 and develops and markets turn-key solar thermal solutions based on concentrated solar power using parabolic mirrors. The parabolic mirrors are automatically controlled to track the sun and focus the radiation

on a tube carrying a heat transfer fluid (mineral oil) that stays in liquid state at 400°C. A heat exchanger is then used to transfer this heat to generate electricity (via a steam turbine), process steam or process heat. The systems are suited



for dry sunny climate and are designed for a 25 year lifetime. They are not suited for humid conditions.

Protargent's systems are modular; with the smallest modular unit having a nominal thermal power capacity of 250kW. This size of system requires 2 rows of parabolic trough mirrors of 96m length and produces 300kg of steam per hour at 100-400°C. For flexibility the system also comes with a heat storage option that ensures operation at night or during cloudy conditions. Furthermore, the system can be controlled to provide the required level of heat as per demand requirements.

Indicative figures with regard to installed costs and levelized cost of (heat) energy for a 250kW turnkey thermal system are 200,000-300,000€ and 2-3€/kWh respectively. The system ships in 1½ containers and takes three months of planning and construction.

The thermal system is suited for industrial heat applications such as:

- Dairy's and bakeries - Drying, cleaning, cooking, deep frying, baking, pasteurisation
- Slaughter houses – Rendering process, steam cooking, cooling and refrigeration
- Wineries, breweries, distilleries – Steam juicing, sterilisation, distillation
- Textile and leather industry - Dying, shaping,

ironing, tanning

- Cement and ceramic industry – Drying, burning, calcination
- Paper industry – Bleaching, thermo mechanical pulping, drying
- Pharmaceutical and chemical industry - Process specific applications, distillation
- Plastics and rubber industry - Heating, cooling, vulcanisation
- Mining and oil industry – Ore leaching, galvanic processes, oil recovery, cleaning
- Hotel and tourism industry - Laundry, heating, cooling, water treatment and desalination

Kenyan delegation visits protargent's 250kW concentrated solar power system in Munich

Protargent's system can also be used to generate electricity via an Organic Rankine Cycle (ORC) steam turbine. Heat storage means that the system can continuously operate at night or during bad weather. The ORC steam turbine is designed to run 24 hours a day, 7 days a week for a full year with only 3 days of maintenance required per year. The electric power plant capacity is scalable from 1-20MW.

The system is also installed turnkey; 12 months from order to finalizing construction. The levelized cost of electricity generation for the solar thermal electricity system is below 0.15€/kWh based on an installed cost of 5 million €/MW.

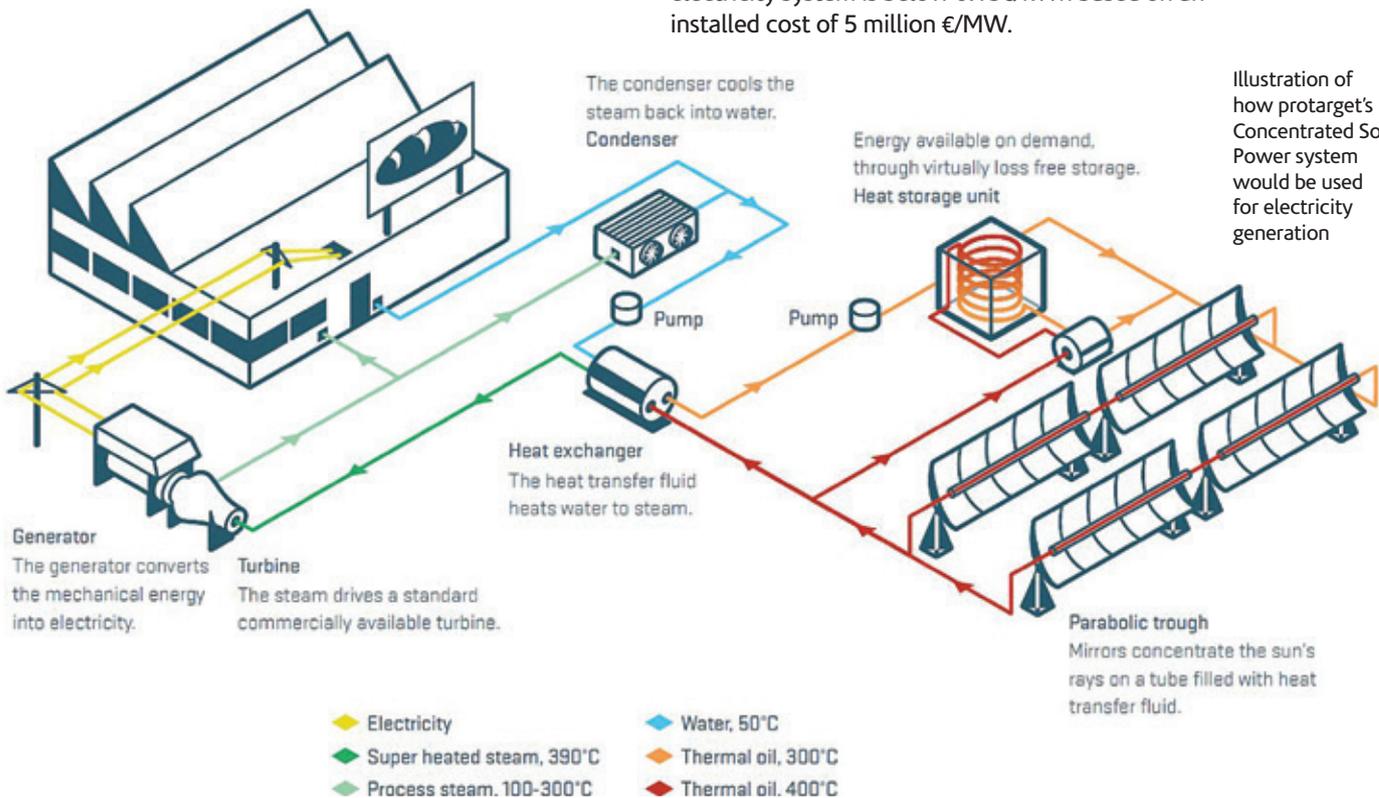


Illustration of how protargent's Concentrated Solar Power system would be used for electricity generation

Lowest „cut-in wind speed“ (1,5m/s) worldwide

▶ Globally applicable

Lowest noiselevel worldwide <34dB

▶ Unrestricted usage in residential areas

No cut-out at high wind speeds

▶ Year-round operation up to 200km/h

No vibrations

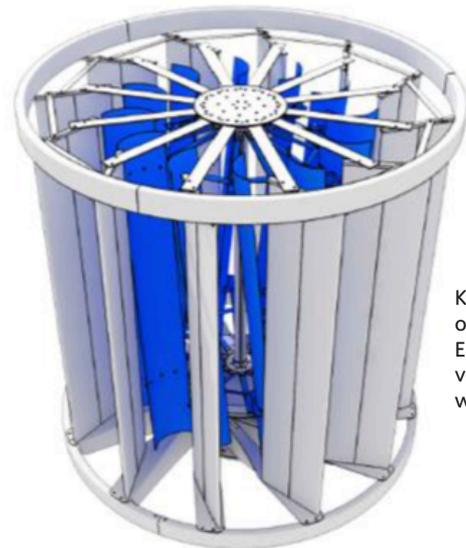
▶ Simple and affordable roof-top installation

All moving parts are inside the turbine

▶ Safe for humans and animals

Certification is carried out by TÜV and NEL

▶ Safety & Quality „Made in Germany“



Key features of TURBINA Energy's vertical axis wind turbine

TURBINA Energy AG
(<http://www.turbina.de/en>)

TURBINA Energy develops, produces and delivers small wind energy system for households and industrial applications. The company was established in 2013 but has been doing research and development of its wind turbine since 2006. TURBINA specialize in a vertical axis wind turbine design which has the unique feature of being able to produce energy at low wind speeds (i.e. 1.5m/s), are quiet and have low visual impact (compared to typical wind turbines) making them suitable for urban applications. The turbine design is based on a symmetric arrangement of the rotor and stator. As illustrated in the picture, the stator (on the outside) guide wind directly to the rotor blades (on the inside) to increase the surface exposed to the wind.

TURBINA Energy's product range currently comprises a 1kW, 4kW wind turbine and a 4kW hybrid-solution for Telecom applications. Indicative installed costs of the 1kW and 4kW turbines are 5,000€ and 18,000€ respectively (translating to an energy cost of 18€/kWh). A 500W turbine is also currently under development. The turbines have an estimated 20 year lifetime and come with a 5

year guarantee. TURBINA has over 82 operational turbines worldwide.

Established RE Companies developing and marketing high-quality cutting edge products

STECA Elektronik (<http://www.steca.com/>)

STECA is a family owned business established in 1976 for the development, production and assembly of battery charging systems. It has 2 key business segments:

- Solar electronics – branded products developed, produced and marketed by STECA for solar PV (grid and off-grid) and solar thermal applications.
- Electronic Services – the design and manufacture of electronic components for products (e.g. home appliances, consumer electronics, medical and communication technology, automotive and maritime and industrial electronics) manufactured by other companies. STECA's solar electronic product range includes:
- Solutions for Solar Home Systems e.g. charge controllers (3A – 30A at 12-24V), energy saving lamps, solar fridges and solar freezers. The solar fridges and freezers are temperature programmable (allow the user to set the desired internal temperature). An alarm is also incorporated to inform the user when the internal space is not cold enough and in case of a power outage the highest temperature reached is indicated on the electronic display.
- Solar Street lighting/outdoor lighting solutions (6A-140A at 12-48V) which include light sensors for automatically switching the lights on and off.
- Battery Inverter systems: 100W – 5,000W (sine wave) range for domestic and small commercial applications, 200W – 8,000W (parallel connectable up to 72kW) for single phase DC Hybrid System for village power supply and industrial installations, 10kW – several hundred

Installation of Turbina's Vertical Axis Wind Turbine at its offices in Unterhaching, Bavaria





STECA presenting its Company Background and Products to the Kenyan Delegation

- kW for three-phase AC Hybrid Systems for village power supply and industrial installations.
- Inverters for residential PV grid connected systems (1,800W – 4,200W): peak efficiency of 98.6%, long service life and light weight (9-10kg) compared to other similar inverters in the market.
 - Inverters for commercial PV grid connected systems (8,000W – 10,000W) with three-phase feed and designed for outdoor installation.
 - Temperature differential controllers for solar thermal systems (domestic and commercial applications) with 2 inputs – 1 output up to 24 inputs – 12 outputs.

Some of STECA's new stand out products include; the TAROM 4545 charge controller with up to 45A PV and load current allowance, a graphic animated display, programmable with data logging ability and the TAROM Maximum Power Point Tracking charge controller with high allowable PV input (17-200V) and low battery charging voltage (12/24/48V).

The TAROM MPPT 6000 comes with two separate inputs and independent MPP trackers allowing the use of two different module orientations, two different string lengths (e.g. input 1 with 6 modules, input 2 with 4 modules) or use of two different module technologies (e.g. input 1: crystalline silicon input 2: thin film). The TAROM MPPT also has a graphic display, dual data logging ability via micro SD card or external data logger.

RUF Briquetting Systems (<http://www.briquetting.com/home/>)

RUF briquetting is a family owned company with 30 years of briquetting experience. RUF manufactures briquetting systems for wood and other biomass materials (e.g. miscanthus, bagasse, onion skin, coffee beans, coffee husks (with 30% saw-dust), peanut shells, grape vine, bark, hay, tobacco, olive residues, corn residue, straw, almond shells etc.). RUF also manufactures systems for briquetting metals. Briquettes have a number of applications

i.e. household fuel for heating and cooking, animal feed, and fuel for industrial boilers. Briquetting also saves waste disposal costs by simplifying the handling of dust and small particles.

RUF produces briquetting systems with throughputs between 100kg and 1,500kg/hour. Their systems can briquette particle sizes below 50mm (e.g. dust, chips and rough pieces) with moisture content below 15%. RUF's briquetting systems have the following features:

- Low running costs (12-18€/t including depreciation and wear (1-4€/t))
- Energy efficient; 50-60kWh energy consumption per ton of briquettes produced
- The machines run automatically
- The machines do not vibrate so no special floor is required
- The briquettes come out hand warm so no cooling line is necessary

Indicative prices for RUF's briquetting systems are 55,000€ for 450kg/hour system and 130,000€ for the 800-1,300kg/hour system. The typical size of briquette produced is 150mm by 60mm although a briquetting system to produce a smaller size of briquette is under development.

RUF's Standard Briquetting System in Operation





Greening the Kenyan economy through innovative financing of start-ups

By KICIC

Over the last decade, Kenya and the East Africa region have experienced significant economic growth. There has been talk to consider transition to a green economy. Efforts of Kenyan stakeholders to develop the green economy have strong potential for both environmental benefits and sustainable economic growth. According to the United Nations Environment Programme (UNEP), a green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest term, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.

According to the Green Economy Assessment Report 2014, Kenya is already moving towards a green economy. However, there is still untapped potential to pursue a development pathway that will create green jobs, accelerate poverty reduction, support sustainable growth and restore environmental health and quality. The private sector through innovation and new ways of production and consumption will continue to play a critical role in the move towards the green economy. With targeted policy interventions and financing, the country can continue to generate new opportunities from this transition, because Article 42 of Kenya's 2010 Constitution recognizes a clean and healthy environment as a right, and calls for

“sustainable exploitation, utilization, management and conservation of the environment and natural resources.”

The urban poor and rural communities in Kenya, the so called 'Bottom-of-the-Pyramid' consumers, will play a crucial role in the successful transformation towards a low carbon, and climate resilient development paradigm. They are most affected by climate impacts and should be the focus of adaptation. They also hold a large mitigation potential today and as the future middle class, have the ability to support or reject national climate policies. As such, they need to be provided with more climate-resilient products and services. Several entrepreneurs have seen this opportunity and are establishing a growing number of start-ups that develop technologies appropriate for this market segment in three key sectors; renewable energy, agribusiness, and water and sanitation. The process of developing new technology-based products can be expensive, time consuming, and risky. Furthermore, many investors are unfamiliar with green technology and, thus, unwilling to invest in enterprises whose businesses are based on unfamiliar technologies. Where these businesses target the bottom-of-the-pyramid, they often have small margins, by virtue of targeting markets which are high volume and low margin by nature. This market also tends to show low product uptake in

the early years. The result is a longer timeframe to profitability, compared to other kinds of early stage ventures. The financing instruments available to these companies are therefore not well developed and there is need to have innovative mechanisms to finance these enterprises. This is where the Kenya Climate Innovation Center comes in by introducing innovative financing mechanisms in Kenya such as crowdfunding.

Crowdfunding is a relatively recent global phenomena whereby a large number of individuals pool their often relatively small financial resources to support efforts, projects or campaigns initiated by other people, typically via an internet-based platform, also called a 'crowdfunding platform'. However, crowdfunding is not actually a new phenomenon in Kenya as it can be related to our 'harambee'. The only difference is that crowdfunding is well structured, and with the advent of technology and the crowd, it is more sophisticated.

Crowdfunding has shown tremendous success in the developed countries with some campaigns being so successful to the surprise of the regulators. For instance, in North America, the USA Government enacted the Jumpstart Our Business Startups (JOBS) Act to encourage funding of United States' small businesses by easing various securities regulations, including crowdfunding. This increased the confidence of entrepreneurs in the North America and made crowdfunding more successful. This concept can be replicated in Kenya and will provide a reprieve for Kenyan innovators and entrepreneurs who will have a more innovative financing mechanism. Though the crowdfunding market is in its infancy in developing countries, the World Bank in the study Crowdfunding's Potential for the Developing World estimates that investments in crowdfunding could go up to US\$96 billion a year by 2025.

Crowdfunding exists for a variety of funding modalities including donations, in-kind rewards, lending and equity investments. The link between the individual crowdfunder and the recipient can be as direct as person-to-person (P2P) or indirect, for instance through an investment fund. The motivation of the funders can range from purely philanthropic to purely financial, with the majority finding themselves in the middle and expecting a 'dual return' of social and financial benefits. Contributions of individual funders are typically

too small to finance the entire project; hence the need to pool resources of several individuals, or the 'crowd'.

To be able to develop a successful campaign, there are three steps that an entrepreneur needs to follow. The first step is creating a video that showcases the idea and the delivery process, as well as its relevance and any possible testimonials from stakeholders like employees, distributors and customers. The video needs to be 'catchy', interesting, short and to the point, to be able to capture potential backers. Backers are the individuals who donate or invest during a crowdfunding campaign.

The second step is selecting a platform that is suitable for your campaign while taking into consideration the backers you are targeting. If it's locally backed it is important to choose a platform that supports local payment methods like M-Pesa. If the target is the international, 'crowd' platforms like Indiegogo and Kickstater will be useful.

