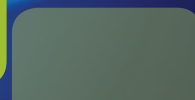




# SUSTAINABLE ENERGY FOR ALL KENYA INVESTMENT PROSPECTUS



*Pathways for Concerted Action toward  
Sustainable Energy for All by 2030*







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# Acronyms And Abbreviations

AA	Action Agenda
AFD	Agence Française de Développement (French Agency for Development)
CFP	Country Focal Point
COMESA	Common Market for Eastern and Southern Africa
EAC	East Africa Community
EAPP	East African Power Pool
EE	Energy Efficiency
EIA	Environmental Impact Assessment
ERC	Energy Regulatory Commission
ESIA	Environmental and Social Impact Assessment
FiT	Feed-in-Tariff
GACC	Global Alliance for Clean Cookstoves
GDC	Geothermal Development Company
GoK	Government of Kenya
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GTs	Gas Turbines
GWh	Gigawatts hour
HHs	Households
IP	Investment Prospectuses
IPPs	Independent Power Producers
KAM	Kenya Association of Manufacturers
KBS	Kenya Bureau of Standards
KCAP	Kenya Country Action Plan
KENGEN	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
KPLC	Kenya Power and Lighting Company
kWh	Kilowatt hour
KSh	Kenya Shillings
LCPDP	Least Cost Power Development Plan
LNG	Liquefied natural gas
LPG	Liquefied Petroleum Gas
MAED	Model for Analysis of Energy Demand
MER	Monitoring, Evaluation and Reporting
MFI	Micro Finance Institution
MIGA	Multilateral Investment Guarantee Agency
MoEP	Ministry of Energy and Petroleum
MSD	Medium Speed Diesel
MTP	Medium Term Planning
MW	Megawatt
NGO	Non-Governmental Organizations
PPPs	Public Private Partnerships
RE	Renewable Energy
REA	Rural Electrification Authority
RES	Renewable Energy Sources
RET	Renewable Energy Technologies
SADC	Southern African Development Community
SE4All	Sustainable Energy for All
SREP	Scaling-up Renewable Energy Programme
TA	Technical Assistance
TC	Technical Committee
TT	Technical Team
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
US\$	United States Dollar

# Foreword

The UN Secretary-General Ban Ki-Moon launched the Sustainable Energy for All Initiative (SE4All) in 2011. He further declared 2012 the year for sustainable energy for all. This great initiative is expected to catalyse major new investments to accelerate the transformation of the world's energy systems, pursue the elimination of energy poverty, and enhance prosperity.

The goal of the initiative is to: mobilize all stakeholders to take concrete action toward ensuring universal access to modern energy services; double the global rate of improvement in energy efficiency and; double the share of renewable energy in the global energy mix, within the UN timeframe of 2030. The Government of Kenya fully embraces the objectives of the SE4All Initiative and appreciates that its timelines fall within those of the national development blue print, Vision 2030.

Kenya opted to be part of the SE4All Initiative, because the Government had achieved significant strides in developing the framework for energy development, thanks to the Energy Policy, 2004, and Energy Act, 2006. Review of these two documents is almost complete and is expected to further improve the enabling environment for the engagement of a wide range of stakeholders, and particularly private sector in the delivery of clean and modern energy services. It also happens at a time when petroleum resources have been discovered in the country and will therefore be instrumental in diversifying the energy mix and addressing energy poverty.

The Kenya Action Agenda and Investment Prospectus, has been developed through a consultative process and has provided useful experience in defining the country roadmap to delivering clean energy to all Kenyans. In collaboration with the New Partnership for African Development (NEPAD) Energy, EU BizClim Facility and United Nations Development Organization (UNDP), MOEP and HCL Consultants initiated and completed the draft Action Agenda and Investment Prospectus, which were both taken through a validation process after extensive consultations with the stakeholders in the Kenyan Energy Sector.

Thereafter the SE4All Hub at the African Development Bank provided further financial assistance to enable the refinement of the draft AA and IP by Consultants IT Power UK and Integral Advisory Limited Kenya. The refinement included four key elements: addressing stakeholder validation comments and aligning the document to SE4All AA guidelines; the enhancement of the decentralized energy and energy efficiency components; creation of synergy between the AA and Kenya's Vision 2030 Medium Term Planning process; and alignment of the AA to the devolved Government systems comprising the National and County Governments, in line with the Constitution of Kenya (2010).



The AA finalization process was led by the Ministry of Energy and Petroleum, with a Technical Team comprising UNDP, Practical Action East Africa, SNV Development Organization, WWF, SEAF-K, Consultants and the MOEP's own technical staff in the Directorate of Renewable Energy – led by the Director Renewable Energy Eng. Isaac Kiva and the Deputy Director Renewable Energy, Faith Odongo, who doubles up as the SE4All Country Focal Point.

It is therefore with great pleasure that I present the Kenyan Action Agenda and Investment Prospectus, which represents the third milestone in the four-step SE4All process, namely: i) Country Opt-in; ii) Stock-Taking and Gap Analysis; iii) Country Action Plan (Action Agenda and Investment Prospectus) and; iv) Implementation, Monitoring and evaluation.

This AA therefore paves way for mobilization of resources and multi-stakeholder engagement to facilitate implementation, monitoring and evaluation of high impact opportunities and high impact initiatives and priority projects in the energy sector. It also presents the opportunity for increased private sector participation. It is worthwhile to remember that challenges will always be there but the onus is on us to devise innovative means of overcoming them.

The Ministry of Energy and Petroleum is pleased to take an early lead in contributing to the on-going efforts to address the energy needs of the African Continent. The Action Agenda and Investment Prospectus will be instrumental in driving socio-economic development in Kenya.

I therefore urge development partners, private sector, civil society, academia and the general public to take an active role in realizing the Kenyan dream towards sustainable energy for all.

**Hon. Charles Keter**

Cabinet Secretary  
Ministry of Energy and Petroleum  
Kenya

# Acknowledgement



The Ministry of Energy and Petroleum wishes to express deep appreciation to all parties who have unreservedly offered support to enable Kenya to achieve the first three milestones towards developing its Action Agenda and Investment Prospectus (AA/IP) under the Sustainable Energy for All Initiative.

