



A Review of the Kenyan Policy Environment for Off-grid Solar PV

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Acknowledgement

This research paper presents the findings of one of the work packages of a larger research project conducted in partnership with the STEPS Centre at the University of Sussex, UK and funded by the Climate Development Knowledge Network (CDKN). The project seeks to inform policy on facilitating the uptake of pro-poor, low carbon energy technologies and associated economic development in low-income countries.

This paper has been prepared based on work efforts of the ATPS research team including Prof. Kevin Chika Urama, Dr. Nicholas Ozor, and Dr. Edith Kirumba, with inputs from Dr. David Ockwell and Dr. Rob Byrne, University of Sussex. For further details please refer to the project webpage at http://steps-centre.org/project/low_carbon_development/

1.1 Introduction

The overall national development objectives of the Government of Kenya are accelerated economic growth and rising productivity of all sectors, equitable distribution of national income, alleviation of poverty through provision of basic needs, enhanced agricultural production, industrialisation, accelerated employment creation and improved rural-urban balance. The extent to which these objectives can be realised on a sustainable basis and in an environmentally sound manner is dependent on the degree and economic efficiency with which critical factors of production are made available and combined with each other to produce the desired results. The realisation of these objectives is only feasible if quality energy services are made available in a sustainable, cost effective and affordable manner to all sectors of the economy ranging from manufacturing, services, mining, and agriculture to households. The need for an integrated comprehensive national energy policy cannot therefore be gainsaid (National Energy Policy 2004).

Although energy has been identified as one of the foundations and enablers of the socio-economic transformations visualized by the country in its Vision 2030 development blueprint, many Kenyans still do not have access to affordable energy which is limiting socio-economic opportunities for development especially for the poor, women and children. About 77 percent of the Kenyan population does not have electricity connections and over 85 percent of the population relies on traditional fuels such as wood, charcoal, dung, and agricultural residues for cooking and heating (Government of Kenya, 2011). The commercial energy sector in Kenya is dominated by petroleum and electricity as the prime movers of the modern sector of the economy, while wood fuel provides energy needs of the traditional sector including rural communities and the urban

poor. At the national level, wood fuel and other biomass account for about 68% of the total primary energy consumption, followed by petroleum at 22%, electricity at 9% and others at about less than 1%. Solar energy is also extensively used for drying (National Energy Policy, 2004). There are about 4 million households in rural Kenya alone which present a vast potential for off grid technologies such as solar technology whose market is estimated to be over 40MW (Energypedia, 2013).

The Government of Kenya has begun spearheading the promotion, development and use of alternative sources of energy following a low carbon path through an energy mix that puts emphasis on carbon-neutral energy sources such as geothermal, wind, solar and renewable biomass. In addition, Kenya's building codes are being reviewed to incorporate measures that will encourage climate-proofing and the construction of energy-efficient buildings. The dynamic private sector actors are also active in renewable energy development. Effectively harnessing these renewable resources requires careful planning and advanced technology. All these resources can supply our needs and those of future generations in a sustainable way. According to the Economic Survey 2011, renewable energy accounts for 69% of the country's overall energy mix while petroleum accounts for about 22% and electricity 9%. 67.5% of the electricity component is generated using renewable energy sources with fossil fuels providing the balance of 32.5%.

The private sector is taking advantage of the favorable business environment and policy to invest in the renewable energy sector. This sector includes a financial system with a banking sector that has more than 40 commercial banks that are, with support from development partners, increasingly looking at financing renewable energy and energy efficiency opportunities. In addition to independent power producers (IPPs) that are active in the energy sector, renewable energy developers are also vibrant in the country and a number of companies in the field are part of the private sector associations, such as Kenya Private Sector Alliance (KEPSA) and Kenya Renewable Energy Association (KEREAA).

This paper explores the policy environment of solar home systems in Kenya with a view to understanding the enablers and inhibitors to the development of the technology in the country. The method used in synthesizing this paper includes

desk review of relevant literature and official documents as well as interviews with selected stakeholders in the energy industry in Kenya. A list of the interviewees from each organization is provided below:

1. Mr Stephen Kinguyu, National Climate Change Action Plan Secretariat, MEMR. Interviewed on 23 October 2013
2. Mr Timothy Ranja, United Nations Offices in Nairobi (UNON). Interviewed on 15 November 2013
3. Enoch Kanyanya, United States Agency for International Development (USAID). Interviewed on 15 November, 2013.
4. Anthony Karembu, KFW. Interviewed on 20 November 2013.
5. Murefu Barasa, International Finance Cooperation (IFC). Interviewed on 25 November, 2013.
6. Eustace Muriithi Njeru, ERC. Interviewed in July, 2012.
7. Engineer Mwatu J.P. Mbithi, MoE. Interviewed in July, 2012.
8. Engineer Mwatu J.P. Mbithi, Chloride Exide. Interviewed in July, 2012.
9. Michael Omondi, Solar World (EA) Limited. Interviewed in July, 2012.
10. Cathy Owinga, Kenital Solar Ltd. Interviewed in July 2012.
11. Jacob Kimuya, Ubbink East Africa Ltd. Interviewed in July 2012.

1.2 Off-grid Solar Electricity in Kenya

Kenya receives good all year round solar insolation coupled with moderate to high temperatures estimated at 4-6 kWh/m²/day (National Energy Policy, 2004). This can be harnessed for water heating, cost effective crop drying and electricity generation for households and telecommunications facilities in isolated locations. It is used widely for various applications including crop, fish and wood drying, through direct exposure to the sun. Solar home systems are popular among the educated and relatively well to do rural households and other consumers who are far from the grid.