Step three is to run the campaign which may start with a soft launch. This will involve creation of mailing lists of the people who may be interested in backing your idea. For a successful campaign, it is important to have social media presence because the campaign is online-based.

Besides financing, crowdfunding can also be used to as tool of marketing products or services, because products or services that do well on crowdfunding platforms generate a lot of interest among customers locally and abroad.

Improving access to finance for climate action by the bottom of the pyramid through innovation is an important task for both the private sector and the government. This area has been largely neglected by governments and formal financial institutions. Crowdfunding is one of the mechanisms that will help address this gap especially considering the fact that we in 'the crowd' are all responsible for sustainable development. By contributing to the crowdfunding movement for climate change, we will play a role in meeting the needs of the present generation, without compromising the ability of future generations to meet their own needs.

Edward Mungai is the Chief Executive Officer of Kenya Climate Innovation Center, a World Bank project helping to scale up green start-ups in Kenya.

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"The financing instruments available to these companies are therefore not well developed and there is need to have innovative mechanisms to finance these enterprises. This is where the Kenya Climate Innovation Center comes in by introducing innovative financing mechanisms in Kenya such as crowdfunding."

Promoting intra-Africa collaboration in the renewable energy field

By Michael Sudarkasa, Africa Business Group

Over the past five years, South Africa has emerged as a leading renewable energy investment destination among all of the G-20 nations. Profiled in the 2013 PEW Charitable Trusts Annual Report entitled “Who’s Winning the Clean Energy Race, South Africa’s clean energy sector garnered \$4.9 billion in 2013, and it moved up from being the 10th-largest to the ninth largest market in the G-20. Furthermore, South Africa emerged as the highest ranking country in terms of “Investment

Intensity” (clean energy investment per dollar of GDP) and the fastest growing clean energy market among the G-20 over the past five years as sixty percent of the country’s clean energy investment in 2013 (or US\$3 billion) was invested in the solar sector and an additional US\$1.9 billion was invested in the wind sector under the country’s Renewable Energy Independent Power Producer Procurement Program (REIPPPP).

Top 10 Countries in investment Intensity, 2013

Clean Energy investment intensity rankings

Rank	Country	Investment intensity*
1	South Africa	0.82
2	Japan	0.60
3	United Kingdom	0.52
4	Australia	0.44
5	Canada	0.43
6	China	0.41
7	Germany	0.31
8	United States	0.22
9	Italy	0.20
10	Brazil	0.13
11	France	0.13

*Clean Energy investment per dollar of GDP
Source Bloomberg New Energy Finance, CIA World Factbook 2013
©2014 The Pew Charitable Trusts

Top 10 Countries in investment Intensity, 2008-13

South Africa fastest-growing clean energy market over past 5 years

Rank	Country	5-year growth rate
1	South Africa	96%
2	Japan	57%
3	Australia	33%
4	United Kingdom	18%
5	Mexico	13%
6	China	18%
7	India	2%
8	Canada	24%
9	United States	0%
10	Rest of EU-28	-6%

Source Bloomberg New Energy Finance
©2014 The Pew Charitable Trusts



Established as an implementation tool through the National Integrated Resources Plan, which targets the generation of 3,725 MW of renewable energy in South Africa by 2030, REIPPPP is a reverse auction program developed to help the country achieve its aim of reducing carbon emissions in the production of electricity.

As a result of the work undertaken to achieve these targets, South Africa is also fast developing a globally competitive renewable energy industry with improved capacity in education and training, related engineering capacity, related renewable energy entrepreneurship and business incubation programs, with an expanded focus on local content utilization, as well as increased research and development and technology manufacture.

As the renewable energy clusters within the country expand, particularly in the provinces of the Western Cape (wind and photo voltaic and thermal solar), Northern Cape (concentrating solar power) and Gauteng (research and development, high temperature solar technologies, and commercial and industrial energy efficiency), South Africa is also emerging as an important potential renewable energy knowledge and financial resource for the entire continent of Africa.

In recognizing these developments, South Africa based and continentally active economic and business development company, Africa Business Group, has launched an initiative to foster accelerated intra-regional renewable energy knowledge transfer and cooperation through the development of an Africa Renewable Energy Regional Centre of Excellence initiative intended to facilitate learning journeys

to and from South Africa, to promote partnership between renewable energy project developers in South Africa and others elsewhere on the continent, to showcase South Africa's increasing renewable energy skills development programs where African technicians and engineers can gain academic and practical knowledge, to facilitate regulatory and policy development capacity development, and to foster increased research and development collaboration between South African research centres and universities and emerging research centres focused on renewable energy based elsewhere on the continent.

A first step toward concretizing such intra-regional partnership was taken at the inaugural East African Renewable Energy Forum and Exhibition held in November 2014 in Dar es Salaam, Tanzania and co-convened by the East African Community and the East African Business Council. At the conference, ABG's CEO Michael Sudarkasa, who recently served as the Program Manager of South Africa's national effort to develop a long term (2015 – 2050) Solar Energy Technology Road Map, extended an invitation for East African participants to consider increased collaboration, partnership and skills development focused engagement with private sector and public sector institutions in South Africa.

Toward this end in 2015, efforts will be made to follow-up on these potential linkages through continued discussion with the EABC and with national institutions in Kenya and Tanzania in particular, as delegates from these countries expressed preliminary interest in following up on the invitation.

Lessons on mainstreaming climate change in the second medium term plan of Kenya's Vision 2030 (MTP II) process

By UNDP

The Climate Change Secretariat from the Ministry of Environment, Water and Natural Resources (MEWNR) was represented by Ms. Fatuma Hussein.



About the UN Joint Project on Climate Change

The UN Joint Climate Change Project 'Support to Low Carbon Climate Resilient Development for Poverty Reduction in Kenya' was developed to address the impacts of climate change across a range of key sectors in Kenya's economy. Kenya heavily relies on rain-fed agriculture, pastoral livestock production systems and tourism which are all dependent on rainfall and weather patterns. This project that is supported by the UK Government under the Strengthening Adaptation and Resilience to Climate Change Kenya (StARCK+) initiative seeks to help Kenya transition to a low carbon/climate resilient development pathway. The project also aims to reduce the country's vulnerability to climate risk and improve livelihoods while contributing towards global efforts to reduce green-house gases emissions.

The project has four key outcomes areas covering the critical areas, where climate change offers challenges and opportunities in equal measure, and affords the UN agencies and the Government of Kenya real practical solutions of mainstreaming climate change into Kenya's developmental plans.

- Output 1: Pro-poor CC adaptation and mitigation mainstreamed in national and sub-national planning and budgeting processes (*UNDP/UNEP*)
- Output 2: Renewables and sustainable biomass production promoted in arid and semiarid lands (*UNDP/KEREA*)

- Output 3: Green buildings are promoted in the construction sector with associated benefits for employment, environmental improvement, social equity and economic prosperity (*ILO*)
- Output 4: Low carbon transport is included in the on-going urban planning processes and national policies are developed to promote importation of cleaner, more fuel efficient vehicles in Kenya (*UNHABITAT/UNEP*)
- Output 5: Governance reforms in the wildlife sector contribute to reducing illegal wildlife trade in Kenya (*UNEP/UNESCO*)

Understanding the Vision 2030 and the Mid Term Planning Processes

Kenya's Vision 2030 is the country's aspirational development blueprint that was launched by the Government of Kenya in June 2008. Under this vision, Kenya aims to transform to a 'middle income rapidly industrializing country by 2030, offering all its citizens a high quality of life'. The Vision 2030 is normally implemented within 5 year Mid-Term Plans (MTP), which coincide with Kenya's electoral cycles, to afford successive regimes an opportunity of aligning their election manifestos with the overall spirit and letter of the Vision 2030. The 1st MTP was implemented by the NARC Coalition, to some level of success, between 2008 and 2012, and currently, the 2nd MTP II plan is under implementation, after being launched by the H.E. President Uhuru Kenyatta on 3rd October 2013 (To review the MTP II Document,

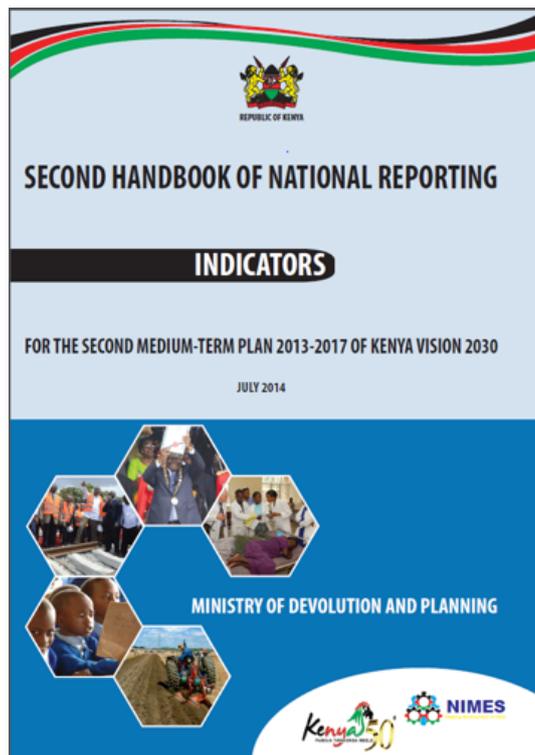
check here). This MTP II has also integrated the Jubilee Coalition Manifesto titled "Agenda for Kenya 2013-2017 and Beyond". And aims at 'accelerating economic growth putting the economy on a higher, inclusive and sustainable growth trajectory leading to a double digit GDP growth rate within the five year period (MTP II 2013)'.

Mainstreaming climate change in the Vision 2030 planning processes

It is therefore a well-documented fact that the realization of the aspirational goals of the Vision 2030 will depend on Mid Term Plans that are designed to take integrate cross cutting issues such as gender, human rights and importantly for Kenya, a country whose economy's backbone is rain-fed agriculture, climate change. The Government of Kenya recognizes the importance of climate change (CC) impacts on Kenya's development and risks towards achieving Vision 2030 as highlighted in the National Climate Change Response Strategy 2010. UNDP is working with the Monitoring and Evaluation Directorate (MED), Ministry of Devolution and Planning to ensure implementation of the MTP II effectively recognizes the importance of cross cutting issues such as climate change, gender and human rights.

This is through the following key activities:

The Validation of the Draft 2nd National Indicators Reporting Handbook for the MTP II



The 2nd handbook of Nation Reporting covering the MTP II period of 2013 - 2017 which benefitted from UNDPs climate change mainstreaming interventions. The handbook was launched on 19th November, 2014 by the Cabinet Secretary, Ministry of Devolution and Planning during the Monitoring and Evaluation Week hosted by the Monitoring and Evaluation Directorate in Nairobi.



Under the UN Delivering as One (DaO), UNDP, UNWOMEN and the Office of the Human Rights Commission (OHRC) supported the National validation Workshop for the 2nd National Indicators Reporting Handbook for the MTP II. This Handbook is an important tool which is used to guide the reporting by all the key government ministries on the implementation of the activities and flagship projects under the MTP II period of 2013 - 2017. The workshop was attended by 52 participant's representatives of the Ministry of Devolution and Planning, Monitoring and Evaluation Directorate, government ministries, UN agencies (UNDP, UNWOMEN, Office of the Human Rights Commission), civil society organizations and some representatives from the Nakuru County. The workshop was aimed to validate the 2nd Draft National Indicators Reporting Handbook and to ensure effective mainstreaming.

Mr. Geoffrey Omedo delivering the opening remarks at the start of the three day workshop. Mr. Stephen Wainaina, the Economic Planning Secretary (to left) was the Chief Guest during the function. The MED Director, Mr. Samson Machuka (seated next to the EPS) also participated in the workshop



UN WOMEN were represented by Ms. Maureen Gitonga (with microphone), Mr. Ahmed Osman (seated to her left). Ms. Fiona Gatere was the M&E Specialist reviewing the Handbook from a gender perspective.

Upscaling Climate Change Mainstreaming to County Level

After the launch of the 2nd MTP II National Reporting Handbook at the National level, UNDP further supported organization of a County MTP II 2nd Handbook of Reporting Indicators validation and Drafting workshop held in Nakuru, Kenya from 1st - 6th December 2014. The workshop brought together most of the county planners from the 47 Counties, and each of the counties prepared a draft Indicator

book which they will be discussing further with the county stakeholders before formal adoption. It is hoped, that with a sound climate change, gender and human rights mainstreamed monitoring and evaluation framework for the MTP II at the county level, the next round of County Integrated Development Plans (CIDPS) will fully integrate climate change issues. More discussions will be held with the Monitoring and Evaluation Directorate and the Counties to upscale the mainstreaming work of climate change at the Counties in 2015.

“Under this vision, Kenya aims to transform to a ‘middle income rapidly industrializing country by 2030, offering all its citizens a high quality of life”.



Participants at the County MTP II 2nd Handbook of Reporting Indicators validation and Drafting workshop posing for a photo after one of the sessions.

The potential of ethanol fueled stoves in Kenya

By Mohammed Uhuru Kadhi, Consumer's Choice Limited

Denatured bioethanol cook-stoves can be used for cooking and water heating. They can also be used in space heating within buildings; that is, in households, and institutions such as schools, health centres and in industries like hotels.

The materials required to fabricate denatured bioethanol fueled stoves are similar to those used for fabricating kerosene stoves. Some parts of denatured bioethanol fuelled stoves are made of stainless steel to minimize corrosion in the gel reservoir and the flame regulator.

Denatured bioethanol is produced by the addition of bitter tasting substance and colouring to ethanol to make it unpalatable. Bioethanol is produced by the fermentation of sugar from a variety of biomass feedstocks including maize, sweet sorghum, wheat, cassava and sugarcane.

Generally, improved biomass cook-stoves (ICS) can attain an efficiency of up to 60% (source: Prof. Kithinji J, September 2014, Report on "Documentation and evaluation of the efficacy of household institutional and energy stoves for improved livelihood and poverty reduction of Kenyan communities.") when compared to traditional three stone cookstove. By reducing the amount of wood-fuel, the improved biomass cook-stoves' (ICS') use decreases the emission of pollutants significantly.

In comparison to improved cook-stoves and the traditional three-stone cookstoves, denatured bioethanol cookstoves have a number of advantages. Namely:

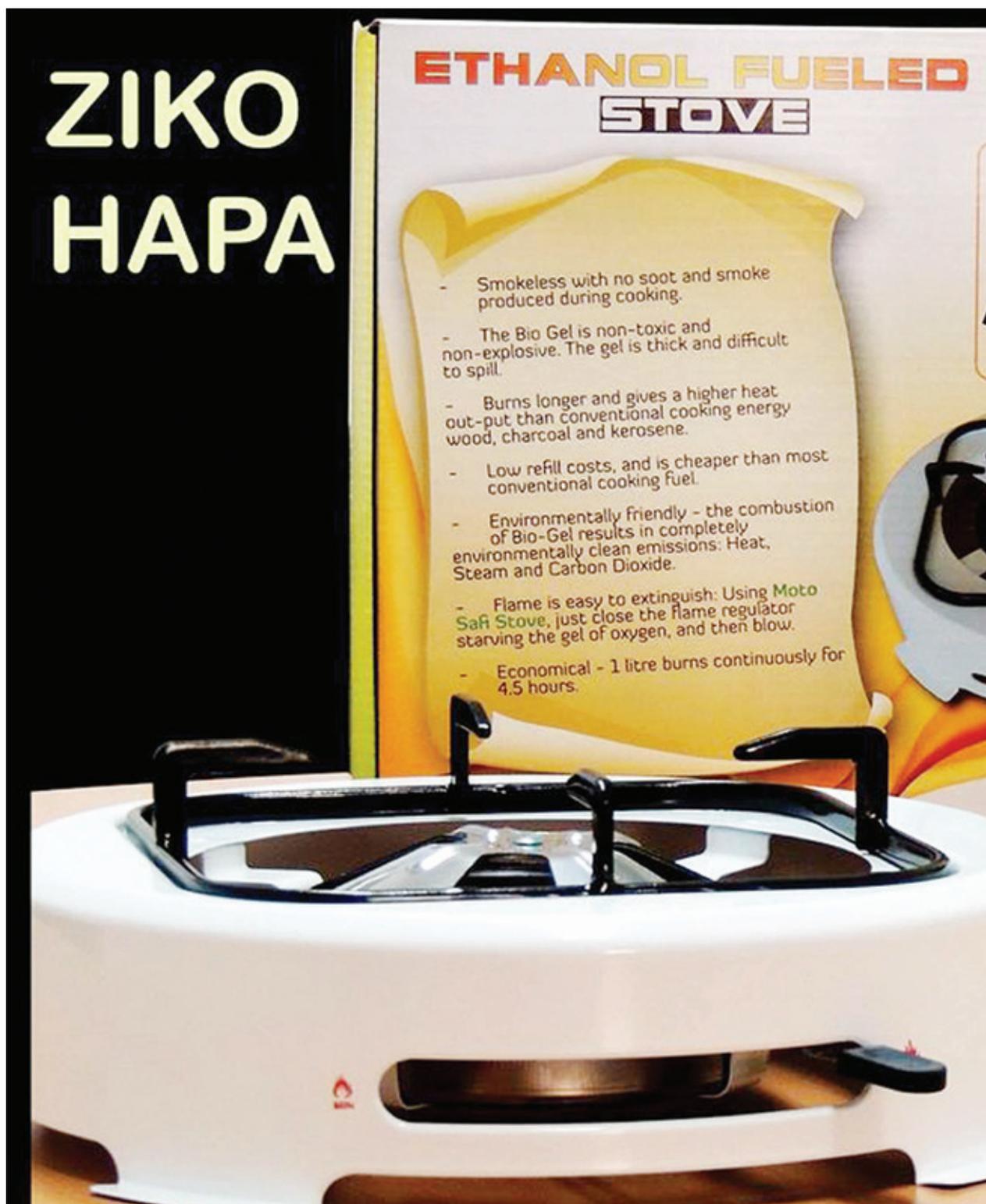
1. They meet the World Health Organisation (WHO) indoor carbon monoxide pollution cut-off point of below 10mg/m³ (Source: WHO Guidelines For Indoor Air Quality).
2. They burn with a higher heat flux hence faster cooking.
3. They burn with colourless, soot-free and smoke-free flame.
4. While bioethanol based technology is more expensive, in terms of both the initial cost of purchasing the stove as well as the costs related to the regular purchase of ethanol, bioethanol stoves last long.