In this regard, special gratitude is extended to the following:

- EU BiZClim Facility for funding the first draft of the SE4All Action Agenda and Investment Prospectus
- African Development Bank (AfDB) for funding the National and County SE4All Initiative awareness and final drafts of the Action Agenda and Investment Prospectus.
- SNV, Practical Action Eastern Africa and WWF for funding the development of SE4All awareness materials, Newspaper supplements on SE4All Initiative and SE4All Technical Committee workshop respectively
- UNDP, which has funded the SE4All Country process since the launch of the Initiative in Kenya in March 2012.
- The African Union for coordinating the standardisation of the formats used, and the New Partnership for African Development (NEPAD) Energy Division, led by Prof Mosad Elmissiry, for taking the leading role in securing financial support from the EU BizClim Facility. Prof Elmissiry's team for guiding us through the whole process, and the NEPAD Kenya Team, for ensuring successful engagement of stakeholders to improve the initial draft documents.

- The SE4All African Hub, through Mr. Daniel Schroth, the SE4All African hub coordinator has consistently walked with us by providing review comments on the initial drafts.
- Consultants; HCL, IT-Power UK, Integral Advisory Limited Kenya; under the umbrella of the Africa SE4All Coordination Hub, for their unrelenting technical and financial support in preparing the Stock-Taking and Gap Analysis, conducting consultations with stakeholders, and reviewing the draft reports of the Action Agenda and Investment Prospectus.
- The EU Delegation to Kenya, led by programme officer Sanne Willems, has been ardent supporters of energy development in Kenya, including the SE4All process.
- The Council of Governors Secretariat, through the Ag. CEO Jackline Mogeni for supporting County SE4All Awareness Creation.

We also extend appreciations to stakeholders from line ministries of Environment and Mineral Resources, Devolution and Planning, and Industrialization, and those from the Energy Sector, Semi-Autonomous Government Organisations, Kenya Renewable Energy Association (KEREAA), and Civil Society Organisations through Practical Action Eastern Africa, for providing valuable comments at all stages of implementation. Their inputs helped to improve the drafts to acceptable standards.

The Ministry is very The Ministry of Energy and Petroleum team has ensured successful coordination of developing the SE4All Action Agenda and Investment Prospectus.

The Ministry looks forward to continued collaboration and support of all stakeholders in ensuring success in the achievement of SE4All national goals in solidarity with the spirit of the Global SE4All Agenda. The short-term vision is to entrench SE4All into the Medium Term Planning (MTP) process, starting with MTP III. The long-term vision is to support counties to develop their respective roadmaps while contributing to the national and global agenda.

We encourage county governments to support the Ministry of Energy and Petroleum in this exercise as we aspire to deliver clean and modern energy services to all Kenyans.

## **Dr. Eng. Joseph K. Njoroge**

Principal Secretary,  
Ministry of Energy and Petroleum  
in charge of Energy



# Executive summary

This Investment Prospectus (IP) aims to present the short-term priorities of the Kenyan Government for the operationalization of the country's SE4All AA. The (IP) has been developed for the Government of Kenya (GoK) in order to attract investment in the country's energy sector, and in particular to address the country's SE4All goals of ensuring universal access to modern energy services, doubling the global rate of improvement in energy efficiency and doubling the share of renewable energy (RE) in the global energy mix by 2030.

The IP presents the investment environment with regard to investors' priority requirements in terms of support and incentives. At a national level, Kenya has attractive taxation arrangements including easy repatriation of profits. The country provides protection systems for investors together with dispute resolution, and assists investors with opportunities for insurance cover, letters of support and risk guarantees. The created Public Private Partnership Act also facilitates cooperation in the mobilization of resources in conjunction with the GoK.

At the Energy sector level, Kenya has a strong institutional framework, supported by experienced government agencies, and a healthy private sector. GoK has introduced special (RE) tariffs and Power Purchase Agreements (PPA) in order to ensure returns on investment and to facilitate borrowing by private sector investors. The government provides Partial Risk Guarantees (PRG) for investors and de-risking investment - e.g. for RE generation projects - by undertaking resource assessment and feasibility studies. In addition, it provides the necessary grid infrastructure to distribute power and reach consumers, even subsidizing consumer connections to enhance demand.

With regard to investment opportunities, the IP describes the priority project areas which were identified in Kenya's SE4All Action Agenda.

The identified projects that are awaiting investment consist of geothermal (850 MW), hydropower (1240MW), wind (500MW), power plants, transmission lines of various sizes<sup>1</sup> and an LPG (2,250 million tonne storage) project. These projects have complete feasibility studies and investment is being sought from Independent Power Producers (IPP), other Public-Private Partnerships (PPP) including Build Own, Operate and Transfer arrangements. The estimated investment requirements for these government projects are of the order of US\$ 9 billion in the short term (3-5 years). This

IP presents detailed templates for some of the projects under government agencies that are investment ready, namely:

- Geothermal generation plants at Menengai (460 MW), Suswa 1 (150 MW) and Baringo Silali (200 MW)
- A large hydropower plant at Grand Falls, Tana River
- Lamu-Kitui-Nairobi transmission line and Four Power Evacuation Transmission projects under 5000+MW (Menengai-Rongai Transmission line: Silalii-Rongai Transmission line: Isinya-Nairobi East Transmission line: Dongo Kundu- Mariakani Transmission line)
- A LPG Storage and Bottling facility in Nairobi

The Private sector pipeline consists of those projects under Feed-in-Tariff (FiT) that are seeking financing and are undertaking feasibility studies and/or seeking PPAs. There are 2 geothermal projects (Longonot- 140 MW and Akiira-70 MW); 26 hydropower projects (136 MW) 4 of which are proceeding to financial close stage of 8 under PPA negotiations, while the rest (14) are still the subject of feasibility studies. To have been issued with or applying for PPAs means that the projects have proof of land acquisition, access or usage rights, a grid connection plan, a full technical and economic feasibility study, and approved Environmental Impact Assessment (EIA). The project pipeline is with the Ministry of Energy and Petroleum, and details of owners, projects' status and budget estimates can be obtained through the SE4All National Coordinator.

There is a solar project at Witu (40 MW) that is seeking financing.

The Agence Française de Développement (AFD) initiative SUNREF (Sustainable Use of Natural Resources and Energy Finance) has been designed to help the private sector. The innovation of the SUNREF product lies in the combination of a financial approach and technical approach. In Kenya, Tanzania & Uganda, SUNREF has been conceived to provide technical assistance to Renewable Energy (RE) and Energy Efficient (EE) project sponsors and local commercial banks. A concessional credit line is available for the partner banks to finance projects.

In East Africa, during the project period (Phase 1 - 2011 to 2013), the TA team has built a project pipeline with 123 active projects (and 40 non active disqualified projects), accounting for an installed capacity of 450 MW, an energy flux of 2079 GWh/yr, and an annual CO<sub>2</sub> abatement of over 1.5 million tonnes per annum.