The number of solar home systems installed in households in Kenya has continued to grow significantly over the years. This growth is attributable to aggressive marketing by the private sector with limited support from the Government in form of low taxes on panels. With enhanced State support, it is estimated that the rate of market penetration can be improved considerably. Given that there are at least four million households in rural Kenya alone, the potential for photovoltaic solar home systems is virtually untapped. It is therefore

expected that with the diversification of rural electrification strategies, the number of installed photovoltaic solar home systems will grow even more substantially.

The solar PV systems around the country are mainly for domestic installations with the private sector playing a major role. In the early 1990s the overall installed PV capacity in Kenya was estimated at around 1.5 MWp, with approximately two-thirds installed in institutional systems. By 2000, the Kenyan market had more than doubled to 75% of the installed capacity was used in households. One decade on, the overall market has reached between 8 and 10 MWp of installed capacity (Ondraczek, 2012). Annual sales of solar PV systems have recently reached 1-2 MWp and annual growth rates have been around 10- 15% since the 1990s, with much of the market dynamic stemming from demand for residential SHS. The key driver for the spread of SHS has been the need for electricity of rural households that are not connected to the electricity grid to power TV sets and radios. More recently, a major factor driving the demand for SHS has also been the rapid spread of mobile phones and the need to recharge them.

The government plans on preparing the Energy (solar PV Systems) Regulations, 2011 which are expected to provide a licensing framework for the solar PV value chain and facilitate proper design, installation and use of solar PV systems while avoiding supply of sub-standard components and installations, so as to improve distributed electricity service delivery and facilitate sustainability of the PV market in Kenya (Government of Kenya, 2011). It is projected that by 2020, the installed capacity of solar PV systems will reach 10MWe and generating 22 GWh annually (Ministry of Energy, 2013).

1.3 Relevant Kenyan Policy

In support of the development of the SHS in Kenya, the following policy and legal frameworks have been developed and utilized:

- i. Sessional Paper No. 4 on Energy of Kenya
- ii. Energy Act 2006
- iii. Kenya rural electrification master plan
- iv. Feed-in-Tariff (FIT)
- v. Kenya Vision 2030
- vi. The Kenya National Climate Change Response Strategy
- vii. The Final Draft National Energy Policy of 2013

1.4 Sessional Paper No. 4 on Energy of Kenya

With a large number of households yet to have access to electricity supply of any sort the Kenyan Government through the Ministry of Energy came up with a Sessional Paper No. 4 which was passed in Parliament on 7th October 2004. The energy Sessional Paper therefore sets out the national policies and strategies for Kenya's energy sector in the short to long-term. The broad objective of the energy policy is to ensure adequate, quality, cost effective and affordable supply of energy to meet development needs, while protecting and conserving the environment.

In order to meet the policy objective and address the demand for energy as a critical input for development, there was need to expand and upgrade the energy infrastructure so as to promote efficiency, mobilize requisite financial resources, increase accessibility to all segments of the population, as well as enhance legal, regulatory and institutional frameworks to create both consumer and investor confidence among others.

The Sessional Paper recognizes the need to promote the use of solar energy as an alternative source of energy. In its commitment to implement this policy, Government embarked on widespread awareness and demonstration campaigns on the use of solar systems for domestic and industrial use as well as undertaking direct installation in selected institutions. The policy recognized diverse application of solar energy technologies including solar thermal for heating and drying and solar photovoltaic (PV) for lighting, water pumping, refrigeration and telecommunications. Solar PV was widely used for provision of electricity in off-grid rural and urban slum areas for low power application. The Government recognized the great potential of this source of energy and encouraged the development and utilization of appropriate technologies. The challenge was in the development of fiscal and regulatory frameworks to create an enabling environment to accelerate the development and utilization of the technology in the country.

The implementation plan under this policy has short-term, medium term and long term strategies. The short-term interest of the Government focused on capacity development in terms of human and physical resources to facilitate realisation of the energy sector policy objectives in a timely manner. The medium term strategies include: undertaking full cycle technology transfer from initiation to

local adaptation and acceptance of specified technologies; and the development of local expertise for energy consultancy services in renewable energy among others. The long term strategies include: the development of local manufacturing capability for advanced renewable energy technologies (such as photovoltaic and wind power turbines for electricity generation) both for domestic and export markets; and review of the fiscal regime for renewable energy technologies to promote their widespread utilisation.

1.5 Energy Act 2006

The Energy Act of 2006 as well sets out the National Policies and Strategies for short to long-term energy development. This is in line with the Government's vision of emerging as a newly industrialized country by 2020. Because a strong regulatory and legislative framework was required to manage the activities required to achieve this vision, the Energy Regulatory Commission (ERC) was established as an Energy Sector Regulator under the Energy Act of 2006 in July 2007. ERC is a single sector regulatory agency, with responsibility for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, and dispute settlement among others. The broad objective of the Energy Policy was to ensure the provision of adequate, quality, cost-effective, affordable supply of energy while ascertaining environmental conservation. It provides an enabling framework for the efficient and sustainable production, distribution and marketing of biomass, solar, wind, small hydros, municipal waste, geothermal, and charcoal. It also promotes the development of appropriate local capacity for the manufacture, installation, maintenance and operation of basic renewable technologies such as the solar systems.

The Energy Act also established the Rural Electrification Authority (REA) which is mandated among other things to promote the use of renewable energy sources including but not limited to small hydros, wind, solar, biomass, geothermal, hybrid systems and oil fired components taking into account specific needs of certain areas including the potential for using electricity for irrigation and in support of off-farm income generating activities. The Authority is also mandated to develop and update the rural electrification master plan.