In Kenya's case, ideal crops for bioethanol production are sugarcane and sweet sorghum, which are grown in Western and Eastern Kenya, respectively. Bioethanol is predominantly made from molasses, a by-product of sugar production from sugarcane. Sweet sorghum has high potential as an alternative feedstock because it's a multipurpose crop (food, feed, fodder and fuel). It has high biomass production, short maturity period, low water requirement, and wider adaptability too.

Biomass is mostly used for domestic cooking by over 78% of the Kenyan population. Stoves fuelled by denatured ethanol therefore have a high potential in Kenya's market.

The form of bioethanol fuel used in the stoves can be either liquid or gel. Though the bioethanol is produced in liquid form, once denatured, it can be thickened into a gel. The Denatured bioethanol gel is much safer to use than the liquid fuel as it is less volatile and does not spread if spilled. Due to its denatured form, it can neither be used as an alcoholic beverage. An example is "Moto Poa™" gel which is developed in Arusha, Tanzania. "Moto Poa™" is burned in a "Moto Safi™" stove.

The high performing "Moto Safi™" denatured bioethanol gel cook-stove has proved to be popular with Kenya's urban users despite the high "Moto Poa™" denatured bioethanol gel prices. The cookstove – retails at \$25.00 (KES. 2,200) and the fuel at \$1.95 (KES. 170) per litre. Both products have been tested by the Kenya Industrial Research and Development Institute (KIRDI) and passed the International Standards Organization's (ISO), International Workshop Agreement (IWA) on cook-stoves' efficiency, and emission tests at tier level three.



Market penetration of bioethanol cookstoves

Penetration of denatured bioethanol fuelled stoves in markets in developing countries depends on several factors such as: population density, rural and urban differences, income levels, proximity to energy resources, and social and behavioural patterns. Urban residents usually have to pay for cooking fuel. A typical urban household uses either LPG, denatured bioethanol or kerosene as a principal cooking fuel; and a "jiko" (charcoal

stove) for foods with long cooking durations such as beans, cassava, yams, sweet potatoes and maize, which form some of the staple foods in the country (Elias and Victor, 2005). So they are likely to switch to a cleaner fuel alternative faster than their rural counterparts for whom firewood is 'free' (no opportunity cost for labour).

Higher poverty levels in rural areas also make the use of denatured bioethanol for cooking comparatively unaffordable. This limits the fuel's availability and ease of accessing more costly technologies (Zuzarte, 2007).



Other contributing factors in the decisions on whether to switch to an alternative cooking fuel are the sometimes complex social behaviours. They include the status of women, their role in decision making and cultural practices related to the fuel used.

Then, distances between households and major denatured bioethanol supply centres are generally longer in rural areas and there are corresponding cost differences. Consequently, the uptake of denatured bioethanol fuelled stoves such as “Moto Safi™” may be higher in urban and peri-urban

With the removal of excise duty from bioethanol, “Moto Poa™” and “Moto Safi™” are estimated to retail at \$1.00 (KES. 98) per litre and the stove for \$15.00 (KES. 1,470). For the excise duty being removed, the price goes down from \$1.95 (KES. 191) per litre for the gel.

areas, as an alternative to kerosene and charcoal stoves.

The implementation of denatured bioethanol stoves however was hampered by regulatory structures. The excise duty of \$1.38 (KES. 135.24) per litre levied on denatured bioethanol, regardless of whether it is potable or denatured. This made it impossible to produce denatured bioethanol gel locally. This saw bioethanol gel exported to Arusha, Tanzania, which has a more favourable tax regime that exempts denatured bioethanol production from excise duty. The processed denatured bioethanol gel is then exported back to Kenya. For bioethanol cooking fuel to become affordable, denatured ethanol must be exempted from value added tax.

With the removal of excise duty from bioethanol, “Moto Poa™” and “Moto Safi™” are estimated to retail at \$1.00 (KES. 98) per litre and the stove for \$15.00 (KES. 1,470). For the excise duty being removed, the price goes down from \$1.95 (KES. 191) per litre for the gel. Quality control, service back up, spare parts and maintenance must be set up to help establish a market for the denatured bioethanol fuel.

Supply chains for denatured bioethanol fuelled stoves also need to be set up; from feedstock production, harvesting, processing, and the distribution of the final products to the end user.

Bioethanol cookstove status and market potential

Denatured bioethanol cookstoves production is continuously improving. There is big likelihood of replacing the traditional three-stone fire-place, charcoal and kerosene stoves which have negative health related repercussions. However, the lack of awareness of the denatured bioethanol's stoves' benefits and the limited availability of microcredit financiers to support the purchase the bioethanol stoves are barriers to its adoption.

The health benefits of using denatured bioethanol outweigh the economic challenges of its implementation. The use of denatured bioethanol for cooking should therefore be promoted.

New institutional clean cookstove

Revolutionizes cooking for schools, communities and households

By Envirofit

- *New “institutional” cookstove to radically reduce fuel costs and air pollution in school, hospital and prison kitchens.*
- *Kenya first to tackle serious health impact of cooking at both community & household level.*



Indoor air pollution caused by inefficient cooking on open wood fires and traditional stoves claims more than 15,000 lives in Kenya each year. Less known is that burning fuel inefficiently is burning a major hole in schools' pockets. Recent reports suggest that schools which offer meals to students have a 28% higher enrolment. However, providing lunch can also place a large financial burden on the schools, with most spending 20-50% of their annual budget on fuel.

The institutional stove has been designed with a high performing combustion chamber that burns wood more efficiently – decreasing harmful emissions and fuel consumption by up to 90%. The stove uses state-of-the-art technology and design, to create a product that schools can afford, at around 1/3 the approximate annual fuel bill of a school with 300 students. Envirofit has partnered with Equity Bank to help schools finance the purchase and benefit from the resulting huge

savings, and is also working with the Greening Kenya Initiative to make this available nationwide.

“Our chef would begin cooking at 6 am and often lunch would not be ready for the children at 1. Now she starts at 10 am and never misses a meal,” says School Head Master, Titus Ktoko, the first recipient of the institutional stove. “With the new institutional stove we can cook a meal for 300 students with just three pieces of wood.”

The stove has also been creating positive impact within the Ngelani community. Regina Musyimi, a parent at the school who also supplies its firewood requirement said, “It used to take me 4-5 days to collect firewood for the school for 1 week, now it takes me only 2-3 days.”

Impact in the community extends beyond firewood as the stove also helps to educate the community about clean cooking. “When we launched the institutional jiko and the parents saw how it consumed less firewood they wanted stoves

for their homes too,” said Mr. Ktoko. “We then contacted Envirofit and they were able to supply the community with household stoves as well.”

Ron Bills, CEO of Envirofit said: “Through working with schools we can demonstrate the economic and social benefits of adopting clean cooking technology to households. 84% of Kenya’s population uses charcoal and wood cookstoves – with families spending as much as 30% of their annual income on fuel costs. When traditional types of stoves are used, 90% of the fuel’s energy is wasted, and the smoke generated is equivalent to smoking two packs of cigarettes a day.”

By promoting behavior change at the community level, Envirofit aims to influence a community to transform households. The company is also working with corporates such as

Kaluworks to explain the positive health impacts of clean cooking technology, and make cookstoves available nationwide.

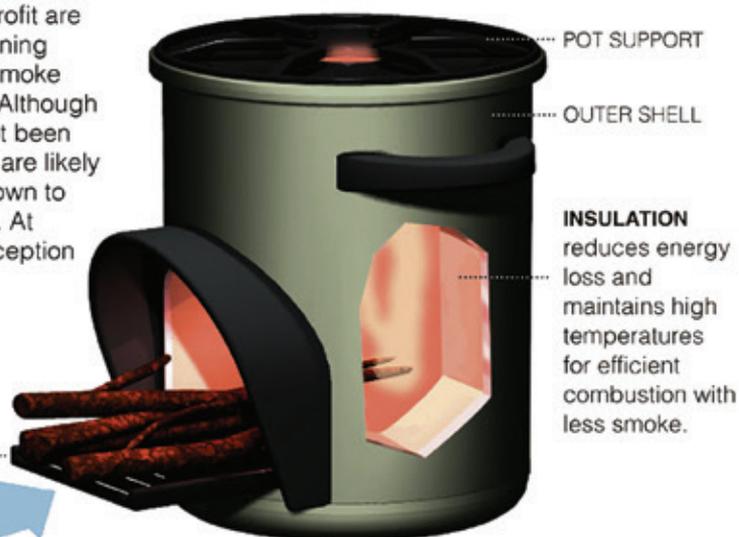
Kenya is the first country in which Envirofit will offer the institutional stove to schools and other community facilities such as hospitals and prisons – receiving a wave of interest from the government, industry associations and institutions at the launch. Envirofit expects to install 1,000 stoves in Kenya by 2015.

“With the new institutional stove we can cook a meal for 300 students with just three pieces of wood.”

A Cleaner Stove

Researchers at Envirofit are designing clean-burning stoves that reduce smoke and use less wood. Although the designs have not been finalized, the stoves are likely to use principles known to work in other stoves. At right, an artist’s conception of a compact clean-burning stove.

ELEVATED GRATE provides space for efficient air flow under the wood.



POT SUPPORT
OUTER SHELL

INSULATION reduces energy loss and maintains high temperatures for efficient combustion with less smoke.

Sources: Envirofit; Aprovecho Research Center



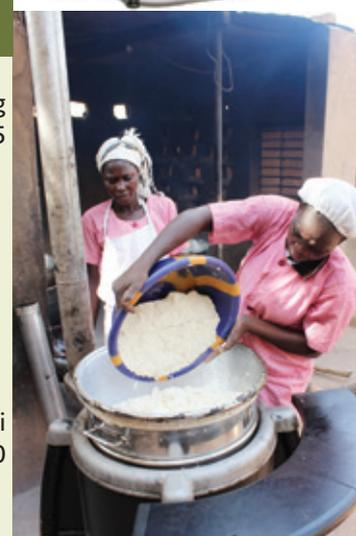
About Envirofit

Envirofit is the world’s leading clean cookstove business producing high performing biomass cookstoves that are efficient, durable, desirable, and affordable for households and institutions in developing nations. Envirofit was founded in 2003 to develop well-engineered technology solutions to solve global energy and health challenges, and in 2007 partnered with Shell Foundation to create a viable clean cookstoves business. Envirofit’s mission is to create products that reduce pollution and energy dependence while yielding health, environmental, and economic improvements. Using a market-based approach, Envirofit has

pioneered the clean cookstove market, selling more than 700,000 stoves and impacting over 3.5 million livelihoods across 45 countries.

For Inquires contact:
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With just three pieces of wood the Ngelani Ranch Primary School can cook lunch for 300 students.





A legacy of building briquette enterprises

By Practical Action EA

Practical Action's drive for Total Energy Access (TEA) is supported by three cross-cutting themes: climate change, gender & social inclusion, and inclusive market development. It is critical that all the projects we implement provide relevant solutions to these challenges, which are typically more pronounced in developing countries, and more so among vulnerable groups. By focusing on these thematic areas, the outcomes of our projects have a longer-term and more sustainable impact on energy access, and ultimately energy poverty and livelihoods.

Promoting the use of renewable energy helps in the conservation of carbon sinks. In addition to the wider environmental benefits, the potential impact they have on the poor, at both the social and economic levels, cannot be emphasized enough. For over 30 years, our organisation has focused on leveraging technology to challenge poverty.

Among poor households that typically rely on 'dirty fuels', the uptake of renewable energy technologies such as briquettes, improved cook stoves, and solar lighting, helps improve indoor air quality, reducing expenditure on health complications. These technologies also help ease the drudgery of daily work, especially for women and girls, by eliminating the need to dedicate large amounts of time towards searching for and using inefficient sources of energy like firewood. The additional productive time created allows women and girls to engage in social & economic activities.

From an enterprise perspective, integrating men and women into renewable energy value chains will improve their livelihoods. It will empower them and help them to adapt to the negative effects of climate change. These technologies also reduce the disproportionate burden of energy expenditure on the poor.

As early as 1982, Practical Action was promoting the adoption of briquette-making technology in developing countries, and raising awareness about it. Over and above providing an alternative to traditional forms of energy, integrating men and women into the briquette value chain has provided them with an avenue to generate income and secure their livelihoods.

In early 2011, Practical Action, with the support of funding from The Energy and Environment Partnership Programme with Southern and East Africa (EEP), embarked on a project to demonstrate the viability of briquetting technology in peri-urban and informal settlements in Nairobi and Nakuru. Over a 15 month period, men and women entrepreneurs were trained in technology and business development skills, and this translated into 80 viable energy enterprises.

At the beginning of 2013, Practical Action partnered with Micro Enterprise Support Programme Trust (MESPT) to promote the uptake of briquettes, efficient cook stoves, and solar PV technologies. The 20 month Energy Enterprises Support Initiative project covered four coastal

“The viability of briquettes as an alternative to charcoal has been successfully demonstrated.”

counties including Mombasa, Kilifi, Kwale and Taita Taveta. The project focused on the utilization of coconut waste to produce fuel briquettes, and over 105 vibrant enterprises were developed.

In July 2013, Practical Action, in partnership with ETC Foundation of The Netherlands, and with funding support from The Energy and Environment Partnership Programme with Southern and East Africa, commenced scaling up briquette technology in major cities in Kenya including Mombasa, Kisumu, Nairobi and Nakuru, where 200 men and women who led briquette enterprises were targeted for support.

All these projects adopted market-led approaches to delivering energy services. Strategies for implementation included support to men and women energy entrepreneurs through customized Technology & Business Development Skills (TBDS) trainings, customized mentorship, financial linkages, and market development support/linkages which included social marketing.

The viability of briquettes as an alternative to charcoal has been successfully demonstrated. Awareness of the potential impact the manufacture and use of briquettes is increasing, and we are now seeing more entrepreneurs taking up the business, and focusing on making quality products. These factors have worked together to increase the uptake of briquettes at the household and institutional levels. The size of the industry needs to be scaled up to be able to sustainably supply large scale consumers.

But the real story can be witnessed by the men and women whose livelihoods have been changed.

In Kisumu, Judith Akeyo gives a testament to the benefits of the briquette making business. She embarked on her journey as an entrepreneur when her previous employer went under, and she sought a business idea that required minimal investment. “Having been extremely poor, losing my fortune, and having to start over working as a briquette producer, I encourage every entrepreneur to realize that your past and current circumstances don’t determine your ability to be successful in the future. Only you and your willingness to work hard, work smart and keep trying. Having been there a while, my success speaks for itself and will hopefully inspire your success too”.

Judith highlights some of the challenges entrepreneurs like her sometimes face. “Production space is a big challenge as I have to produce at my residence which has very little space. Transportation of raw materials from the dealers to my place is taxing.”

Financial institutions were previously reluctant

to fund such ventures, because of the perceived risk. The project has piloted innovative financing models, and continues to develop others, to support the entrepreneurs.

Susan Asiko lives in Kibera. She found herself in an unfortunate position when her only source of livelihood as a domestic worker came to an abrupt halt.