<sup>1</sup> There are 15 Transmission projects since 2012/2013 and 20 projects in 2013/2014 with feasibility studies and bid documents complete. Together with estimate for the Lamu- Kitui Nairobi 400KV seeking – total financing sought for transmission is about US\$1.36 billion.

The total investment amounts to \$1045 million, with a debt finance requirement of \$694 million. The implementation of Phase II is on-going.

For the proposed mini-grids, there are 23 hybrid sites (diesel, solar, wind) mapped in the Scaling-up Renewable Energy Programme (SREP) that are under the Ministry and Rural Electrification Authority (REA) and require about US\$84million in investment for the RE component (solar –US\$77 million and wind- US\$ 8 million).

The IP also proposes the scale up of the ongoing initiatives and include; The Kenya Modernization Programme, the Last Mile Connectivity Project, Kenya National Domestic Biogas Programme (Biogas for Better Life Programme), development of improved cookstoves and clean fuels sector. These address some of the nexus issues including cleaner, safer homes; lives of greater dignity and less drudgery for women; better livelihoods and better quality health and education. Increased access to affordable, clean energy services is envisaged to change the lives of women and girls and help to generate local income through productive activities. Key nexus issues addressed in the IP include water, energy and food, energy, women, children and health, energy and education and energy and gender.

Kenya presents some risks to investment in terms of market predictability and development, surrounding pricing, subsidies, incentives, sustainability, infrastructure development plans; financing and the related high costs of capital, and delays in response to investment enquiries. GoK will aim to manage the risks associated with tariff and pricing regimes to ensure good returns to investment and provide the necessary incentives; for instance in the form of PPAs and tax exemptions allowing for some smart subsidies, such as pro-poor policies to meet basic energy service requirements for all.

As Kenya integrates SE4All into its national planning, the trajectory towards the country's SE4All Goals is informed by the following phases:

Transition (2015 – 2017). During this period, MTP2, the country continues with its current strategies and starts a national dialogue toward the adaptation, update and alignment the existing interventions under the country's SE4All agenda. During this period, all new strategies and interventions will have to be consistent with Kenya's SE4All AA.

Phase I (2018 – 2022). SE4All become the key energy sector reference for the MTP 3 planning process. In this context, the AA will be reassessed by its progress and additional interventions and IP(s) should be incorporated as needed.

Phase II (2023 – 2027). The AA and the MTP 3 will be reassessed by its progress and additional interventions and IP(s) should be incorporated as needed

Phase III (2027 – 2030). The AA and the MTP 4 will be reassessed by its progress and additional interventions and IP(s) should be incorporated as needed

The priority action areas are critical to the implementation of the AA and the rollout of the IP. Yet, the

AA and the IPs are to be integrated into the government mid-term planning (MTP) process by incorporating them into the MoEP five-year Strategic Plan 2018 – 2022.

The Prospectus focuses in the following two areas;

- Programme Support. This focuses on the immediate needs of MoEP and the SE4All Secretariat in support of the implementation of the AA.
- Project Investment Opportunities Associated to energy access, renewable energy and energy efficiency.

# 1.0 Explanation of the Investment Prospectus

## 1.1 Country Overview

Kenya is located across the equator, stretching from latitudes 4° North to 4° South and longitudes 34° to 41° East covering an area approximately 582,646 square kilometres. The country is endowed with diverse forms of energy resources, including fossil fuels, geothermal, hydro, coal, biomass, solar and wind.

The population is currently estimated to be 44.4 million<sup>2</sup> up from 38.6 million reported in the last Population Census (2009)<sup>3</sup>, with 50.3% being women compared to 49.7% men and rural/urban share of 67.7% and 32.3% respectively.

Kenya is a multi-party state located in East Africa. It is governed through a devolved government system introduced by the new Constitution (2010), comprising the national government and 47 county (regional) governments. The structure of the Government consists of The Executive, The Legislature, The Judiciary and The Devolved Governments. The President, the Deputy President, and the cabinet constitute the executive arm. The governance cycle is five years, with presidential, parliamentary, senatorial, and gubernatorial elections last held in March 2013. The National Assembly has 349 members, while The Senate comprises 67 members.

Kenya's economic agenda is currently driven by Vision 2030. There are a series of development and sector policies and strategies in place which aid in the implementation of the MTPs that support efforts to realize the Vision.

The country's GDP is KShs 3,798 billion (US\$ 39.15 billion)<sup>4</sup> with agriculture and forestry contributing the largest – 25.3% of GDP by activity and 13.1% to growth (although its growth rate was also among the lowest, at 2.9%). GDP per capita (constant) is KShs 40,345 (US\$ 416). Gross national income (GNI) in 2012 was US\$ 860/capita<sup>5</sup> compared to an average of US\$ 7500 for Upper Middle Income countries.

The World Bank estimates that poverty level has declined from 47% in 2005 to 34-42% in 2014. GDP per capita in Kenya averaged US\$ 485.86 from 1960 until 2014, reaching an all-time high of US\$ 648.84 in 2014 and a record low of US\$ 155.69 in 1960.

According to Kenya Facts and Figures 2014, agriculture, forestry and fishing industry is the second largest

employer by sector (15.3%), after education (17.7%). The total working population in public (30%) and private sector (70%) is 2.26 million. About 81.6% of the population earns a monthly income of Kshs 10,000 (USD 103) or less. The high levels of poverty incidence in Kenya remain a serious impediment to increasing access to modern energy services. In 2009, 45.6 % of Kenyans lived below the poverty line. The majority of the poor in rural areas are subsistence farmers and those who derive the bulk of their income from the informal sector; the urban poor are mainly in the informal sector. About a third of rural households are female-headed, and two-thirds of them have no male support, in other words, are headed by widowed, divorced, or separated women with children. The incidence of severe poverty is significantly higher among such households—44 percent compared to 20 percent for male-headed households. A major cause of poverty among divorced and separated women is the loss of access to land. Such women often flee to urban areas where they remain poor. This means that many Kenyans will not afford the modern energy carriers envisaged in the SE4All objectives unless appropriate strategies are formulated that address the inherent poverty barrier.

As observed earlier, many energy projects have in the recent past stalled owing to social conflicts around the issue of land compensation. Furthermore, the Kenyan constitution emphasizes the need for public participation in the decisions touching on the use of land and other resources within their localities.

Poverty remains a pervasive national problem to date. It is a social problem characterized by low levels of income and inadequate access to basic services. Socio-economic functions previously under the national government are devolved progressively.