Since 2006, the Ministry of Energy has been actively promoting the use of solar energy for off grid electrification. In particular, it has funded the solar for schools

programme and targeted to extend this to off grid clinics and dispensaries. Grid connected PV systems covering an area of 15-20 km² (3% of the Nairobi area) could provide 3801 GWh of electrical energy a year, equivalent to the total grid electricity sales for Kenya in 2002-2003 (Energylopedia, 2013).

In order to expedite the uptake of renewable energy resources such as the solar policy measures such as feed-in-tariff, Green Energy Facility, and the incorporation of renewable energy integration into Least Cost Power Development Plan (LCPDP) were introduced by the Government. Incidentally, Kenya was selected as one of the six pilot countries to benefit from the Scaling-Up Renewable Energy Program (SREP). The objective of the program that is supported by Climate Investments Funds (CIF) is to demonstrate, through pilot operations in selected countries, the economic, social and environmental viability of low-carbon development pathway to increasing energy access using renewable energy and creating new economic opportunities.

Although some strides have been made to improve energy efficiency and renewable energy in Kenya by the government, some planned reforms such as the establishment of Centre of Excellence for Energy Efficiency and Conservation, energy and equipment testing laboratories and development of standards and codes of practice on cost-effective energy use are yet to be effected.

1.6 Kenya Rural Electrification Master Plan

A rural electrification master plan was undertaken by the Kenya Rural Electrification Authority (REA) in 2008. The Rural Electrification Authority (REA) is one of the State corporations in Kenya, having been established under Section 66 of the Energy Act (No 12 of 2006) as a result of the Government's Sessional Paper No. 4 of 2004 on Energy. The establishment of the Authority was based on the realisation that there was still very low energy connectivity in most of rural Kenya that required urgent attention in order to achieve the goals of the Economic Recovery Strategy formulated in 2003. The Authority was therefore created and became operational as a body corporate in 2007 with the objective of accelerating the pace of rural electrification, a function previously undertaken by the Ministry of Energy. In 2008, the master plan identified 20,000 public facilities without electricity and by June 2010 a total of 12,094 or 60% of these facilities which include secondary schools, markets and health centres had been

electrified using various energy mixes including the solar energy sources (Global Village Partnerships, 2013). A breakdown of the status of implementation show that during the Phase 1 of the programme (2008-2012), 9,415 trading centres, 6647 public secondary schools, and 3276 health centres have been connected thereby increasing connectivity from 12% to 22%. The Phase 2 of the programme targets to increase the national connectivity from 22% to 65%.

REA's main mandate is to accelerate the pace of rural electrification in order to promote sustainable socio-economic development. Under the Energy Act, REA is mandated among other things to manage the Rural Electrification Programme Fund and promote the use of renewable sources of energy such as the solar systems taking into account specific needs of certain areas in the country. REA is also mandated to manage the delineation, tendering and award of contracts for licenses and permits for rural electrification projects and services.

1.7 Feed-In-Tariff (FIT)

A Feed-in-Tariff (FIT) is an instrument for promoting generation of electricity from renewable energy sources (RES). A Feed-in-Tariff allows power producers to sell renewable energy sources generated electricity (RES-E) to a distributor at a pre-determined fixed tariff for a given period of time. The government of Kenya recognizes that other renewable energy sources (RES) including solar, wind, small hydros, biogas and municipal waste energy have potential for income and employment generation, over and above contributing to the supply and diversification of electricity generation sources. The Sessional Paper No. 4 of 2004 on Energy incorporates strategies to promote the contributions of other renewable energy sources in the generation of electricity while the Energy Act 2006 Part V Section 103 empowers the Ministry of Energy to promote development and use of renewable energy technologies. The Ministry of Energy thereafter prepared a Position Paper in FY 2007/08 proposing to set Feed-in-Tariffs (FIT) for electricity generated from renewable energy sources in order to safeguard the investments made by the respective developers and to boost the development of Renewable Energy Sources Electricity (RES-E) generation.

The FIT Policy was therefore first established in Kenya in April 2008, and subsequently reviewed in January, 2010 and December 2012 as provided in the Final Energy Draft Policy of 2013. The policy took into account cost of money and competitive opportunities offered in other countries and applied for wind, small

hydro, biomass, geothermal, biogas and Solar. It obliges Kenya Power and Lighting Company (KPLC) to enter into a Power Purchase Agreement (PPA) with firms producing electricity under the FIT policy with guaranteed priority purchase. The revision in the Final Energy Draft Policy 2013 provides standardized PPA templates to be used as basis for negotiations. It also provides the connection guidelines for small scale renewables to guide the grid connection study that all developers are required to undertake, as well as revised the implementation guidelines to include a standardized application form and progress reporting and monitoring frameworks.

The FIT Policy envisages that by adopting the FIT's system, Kenya's energy sector will improve its rating as an attractive destination for substantial private sector capital thereby facilitating the exploitation of the abundant local renewable energy sources such as solar, wind, small hydro and biomass. Tables 1 and 2 show the FIT values for the different categories of renewable projects in Kenya (Oimeke, 2013).