After months of living from hand to mouth, and many times sleeping on an empty stomach, a neighbour introduced Susan to the briquette making business. With minimal education, having dropped out of school at class 4, Practical Action provided both business and technology support that has empowered her to manage her enterprise and make business decisions effectively. From an initial investment of KES. 200, she has been able to see her daughter through secondary school, and is optimistic that she will manage her college fees. She is also paying school fees for her son in primary school.

Patrick Karori Kimani can attribute the change of his fortunes to the briquette making business. Before he ventured into the briquette business, Patrick was a fruit farmer. He watched as his business collapsed due to the effects of waste and soil degradation. A visit to a friend introduced him to the business, and he began an upward journey to financial freedom with an initial investment of KES. 500. The enterprise presented him with a viable opportunity to provide for his family, despite his low level of education. The skills provided by Practical Action saw Patrick focus on quality products, and take charge of the planning, accounting and management of his business. He has now completed the construction of his house, and was able to dig a borehole in his compound which provides him with water for domestic use and for the production of his briquettes.

We continue to work with entrepreneurs, groups that represent the poor, as well as the government to build the capacity of renewable energy entrepreneurs, and to create an enabling policy and business environment for them.



Dry briquettes attract a lot of attention from customers looking for a charcoal alternative



Briquette making machines have made the extrusion of good quality briquettes easier even for women



The case for demand side energy technology interventions in the tea processing sector

The Dilemma of Wood Fuel Plantations

By Altener Solar

Kenya's industrial heat energy supply is heavily dependent on imported petroleum and wood fuel. According to figures attributed to the United Nations Development Program (UNDP), Kenya's small and medium size enterprises consumed an equivalent of 780,000 tons oil in 1996. The figure was projected to double by 2020. The high and rising costs of petroleum products coupled with the high levels of industrial energy inefficiency in the country result in high manufacturing costs, less competitive products and increased competition from lower-priced imports.

In a recent survey conducted by Ipsos Synovate of chief executives allied to the Kenya Private Sector Alliance (KEPSA, September 2012), 63% of those polled cited high energy costs as the greatest challenge facing trade today.

While Kenya's electricity tariffs rank among the highest on the continent at Kshs.20/kWh for some classes of industrial consumers, the cost of industrial fuel oils have literally doubled in the last 3 years, forcing some large factories, even those located in urban areas, to switch to wood fuel and other forms of biomass. This, coupled with the increased competition for tree products from

other sectors, has led to the reduced availability and increased costs of industrial firewood. Recent figures published in "Strategies for Sustainable Production of Wood Fuel in Kenya" by Githiomi and Oduor, indicate that the country's annual deficit for wood and wood products when all sectors are considered is 55,000,000 m³ (30,000,000 tons). Further, the deficit is rapidly growing due to factors external to the wood fuel sector.

As a result, and in the search for a sustainable long term-solution, the rural based small-holder tea sector has in the past few years initiated programs to set up industrial wood fuel plantations and/or to contract farmers with sizeable tracts of land to grow firewood. However, a closer look at the overall dynamic based on the experience of the multi-national tea sector in the country suggests that the increased logistical costs of logging and transportation, market externalities and the massive loss of value associated with harvesting tree plantations for wood fuel may instead set in motion a series of events that may lead to the increased felling of the mostly indigenous tree cover on small farms and unprotected community forests around tea growing areas.

Recent figures published in "Strategies for Sustainable Production of Wood Fuel in Kenya, indicate that the country's annual deficit for wood and wood products when all sectors in the region are considered is 55,000,000 m³ (30,000,000 tons)"

The rising demand for & cost of industrial woodfuel

While the small tea factories have traditionally relied on freely-traded wood fuel purchased from farmers living near the factories, the growing competition for tree products from the electricity poles, timber and construction sectors has served to entice farmers away from selling trees as wood fuel for the low prices (KES.2/kg) offered by tea factories. Indeed, some factories in other sectors around Thika town are now paying as much as KES. 30/kg of firewood, very close to the cost of fuel oil per unit of thermal energy. This trend is bound to continue regardless of the success of the collective national effort to increase tree cover to 10%.

Land use-conflict, increased logistical costs & market externalities

So far the strategy of establishing proprietary industrial wood fuel plantations is largely hindered by the difficulty of acquiring sufficient land in close proximity on which to establish viable plantations. A typical small-holder factory processing 15,000 kg of MT a day and consuming 25-30 m³ of firewood per day will require up to 400 acres on which to grow its own wood fuel sustainably.

Even if such a factory were to purchase or otherwise acquire the use of this size of land to grow wood fuel, it would have to forego the income that would otherwise be generated if it grew tea on this land, in this case up to KES. 60 million annually (at KES. 150,000/acre/year), against a saving of KES. 7 million presently spent on fire wood annually. This is over and above the initial cost of the land (at least KES. 200 million).

Further consideration will have to be given to the fact that tree plantations will actually lead to increased costs of delivered wood fuel. While tea factories have been paying as little as KES. 2/ kg for partially hewn firewood delivered to the factory gates, wood fuel plantations will attract higher (by as much as 300%) costs occasioned by

the increased logistical requirements of nurturing and protecting plantations over 8 years, logging, transportation and hewing. These costs may escalate substantially for tree plantations located on disparate sites a substantial distance from the factory.

Finally, the option of entering into long-term wood fuel supply contracts with farmers operating small tree wood lots will be hindered by the difficulty of tying them down to the low prices offered, given the availability of better and improving markets for tree products elsewhere.

Conclusion

Technological

It is clear that a holistic, long-term solution will not be found on the supply side only, and that energy efficiency and the technological alternatives to wood-fired steam boilers must eventually assist the process. Some tea growing countries like India and Sri Lanka have realized this and are developing and adopting heating and drying systems that transport heat in pressurized water or generate hot air directly. This eliminates 20-30% of the thermodynamic phase-change losses associated with steam systems.

Still, my feasibility studies into the viability of Concentrated Solar Heat (CSH) implemented with sensible heat transport systems indicate that up to the 50-70% of the heat energy currently deployed in Kenya's tea processing factories can be displaced cost effectively (30% of total present costs over the 20-year lifespan of solar equipment) against tree plantations established on purchased land. This is with further strategic benefits in the optimal use of agricultural land and the avoidance of the high opportunity costs associated with harvesting tree plantations for wood fuel. Solar heat requires only 15-20% of the land needed to grow wood fuel sustainably in regions with Direct Normal Irradiation (DNI) levels of 3kWh/m²/day against tree growth rates of over 60m³/ha/year. Put differently, an equivalent area of land 'planted' with parabolic dishes will yield 5-10 more times the energy than wood fuel plantation would deliver, considered over a period of 7-9 years.

Strategic/Financial

In some regions, the value of trees and tree products already exceeds that of tea planted on an equivalent area of land by up to 40%. According to figures attributed to former Energy PS Patrick Nyoike, one hectare of land planted with eucalyptus trees equally spaced 2.5m apart will hold about 1, 600 trees. With a producer price of KES. 3,000 per pole and a survival rate of 80% over 7 years, the income generated would be KES.3.84 million, about 40% higher than what would be



realized through tea growing. Even if a substantial fraction of the rural industries, heavily dependent on firewood, were to successfully establish wood fuel plantations, balance sheet considerations may make the harvesting of these plantations for firewood difficult to justify to shareholders as this would amount to throwing away massive monetary value. Out of this consideration alone, several factories with fairly large and mature tree plantations have been observed to trade these tree products in the better markets for timber and electricity poles while still buying firewood from farmers and other untracked sources at KES.2/kg.

Energy & environmental policy linkages

Against this background, it should be seriously considered that deforestation fuelled by the market for cheap and freely-traded firewood sourced from locals may actually increase despite the strategy by the tea sector to establish wood fuel plantations. This section of the value chain will mostly affect the indigenous tree cover landed on small farms and poorly protected community forests.

That is not all, however. Our environmental and wildlife conservation policies must recognize the obvious linkages with other economic and social sectors, over and above electricity generation. While exotic trees may well attract the same levels of rainfall as indigenous ones, the monoculture of exotic tree plantations has been frequently associated with negative environmental and social impacts. These include decreasing water availability, modifications in the structure and composition of soils, the depletion of biological diversity and increased human-wildlife conflict. Natural forests could be considered as complete ecosystems that support all forms of life - from the insects that breed on deadwood to the communities that, to some extent, still rely on herbal medicines harvested from natural ecosystems, and others.

Regulation & industry support

Whether considered from an energy or environmental perspective, some regulation of the industrial wood fuel sector is clearly necessary. As things stand now, there's absolutely nothing to stop a tea factory from buying 400 acres of land ostensibly to grow wood fuel, and then planting it with tea (immediately or at some point in the future) on the basis of the obvious economic benefit. This thereby increases the demand for wood fuel in its immediate locality. The trees could also be illegally felled for electricity poles or for woodfuel by untracked or 'grey' sources, as is happening.

Given that wood fuel will remain the cheapest source of heat energy for the foreseeable future and that the manufacturing sector cannot be expected to make the voluntary switch to costlier fuels, some regulation prescribing some quota of non-biomass energy would greatly assist the national effort towards a sustainable long-term industrial energy regime. In this regard especially, organizations supporting the manufacturing sector like the Kenya Association of Manufacturers' (KAM) should embrace technology more wholesomely in assisting the manufacturing sector into moving beyond 'energy efficiency' and into 'sustainable energy generation'. The two are not mutually exclusive and indeed, sustainable [renewable] energy generation may not be superimposed onto inefficient systems. Given their massive influence within the manufacturing sector, their obvious aversion to matters technology and 'round robin' energy awards scheme continues to render, I dare say, a disservice to technological progress in the energy and manufacturing sectors. But that is a story for another day.

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Remote borehole pump monitoring transforms water supply to remote communities

By Davis and Shirliff

For remote communities whose only source of clean water is a borehole, the failure or malfunction of the pump can have a devastating effect, leaving people without water for days or weeks. A recent development has been the wider introduction of solar powered pumps to replace the traditional generator driven alternatives, which due to their simplicity are intrinsically much more reliable. Operating problems can still occur, however.

In response to this challenge, the Kenyan based multinational water and energy specialist Davis & Shirliff is now able to offer remote monitoring of solar pumping systems through the "pumpMANAGER" web platform, launched in collaboration with German Solar Pump manufacturer LORENTZ. This enables its technicians and customers to remotely monitor borehole and pump performance using the mobile phone network, thus enabling the chance of intervention before a system breakdown actually occurs. Various malfunctions such as tripping can be identified and often corrected from Nairobi or indeed anywhere else via a remote pump configuration facility. Even when a site visit is necessary, technicians can be on site to correct a malfunction well before the community itself is aware of any problem.

The system monitoring hardware and software has been developed in-house by LORENTZ. All system operation data is continuously sent via GPRS/cellular network to their data centre from where it is continuously analysed and stored. The information being cloud based, it is accessible to D&S technicians and customers using laptops, tablets or smart phones.

Two such systems with remote monitoring are already in operation in Wajir County where thousands of people depend on a stable water supply for themselves and their livestock.

These systems are a result of a partnership between D&S and the British NGO Oxfam.

For Oxfam, as well as other NGOs who have installed water pumping systems in remote areas, a real-time monitoring of system performance parameters such as voltage, amperage, flow rates, operating time, pump speed, cable dynamics, temperature, and more means that they can offer the communities a more reliable water supply. They can also avoid the risk of unnecessary and unexpected failures.

The system stores up to 10 years of data (at a 10 minute frequency) and allows for two-way communication to control and program pump speeds and operating times.

"The system stores up to 10 years of data (at a 10 minute frequency) and allows for two-way communication to control and program pump speeds and operating times."

Davis & Shirliff is the leading supplier of high quality water and energy solutions to the East African Market and is well represented throughout the region with branches and subsidiaries.

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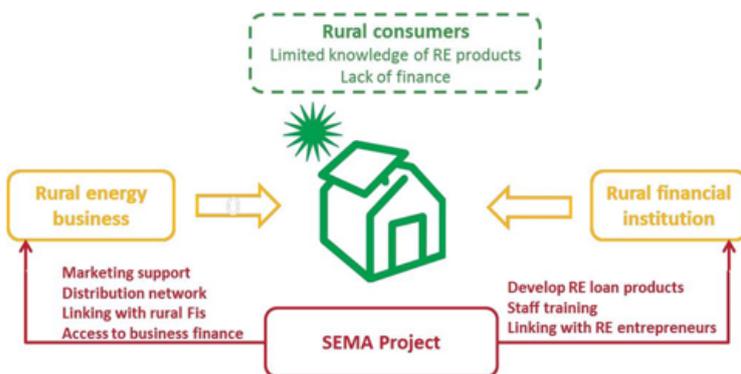
Lessons from SEMA Project ●●

It is well documented in many studies that the uptake of clean energy products, whether on-grid or off-grid, amongst low income consumers in East Africa is severely limited by households' ability to pay the high upfront lump sum costs. The Sustainable Energy Markets Acceleration (SEMA) Project works on creating business partnerships between clean energy entrepreneurs and rural financial institutions to increase access to finance for clean energy businesses and end users.

SEMA was established after a scoping study by Triodos Facet (now Enclude), Integral Advisory Limited and Friends Consult Limited, highlighted lack of financial solutions for renewable energy to be one of the key obstacles. This in turn cause a low level of interest of financial institutions in developing and deploying energy product loans. This is because of the poor reputation of energy product performance due to bad substandard products, bad installations and inadequate after sales services, if any. The study recommended the strengthening of relationships between energy service companies and financial service providers. This would only be possible if the financial institutions partnered with reliable locally based energy entrepreneurs.

In 2011, the European Union and Hivos co-funded SEMA in order to increase access to affordable and sustainable energy services for rural and peri-urban low-income communities in Uganda, Kenya and Tanzania. SEMA is supporting and linking renewable energy enterprises (REEs) to microfinance institutions (MFIs) and savings and credit cooperatives (Saccos) serving rural markets. By helping energy enterprises and financial institutions to enter beneficial memoranda of understanding, financing part of the marketing efforts, assisting the MFIs/Saccos and REEs in developing renewable energy financial products, SEMA is helping to build long term partnerships and raise the capacities of MFIs/Saccos in dealing with energy technologies and related loan products.

SEMA has developed a toolkit to guide the REEs and MFIs/Saccos through the process of developing sound partnerships and to provide lessons learnt to other projects who may want to replicate the project in other markets. This toolkit can be downloaded from the SEMA website using this link: http://www.sema-project.org/?page_id=37



SEMA is currently holding regional workshops to strengthen project partnerships and inform additional financial institutions about its approach. Key elements of the workshops are: improving performance of existing partnerships, strengthening networks and business options, and disseminating tools to new renewable energy enterprises, micro finance institutions and Saccos.

Based on experiences of its interventions, the SEMA Project has documented challenges associated with development of partnerships between MFIs/Saccos and REEs.

- Long gestation period for establishing a solid partnership. It is far much easier to execute an MOU between an MFI/Sacco and an REE than it is to realise its results. There are many MFIs/Saccos who have signed up MOUs with REEs, with no business generated.

Partnership is not in the signing of a cooperation agreement, it is in the journey together towards realisation of the desired result.

- The buy-in of executives of an MFI/Sacco is not enough to sustain the MFI/Sacco-REE relationship. This is primarily because the actual day-to-day interface between the two organisations is handled by middle to lower management staff – and this is where the real partnership needs to be cemented.
- Inadequate access to growth capital by REEs is a distraction that interferes with efforts to forge a well-functioning MFI/Sacco – REE relationship, because the REE is unable to deliver on its promises due to weak working capital.
- Many partnerships created between MFIs/Saccos and REEs are not backed by action plans and in many cases there are no marketing plans and materials. Lack of clarity in key responsibilities, especially those that involve spending own resources, can lead to an ineffective partnership.
- Many REEs have severe back office environments that prevent them from fulfilling financier business documentation requirements and performance evidence.
- Privacy and confidentiality (most likely due to the highly competitive nature of the market) interferes with the ability of organisations to partner effectively. Monitoring data is critical for strong partnerships, and partners should strive to find a way to share information between them.

Case studies ●●

Lemorio – Energy enterprise – Unlocking the solar lamps distribution

Lemorio Energy markets and distributes portable solar lanterns, solar fishing lamps (CATCH) and energy efficient cook stoves in different parts of Kenya. The company has applied the SEMA microfinance business model, which is geared towards unlocking the latent demand of solar lamps and encouraging effective distribution of the lamps to off-grid and underserved communities in rural areas. Lemorio's strategy includes flexible payment terms, hence it partners with MFIs and Saccos. The financial institutions remove the upfront product cost by availing the product on credit and repayment installments are payments made by the end user.

The Lemorio Energy-SEMA collaboration has been active for the past two years, during which Lemorio has expanded its distribution network by teaming up with financial institutions through SEMA-brokered relationships. SEMA has assisted Lemorio Energy in raising customer awareness, building the capacity of Lemorio Energy staff and that of the partner MFIs and Saccos.