The country's economy is estimated to have grown by 5.4% in 2014 and is projected to grow by 6% in 2015. The resilience is likely to continue with the economy expanding at 6.6% in 2016 and 6.5% in 2017, according to the latest World Bank Group's economic analysis.

Kenya has introduced major policy, regulatory and institutional changes to enhance energy access and promote investment in renewable energy and energy efficiency. These strategies include the following:

<sup>2</sup> <http://www.worldbank.org/en/country/kenya>

<sup>3</sup> *The 2009 Kenya Population and Housing Census*

<sup>4</sup> *Converted at (11 June 2015) CBK mean rate of 97 (<https://www.centralbank.go.ke/index.php/interest-rates/commercial-banks-weighted-av>).*

<sup>5</sup> [http://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_GNI\\_\(nominal,\\_Atlas\\_method\)\\_per\\_capita](http://en.wikipedia.org/wiki/List_of_countries_by_GNI_(nominal,_Atlas_method)_per_capita)



## ■ Policy Framework:

- Sessional Paper No. 4 of 2004 and governed by a number of statutes
- Energy Act, No. 12 of 2006
  - Geothermal Resources Act No. 12, of revised 2012
- Feed-in tariffs for Renewable Energy 2012
- Petroleum (Exploration and Production) Act, Cap 308.
- Electricity regulations
  - The Electric Power (Electrical Installation Work) Rules, 2006,
  - The Energy (Complaints and Dispute Resolution) Regulations, 2012,
  - The Energy (Electricity Licensing) Regulations, 2012
- Renewable Energy Regulations
  - Regulatory Impact Statement - Draft Energy (Appliances Energy Performance) Regulations
  - Draft Appliances Energy Performance Regulations- Comments
  - Designation of Energy Users Gazettement
  - The Draft Energy (Improved Biomass Cookstoves) Regulations
  - The Energy (Solar Photovoltaic Systems) Regulations, 2012
  - The Energy (Energy Management) Regulations, 2012
  - The Energy (Solar Water Heating) Regulations, 2012.
- Petroleum Regulations
  - The Petroleum (Amendment) Rules, 2002 - Ln 31
  - The Petroleum (Amendment) Rules, 2000 - Ln 64
  - The Petroleum (Amendment- No 2) Rules, 2003 - Ln 197
  - The Energy( Gasohol Blending) Regulations, 2010
  - The Energy (Petroleum Regulation Levy) Regulations, 2008 (June) - Ln 91
  - The Energy (Petroleum Regulation Levy) (Amendment) Regulations, 2008 (August) - Ln 109
  - The Energy (Petroleum Pricing ) Regulations, 2010
  - The Energy (Minimum Operation Stock) Regulations, 2008
  - The Energy (Liquefied Petroleum Gas) Regulations, 2009
  - The Energy (Importation Of Petroleum Products)(Quota Allocation) Regulations, 2010
  - The Energy (Strategic Stock) Regulations, 2008
- Proposed Energy Policy & Law
  - The National Energy and Petroleum Policy
  - The Energy Bill 2015
  - The Petroleum (Exploration, Development and Production) Bill, 2015
  - Energy (Local Content) Regulations, 2014
  - Petroleum Exploration, Development and Production (Local Content) Regulations, 2014

## ■ Government driven strategies and plans:

- Kenya Vision 2030
- Kenya's 5,000+ MW Power Plan (2013-2016)
- Kenya's Last Mile Connectivity Project (2015-2017)
- Least Cost Power Development Plan (2013-2033)
- Scaling-up Renewable Energy Programme (SREP) – Investment Plan for Kenya
- Rural Electrification Master Plan
- Kenya National Climate Change Response Strategy
- National Electrification Program Prospectus (herein referred to as REA Prospectus) developed by REA with support from NORAD (July 2014)

## ■ Private Sector Strategies:

- Kenya National Domestic Biogas Programme (KEDBIP)
- Kenya Country Action Plan – Cookstoves

## 1.2 Kenya's Energy Sector

### 1.2.1 The Power Sector

Kenya's power industry generation and transmission system planning is undertaken on the basis of a 20 year rolling Least Cost Power Development Plan (LCPDP) updated every 2 year. According to the Updated LCPDP 2013-2033, the load forecast based on the Model for Analysis of Energy Demand (MAED) based excel worksheets indicates that the peak demand lies in the range of 1,370 MW in 2012 and between 11,318 and 31,237 MW in 2033. The reference case ranges from 1370MW in 2012 to 3034MW in 2018 to 14446MW in 2030 and 21,075MW in 2033 while the energy demand increases from 8010GWh in 2012 to 17,719GWh in 2018 to 81,352GWh in 2030 and 118,680GWh in 2033. The peak load is estimated to grow 10 by the year 2030.

Candidate generation resources considered in the system expansion plan include geothermal, hydro, wind, coal, oil-fired and nuclear power plants, with geothermal capacity planned to increase from 209 MW (2012) to 7,264 MW (2033), equivalent to 34% of the system peak demand by 2033. Other sources by 2033 are 12% from nuclear plants, 26% from coal plants and 9% from imports. Wind and hydro plants will provide 10% and 4% respectively while medium speed diesel (MSD) and gas turbines (GTs) – Liquefied Natural Gas (LNG) plants will provide 2% and 19% of the total capacity respectively.

Regional electricity trade is an important component of Kenya's strategy, as well as within the East African Power Pool (EAPP) countries. Kenya imports 49.0 million kWh of power and exports 43.7 million kWh to EAPP countries, which constitutes 1.1% of Kenya's net generation. Efforts are underway to enhance power trade in the region and Kenya is well placed to provide a interconnectors for wheeling power to other EAPP countries in the region. The EAPP market will also become a market for some of the huge generation capacity that Kenya is investing in.

Demand for electricity has grown steadily from a peak demand of 899 MW in 2004/05 to 1,512 MW in 2014/15. Per capita electricity consumption was 155 kWh in 2010 and 2011. This is in comparison to an average of over 1500 kWh/capita per year for African Upper Middle Incomes countries.

The total installed electricity generation capacity in Kenya stands at 2294.82 MW as of November 2014. The generation mix includes hydropower (821 MW),

geothermal (598 MW), cogeneration from bagasse (26 MW), wind (25.5 MW) and fossil based electricity (827 MW).

About 65.0% of electricity was generated locally using renewable energy sources (hydropower 35.9%, geothermal 25.86%, cogeneration from bagasse 1.66%, wind 1.11% and solar 0.08%) while 35.386% was generated using fossil fuels in the form of diesel plants (medium speed 30.19%, high speed diesel 1.26%, emergency power 1.31%, off-grid 1.13% and gas turbines 2.62%).