Table 1: FIT values for small renewable projects (up to 10MW)

Technology	Capacity	Tariff	Escalable portion of the tariff	Min. capacity MW	Max. capacity MW
Wind	0.5-10	0.11	12%	0.5	10
Hydro*	0.5 10	0.105 0.0825	8%	0.5	10
Biomass	0.5-10	0.10	15%	0.5	10
Solar (grid)	0.5-10	0.12	8%	0.5	10
Solar (off-grid)	0.5-10	0.2	8%	0.5	10

***For values between 0.5-10MW, interpolation shall be applied to determine tariff for hydro**

Table 2: The FIT values for renewable projects above 10MW

Technology	Installed capacity (MW)	Standard FIT (US\$/kWh)	Escalable portion of the tariff	Min. capacity MW	Max. capacity MW	Max. cumulative capacity (MW)
Wind	10.1-50	0.11	12%	10.1	50	500
Geothermal	35-70	0.088	20% for first 12 years and 15% after	35	70	500
Hydro	10.1-20	0.0825	8%	10.1	20	200
Biomass	10.1-40	0.10	15%	10.1	40	200
Solar (grid)	10.1-40	0.12	12%	10.1	40	100

The implementation agenda for the FIT Policy from 2013 to 2017 proposes to firstly develop an investment guide, set minimum and maximum tariffs to guide the negotiations for PPA under the FIT, review the FIT Policy to include operations and maintenance escalation components, expand the scope of FIT to include the emerging technologies, and provide capacity building and financial assistance to community based projects.

1.8 Kenya Vision 2030

The primary goal of Vision 2030 is to transform Kenya's economy from a poor agriculture-based one to a middle-level industrialised country within the next two decades starting from 2008. Energy is one of the infrastructural enablers of the three “pillars” of Vision 2030 with an objective to increase national power generation, provide the energy required to accelerate growth and mobilize private sector capital for generation of electricity from renewable energy sources such as the solar energy systems. A target to generate and distribute up to 23,000MW of electricity was estimated during the period. The level and intensity of commercial energy use in a country is a key indicator of the degree of economic growth and development. Kenya is therefore expected to use more energy in the commercial sector on the road to 2030. As incomes increase and urbanization intensifies, household demand for energy will also rise. Preparations have been made to meet this growth in demand for energy under the Vision.

Under the Vision 2030, the Government intends to spend Kshs. 180 million to provide solar electricity generators to 74 public institutions including boarding

primary and secondary schools, health centres and dispensaries in Baringo, Marakwet, Samburu, West Pokot, Turkana, Makueni, Narok, Kajiado, Moyale, Marsabit and Mandera districts (Government of Kenya, 2007).

1.9 The Kenya National Climate Change Response Strategy

Under the mitigation measures of the National Climate Change Response Strategy, Government aims to step up efforts that seek to prevent or slow down the increase of atmospheric GHG concentrations by limiting current and future emissions and enhancing potential sinks for GHGs. In Kenya, the sectors associated with high emissions include forestry (due to forests logging and land use change), energy, agriculture and transport. Proposed mitigation interventions include projects of the Kenya Forest Service's Forestry Development Plan (FDP); Energy Ministry's Green Energy Development; as well as other interventions in the transport and agricultural sectors.

The Green Energy Development Programme seeks to take advantage of Kenya's abundant renewable energy resources. For instance the arid and semi-arid areas have long hours of sunshine throughout the year, making them conducive for solar energy capture and utilization. By maximizing this and other RE potentials, Kenya can contribute significantly to reduce global GHGs as well as its unhealthy reliance on imported fossil fuels (Government of Kenya, 2010).

A number of desirable and implementable green energy projects have been identified under this Strategy. The Government is prepared to allocate a large amount of budgetary resources, while at the same time seeking the support of bilateral and multilateral financial institutions. Through the Strategy, Government offers credit and subsidy facilities to private investors to facilitate rapid completion of these projects. The green energy projects are estimated to provide an additional 2790 MW by 2014. Building on the success of this programme, it is envisaged that Kenya will become a Green Economy by 2020. In addition, Kenya will pursue energy efficiency options such as : mandatory energy audits of large commercial and industrial consumers; subsidies and other tax incentives to promote and sustain wider adoption of energy efficient electrical gadgets such as compact fluorescent light (CFL) bulbs and solar hot water heating; and constructing energy efficient buildings, e.g. buildings that use as much sunlight as possible while avoiding direct heating from the Sun in order to minimize energy requirement for cooling purposes.

1.10 The Final Draft National Energy Policy of 2013

The overall objective as stated in the final draft energy policy of 2013 is to ensure affordable, sustainable and reliable supply of energy to meet national and county development needs, while protecting and conserving the environment. The energy sector is already guided by the policy set out in the Sessional Paper No. 4 of 2004 and governed by a number of statutes, principally the Energy Act, No. 12 of 2006. The Policy recognizes that renewable energy, derived from the naturally occurring resources including geothermal, hydro, solar, wind and ocean energy, biomass, biofuels, biogas and municipal waste can supply the present needs and those of future generations in a sustainable way if effectively harnessed through careful planning and advanced technology. In addition, the policy among other things recognizes that renewable energy has potential to enhance energy security, mitigate climate change, generate income, create employment and generate foreign exchange savings.

With specific emphasis on solar energy, the 2013 Energy Policy recognizes that Kenya is well known for a large-scale market driven penetration of small PV systems with capacity of 12-50Watts power (WP) consisting of low cost amorphous silicon modules and both mono and polycrystalline silicon modules. The development of the solar technology has faced numerous challenges which the Policy recognizes several factors as being responsible. Some of them include: a disjointed approach in policy implementation and promotion of solar energy projects by the various ministries and organizations; low percentage of solar energy being harnessed for commercial and domestic applications relative to its potential; high cost of SHS; and low level of consumer confidence due to inappropriate system standards, faulty installations and importation of substandard systems. Others include: rampant theft of solar PVs; lack of adequate awareness on the potential of the SHS technology; and lack of appropriate credit and financing mechanisms to facilitate acquisition of solar technologies.