Through this collaboration, Lemorio Energy has enabled over 5,000 households to access clean and safe energy products and save on energy consumption and costs. Lemorio Energy has distributed and advocated for environmentally friendly and efficient lighting and cooking means for households across the country. Some of the products supplied by Lemorio Energy as shown below:

SEMA Project is funded by the European Union and Hivos



The Project is implemented by:



ENCLUDE
THE NETHERLANDS



FRIENDS CONSULT
UGANDA



INTEGRAL ADVISORY
KENYA

relationships between and energy companies



Kenya Women Finance Trust- Biogas loan product

Kenya Women Microfinance Bank (KWFT) is the leading Microfinance Bank in Kenya. KWFT has over the years partnered with Women in their creation of wealth for the benefits of the households of this country. KWFT boasts of a strong renewable clean energy portfolio tailored to meet the needs of lighting and cooking for Kenyan families.

In particular, KWFT in partnership with SEMA introduced biogas loan product to provide clean and affordable energy for KWFT clients. The biogas loan was to enable KWFT client access credit for installation of quality biogas digesters. We promote domestic biogas sizes ranging from 4M3-12M3 and the cost vary from one client to another depending on the availability of materials.

Rafode Micro-finance – Outstanding loan portfolio

Formed seven years ago and operating mainly from its Kisumu Head Office, Rafode is a micro finance institution that has carved a market niche among the underserved and marginalized communities in the Western region of Kenya. By Dec 2013 Rafode had an outstanding loan portfolio exceeding US\$ 500,000, with a clientele totaling over 4,000.

Rafode can therefore be viewed as a small MFI with big strides and equally big lessons on renewable energy product lending.

Having worked with SEMA for the last three years, Rafode's Managing Director, Mr. Anthony Oyondi, said the company is "Grateful for the support granted for the promotion of its renewable energy products." he adds that, "Rafode targets clients based in rural areas and urban slums where access to electricity is either limited or unavailable."



Mwangaza (solar) loan products

Equater Fuel Wood Energy Saving

Equater fuel wood energy saving (EFWES) has partnered with Sustainable Energy Market Acceleration (SEMA) project (EU) for the last two years in expanding distribution of biogas, cook stoves and solar lanterns through micro-finance (MFI) partners. EFWES is a Social Enterprise that is devoted to the promotion, production, installation and distribution of sustainable, friendly and affordable renewable and alternative energy technologies namely: biogas construction and installation, design, fabrication and production of clean cooking stoves as well as distribution of solar systems at household level.



EFWES Energy products on display



SEMA project has provided back office support and capacity building to the enterprise human resource. SEMA also supported establishment of strong linkages between EFWES and established local financial institutions (FI's) such as Wakulima Sacco Ltd, Fortune Sacco, Equatorial Dairy Agency, Siraji Sacco and KANTUKA CBO, all with an aim of accelerating energy products uptake to the end users. SEMA trained staff and members of the financial institutions on the energy product and out of it EFWES has managed to market energy products to some of the members of these institutions. Through SEMA partnership, EFWES, has marketed 63 biogas plants and 120 clean cook stoves.

Center for innovation and Development Solutions (CIDES) - Product diversification

CIDES is a biogas and solar company that has operations in Central, Eastern and coast region. SEMA has been a real catalyst in expanding product range for CIDES including fuel efficient jikos in their portfolio of renewable energy. The intervention by SEMA of establishing partnerships CIDES was linked to RAFIKI MFI, Fortune Sacco and BIMAS Sacco. The partnership has resulted to increased

geographical coverage in the promotion of selling of biogas digesters and solar systems in Kirinyaga (Fortune SACCO), Kiambu (Githunguri Farmers) and Embu (BIMAS SACCO). CIDES and RAFIKI have developed a joint work plan which will contribute significantly to the growth of their business.

ECOSAN Investment – Successful loan access from MFIs

ECOSAN in April 2013 was selected from a group of entrepreneurs and screened by the

SEMA Project whose mandate is to promote and secure strategic linkages between renewable energy entrepreneurs and financial institutions to develop friendly green energy loan products so as to broaden their loaning portfolio, grow the entrepreneurs and increase the adoption of renewable energy by household and institutional clients. ECOSAN received loans from UNAITAS as a result of their participation in the SEMA programme in particular being introduced to the MFI by SEMA. ECOSAN has been linked to RAFIKI MFI of which they have a joint work plan. The other linkage is Fortune Sacco.

The peer, NSF project

By SERC

SERC in collaboration with Arizona State University, won a grant under the National Science Foundation (NSF), USAID funding to develop and implement a solar PV outreach training module for capacity building in East Africa. The 119,000 USD project commenced in July 2014 and had a grand entrance launch event in September at Strathmore University. The project attracted a partnership with GIZ Prosolar to strengthen the impact of the project through funding the purchase of the training equipment which enhances effective hands-on experience of the technicians during the training.

This project tries to address the findings from the survey funded by JICA in 2012 in which 41 higher education institutions participated and it was identified that only 50% offered courses in Solar PV technology. Of the 368 teaching staff interviewed, only 16% had received prior training in solar PV technology. 52% of the institutes did not have access to adequate training materials while 60% of the respondents felt that they did not have appropriate hands-on training equipment. 20% did not have any hands-on training equipment.

The PEER project aims to train and empower technical training institutions (TTIs) within the country and the region. The selected TTIs (from the different parts of Kenya) will be trained and equipped to train solar PV technicians who qualify to get licensed by ERC. A memorandum of understanding strengthens the cooperation between the TTIs and SERC for the achievement of the project objectives. Selected TTIs will be provided with the VOCTEC Mobile Training Toolkit (MTT) developed by ASU. The VOCTEC Mobile Training Toolkit (MTT) is a portable solar PV training center "out of a box" that incorporates solar PV components, test equipment, tools and educational materials to conduct hands-on training exercises as

a part of a stand-alone solar PV technician training curriculum. The project will lead to at least 100 trainers and through them 1000 technician trained and certified at level T2 within 36 months. Thus, by the end of the project period, there will be a sufficiently qualified pool of solar PV professionals conversant with proper design, installation and commissioning of solar PV DC systems.

Project High lights

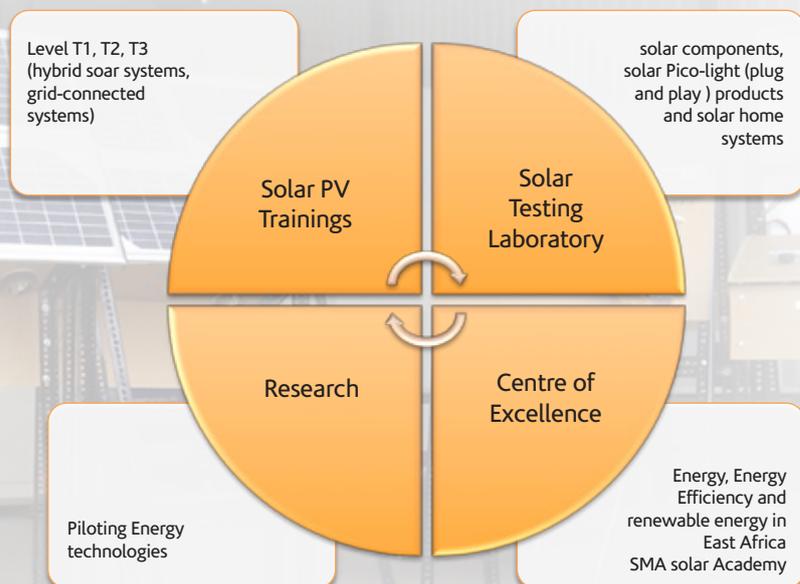
- Female-only solar PV training
- Strengthening of national institutions through capacity development of vocational training institutions: 1000 T2 level solar PV technicians
- Strengthening of the solar PV market in Kenya
- Building the human and training infrastructure capacity of Strathmore University in the area of solar PV
- Contributing to increased access to modern and renewable energy in rural and peri-urban areas of Kenya through access to quality solar home systems.

SERC other activities

- Solar PV trainings: Level T1,T2,T3 (hybrid soar systems, grid-connected systems)
- Centre of excellence in Energy and renewable energy in East Africa
- Hosts the SMA solar academy
- Solar PV testing labeling quality assurance and testing laboratory for all solar components individually, solar Pico-light (plug and play) products and solar home systems
- Consultancy in renewable energy and energy, training and research services

For more details please check our website

"The PEER project aims to train and empower technical training institutions (TTIs) within the country and the region."



Pay as You Go

Distributed Solar through Pay-as-You-Go systems in East Africa

By AECF REACT

Application of pay as you go systems is an emergent approach to increasing energy access particularly through the distribution of solar products to low income households. This concept of integrating PAYG systems into business models is increasingly capturing the interest of companies in the solar sector. In fact, a number of companies in Africa Enterprise Challenge Fund's (AECF) Renewable Energy and Adaptation to Climate Technologies (REACT) portfolio have already adopted this novel concept.

The Africa Enterprise Challenge Fund (AECF) is a US\$200m private sector fund, hosted by the Alliance for a Green Revolution in Africa (AGRA). It is designed to stimulate investment by the private sector in new and innovative business ideas with potential for wider social benefit. The fund manager of the AECF is KPMG International Development Advisory Services. AECF Connect supports AECF grantees and finalists in raising capital from other investors and lenders.

For more information about AECF Connect please contact sebastian@aecfafrica.org.

PAYG is well established in the telecommunications industry, with the use of pre-paid scratch cards enabling customers to secure services at a desired level of affordability. However, application of PAYG in the energy access space, and in distributed energy solutions is a new and innovative approach. Similar to the telecommunications industry, PAYG in the solar

sector allows the end-user of a solar product to pay for the energy service whenever the product is being used. Payments can be made through scratch cards or GSM technology, and ownership of the product be maintained by the company, or transferred to the end-user over time.

What is Pay-as-You-Go?

A business model integrating pay as you go systems allows customers to buy energy services; or buy energy products on credit and pay in instalments while using the products. The products could be solar lanterns mobile phone chargers, radios and solar home systems. This model mainly benefits households with limited access to finance, especially where small sums of money are available infrequently. Normally, solar products are too expensive for low income rural households, but PAYG enables such households to secure modern energy services or products with their available disposable income. Whilst previously unable to access the capital required to purchase solar products off the shelf easily, households are able to pay a nominal fee upfront and the balance through instalments over a specific period of time.

The advantage of PAYG is that it allows customers to pay an affordable amount, at a pace of their convenience (per day, week or in bulk), when they can. Simply put, low income rural households can pay for and access electricity when they need it.



For companies, PAYG provides an entry point into a new market segment, which is currently largely unreached. This market segment – the bottom of the pyramid (BoP) – has the highest population lacking modern energy access; also spending the highest proportion of their income on energy services. The potential for PAYG to increase energy access and impact social and economic conditions of households is therefore great.

How it works

The PAYG integrated business model extends a line of credit to customers. The role of credit providers is therefore essential in widening the traditional role of solar products distributors. AECF has funded a number of companies implementing PAYG business models in the solar sector. These companies mainly focus on provision of lighting products as well as additional services such as charging of mobile phones and powering of appliances such as radios and televisions.

Pay as you go systems typically consist of two basic components; revenue collection through mobile money transfer and a remote off-switch. In addition, the possibility of remote monitoring further facilitates

distribution of products and services, their operations, and interaction with customers. In the case of mobile money transfer, payments are transacted through telecommunications service providers. However, the remote off-switch function and the remote monitoring function are integrated into the product's control unit.

Distributing solar products on credit to the bottom of the pyramid market is considered a high-risk venture, one which the pay-as-you-go integrated - business model mitigates in three ways. Firstly, all the products are easy to install and dismantle. This makes it easy to recover the products should payments not be forthcoming, and reduces the risk of losing the assets. Secondly, and perhaps most notably, is the remote off-switch function built into the control unit of the products. It prevents the consumer from using the product without up-to-date payment for the service. There are two main configurations of the remote off-switch. The first is based on a timer activated by a code sent to the customer via text message once a payment has been made. The second is based on a GSM SIM-card integrated into the product. The company communicates with the SIM-card directly, and can remotely turn the system off

“The PAYG integrated business model has the advantages of increased security and low transaction costs through mobile money transfer.”

maintaining low prices in the BoP market, there may be additional risks such as low quality of products and long repayment periods. Further, companies may face the risk of cash flow constraints, which should be mitigated by innovative financial and operations strategies.

Future developments

There are several potential developments in the application of PAYG systems in the area of energy access. The PAYG integrated-business model has attracted significant interest, with its application expanding within the solar sector as well as to companies in the biogas sector. Further, as a versatile technology which can be easily integrated, PAYG can be applied to increase the affordability of other products and services, across other sectors as well.

Furthermore, modern energy access has been shown to increase energy demand of rural households. This means that households using solar products offered by pay-as-you-go companies experience an increase in demand, wanting to use larger and/or more appliances. This presents new potential opportunities for customers and companies. These may include increasing solar system capacities and retailing products such as radios, televisions and fridges in order to add value to the solar products. In fact, pay-as-you-go companies which seek to add value to their products, availing appliances such as televisions for purchase and solar products of suitable capacity, have been proven to have an important competitive advantage. However, companies may face difficulties providing warranties and after-sale services for such products for which they are simply

when a customer defaults on payment.

Thirdly, risk is mitigated by implementing a carefully selected pricing strategy. Companies using PAYG systems price their products and design payment plans to mimic a typical customer's current energy expenditure behaviour. By considering the customer's spending habits – amount and frequency – the company can set a flexible payment plan (amount per day, week, month etc.) depending on the customer's preferences. As rural households primarily purchase kerosene, the customer's payment plan for a solar product usually corresponds to the current expenditure on kerosene. In order to establish this, the sales person offering the credit options only needs to ascertain the type, quantity and cost of energy services that the household is currently using which will be replaced by the solar product. The sales person then makes a judgement of the household's ability to afford the solar product. Since the most crucial aspect in microfinance is assessment of the borrower's ability to repay the loan, this strategic pricing strategy drastically reduces the risk of bad debts.

These three strategies increase the efficacy of PAYG systems in solar products distribution. However, it should also be noted that due to the necessity of

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the retailer. Provision of appliances therefore increases the risk for PAYG companies, and alternative strategies may be considered. For example, PAYG companies could potentially partner with microfinance institutions to provide these appliances. It can therefore be considered that product development and compatibility with highly demanded appliances are priorities for future developments, in order to create demand for solar products among new customers - which is a significant challenge in low income rural settings.

Pay-as-You-Go and the solar market in East Africa

So, how does the pay-as-you-go integrated business model affect the solar market? First of all, the population lacking access to electricity in East Africa is huge, with a large diversity of needs and incomes. Pay-as-you-go companies provide access to a market segment largely dominated by fuels such as kerosene and biomass, or cheap, low quality solar products which have resulted in a bad reputation for all solar products. Successful introduction of good quality and affordable solar products into this market through PAYG systems can serve to improve the reputation of solar and increase consumer confidence thereby positively impacting the solar market as a whole.

While there are many business models extending a line of credit to customers, PAYG systems are based on a mobile phone based technical solution. The PAYG integrated business model has the advantages of increased security and low transaction costs through mobile money transfer. In comparison to other credit based models, PAYG could be considered to be more competitive on the basis of offerings. Further, pay as you go solar companies may provide credit histories for customers who have never had one before and are



seeking credit from conventional finance institutions. There is significant potential for customers who have completed their full payments for solar products, to use this as proof of credit worthiness, and therefore access credit.

Overall, this emerging business model has great potential to change the lives of low income rural households in East Africa. PAYG technology is mature, and in combination with a robust information management system, could greatly contribute to increasing energy access. With the right financial and operational innovations, renewable energy companies could adopt PAYG systems, and expand their businesses and social impact.

Unlocking solar solutions for Kenyan enterprises

By Solar4Africa / Matt Tilleard and Jake Cusack, CrossBoundary Energy
James Irons, NVI Energy



According to the World Bank, Africa's GDP is expected to rise at an annual rate of 5.2% in 2015 and 2016. This growth will be driven by expansion in mining and petroleum, increased agricultural production, and a growing services sector (World Bank). In Kenya, leading industries like agriculture (29.9% of GDP), manufacturing (10.4% of GDP), and wholesale and retail trade (13.4% of GDP) are expected to drive a 2014 GDP growth rate of 5.7% (African Economic Outlook).