Household electricity access about 32% with 51% of urban and 5% of rural households connected to the grid<sup>6</sup>. The number of electricity consumers however more than tripled from 735,144 in 2004/05 to 2,330,962 by June 2013<sup>7</sup>. The GoK is implementing initiatives to make electricity more accessible to the population especially in rural areas. Among the consumers were some 382,630 rural households electrified through the Rural Electrification Programme under REA. In addition REA connected more than 23,000 public facilities in the last five years constituting 89% of the main public institutions<sup>8</sup> that were to be electrified in REA's first strategic plan (2008/09-2012/13)<sup>9</sup>. About 30% of other public institutions are however still to be electrified. The Government implemented a total of 2,036 electrification projects spread across all the constituencies at an estimated cost of KShs 5.0 billion (US\$ 57 million)<sup>10</sup>.

The first "grid-tied" solar photovoltaic project has been put up at Strathmore University in Nairobi. The capacity is 0.6 MW, tied to the national power grid, on the roof of its buildings. The system is intended to supply the university with its electricity needs and allow it to sell the excess power to the national grid. This is an example of the government effort of encouraging more solar power use by making it easier for investors to make solar photovoltaic projects part of the national energy mix supply. The effort includes a raft of measures of setting up a feed in tariff (FiT) to help investors understand what returns they might expect from providing power to Kenya's national grid.

The off-grid and decentralized electricity market in Kenya is estimated to comprise about 6.7 million households<sup>11</sup>. Supply comprises micro and Pico systems, mini-grids, and stand-alone systems – with solar, wind and hydro being the main resources in use.

Current strategies aim to support current energy supply and access targets in the medium and long term:

<sup>6</sup> Rural Energy Master Plan

<sup>7</sup> Stock taking and Gap Analysis report 2013

<sup>8</sup> Trading centres, secondary schools and health centres

<sup>9</sup> 5000+MW by 2016 Investment Prospectus (2013-2016)

<sup>10</sup> KNBS Economic Survey 2014

<sup>11</sup> <http://www.solarwirtschaft.de/fileadmin/media/pdf/intersolar2013/4-Muchunku-Solar-P-Market-Kenya.pdf>

- Last Mile Connectivity Project (2015-2017) aims to accelerate the connectivity rate and achieve annual connections in the range of 1.3 million, it is proposed that a new model be adopted that will help overcome the current bottlenecks in the connectivity pipeline. This new model focuses on availing the service connection including the meter to the customer premises prior to engaging the customer to pay for the service. The approach has changed as now Kenya Power and the Rural Electrification Authority will go door to door asking Kenyans to allow them to connect their households to electricity. Agencies will ensure that all households near electricity transformers are connected to power whether the owners have made applications or not.
- Kenya National Domestic Biogas Programme (KENDBIP) - The second phase is designed to run for 4 years from January 2014 to the year 2017 and will build on the achievements realized in phase one to further develop the domestic biogas sector in Kenya, and targets to install some 27,500 digester across the country. These initiatives confirm the recognition of the large potential for biogas technology uptake in Kenya and presents great opportunity to all sector actors to quickly position themselves well to take advantage of this immense potential and further develop themselves within the sector. These initiatives are in line with the overall goal of the programme to develop a commercially viable market driven biogas sector in the Kenya that will nurture private sector actors to efficiently and effectively provide affordable services to the fast developing biogas market in Kenya.
- Energy Access Market Accelerator, a partnership between the UN Sustainable Energy for All, the Energy+ Technical Working Group and Accenture Development Partnerships aims to complement the existing energy access sector and aggregate existing information and services. It will also identify gaps and work with country partners to close them with the objective to increase competition of energy services and achieve a rapid scale-up.
- Kenya Country Action Plan (KCAP) 2013- The KCAP defines what stakeholders in the Kenyan clean cooking sector can do to catalyze a thriving market for clean cooking solutions in Kenya. It presents a comprehensive summary of the highest priority intervention options necessary to affect change, and provides interested parties (potential donors, entrepreneurs, NGOs, and policymakers) with a menu of ways to get involved in scaling up the widespread adoption of clean cooking technologies in Kenya. The inclusive nature of the KCAP also represents the cooperation and consensus of a wide

variety of Kenyan stakeholders who are committed to saving lives, improving livelihoods, empowering women, and protecting the environment. KCAP has set targets for 5 million improved cookstoves adoption by 2020.

## 1.2.2 The Process Heat Sector

Kenyans rely on the traditional use of biomass as the primary source of energy for cooking and heating – with firewood contributing 68.7% and charcoal 13.3%<sup>12</sup>. About 87% of the rural population uses firewood for cooking and 82% of the urban population uses charcoal for cooking<sup>13</sup>.

A pre-feasibility study of potential direct use applications has been carried out by Geothermal Development Company (GDC) with support of USAID, on low heat use from geothermal energy applications. Opportunities in different market sectors in Kenya include industrial applications and agricultural applications. The different possible forms of utilization include process heating, evaporation, drying, distillation, sterilization, washing, de-icing, and salt extraction, bottling of water and carbonated drinks, oil recovery, milk pasteurization, leather industry, chemical extraction, CO<sub>2</sub> extraction, laundry use, pulp and paper processing, and borate and boric acid production. A cottage industry utilises the bleaching properties of the H<sub>2</sub>S in geothermal waters to produce innovative and much admired textiles for ladies' clothing. The objective of direct geothermal steam is to promote local socio-economic growth near geothermal project areas resulting in improved livelihoods through establishment of Large, Medium & Cottage industries. GDC launched its first Direct Steam Use Pilot Project at Menengai in August 2015. This is a demonstration project of alternative uses of geothermal including milk pasteurization, greenhouse heating, drying, and aquaculture.

Biomass-fuelled generation has received some investment. For example, there is 30MW of bagasse<sup>14</sup>-fired cogeneration in the sugar sector and there is some investment in prosopis<sup>15</sup>-fuelled gasification. Biomass end-use devices have received some investment. For example, improved cooking stoves particularly for charcoal stoves are commercial with some involvement of social entrepreneurs, Non-Governmental Organizations (NGOs) and Micro Finance Institution (MFI) sector.

Institutional biogas is also gaining root, with some health, educational and correctional institutions either having installed or considering installations of the technology. GoK is promoting use of biogas in public institutions such as schools and prisons.