Nevertheless, the Policy spells out some strategies for the development, uptake and adoption of solar home system technologies in Kenya including; the promotion of widespread use of solar energy while enforcing the existing regulations and standards; provision of incentives to promote the local production and use of efficient solar systems; enforcement of the regulations requiring all commercial buildings to adopt solar and hybrid solar energy

sources for water heating and lighting; and enforcement of minimum standards for solar energy technologies. Other strategies considered include: the provision of a framework for connection of electricity generated from solar energy to national and isolated grids, through direct sale or net metering; provision of tax rebates on solar panels and equipment; and ensuring adequate penalties for theft and vandalism of solar systems among others.

The implementation strategies of this Policy are phased in line with the Kenya Vision 2030 into short term (2013-2017), medium term (2013-2022) and long term (2013-2030). In the short term, the Policy aims to formulate regulations and standards for solar energy technologies and install 50% of all the remaining public facilities with solar PV systems in off grid areas. It also hopes to promote the installation of at least 100,000 units of solar PV home solar systems, provide incentives to promote the local production and use of solar systems, zero rate taxes and duties on solar energy equipment, facilitate the generation of at least 100MW electricity from solar as well as develop a programme for raising awareness on requirements for conformity with mandatory regulations for solar water heating systems and ensure installation of at least 350,000 SWH units. In the medium term, the policy aims to install 100% of all the remaining public facilities with solar PV systems in off grid areas, promote installation of at least 200,000 units of solar PV home systems, and facilitate the generation of at least 200MW electricity from solar. It also hopes to develop a programme for raising awareness on requirements for conformity with mandatory regulations for solar water heating systems and ensure installation at least 450,000 SWH units. Similarly, in the long term, the Policy aims to promote the installation of at least 300,000 units of solar PV home systems, facilitate generation of 500MW electricity from solar, and develop a programme for raising awareness on requirements for conformity with mandatory regulations for solar water heating systems and ensure installation at least 700,000 units.

1.11 Institutions and Organisations Driving the Solar Home System Policy Environment and Development in Kenya

1.11.1 Governmental Institutions

The Sessional Paper No. 4 of 2004 and the Energy Act No.12 of 2006 restructured the sector in a bid to facilitate high level performance. The Policy has enabled increased private sector participation in the development of the sector whilst

simultaneously focusing on improved management and delivery of energy services. This was intended to enable the sector achieve its mission of providing clean, sustainable, affordable, reliable and secure energy services at least cost while protecting the environment. The following are the key governmental actors in the Kenya energy sector with particular reference to the actors that have influence on solar energy policy and development (Ministry of Energy, 2013):

1.11.2 Ministry of Energy (MoE)

The MoE is responsible for formulation and articulation of energy policies through which it provides an enabling environment for all stakeholders. Its tasks include; national energy planning, training of manpower and mobilisation of financial resources. Figure 2 shows the structure of the Ministry of Energy in Kenya.

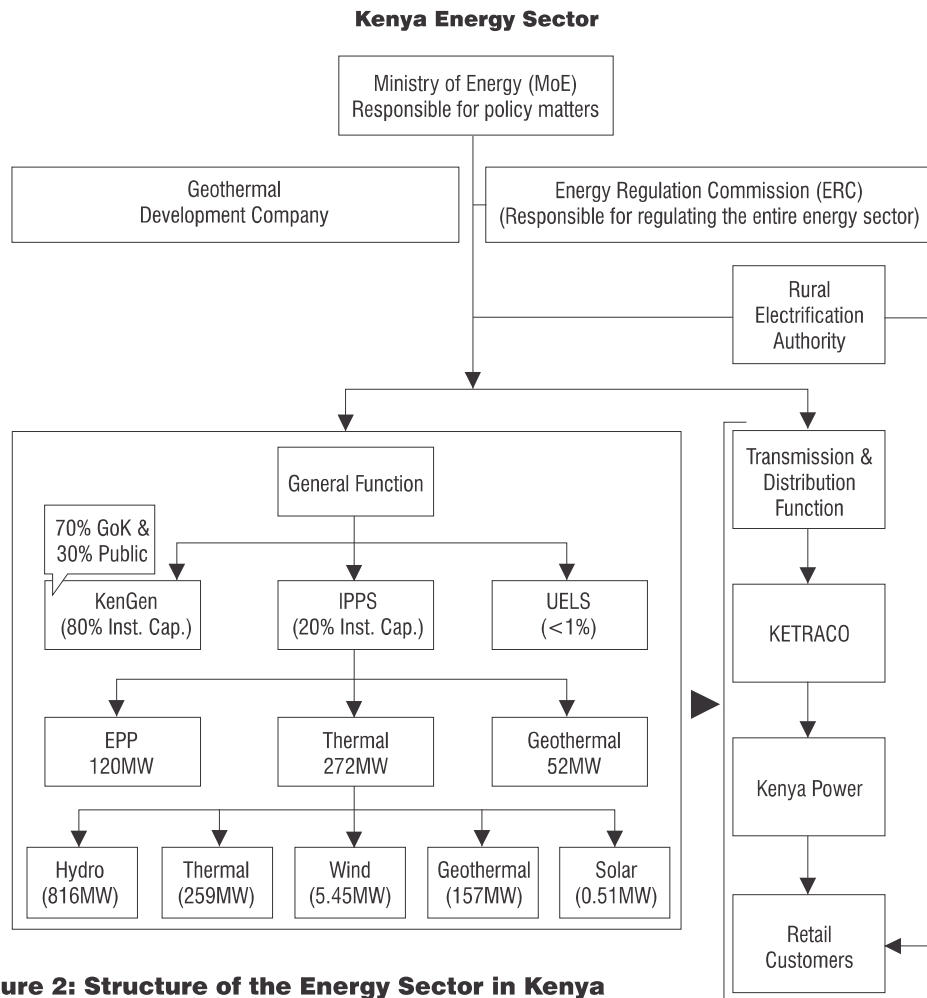


Figure 2: Structure of the Energy Sector in Kenya

1.11.3 Energy Regulatory Commission (ERC)

ERC was established as an energy sector regulator under the Energy Act, 2006, with responsibility for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors. Its functions also include tariff setting, review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.