Yet, despite this growth, Kenyan enterprises face a common challenge: access to electricity is limited, expensive and unreliable. 21.4% of African firms identify access to energy as a major constraint on doing business – more than any other issue. This is a major impediment to growth, particularly in energy intensive industries such as agriculture and manufacturing. Agricultural irrigation, processing and storage require significant energy resources, and energy plays an important role in facilitating added value in the agricultural sector (UNIDO). In Kenya, manufacturing is the largest consumer of electricity (Journal of Energy and Development). As stated by the Government of Kenya's Medium Term Plan,

“inadequate, unstable and costly supply of energy in Kenya has led to low productivity, high production and distribution costs, and uncompetitive products and services.” The 2013 World Bank Enterprise Survey found the average Kenyan firm suffers 6.3 electrical outages per month, with a duration of 5 hours. This disruption causes the average Kenyan firm to lose 5.6% of annual sales.

Given these challenges, many firms are willing to pay to control their own electricity generation. As a result, own electricity generation makes up more than 6% of total installed generating capacity on the African continent. In Kenya, 57% of firms own or share a generator and source an average of 14% of their power from it. Because it carries the lowest upfront cost, diesel generation is the default choice for the majority of Kenyan firms. But diesel is a highly imperfect solution: it requires high ongoing fuel and maintenance expenditure. Its only advantage is that similar to grid electricity, you only pay for what you use.

In contrast, renewable technologies, such as solar, present a significantly cheaper alternative source of power. The price of renewable energy solutions has





“Solar4Africa is a finance, technical oversight and asset management service that enables solar companies in Kenya to offer financing plans to potential customers through accessing the Solar4Africa Platform.”

steadily dropped in price over the last 10 years. Solar can now be cheaper than the prevailing grid tariff. These cleaner technologies are the more economical choice for firms.

Overcoming barriers to solar adoption

However, there are two barriers to adoption of solar by Kenyan companies. First, although solar saves money over the long term, it does require a significant upfront investment. Second, many companies are reluctant to commit to the task of constructing and managing their own solar power plant.

These barriers are not unique to Kenya. In fact, these same barriers to solar adoption existed in markets such as the United States of America. In the USA, the explosive growth of solar has been unlocked by the emergence of third party finance solutions known as power purchase agreements (PPAs).

East Africa needs solutions that allow the business

to pay for solar power on a similar basis to how they currently pay for grid electricity, on a monthly basis. PPAs are a well-known industry standard, internationally accepted by regulators, utilities and developers in mature solar markets as effective financing tools to allow businesses to purchase solar on an operating lease basis (similar to renting a generator) or to lease the solar system over multiple years before taking ownership.

Financing plans like a PPA allow enterprises to meet their energy needs without incurring the risk and expenses of paying for a solar system upfront. Instead, the enterprise enters into a long-term agreement with a solar company who installs and manages the system for them, in exchange for a monthly payment based on the power produced. The solar company often owns the solar power plant as security and operates it at their own risk. The enterprise benefits from cheaper and cleaner power, but does not have to pay the full upfront cost or manage the installation themselves.



The PPA approach is best understood through practical example. Consider an off-grid manufacturing plant, such as a tea processing factory, which currently operates purely on diesel. Installing a solar facility that offsets 40-60% of their diesel consumption will save them money. However, the manufacturer cannot afford the upfront cost of the system. Instead they enter into a PPA with a solar company to buy power for 10 years. The solar company installs solar panels on the roof of the tea processing factory. Each month the tea company pays the solar company for the power generated by the panels. The tea company benefits immediately from cleaner and cheaper power.

Currently, however it is difficult for solar companies in Kenya to offer any financed solutions to potential commercial and industrial customers. Many solar developers do not have access to sufficient capital, and offering plans like a PPA also requires significant legal and operational capabilities that can be expensive to develop.

Solar4Africa – A financing solution for captive

commercial generation

To address this challenge, CrossBoundary Energy has partnered with NVI Energy to offer its solutions platform branded Solar4Africa (S4A) to the East African market. Solar4Africa is a finance, technical oversight and asset management service that enables solar companies in Kenya to offer financing plans to potential customers through accessing the Solar4Africa Platform.

Solar developers in Kenya can use the platform to offer PPA solutions, rent-to-own solutions and other services to their potential customers free of charge. By making use of the platform they can provide project funding along with an integrated financial, legal and asset management solution, allowing developers to focus on sales, design, installation and maintenance.

The Platform allows developers to offer three basic plans dependent on the desired level of eventual ownership their customer would like:

- Solar Development Services – under this plan the developer can access wholesale procurement, legal agreements, insurance and performance guarantees. The client pays a discounted price for their system, provided they enter into a 3-5 year maintenance and performance contract.
- Pay-By-Solar (PBS) – For customers that would like to eventually own the solar system, PBS is the right plan. With a percentage (usually around 30%) of the price payable upfront, the customer can then purchase power at a discount to its current cost. The customer pays the system off over the life of the agreement (8-15 years). Upon making the final payment, ownership is transferred to the customer.
- Power Purchase Agreements – here the client just pays for power on an operating lease basis, while all capex and operating expenses are covered by Solar4Africa

Once a developer or solar installation firm has gone through a vetting process, the Solar4Africa platform can be used free of charge to:

- Prepare project quotes for any of the three plans
- Access pre-approved project agreements with assistance in negotiation and closing of the contract with the client
- Access standard proposals that are branded with the developer's logo
- Select top-end equipment and modules and procure equipment to project site
- Secure discounted project insurance (contractors all risk)
- Receive design assistance and project oversight provided by NVI Energy and system financing provided by CrossBoundary

Solar4Africa enables Kenyan solar developers to offer third party financed solutions. This removes barriers to wider adoption of solar by Kenyan enterprise. Kenyan manufacturers, farms, shopping malls and other enterprises can now convert to solar and begin saving money immediately. Once enabled, solar has huge potential to deliver cleaner and cheaper energy directly to Kenyan enterprise and contribute to a more prosperous Kenya.

Kenya Renewable Energy Association accredits suppliers, vendors and technicians in the Solar PV sector

By Kenya Renewable Energy Association

In May 2014, Kenya Renewable Energy Association (KERA) launched its most innovative project. The project for “Development and Implementation of a Voluntary Accreditation Framework for Vendors of Off Grid Lighting Products in Kenya” was created to address the issue of quality of products and services in Kenya’s solar PV market. Co-financed by Sustainable Energy Services for Africa (SESA) Programme and UNDP – DFID, the project has made significant progress over the last 10 months, and is set to roll out nationwide within the first quarter of 2015.

The project responds to growing concerns over the quality of products and services available to users of solar PV technologies. While Kenya’s solar PV sector has long been considered amongst the most progressive in the world and has a high market growth rate, its growth and development has not been without its challenges. In a field inspection of solar PV systems conducted in 2009, KERA found that 90% had been incorrectly designed, 64% incorrectly installed, and only 58% of owners were satisfied with their systems. These trends have contributed to consumers losing confidence in solar PV, businesses facing unfair competition from providers of low – quality products, and a decline in the market. Initially growing at a rate of 17% per year between 1998 and 2007, the market has fallen to about 11% per year between 2007 and 2011.

However, despite this bleak outlook, there have been some successful interventions to arrest this trend. Institutions such as IFC have used a voluntary and self-regulatory approach to ensure high quality products are available in the market, and speed up the uptake of solar

PV. The IFC Lighting Africa Kenya Programme for instance was able to attain a 200% increase in the uptake of pico-solar PV systems between 2011 and 2013. We therefore considered that a similar approach could be used in the wider solar PV sector, incorporating more aspects such as individual system components, quality of service available in the market, and consumer rights such as guarantees.

We therefore proposed to develop a voluntary accreditation framework consisting of criteria, systems and processes through which providers of products and services in the solar PV sector could seek accreditation by the association, and remain compliant. The resulting project, under implementation from May 2014 to October 2015, is aimed at enhancing the provision of good quality products and services in Kenya’s solar PV market, and increasing consumer awareness and access to these providers. The project creates a standard to be aspired to within the solar PV sector, and allows those who meet the minimum criteria to be recognized and even possibly rewarded. Our vision is a business environment in which standards are upheld, consumers’ needs are specifically addressed, and consumers are enabled to make better informed decisions when procuring products and services. Further, by ensuring that technicians, suppliers and vendors have an incentive to become accredited and remain compliant, we hope to attain accreditation of the majority of the market.

KERA’s initial concept evolved over time, with the benefit of insights from stakeholders. Through a series of consultation activities, including one on one meetings with companies, and two stakeholders’ consultation workshop, the association was able to define the project

“The IFC Lighting Africa Kenya Programme for instance was able to attain a 200% increase in the uptake of pico - solar PV systems between 2011 and 2013.”

components and strategies to ensure they are well aligned to the needs of the sector. A 1st stakeholders' consultation workshop convened on 10 September 2014 provided recommendations for the development of a draft accreditation framework and marketing strategy. These were presented for discussion, feedback for improvement and validation, at a 2nd stakeholders' consultation workshop convened on 11 December 2014.

The project

The project has three main components.

1) Developing criteria, systems and processes for accreditation of suppliers, vendors and technicians.

Good quality products and services have been defined, and their providers (suppliers, vendors and technicians) will be documented following an assessment process undertaken by the association. Key aspects of the accreditation criteria include issues of product quality, warranty periods and processes, and competency of service providers.

2) Achieving the uptake of the accreditation framework and compliance by at least 100 vendors and 100 technicians.

KEREA will undertake extensive marketing of the voluntary accreditation framework to suppliers, vendors, technicians and consumers. Marketing will be carried out through a door to door awareness creation campaign covering at least 40 major towns nationally. Information packages, including a list of accredited suppliers, brochures and application forms, will be distributed as part of the campaign.

3) Marketing the accredited vendors to reach at least 800,000 households across 40 major towns in Kenya.

Consumers will be made aware of the definition of good quality products and services, and their providers. Firstly, the association will develop a mobile phone based tool (USSD and/or SMS) to allow consumers nationwide to easily access information on accredited suppliers, vendors and technicians on their mobile phones. The tool will inform consumers who accredited providers are and where they are located. It will also provide a feedback channel for consumers to share recommendations and complaints, and contribute to monitoring.

Secondly, marketing to consumers will be carried out through extensive mass media including radio and television stations as well as newspapers, in both English and vernacular languages. Other media will also be incorporated including fliers, posters, stickers, billboards, social media and KEREA's website.

Voluntary accreditation criteria

There are three categories of accreditation: technicians, vendors and suppliers. There will be two levels of accreditation for technicians; interim accreditation and full accreditation.

To obtain interim accreditation, technicians are required to:

- Provide proof that they have undertaken a relevant, formal solar PV training course.
- Have relevant solar PV design, installation, and troubleshooting and maintenance experience; to be confirmed by a recommendation letter from an accredited supplier or vendor.
- Have a basic solar PV design tool.

- Have a high level of competence, to be confirmed by a testimonial letter from at least one satisfied customer, whose solar home system has been installed for at least 6 months.
- Have a licence from the Energy Regulatory Commission (ERC).
- Commit to issue commissioning certificates to all customers.
- Commit to provide a 6 months' workmanship warranty to all customers.
- Commit to submit bi-annual returns to the association twice a year, indicating the number and locations of installations.

Technicians with interim accreditation will obtain full accreditation if they meet the following additional requirements:

- Have carried out installation of at least 2 solar home systems after receiving the interim accreditation, as the lead technician.
- Provide proof of having carried out the 2 solar home system installations. Specifically, technicians will provide copies of commissioning certificates showing system specifications such as types and sizes of components, cable sizes, and a list of household appliances being used, amongst others. Additionally, technicians will provide photographs of the installed modules (taken with the sun directly behind the photographer), batteries, inverters and charge controllers.

To be accredited, vendors are required to:

- Have at least one dedicated accredited technician affiliated to the business.
- Have a solar PV design tool.
- Have a valid license from the Energy Regulatory Commission (ERC).
- Stock products from accredited suppliers only.
- Put in place warranty processes and required documents to ensure warranties are honoured to end users within a maximum period of 2 weeks.
- Extend the accredited suppliers' warranty periods to consumers for manufacturers defects.
- Submit bi-annual returns indicating the number and types of products and components sold and/or installed.

To be accredited as a supplier, a vendor will be required to meet the following additional requirements:

- Stock products with recognized international certifications such as IEC, CE and UL, and provide a standard warranty period for each of the certified products.
- Locally test products without recognized international certifications, and provide an additional 6 months to the standard warranty period for each of the non – certified products.
- Serialize, label and brand products for purposes of traceability.
- Provide the following warranty periods manufacturers defects to vendors, to extend to consumers:

To apply

Technicians, vendors and suppliers interested in the project, or accreditation should contact the association at administrator@kerea.org. The project's information package, including brochures and application forms, are available for download on www.kerea.org.

Voluntary Accreditation

The Kenya Renewable Energy Association (KERE) will receive applications for accreditation from technicians, vendors and suppliers.

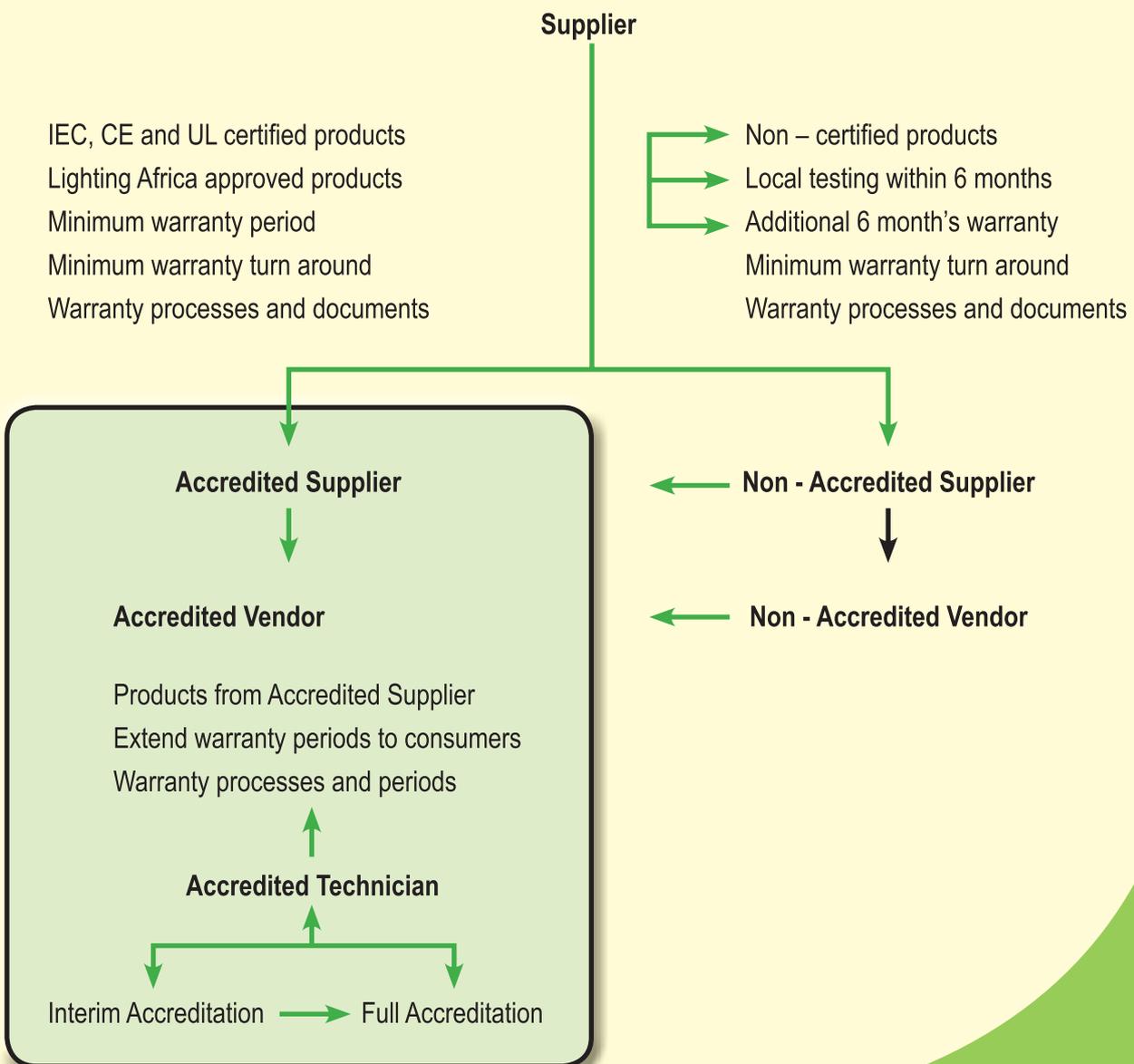
Technicians' applications will be assessed on the basis of competence and experience, as per the accreditation criteria for technicians. All applicants will be eligible for interim accreditation, and only technicians already holding interim accreditation will be eligible for full accreditation.