<sup>12</sup> GLPGP- Kenya Market Assessment

<sup>13</sup> Ministry of Environment, Water and Natural Resources: Analysis of Demand and Supply of Wood Products in Kenya July 2013

<sup>14</sup> Bagasse is a dry pulpy residue left after extraction of juice from sugar cane

<sup>15</sup> a kind of invasive shrub found in semi-arid areas in Kenya



Commercial scale biogas is still nascent and its economic viability proven. Studies have been done to evaluate potential in sectors such as coffee, horticulture and floriculture, and some pilot projects exist – including one by the MOEP in a flower farm in Thika.

Commercial institutions such as Tropical Power, Kilifi Plantations and a number of abattoirs are generating biogas-fuelled electricity produced from agricultural waste and animal waste. There is also significant potential for biogas electricity generation from municipal waste, sisal, flower waste and coffee husks (29-131 MW). Kenya has launched Africa’s first biogas plant that is linked to a national power grid, adding 2 MW of electricity generated and 200kW will be utilized on the farm.

Bioethanol fuel is used for heating in restaurants. Nevertheless; the potential for production of biofuels (bioethanol and biodiesel) is so far not well exploited. Recent developments include establishment of

a Bioenergy and LPG Working Committee within the MoEP that is developing an Action Plan for the sector; and proposals for tax and other incentives for household and transport sectors. The Treasury has recently made changes in tax regulations that effectively separate denatured bioethanol from the tax regime of ethanol in general.

Briquettes i.e. compacted combustible material from charcoal dust, agricultural waste and wood waste (mainly saw dust) are used as a form of fuel for heating or cooking. Their use is both in the domestic sector where they are used as alternative to charcoal and industrial sector where they are used in boilers for heating.

There is an emergence of commercial players in briquette and wood pellet production, including small and medium scale enterprises, but the fuel usage is small compared to charcoal. High investment cost for production technology is part of barriers hampering large-scale production.

### 1.3 Country Investor Readiness

Kenya economy ranked position improved to position 108 in June 2015 from position 139 in June 2014, in terms of ease of doing business out of 189 economies. A high ease of doing business ranking means the regulatory environment is more conducive to the starting and operation of a local firm. The rankings are determined by sorting the aggregate distance to frontier scores on 10 topics (a-j) indicated in the table 1, each consisting of several indicators, giving equal weight to each topic. Though ranking is low, the Government of Kenya has taken steps to establish itself as investment-friendly destination. The legal framework for foreign investment exists and can be found within

the Companies Ordinance, the Partnership Act (1981-revised 2012), the Foreign Investment Protection Act (1990 revised 2012), and the Investment Promotion Act of 2004.

In order to attract foreign direct investments in renewable energy sector, the GoK formulate the Feed In Tariff policy, developed a renewable energy portal which offers one stop guide to renewable energy clearance. Policy and regulatory reform in the country is partly driven by the need to improve on ease of doing business metrics, which are summarized in the Table below:

**Table 1: Key country investor readiness indicators/ metrics**

No.	Description	Indicators
1.	Economic Analysis (Source: World Bank, Kenya National Bureau of Statistics, Trading Economics)	
	GDP Forecast 2014 (%)	5.3%
	Inflation (2014)	6.90%
	Cost of Living (Consumer Price Index) 2015	160.46%
2.	Ease of doing business(Rank out of 189 economies) FY 2015; (Source: World Bank)	
	Overall Rank for Doing Business	108
a)	Starting a Business	153
b)	Dealing with Construction Permits	149
c)	Getting electricity	127
d)	Registering Property	115
e)	Getting Credit	28
f)	Protecting Minority Investors	115
g)	Paying Taxes	101
h)	Trading Across Borders	131
l)	Enforcing Contracts	102
j)	Resolving Insolvency	144

No.	Description
3.	Tax regimes for renewable energy <ul style="list-style-type: none"> <li>• Exempt VAT on plastic bag biogas digesters</li> <li>• Zero rate on Import duty and no VAT on renewable energy equipment and accessories.</li> </ul>
4.	Security: Ranking based on Global Peace Index and Ranks 162 independent states; Index gauges level of safety, extent of domestic & international conflict, as well as the degree of militarisation (Source: Vision of Humanity) <ul style="list-style-type: none"> <li>• Rank: 133; Score: 2,342</li> </ul>

**Table 2: National Support and Incentives in Place in Kenya**

National Support & Incentives	Brief description
Rule of Law and Doing Business in Kenya	<p>Kenya maintains the stability and enforceability of laws and contracts in the country, with respect to the rights of investors and a judicial and regulatory process free of arbitrary government interference.</p> <p>Although on the rule of law index report of 2014, Kenya was ranked 86 out of 99 countries globally and 12 out of 18 Sub-Saharan African (SSA) countries that were surveyed in 2012, the country has experienced an improvement and provides protection against the expropriation of private property except under due process.</p>
Taxation	<p>Kenya offers a number of tax incentives to foreign firms that manufacture goods locally for export, including a 10-year corporate income tax holiday and a 10-year withholding tax holiday on repatriated dividends and other remittances. Foreign investors are also exempted from paying value added tax (VAT), import duty on inputs, and payment of stamp duty on legal instruments. They qualify for 100 per cent tax deduction on new capital investments. The incentive is in operation but may change in future as the incentives are costing the country hundreds of billions in revenue.</p> <p>The Government of Kenya has concluded Double Taxation Agreements (DTA's) with a number of countries and is currently expanding this list. Kenya has in place DTAs with some European economies (UK, Germany, Sweden, Denmark, Norway), Canada and Zambia in Africa and is working to include Italy and the EAC counterparts of Tanzania and Uganda, some SADC (South Africa, Mauritius and Seychelles) countries and other foreign (France, Thailand, Russia, Finland, Iran) and African (Nigeria) countries</p>
Repatriation of profits	<p>Kenya has no restrictions on converting or transferring investment funds. Capital repatriation and remittance of dividends and interest to foreign investors are guaranteed in the Foreign Investment Protection Act (FIPA). Investors are free to convert and repatriate profits including un-capitalized retained profits after payment of the relevant taxes, the principal and interest associated with any loan. Repatriation of amounts above KShs 500,000 (about US\$ 5,600) should however be declared as a formal check against money laundering.</p>
Bilateral trade agreements with some countries	<p>Kenya has huge market opportunities through the bilateral trade agreements with over 20 countries spanning Africa, East European, Latin America and EU countries and presents a huge market through COMESA EAC and Africa Free Trade Zone countries:</p>
Multilateral Insurance Guarantee Agency (MIGA)- insurance cover for investment	<p>MIGA provides political risk insurance (guarantees) for projects in a broad range of sectors in developing member countries. Kenya is already benefiting from on-going MIGA support to its energy sector which is a strong demonstration of trust by the agencies of the World Bank Group to assist the economy mobilize private sector investment for the sector.</p>