1.11.4 Energy Tribunal

This quasi-judicial body was established under section 108 of the Energy Act, 2006. It came into operation in July 2007 to primarily hear appeals against the decisions of ERC. It also has jurisdiction to hear and determine all matters referred to it relating to the energy sector.

1.11.5 The Kenya Power and Lighting Company Limited (KPLC)

KPLC is a State Corporation with the Government of Kenya (GoK) shareholding of 50.1% and private shareholding of 49.9% as at December 2011. It purchases electrical energy in bulk from KENGEN and other power producers and carries out transmission, distribution, supply and retail of electric power.

1.11.6 Kenya Electricity Generating Company Limited (KenGen)

KenGen is a State Corporation with GoK shareholding of 70% and private shareholding of 30% as at December 2011. It is mandated to generate electric power, and currently producing the bulk of electricity consumed in the country. The company utilizes various sources to generate electricity including hydro, geothermal, thermal, solar, and wind.

1.11.7 Rural Electrification Authority (REA)

REA was established under section 66 of the Energy Act of 2006 as a body corporate with the principal mandate of extending electricity supply to rural areas, managing the rural electrification fund, mobilizing resources for rural electrification and promoting the development and use of renewable energy.

1.11.7 Kenya Electricity Transmission Company Limited (KETRACO)

This is GoK wholly owned company established to be responsible for the development, maintenance and operation of the national transmission grid

network. It is also responsible for facilitating regional power trade through its transmission network.

1.11.8 Centre for Energy Efficiency and conservation (CEEC)

The Centre was established jointly by GoK and the Kenya Association of Manufacturers to champion energy efficiency and conservation efforts in Kenya.

Other governmental key players in the energy sector that have influence on solar energy development include: the National Environmental Management Authority (NEMA), the Ministry of Environment and Mineral Resources, the Ministry of Planning, Ministry of Finance, the National Commission for Science, Technology and Innovation (NACOSTI), and the Presidency.

1.12 International Agencies/Institutions

1.12.1 United Nations Development Programme (UNDP)

The United Nations Sustainable Energy for All (SE4All) hopes to achieve three objectives namely; to attain universal access to energy, to improve energy efficiency and increase the use of renewable energy (RE) in the global energy industry, all with a 2030 target. Based on this mandate the UNDP is assisting Kenya in achieving the Sustainable Energy goals through the provision of sound policy advice, mobilizing and expanding financing options, developing effective approaches for scaling up energy services as well as ensuring access to clean energy by the poor.

In partnership with the Kenya Renewable Energy Association (KEREAA), Jomo Kenyatta University of Agriculture and Technology, and the Energy Regulatory Commission, the UNDP developed a curriculum for technical schools in Kenya to enable them acquire necessary skills required for technologies such as solar home system installations. Graduates from such technical training receive certificates that certify their ability to install SHS. The UNDP supported the National Climate Change Action Plan initiative on technology.

UNDP specifically assisted the Government of Kenya in the formulation of the National Energy Policy of 2004 using the network of its expertise from over 136 countries and best practices from other countries which Kenya could copy from.

1.12.2 United States Agency for International Development (USAID)

USAID through an 'Enhancing Capacity for Low Emission Development Strategy (ECLEDS)' which is an Obama Initiative supports about 20 countries in developing countries (Kenya inclusive) to come up with low emission development pathways. USAID Kenya now receives about US\$ 4 million annually for up till 2017 to develop low emission initiatives in clean energy development and to conduct audits of carbon emissions in Kenya.

Under the Vision 2030 implementation plan of the government of Kenya and the Medium Term Plan (MTP), USAID agrees to use clean energy to reduce GHG emissions and works with a number of other organizations such as M-Kopa to promote access to solar energy technologies in rural areas. M-Kopa is an initiative of USAID, Safaricom and Kenya Commercial Bank (KCB) that supports the use of solar panels by rural people which affords them under the initiative to pay in instalments using the Mpesa money transfer system.

By using low emission technologies, USAID supports the mandates of the National Climate Change Action Plan. USAID also works with the Ministry of Energy to promote efficient use of energy (such as low energy consuming bulbs) in public offices and institutions such as hotels, hospitals, schools.

1.12.3 KFW (Kreditanstalt für Wiederaufbau)

KFW is one of the leading development banks in the world with 80% of its equity owned by the German Government while 20% are owned by the States in Germany. Its mandate and approach is to provide financial cooperation with developing countries through capital provision and complementary advisory services. KFW looks at green energy as one of its investment efforts in developing and transition countries. In Kenya, KFW has supported public institutions such as the Ministry of Energy with concessional loans given to the national treasury. These loans are used to support utility arms of government in the energy sector including the KENGEN, KPLC, REA, GDC (Geothermal Development Company). There is a total of EUR 157.5 million net commitments of investments in renewable energy projects in Kenya with Solar/hybrid energy development receiving up to EUR 15.0 million.

KFW has supported the Feed-in-tariff (FIT) policy of government by encouraging private sector participation in renewable energy development through incentives. This incentive comes in the form of premiums on top of the FIT already set by government. KFW also provide debt and equity funding under the FIT policy by convincing other partners to participate in funding renewable energy development in the country. KFW has participated in the assessment of the Policy and Regulatory Framework for Mini-grid development. It has also done an assessment of best practices and lessons learnt in mini-grid development in Kenya.