Vendors' applications will be independently assessed on the basis of their suppliers and technicians. Vendors will be eligible for accreditation only if all their products are from accredited suppliers. If some of the vendor's products are from non-accredited suppliers,

the vendor will be required to encourage his supplier(s) to become accredited. In all instances, the current list of accredited suppliers and accredited technicians will be made publicly available and disseminated to vendors.

Suppliers' applications will be assessed on the basis of product quality or performance, warranty periods and systems, and turn around periods, as per the accreditation criteria for suppliers. Accredited suppliers will then be welcome to provide a list of their vendors, essentially proposing them for accreditation as well.

The compliance pathway for suppliers, vendors and technicians are interlinked as illustrated below.



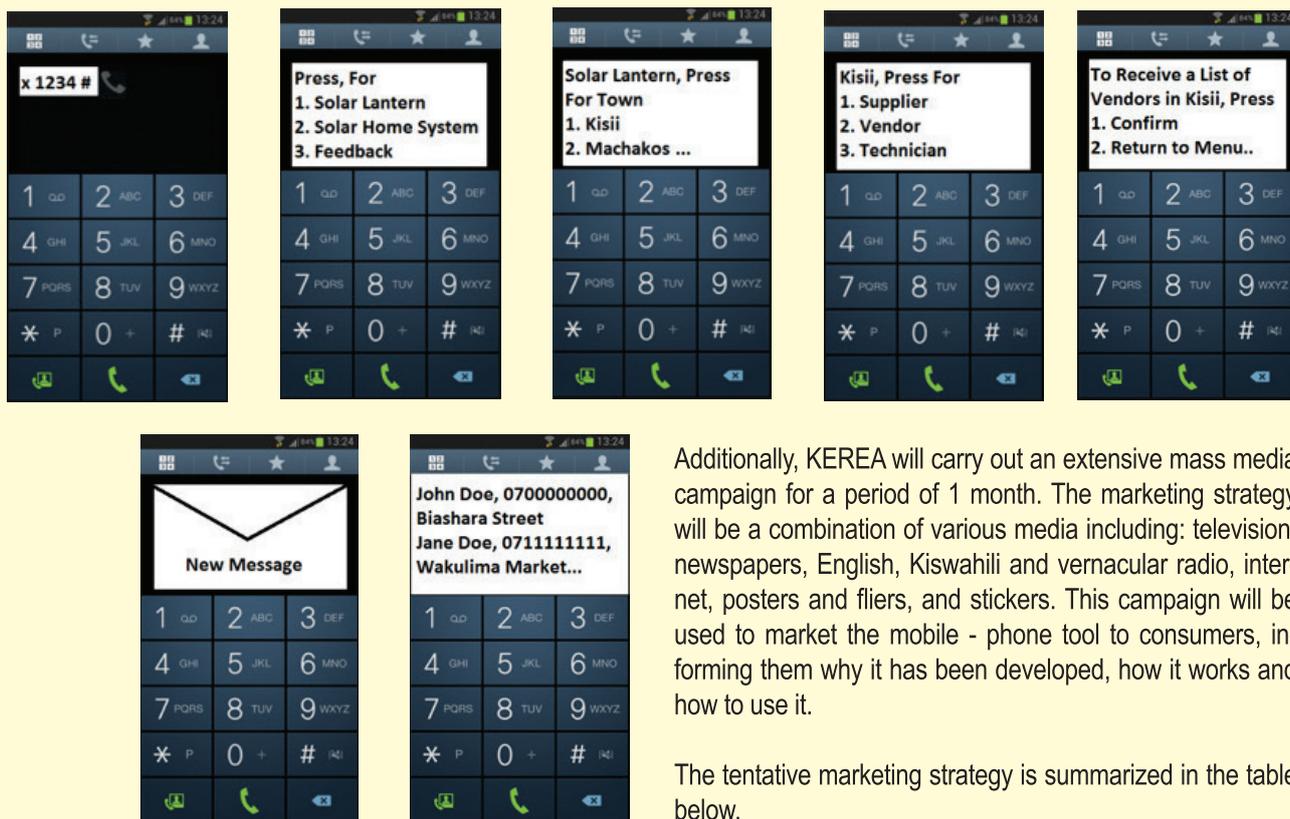
Marketing of Accredited Technicians, Vendors and Suppliers

The Kenya Renewable Energy Association (KERA) will undertake four levels of extensive marketing:

- Marketing of the accreditation framework to technicians, vendors and suppliers
- Marketing of accredited suppliers to vendors
- Marketing of accredited technicians to vendors
- Marketing of accredited technicians, vendors and suppliers to consumers

Marketing to consumers will increase consumer awareness of providers of good quality products and services. It will be carried out through the development of a mobile phone based tool (USSD and SMS). Information on KERA accredited technicians, vendors and suppliers will be accessible to consumers nationwide on their mobile phones, allowing them to make more informed decisions on procuring solar PV products and services.

The mobile – phone based tool is illustrated below.



Additionally, KERA will carry out an extensive mass media campaign for a period of 1 month. The marketing strategy will be a combination of various media including: television, newspapers, English, Kiswahili and vernacular radio, internet, posters and fliers, and stickers. This campaign will be used to market the mobile - phone tool to consumers, informing them why it has been developed, how it works and how to use it.

The tentative marketing strategy is summarized in the table below.

Media	Station	Prioritization of Days	Number of people listening, watching or reading
English Television	Citizen TV	Thur., Mon., Fri., Sat., Sun., Tue. and Wed.	486,301
Swahili Television	Q TV	Wed., Tue., Thur., Sat., Sun., Mon. and Fri.	892,097
Vernacular Radio	Citizen Radio (Swahili)	Mon., Tue., Fri., and Sat.	2,690,411
Stations	Kameme (Kikuyu)	Wed., Thur., and Sun.	1,324,187
	Ramogi (Luo)	-	798,716
	Musyi (Kamba)	-	756,678
	Kass (Kalenjin)	-	483,433
	Kiss (English)	-	462,414
	Egesa (Kisii)	-	399,358
	West (Luhya)	-	399,358
	Star (Somali)	-	357,320
	Muuga (Meru)	-	315,283
	Wimwaro (Embu)	-	231,207
English Newspaper	Daily Nation Supplement	-	170,000
	Total		9,766,763

This selection of stations show that if one advert is placed in each media outlet available, the project will be able to reach almost 10 million listeners, or almost 2 million households. A final list of media outlets will

be determined at a later stage based on the available mass media marketing budget (currently at about KES. 10 million).

How to Become Accredited

Please contact KEREAA should you have any questions or require support with your application(s).

If you would like to become accredited, please send the completed "Application Form and Checklist for Voluntary Accreditation" and supporting documents either by email, post or courier.

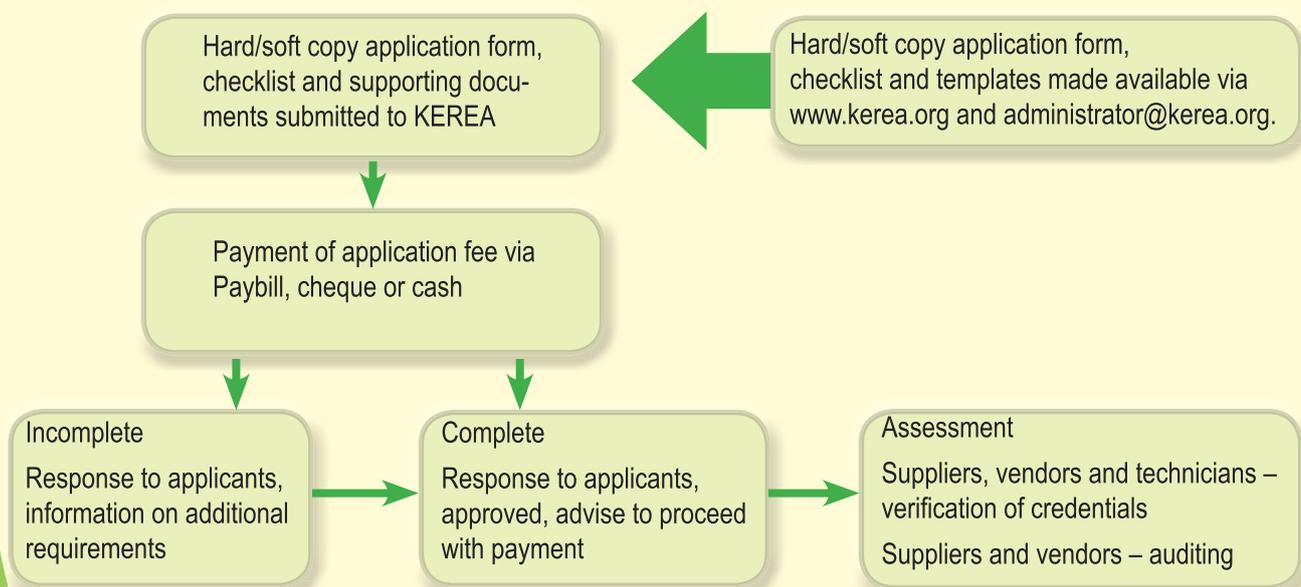
The fees charged for Accreditation by KEREAA are:

Category	Application Fee*	Annual Fee
Suppliers	KES. 20,000	KES. 50,000
Vendors	KES. 10,000	KES. 10,000
Technicians	KES. 5,000	KES. 5,000

*The application fee has been waived between 1 February 2015 and 31 May 2015. Applications received from 1 June 2015 will be subject to this fee.

(Payments to be made through M-pesa Till Number 199915 or cheque in the name of Kenya Renewable Energy Association).

The general structure of the accreditation process is illustrated below.



KEREAA

Kenya Renewable Energy Association

Further information on facilitation can be obtained from:

Kenya Renewable Energy Association
 P. O. Box 42040 – 0100 Nairobi
 Strathmore Business School (SBS), Ole Sangale Road
 Telephone: 0772 338 959
 Email: info@kerea.org
 Website: www.kerea.org

- NVI Energy, the founder of Solar4Africa, received some funding from the Global Climate Partnership Fund (GCPF) to pilot the concept of pay-as-you-use solar for commercial power.
- Pilot project took place at Cheli and Peacock's Tortilis Camp in Amboseli National Park, Kenya. The project is thought to be Kenya's first third party financed and operated solar system operated on a "pay as you use" basis.
- Tortilis Camp now receives power on a per unit basis at a rate no more than the cost of the generator-supplied power that the camp used to use.
- The project's close out report, submitted to GCPF, concludes that solar can compete favourably both financially and operationally with fossil fuel power.

Kenya's first commercial scale "pay as you use" solar project, enabled by Solar4Africa, successfully completes the pilot phase



By Crossboundary Energy and NVI Energy

NVI Energy's piloted "pay-as-you-use" solar project at Cheli and Peacock's Tortilis Camp in Amboseli National Park, Kenya has now been in operation for more than six months. The camp is one of the few safari camps in East Africa to be running exclusively on solar power.

The 46.6 kWp solar system, designed to replace the 27,000 litres of diesel previously used by the camp to power two generators, will reduce carbon emissions by more than 72 tons per annum. Furthermore, the solar system provides power to the camp on a per unit basis at a rate never more than the cost of the generator-supplied power that the camp used to use. This cost includes the diesel, generator maintenance and depreciation.

Through its Solar4Africa platform, NVI Energy has provided Tortilis Camp with a turnkey, low cost solar power package that includes design, installation, finance, insurance, operations and maintenance. NVI Energy owns the solar system, while Harmonic Systems installed the system and provides maintenance services. Tortilis Camp just has to pay for the energy that they use. All of this at a rate no more than what it used to pay for generator-

supplied power.

The system will provide the camp up to 77,400 kWh annually, storing energy produced during the day in an 11 ton Hoppecke battery bank, for use at night. The 190 solar panels cover an area of 440 m² and have been carefully positioned to minimise visual impact while optimising yield. The pilot was aided by a technical assistance grant from GCPF that helped to overcome some of the first time challenges and unknowns with developing a "pay as you use" off grid solar system in Kenya.

The conclusion bodes well for financing commercial scale renewable energy projects like this. It demonstrates that off-grid projects, with energy storage, are feasible and can attract private investment. Stefano Cheli, Owner of Cheli & Peacock said:

"Since Liz and I first established Cheli & Peacock in 1985, sustainable tourism and genuine environmental responsibility have been at the heart of all we do. We seek to set the 'green agenda' in Kenya and are immensely proud that Tortilis Camp is now 100% solar. It is the first camp of a substantial size in Kenya - if not all of Africa - to operate 100% on solar power, 24

hours/day. For some time we've wanted to make the move to solar but the costs involved were prohibitive. Working with NVI Energy on this venture has not only made the switch financially viable but immensely satisfying, as we can now harness Amboseli's wonderful sunshine to best effect." Monika Beck, Chairperson of the Board of Directors of GCPF said: "Climate change remains an ever pressing need. We are pleased that, through the Technical Assistance Facility of the GCPF, we were able to contribute to the success of this promising project. It perfectly fits into our overall objectives to mitigate greenhouse gas emissions in the world's fastest growing economies in a lasting, sustainable way. We look forward to further expanding our coverage and are dedicated to continue delivering on our objectives." James Irons, Managing Director of NVI Energy said:

"With a project like this behind us we are closer to demonstrating the importance of a platform, like Solar4Africa, to pull together all of the ingredients needed for a solar project. We bring together interested power users, equipment, design and installation firms and capital. Through standardisation we are able to deliver first class solar systems that are affordable to the power user, profitable to the installer and financially viable for private sector funding.

We are extremely grateful for GCPF's support to date and look forward to working with them on the emerging pipeline that are benefitting from successes like this."

For further information, please contact:

- Elizabeth Muir, NVI Energy, 00 44 7876 563849, elizabeth@nviadvisory.com
- Rosie Kempson, Cheli and Peacock 00 44 7870 556 947, rosiek@chelipeacecock.co.ke
- Ulli Janett, responsAbility Investments AG, +41 44 250 67 15, ulli.janett@responsAbility.com

NOTES TO EDITORS

Tortilis Camp Solar System Specifications

- Capacity: 46.55 kWp
- Expected Production (1st Year): 77,400 kWh
- Daily Average Energy Production: 212 kWh
- Energy Storage: 346 kWh
- Batteries: 48 x Hoppecke Batteries
- Panels: 190 (245 Wp)
- DC-AC Inverters: 3 (STP 1500 TL)
- Bi-directional Inverters: 6 (Sunny Islands 8.0H)
- Framing: Aluminium and steel mounting

About NVI Energy & Solar4Africa

Established in 2011, and based in Mauritius, NVI Energy develops and invests in commercial and industrial-scale renewable energy projects in Southern & Eastern Africa. It is also the founder of Solar4Africa. Solar4Africa delivers solar solutions for both on and off-grid projects. This unique platform brings together commercial power users, in-country technical and design firms, and capital. Through standardisation of the process it is able to deliver first-class solar systems that are affordable for end user, profitable for the installer and financially viable for the private sector investor.

www.nvienergy.com / www.s4africa.com

About Tortilis Camp

Tortilis Camp enjoys the best view of Mount Kilimanjaro from the spectacular plains of Amboseli.

It is famous for its local elephant population. There are over 1000 resident elephants, which roam alongside prolific lions, hyena and jackal. Tortilis Camp is named after the flat-topped, umbrella thorn tree - the Acacia Tortilis - and is situated in one of Amboseli's areas of Acacia Tortilis woodland. The woodland is home to many bird species and hundreds upon thousands of weaver nests hang directly above the camp, providing a rousing dawn chorus!

The camp's 16 spacious ensuite tents, family tent and secluded private house represent the very best of low impact, high comfort tourism. Meanwhile, the main lounge, bar and dining area are exquisitely built using natural materials and thatched roofs, providing the perfect setting for evening sundowners and the camp's famed North Italian cuisine – based on original dishes by Stefano's mother.

Guests at Tortilis Camp enjoy game drives, walking safaris, sundowners and bush meals in both Amboseli National Park and Kitirua Private Conservancy. The camp also has two swimming pools (one private infinity pool shared between the family tent and private house), two excellent massage therapists and a superb vegetable garden with 20 different fruits, vegetables and herbs - all of which are used by the camp chefs.

Tortilis Camp was the first eco-lodge of its kind in East Africa, winning British Airways' coveted Tourism for Tomorrow Award when it opened. Year on year, this SILVER eco-rated camp continues to set the standard for the 'Green' agenda, with 2014 seeing the property become 100% solar powered - the first camp of a substantial size in Kenya, if not all of Africa, to do so.

www.tortilis.com

About Global Climate Partnership Fund

The Global Climate Partnership Fund (GCPF) is an innovative public-private partnership dedicated to mitigating climate change through a reduction of greenhouse gas emissions in emerging and developing markets. It focuses on financing energy efficiency and renewable energy projects primarily in cooperation with local financial institutions, thereby creating a positive impact on the local environment and economy. Established in 2009, the Fund is a "société d'investissement à capital variable" governed by Luxembourg law. It was initiated by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMU) and KfW Entwicklungsbank and is managed by responsAbility Investments AG.

www.gcpf.lu

ENERGYNET - AFRICA INVESTOR'S PORTFOLIO 2015



EnergyNet Ltd. organise a global portfolio of investment meetings, conferences and infrastructure events focused specifically on the power and industrial sectors across Africa. Proven to engage the decision makers and technical directors behind Africa's most exciting economies, EnergyNet places economic development at the heart of industrial solutions, helping to generate a more stable and viable investment option for our partners in Africa.