National Support & Incentives	Brief description
Public Private Partnership Act.	Public Private Partnership Unit was established in 2013 to facilitate development of PPPs. The GoK has adopted the Public-Private Partnership policy and some projects are implemented by combining public and private financing.
Dispute resolution facility	Kenya has a facility for dispute resolution in its Nairobi Centre for International Arbitration (NCIA). The NCIA has won the confidence of foreign investors who for years have been hesitant to do business in the country due to drawn out and costly court litigation on commercial matters.
Letter of Support and Risk Guarantees	GoK issues letters of support that give comfort to both project companies and their lenders in cases where certain risks would result in, for example, delayed completion of projects. The Letters also facilitate financing of projects using World Bank support and African Development Bank in form of Partial Risk Guarantees issued by the International Development Association and MIGA cover. The Government however issues no guarantees. To give payment security comfort to IPPs for this perceived inability by the off-taker to meet monthly obligations, GoK has in the recent past obtained Partial Risk Guarantees (PRG) from the World Bank for four IPPs.

### 1.3.1 Policies and regulations in the energy sector

#### Laws and Regulations in the Energy Sector

The Sessional Paper N<sup>o</sup>.4 of 2004; the Energy Act N<sup>o</sup>.12 of 2006; the Geothermal Resources Act N<sup>o</sup>.12 enacted in 1982; the Petroleum Act (Chapter 308 of the Laws of Kenya); and the Petroleum Development Fund enacted in 1991 are the current policy and legal frameworks for energy development in Kenya.

In June 2008, Kenya's Vision 2030, the country's development blue print for economic transformation to an industrialized middle income country, was launched by the President. It is anchored on three pillars: social, economic and political. High oil prices and the need for energy security became urgent drivers for alternative energy which called for re-assessment and update of the country's policy and strategy.

The Energy Act N<sup>o</sup>.12 of 2006, sets out the National Policies and Strategies for Kenya's short to long-term energy development. The Act also established the Energy Regulatory Commission (ERC) which took over regulation from the former Electricity Regulatory Board (ERB). ERC is responsible to facilitate access to efficient and sustainable energy through enabling regulation that will contribute to better quality of life in Kenya.

In the Sessional Paper N<sup>o</sup>.4 of 2004 the Government committed to promote electricity generation from renewable energy sources (RES) and to promote co-generation in the sugar industry with a target of 200MW in 2015. In the Energy Act N<sup>o</sup>.12 of 2006 the Kenyan Government empowered the Ministry of Energy to promote the development and use of RE technologies. Besides these two main frameworks Kenya's RE development is also considered and stimulated through:

- The Least Cost Power Development Plan (LCPDP);
- The Rural Electrification Master Plan;
- The 10 Year Power Sector Expansion Plan;
- The Feed-in-Tariff (FIT) Policy;
- The Kenya National Climate Change Response Strategy;
- Gender Audit of Energy Policies and Programmes in Kenya June 2007;
- The Last Mile Connectivity Project;
- The Investment Plan for Scaling-up RE Programme (SREP); and
- The Kenya Vision 2030.

Moreover, the Government has recently drafted a new National Energy and Petroleum Policy (2015), which addresses policy gaps that have been observed between the needs of the current economy and existing policies.

The LCPDP is now updated biennially, with the last one done in 2013, and a new one discussed recently (2015). The 2013 report is an update of the LCPDP of 2011/2031 and covers the period 2013-2033. The trajectory ranges from 1,370 MW in 2012 to 3,034 MW in 2018 to 14,446 MW in 2030 and 21,075 MW in 2033 while the energy demand increases from 8010GWh in 2012 to 17,719 GWh in 2018 to 81,352 GWh in 2030 and 118,680 GWh in 2033. This is in line with Vision 2030 which states that energy is a key enabler for the economic growth of the country.

The Rural Electrification Master Plan that was completed in June 2009 (Rural Electrification Authority, 2009), states that the Government seeks to have 100% connectivity across the country achieved through grid extension and off-grid systems.

Under this Plan more than 20,000 public facilities



requiring electrification were identified. Thus to meet the increased demand by 2030, there is a need to invest in generation, transmission and distribution, and for that several generation sources (RE and non-RE) are being considered: geothermal (5,110 MW); hydro (1,039 MW), wind (2,036 MW); thermal (3,615 MW); coal (2,420 MW); imports (2,000 MW); and other sources (3,000 MW).

The Country also has in place the Investment Plan for Scaling-Up Renewable Energy (SREP), which is under implementation. The SREP aims at supporting Kenya initiatives towards a low greenhouse gas (GHG) emission development pathway by harnessing RES in the country. It has a specific focus on decentralised

energy systems, especially mini-grids and solar systems.

To promote investment in RE the country has developed and put in place a Feed-in-Tariff framework (The FIT Policy; Kenya Ministry of Energy, 2012). This policy was first issued in March 2008 and has been revised twice to respond to stakeholder experiences: first in January 2010 and secondly in December 2012. This instrument aims at promoting generation of grid-connected electricity from RES (wind power, biomass, small hydro, solar, biogas and geothermal) and specifies the contents of a Standardised PPA for both up to and above 10 MW plants. Once a PPA is established, the tariff is secured for 20 years.

**Table 3: FiT values for RE projects with installed capacity up to 10 MW**

Technology	Installed Capacity (MW)	Standard FiT (US\$/kWhr)	Percentage escalable portion of the tariff	Min. Capacity (MW)	Max. Capacity (MW)
Wind	0.5-10	0.11	12	0.5	10
Hydro	0.5	0.105	8	0.5	10
	10	0.0825			
Biomass	0.5-10	0.10	15	0.5	10
Biogas	0.2-10	0.10	15	0.2	10
Solar (Grid)	0.5-10	0.12	8	0.5	10
Solar (Off-Grid)	0.5-10	0.20	8	0.5	10

Source: Draft National Energy and Petroleum Policy, 2015

**Table 4: FiT values for RE projects with installed capacity above 10 MW**

Technology	Installed Capacity (MW)	Standard FiT (US\$/kWhr)	Percentage 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

Source: Draft National Energy and Petroleum Policy, 2015

### Power Purchase Agreements

The Power Purchase Agreements (PPAs) are issued to facilitate mobilization of project financing by private investors thus the PPA approach is an important tool to support private sector investments in the country. Through a PPA power producers are guaranteed of revenue from investment (and hence also give confidence to lenders on repayment of debt) but bear the risks of supplying the power, while the utility in the case of Kenya being Kenya Power will be assured

of a supply of a certain amount of power. The Utility however has to ensure timely payment for the delivered power. A PPA is an instrument that defines relationships of the power producer and purchaser from delivery of plant, operation stage and transfer of assets at end of the PPA period (e.g. under - Build-Operate-Transfer (BOT) Projects.