1.12.4 International Finance Cooperation (IFC)

The main goal of IFC is to address poverty through private sector interventions. In the last five years, IFC has pioneered renewable energy development in Kenya through the Lighting Africa (LA) project. LA, a joint IFC and World Bank program mobilizes the private sector to build sustainable markets that provide affordable, modern off-grid lighting to communities in Africa which lack electricity. LA operates in Ethiopia, DRC, Kenya, Liberia, Nigeria, Senegal, and Tanzania, where it is either run by the World Bank and IFC or by the Government. Through this initiative, LA and its partners have brought cleaner, safer and better lighting to 6.9 million people in Africa. LA creates standards in the energy industry through peer to peer mechanisms and deliberate awareness on SHS in Kenya. In the 90s the market grew up to 20, 000 additional SHS per year in the country. With the expansion in the market especially pioneered by the private sector actors without much regulation, the challenges of irregular pricing, falsehood in Watts and labelling, etc., became significant. This led to the intervention by IFC to standardize operations in the industry. The Lighting Africa project was initially launched in 2007 and was driven by IFC and its partners.

IFC has two main arms in Kenya: the investment component and the advisory component. Under the advisory component which provides technical assistance as well as removes market barriers in the RE development, there is the Lighting Africa project, the African Renewable Energy Advisory Services (AREAS), and the Scaling up RE project (SREP) (meant for low income countries).

Working with the MoE and the ERC, IFC offers the sustainable business advisory through the Lighting Africa project as well as enhanced the investment climate by developing a renewable energy portal for the country

(www.renewableenergy.go.ke). The portal brings together all the permitting and licensing requirements for renewable energy project development in Kenya. This guides investors who may want to invest in any RE project and directs such investor to the necessary authorities for the purpose. IFC helped the government in developing this portal and all the requirements through collaboration with other relevant government agencies that are involved in the process. The mapping of the regulatory environment fed into the portal provides a one stop shop window for investors. This portal has already been launched and handed over to the ERC by IFC. The portal is being updated by the ERC.

Through the LA project, IFC improves the access to modern and cleaner lighting options for the bottom of the pyramid in Kenya through financing and investment opportunities. LA develops industry level standards among the RE market and raises awareness among the stakeholders. Working with the off-grid industries, LA has facilitated the development of modern portable solar lanterns with lasting components, mobile charging features, and in some cases 'pay-as-you-go' credit schemes which are increasingly becoming a viable lighting and energy alternative for consumers without electricity or with an unreliable grid connection. IFC played a role in the revision of the Energy Policy 2013 to its final draft through the identification of investment opportunities on renewable energy in the country.

1.12.5 Kenya Climate Innovation Center (CIC)

The Kenya Climate Innovation Center (CIC), a new business hub for Kenyan climate technology entrepreneurs, was launched on September 26, 2012. The CIC provides holistic, country-driven support to accelerate the development, deployment and transfer of locally relevant climate and clean energy technologies. In consortium partnership with Strathmore University, Global Village Energy Partnership (GVEP) International, PriceWaterhouseCoopers (PWC), and the Kenya Industrial Research and Development Institute (KIRDI), the CIC provides incubation, capacity building services and financing to Kenyan entrepreneurs and new ventures that are developing innovative solutions in energy, water and agribusiness to address climate change challenges. The Kenya CIC is an initiative supported by the World Bank's infoDev and is the first in a global network of CICs being launched by infoDev's Climate Technology Program (CTP). The Kenya CIC is funded by the United Kingdom's UKaid and the Danish Ministry of Foreign Affairs. The Kenya CIC will be seeded by contributions of US\$15 million over five years and is expected to support up to 70 sustainable

climate technology ventures in the first five years, and is set out to generate 4,600 direct and over 24,000 jobs in total within ten years (Strathmore University, 2012).

The Kenya CIC's mission and goals are delivered through a range of services and programmes including:

Advisory services: Providing one-on-one mentoring and specialised business/technical training programmes; organizing seminars and events to bring together entrepreneurs, investors, bankers, donors, government and academia; and providing access to toolkits, templates and pre-packaged assistance for routine activities e.g. business registration and accounting.

Financing: Providing Kenyan innovators with a range of competitive financing offerings, from proof-of-concept grants, through seed capital investments to syndication of larger financings.

Business Advisory: Providing technical experts with the business skills and competencies to turn appropriate technologies into viable businesses.

Access to Facilities: Providing access to facilities that house Kenya CIC incubatees and support technology design, adaption, prototype testing and manufacture; and collaborating with research institutes to facilitate paper, analytic, and laboratory studies to validate concepts.

Enabling Environment: Leveraging direct experiences of private innovators to inform relevant government regulations and strategies aimed at encouraging profitable local innovation.

1.13 Private Sector Actors

1.13.1 Independent Power Producers (IPPs)

IPPs are private companies which generate power and sell electricity in bulk to KPLC. As at 2011, they accounted for about 26% of the country's installed capacity and play an important role in bridging the demand gap.

1.13.2 Chloride Exide

Chloride Exide has been in the solar home systems market for over 20 years and is one of the best placed firms in Kenya to know the intricacies including supply and demand chains in the industry. Chloride Exide has partnered with Ubbink

East Africa Ltd to open up the first solar panel factory in east and central Africa in Naivasha that manufactures solar panels. With over 20 years' experience in large solar installations and Power backups, Chloride Exide prides itself as the sole distributor of Chloride Exide brand batteries which are manufactured locally by Associated Battery Manufacturer EA Ltd. The average cost of a solar home system sold by Chloride Exide is about 50,000 Kenya shillings. Due to the high demand for solar panels in the country, it imports its inverters from the USA and Holland and sells about 30 complete solar home systems and 200 panels per month. The most common customer they engage with is the rural customers who are not connected to grid electricity. Chloride Exide offers installation services starting at a cost of 6,000 Kenya shillings. They predict that in the next 5-10 years, areas that are not covered by the grid will adopt solar energy.