Our up-coming meetings in 2015 include:



POWERING AFRICA: NIGERIA 14 – 15 September 2015 | Abuja

Powering Africa: Nigeria 2015 is a two-day private sector-led summit on structured finance, development finance and private equity for Nigeria's Discos, Gencos and power sector leaders.

The programme will feature interactive dialogue between Gencos and Discos, private sector banks, multilateral investors and DFIs, government and developers to discuss the changing investment landscape placing the critical role of the private sector at the heart of the agenda. The platform will showcase the vast opportunities that await investment in Nigeria's newly reformed energy sector as well as offer solutions to overcome financial challenges, deliverables and risks that will ensure the reliability of supply for Nigeria. Participants will also have the opportunity to attend the black tie gala dinner, honouring some of Nigeria's most prolific deal makers.

www.poweringafrica-nigeria.com



POWERING AFRICA: GHANA 17 – 18 September 2015 | Accra

The Powering Africa: Ghana summit will provide a platform for investor insights on the future direction of the power sector in Ghana. The agenda will focus on the country's electricity landscape following the division of the energy and power ministries, the critical issues facing the government and investors, and the future project pipeline which is rapidly growing under the leadership of the Minister for Power. Meet with 250 decision-makers including DFIs, banks, developers and EPCs to discuss what is needed to fully support and enable the transformation of Ghana's electricity sector in the medium to long term.

www.poweringafrica-ghana.com



SOUTH AFRICA: GAS OPTIONS 1 – 2 October 2015 | Cape Town

The South Africa: Gas Options meeting is a focused 2 day investment meeting taking place from 1-2nd October 2015.

The meeting will take a detailed look at the opportunities available for gas developers and private sector investors as a result of the country's growing power demands. Debate solutions to the challenges of raising finance, delivering an efficient transmission infrastructure and the supporting industry, and the global LNG trends which could realise the country's vision of a stable and sufficient power supply.

www.southafrica-gasoptions.com



AFRICA INFRASTRUCTURE & POWER FORUM 15 - 16 October 2015 | Beijing

EnergyNet's 4th Africa Infrastructure & Power Forum is the annual gathering for Chinese investors and African developers to do deals and develop Africa's infrastructure and power sector.

Taking place from 16-17th September in Beijing, China, the Forum will welcome government representatives, utilities companies, financial investors, project developers, technology providers and the advisory sector.

www.africa-infrastructure-forum.com



POWERING AFRICA: FINANCE OPTIONS 5 – 6 November 2015 | Cape Town

The 9th Annual Powering Africa: Finance Options meeting is an **executive briefing designed for CEOs and senior-level directors active in the energy, finance and consulting sectors and focused on the financing of projects across Africa**. The meeting will get to the heart of the issues and opportunities surrounding project finance, allowing participants to directly engage with key decision-makers over the course of the concentrated 2 day retreat. This meeting is restricted to two delegates per company to preserve the roundtable format and high quality networking opportunities.

www.poweringafrica-finance.com



POWERING AFRICA: TANZANIA 3 – 4 December 2015 | Dar es Salaam

EnergyNet are delighted to present the 3rd annual Powering Africa: Tanzania meeting this November in Dar es Salaam. This meeting will provide detailed insights into the investment opportunities in Tanzania's power sector in 2015, following on from the success of the 2014 meeting where senior officials from the Ministry of Energy & Minerals, TANESCO, EWURA, TPDC and the Dar es Salaam Stock Exchange invited regional and international power experts to join them in timely discussions regarding the future role of the recently unbundled state utility TANESCO.

www.poweringafrica-tanzania.com



COMING UP IN 2016:

www.energynet.co.uk

IMPROVED CLEAN SOLAR PICO ESP

Call for improved cookstoves ●●

In Kenya about 90% of rural households cook with wood and charcoal on open fires and unimproved cookstoves. These open fires and unimproved cookstoves are very energy inefficient, requiring a lot of wood and at the same time producing considerable amounts of smoke, posing a serious health hazard to people. Although this is bad for health, the majority cannot afford to change to cleaner fuels, such as gas.

The World Health Organization has documented the significant number of deaths caused by smoke from home fires. The negative impacts can be reduced by using improved cook stoves and improved fuels. Improved cookstoves are more efficient, meaning that the stove's users spend less time gathering wood or other fuels, suffer less emphysema and other lung diseases prevalent in smoke-filled homes, while reducing deforestation and air pollution.

The situation is especially grave in rural and peri-urban areas, which suffers from very high deforestation. Continued deforestation has of course seen the negative effects of climate change escalate. Farmers and other inhabitants will give stories that the water volumes of some rivers cutting across their villages have declined, "no person would dare to cross the river where there was no bridge during rainy season. Today, you can cross these rivers at any point."

The justification for the improved efficient cookstoves lays on the fact that an analysis of the national energy shows heavy dependency on wood fuel and other biomass that account for 68% of the total energy consumption in Kenya.

Key highlights

- Use of biomass with unimproved cooking devices is the main cause of Indoor Air Pollution (IAP) in Kenya - estimated to be causing the death of 14,300 people annually .
- The cooking devices used by the majority of households have very poor thermal efficiency and serious health impacts due

to unclean combustion.

- The average rural family spends 20% or more of its income purchasing wood or charcoal for cooking.
- Many rural women have to walk on average over 15 km a day to collect firewood.
- Improved clean cookstove use less wood / charcoal fuel a saving to household expenditure

SNV Kenya, cookstoves solutions ●●

SNV Kenya is implementing the Fuel and Improved Cook Stove Adoption Project under its global partnership with Philips. Within the 2 year period the project aims at improving the livelihoods of 15,000 people in poor urban and peri-urban areas of Kenya through access to and use of affordable clean and efficient cooking stoves and fuels. The stoves being disseminated are the highly efficient tier 4 stoves. The Philips cook stove is the first model to be introduced and gradually other stove types/models will follow. The stoves are sold in combination with biomass pellets, whereby up to 50% of the purchase price is being financed through a mark-up on the recurrent pellet sales, allowing end users to pay back their stove investment over a period between 2 to 6 months. The project targets to support the market development of gasifier stoves and fuel pellets in 4 urban areas in Kenya. The main beneficiaries are 2500 households who currently use kerosene and charcoal for cooking as well as stove and fuel entrepreneurs in the selected urban areas. Other beneficiaries are the stove producers and distributors as well as pellet manufacturers.

Inclusive development approach ●●

The project is based on the principles of sustainable demand-led sector development whereby private sector actors are supported to exploit business opportunities in disseminating clean cooking products and services. Evidence shows that economic growth alone does not reduce inequity and it is important for the

poor households and small enterprises to be actively involved in economic development. This also implies for the RE sector in Kenya: in order to widely avail inexpensive clean energy solutions in the urban and peri urban areas inclusive development is a prerequisite for success.

SNV Kenya in collaboration with Philips carried out a business opportunity workshop for 30 Last Mile Entrepreneurs. These entrepreneurs were offered specific business development support with key focus on customer sensitization, awareness building and after sale service for which Philips will offer backstopping support to entrepreneurs by attaching area-based key account executives in the market. Moreover, Philips is ready to offer attractive credit arrangements to the distributors and will offer support for the initial set up of a pellet production facility.

With the emerging success of the project; SNV and its partners are confident to increase adoption of gasifiers and pellet fuels through providing sustainable cooking solutions for urban and peri-urban poor and improving the livelihoods of end users and entrepreneurs.

Need for solar Pico lighting that only the rich can afford to burn kerosene

According to the CIA World Fact Book only a quarter of households in Kenya have electricity. It's estimated that around a third of Kenyans rely on kerosene lanterns for their lighting needs. The use of solar lights has a huge impact on health, education, productivity and overall improves the quality of people's lives.

Solar lighting is also being credited with better grades for school children. According to Solantern's research, over half of children living in households with a solar lantern were able to study an extra two hours a night.

"It is unbelievable that the solar lamp cut your cost on lighting and phone charging by 100%, you no longer need to walk an average 5 km and wait for a whole day for your phone to be charged at the market, you can as well charge extra phones for your neighbours at a fee, it is free light, free soot, free charge (phone, torch) and an additional revenue"

There is a solar uprising in Kenya. Residents can obtain the gadgets readily from shops, hawkers and supermarkets in both rural and urban areas as dealers seek to reach more buyers. Different sector players have entered into the solar arena to address energy access to the base of the pyramid with significant impacts registered. The shift to solar is technically displacing the use of kerosene, which defined lighting for ages.

Key facts

- In Kenya, every evening thousands of children sit down and do their homework by kerosene-powered light.
- Kerosene CO2 emissions factor – according to commonly accepted estimates kerosene emits approximately 2.5kg of CO2 per litre



COOKSTOVES AND LIGHTING DISTRIBUTION IN KENYA

By SNV

- However, the soot emitted from the burning lamps is not only an environmental hazard but the toxic fumes could be causing children serious harm and putting them at risk of respiratory illnesses.
- In Kenya, kerosene costs between 25 and 30% of family's income

SNV Kenya, unlocking the solar market ●●

The current programme supported under Energizing Development Programme (ENDEV) by SNV Netherlands Development Organisation and the German Society for International Cooperation (GIZ) is one of the most influential stimulants in the market. The programme is being implemented in 10 Counties in Kenya.



Children using solar lamp to study and array of solar Pico PV products



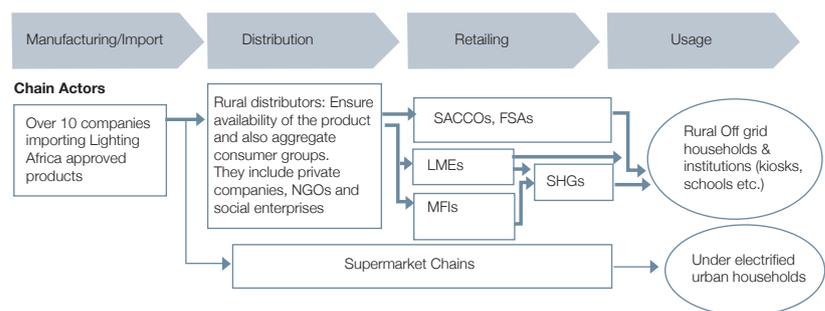
Through this project, SNV seeks to increase access to and use of modern lighting for households at the Base of the Pyramid (BoP) by establishing and strengthening sustainable and commercially viable supply and distribution models for quality Pico PV (1 – 10 W) products and services at the local level.

This includes end user awareness creation, capacity development for rural entrepreneurs, creating business linkages between value chain actors at different levels and facilitating access to finance for both entrepreneurs and end users. This includes, linkages with SACCOs, promoting pay-as-you-go models as well as other payment models that match BoP customers' irregular cash flows. The solar products that this project addresses are products, tailored to the needs of the poor (affordable quality lighting and phone charging), products they really want and for which there is a sizeable national market. The established distribution model is expected to be profitable, commercially viable, environment conscious and scalable.

The project is promoting the distribution of several Lighting Africa approved products that are available on the Kenyan market. They typically cost between Ksh 1,000 and 15,000, have at least a 1 year warranty on them, provide light up to 8 hours a day and have a phone charging facility. Some of the brands include Dlight, Barefoot, Trony, Sunking, Bright Box, Marathoner, Sunlite and Focera.

Project output

- SNV has signed partnership MOUs with 8 of the Lighting Africa Associates based in Kenya.
- 10 rural distributors have been identified covering each of the 10 counties.
- Over 700,000 people have been reached through awareness creation on the use of solar PV Pico products.
- The project already has foot prints in all the 10 counties with a strong presence in Nandi, Uasin Gishu, Kiambu, Nakuru, Laikipia



and Machakos.. The main distribution channels for solar lamps include farmers' organizations, rural SACCOs, Micro Finance Institutions and Livestock markets.

- Over 30,000 lamps have been distributed most of these by micro entrepreneurs.

Project impact

- I. Over 60,000 people are now accessing clean energy for lighting and phone charging, thanks to the commercial distribution model.
- II. The distribution model has created employment opportunities for over 150 people. These consist of the micro entrepreneurs, product agents and promoters.

Lessons learnt

It is evident that there is a big untapped market for solar lamps in off grid communities in Kenya and that BOP consumers respond positively to problem solving and poverty reducing goods. However, consumer confidence is vital to the acceptability of RE goods. This can only be achieved by developing networks of trained and equipped service providers closest to where the products are sold.

Secondly, in order to overcome distribution challenges at the last mile, it is necessary to create sustainable business linkages between

central solar lantern distributors and rural entrepreneurs who have an established customer base. This will enable them to jointly promote and distribute solar lanterns in the rural areas. To make this a success, it is necessary that at each level in the value chain, the margins and incentives are clear and sufficient.

Thirdly, due to the low buying power and scattered nature of BOP consumers, it is expensive to set up business premises thus calling for the development of appropriate aggregation models for the BOP. It is only through innovative distribution models that solar lamps will be made available and affordable at the last mile.

Another key success factor in scaling up access to solar lanterns is access to credit for both rural distributors and end users. Currently, most enterprises lack capital to invest in adequate stocks. They are also unable to access appropriate financial services either due to lack of collateral. In other cases, the entrepreneurs are simply averse to taking credit.

The central distributors partner with financiers to design credit terms for their distributors to enable them to stock enough goods and get paid when goods have been sold. Along the same lines, rural distributors can consider innovative end-user credit schemes.



The wave energy device. Source: WERPO. License: All Rights Reserved.

WERPO draws ambitious wave energy plans for Africa...and the world

The Israeli company, Wave Electricity Renewable Power Ocean (WERPO), is working towards implementing a 100 MW wave energy project in Kenya. In addition, WERPO plans to deploy its technology in other countries in Africa such as Guinea and Gambia, in the near future.

WERPO says it is currently present in nine markets including China, Kenya and Sri Lanka. "We plan to build 10 MW plants in all the countries we are active in the next two years; and 100 MW plants in the next four years."

WERPO possesses the intellectual property, technology, know-how and contracts previously associated with the Israel-based sea wave power company SDE Ltd. WERPO was recently established to take on a public company shell, through a reverse merger with Blackbird International Corp. Through this listing on the US over-the-counter (OTC) market WERPO plans to raise funding for various projects around the world.

Now that the reverse merger has been completed, the company's market value is estimated by experts at USD 40 million.

WERPO's venture into Kenya

In early October, Blackbird announced that WERPO had received the green light from the Ministry of Energy and Petroleum in Kenya, to install a 100 MW wave energy plant on the coastline of the African country. The project will be executed through a 70/30 joint venture with local partner - Sea Wave Gen.

According to Mr. Ovadia, "WERPO is looking to attain investments of about 80 million USD to build a plant in Kenya." The first phase of the project will have a capacity of 10 MW and is expected to bring a gross income of 10 million USD, Blackbird's estimates. The output from the entire plant will be sold to local power company, KPLC, at 0.08 USD per kWh.

Expanding its horizons

WERPO's expansion plans to involve countries such as Guinea, Guinea-Bissau and Gambia, in addition to China. There is interest from ports in Italy, as well. Mr. Ovadia stated that the company "has more than 2 billion dollars worth of orders."

The company has already signed a power purchase agreement (PPA) for an initial 100 MW wave energy plant in Guinea-Bissau that may later be expanded to 500 MW. In Conakry, the capital city of Guinea, WERPO intends to install 100 MW under a memorandum of understanding (MoU) with the government.

In China, WERPO is in the final stages of installing a second pilot plant, a 150 KW wave energy system on Hainan Island. This plant is being established with local partners in China and is part of a larger agreement entailing expansion across all of China.

Waves, energy and affordability

The cost of a 1 MW plant, using the hydro-pneumatic method invented by Mr. Ovadia (under the company SDE Ltd., now owned by WERPO), is around 1 million USD. With SDE's world renowned technology, WERPO can produce energy at the lowest costs available in the energy sector to date.

WERPO's representative, Israel Enden, pointed out that in Africa the company's technology could not only boost local power capacity but also solve water availability problems: "If there was enough energy in Africa there would be enough drinkable water as well, you just need the electricity in order to build water purification plants," he explained.

Enden also noted that 80% of the world's population is located in coastal areas; so wave energy could help solve the energy crisis in many locations around the world.

KEREA members



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