1.13.3 Solar World (E.A.) Ltd

Solar World (E.A.) Limited is a leading company that has pioneered the development of solar energy and environmental services throughout the East and Central Africa region. Its experience spans over 20 years. The average cost of a solar home system sold by Solar World is about 80,000 Kenya shillings. Solar World imports its panels and inverters from China, Germany, and Canada. According to the firm, the demand for solar panels has been increasing rapidly over the past 5 years at roughly 20% per year. Solar World mainly engages with rich customers in urban areas and offers installation services at about 20,000 Kenya shillings. The firm predicts an increase of roughly 25% in the use of solar systems in the next 5-10 years given the government's recent promotion of alternative energy sources and reduction in the cost of solar home systems. Solar World Ltd has also been in the solar industry for long and knows the complexities that exist in the industry.

1.13.4 Kenital Solar Ltd

Kenital Solar has built a solid reputation in the Solar energy field based primarily on experience and solar solutions provided in the most demanding locations. Its experience spans for over 25 years. The average cost of a solar home system sold by Kenital Solar is about 100,000 Kenya shillings. Kenital Solar imports its panels and inverters from Australia. The demand is estimated to be about 3000 Watts/month. Kenital engages with both rural and urban customers. Just like Chloride Exide and Solar World, Kenital Solar also understands the solar industry in Kenya.

1.13.5 Ubbink East Africa Ltd

Ubbink East Africa is the only manufacturer of solar modules in East and Central Africa. Based in Naivasha, Ubbink produces solar modules from 13 to 125 Watt peak. This range covers more than 90% of the market requirement, be it for a rural consumer who is just getting to know the benefits of solar energy or for a PV installation project in a medical centre. The average cost of a fully installed home system (with a 40W panel) is 60,000 Kenya shillings. Ubbink produces roughly 150KW/Month and its customer base is mostly rich people in both urban and rural areas who primarily use the solar power for lighting and domestic appliances.

According to Ubbink, the industry has been growing at roughly 20-30% in the last 7 years and the projected growth in the next five years should be about 20%. Given its partnership with Chloride Exide, Ubbink East Africa is bound to become a credible force in the solar industry in Kenya.

1.14 Conclusion

As the descriptions above demonstrate, the policy environment for off-grid solar PV in Kenya is complex with a range of different regulations and actors. Please refer to the parent research project to which this working paper contributes for applied analysis that considers the implications of this policy environment, together with empirical evidence from in-depth historical analysis on off-grid solar in Kenya, for fostering more widespread uptake of pro-poor, low carbon energy technologies and associated economic development in low-income countries (see http://steps-centre.org/project/low_carbon_development/).

References

- Energypedia (2013) Kenya Energy Situation. Available online at: https://energypedia.info/wiki/Kenya_Energy_Situation#Solar_Energy
- Economic Survey (2011) Kenya National Bureau of Statistics. Kenya.
- Ministry of Energy (2013) Final Draft Energy Policy. Federal Republic of Kenya.
- Global Village Partnerships (2013) Rural Electrification Authority, Kenya. Available online at: <http://www.proudlyafrican.info/Proudly-African/Proudly-African-Territories/Kenya/Business-Investment/Energy/Rural-Electrification-Authority.aspx> and retrieved on 11 November 2013.

- Government of Kenya (2011) Ministry of Energy. Scaling-Up Renewable Energy Program (SREP). Government Printer. Retrieved from http://www.energy.go.ke/?page_id=187 and retrieved 12 November 2013.
- Government of Kenya (2010) National Climate Change Response Strategy. Executive Brief. Available online at: <http://www.environment.go.ke/wp-content/documents/complete%20ncrcs%20executive%20brief.pdf> and retrieved on 13 November 2013.
- Government of Kenya (2007) Kenya Vision 2030: A globally competitive and prosperous Kenya. Available online at: http://www.kilimo.go.ke/kilimo_docs/pdf/Kenya_VISION_2030-final.pdf and retrieved on 12 November 2013.
- National Energy Policy (2004) Sessional Paper No. 4 on Energy. Ministry of Energy, Nyayo House, Nairobi, Kenya. Available online at: http://www.renewableenergy.go.ke/downloads/policy-docs/sessional_paper_4_on_energy_2004.pdf
- Oimeke, R.P. (2013) Feed in Tariff Policy in Kenya. The Energy Regulatory Commission (ERC), Ministry of Energy, Kenya. Available online at: http://search.yahoo.com/r/_ylt=A0oG7iYLAq9SzRwAfahXNyoA;_ylu=X3oDMTEzN3BrNmN2BHNIYwNzcgRwb3MDOQRjb2xvA2FjMgR2dGlkA1ZJUDMyMl8x/SIG=145pbgp1a/EXP=1387229835/**http%3a//www.afurnet.org/index.php/en/component/docman/doc_download/95-en-pp04-afur-re-presentation-kenya%3fItemid= and retrieved on 16 December 2013.
- Ondraczek, J. (2012) The sun rises in the east (of Africa); The development and status of the solar energy markets in Kenya and Tanzania. University of Hamburg, Research Unit Sustainability and Global Change. Retrieved from http://www.fnu.zmaw.de/fileadmin/fnu_files/staff/ondraczek/110816_PVSEC_Paper_Janosch_Ondraczek_final.pdf
- Strathmore University (2012) Kenya Climate Innovation Centre launched. Available online at: <http://www.strathmore.edu/oldsite/News.php?NewsID=912> and retrieved on 15 January 2014.



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