In the case of Kenya, PPAs are signed with Kenya Power and are approved and regulated by the ERC to their execution, as per the provisions of the Energy Act . The

ERC ensures, among other things, the reasonableness of the rates and tariffs prescribed under the PPA and the satisfaction of the minimum criteria as set out in the Energy Act, as well as to consider any other issues which may have a bearing on the operations of the undertakings. Other aspects that ERC considers to approve the PPA include proof of land acquisition, access or usage rights, grid connection plan, a full technical and economic feasibility study, and approved EIA, after which investor/project company can apply for a generation licence to be issued in accordance with the Energy Act and the Energy (Electricity Licensing) Regulations 2012.

### Partial Risk Guarantees

The African Development Fund (ADF) Partial Risk Guarantee (PRG) program<sup>17</sup> is a risk mitigation instrument that covers private lenders and investors against the risk of a possible government failure to meet contractual obligations to a project. For example, PRG will support the Kenyan Government's on-time delivery of a transmission line and will reduce the risk of it being unable to meet payment obligations.

### Investor Information Portal (<http://www.renewableenergy.go.ke/>)

Kenya has established a renewable energy portal under the ERC that provides relevant information about administrative entry requirements and procedures for operating a power plant based on renewable energy, the legal and regulatory framework for such investments (e.g., tariff regulation) and relevant market information in the country.

## 1.3.2 Investing in Energy Sector in Kenya

Kenya is endowed with diverse energy sources including biomass, hydro, geothermal, solar and wind power, coal and oil, much of which is untapped. To increase per capita electricity consumption and expand electricity access, the GoK is encouraging investment in generation capacity, distribution systems and in developing indigenous sources of energy. Moreover, scope exists for accelerating electrification to meet growing demand, especially in the rural areas through off-grid solutions.

The following investment opportunities in the energy sector exist in Kenya:

- Generation, transportation and distribution of energy from various sources;
- Power infrastructure development, rehabilitation and expansion;
- Extraction of biofuels, such as Ethanol from sugar, biodiesel from palm oils and jathropha;
- Construction of petroleum pipeline and petroleum products offloading terminals development of upcountry storage and distribution facilities;
- Geothermal exploration and development;
- Rural electrification;
- Development of new and renewable energy resources;
- Promotion of energy efficiency and conservation initiatives.

## 1.4 The SE4All Initiative In Kenya

Following the launch of the SE4All in 2011, Kenya opted-in in 2012. A high level mission involving the UNDP and the World Bank started the process. The template for stock-taking and gap analysis was supported by UNDP New York, and a Country Focal Point (CFP) was appointed within the Directorate of Renewable Energy in the Ministry of Energy and Petroleum (MoEP). The

MoEP formed a multi-stakeholder taskforce to oversee the development of Kenya's SE4All framework.

The Country Focal Point for SE4All initiated the development of the Action Agenda and Investment Prospectus (AA/IP) in 2014. These developments have been in line with the SE4All process, also reflected in the following diagram.

Figure 1: Proposed Actions and Timelines for Kenya<sup>18</sup>



<sup>16</sup> <http://www.nortonrosefulbright.com/knowledge/publications/100605/investing-in-the-african-electricity-sector>

<sup>17</sup> <http://www.afdb.org/en/news-and-events/article/first-adf-partial-risk-guarantee-approved-in-kenya-for-largest-african-wind-power-project-12324/>

<sup>18</sup> Based on Sustainable Energy For All, presentation by Venkata Ramana Putti: Energy Access in Africa - WB/ESMAP Initiatives, October 2012

The above SE4All timelines fall within those of Kenya's national long-term development blue print, Vision 2030, whose purpose is to create a globally competitive and prosperous nation with a high quality of life by 2030.

Vision 2030 aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030, in a clean and secure environment. The vision is anchored on three key pillars; economic, social and political governance. Vision 2030 is implemented

through medium term plans (MTP); its first MTP was implemented between 2008 and 2012. The current (second) MTP outlines the policies, programmes and projects which the Government intends to implement during the five-year period starting from 2013 to 2017, in order to deliver accelerated and inclusive economic growth, higher living standards, better education and health care, increased job creation especially for youth, commercialized agriculture providing higher rural incomes and affordable food, improved manufacturing sector and more diversified exports.



## 2.0

# Outline of Project/Programme Investment Opportunities

The Government of Kenya has included the priority projects in this IP as part of its efforts aimed at meeting the SE4All goals and national targets.

The prospective investment and project opportunities have been derived from the priority action areas that are presented in the Action Agenda. The identification of priority action areas was through bilateral consultation with the government, development partners, private sector, civil society and other key stakeholders on both on going and planned high impact initiatives. The priority action areas were aligned to the country Vision and referenced to global initiatives. The development process for the AA/IP is outlined in Annex 1. The roles of the some of the stakeholders remain important as outlined below;

### CSOs;

Civil Society is spread in the country up to the grass roots and will greatly compliment government efforts in implementing national energy policy particularly in data collection, awareness creation, technology dissemination piloting and evaluation of technology implementation efforts. Investment Projects in Energy access

### Private Sector

The Kenya Private Sector Association (KEPSA) is a key stakeholder in the sustainable energy development agenda, and by extension, the SE4All initiative. KEPSA as the voice of the private sector in Kenya will continue to play its role that provides an institutional framework for Government and private sector to dialogue and partner.

MoEP. Ownership was further enhanced by engaging multiple stakeholders drawn from key sector ministries, county government, civil society organisations, the private sector as well as the UN Country Office and development partners involved in supporting energy sector interventions.

This section is presented with two components:

- Investment Project Opportunities Associated to Energy Access, Renewable Energy and Energy Efficiency.
- Programme Support. This focuses on the immediate needs of MoEP and the SE4All Secretariat in support of the implementation of the AA.

## 2.1 Investment Projects/Programmes In Electricity Access

Table 5: Witu Solar PV plant

Project Title	Witu Solar PV plant
SE4All Goal and Action Area	Energy Access
Project owner / developer:	KENYA SOLAR ENERGY LTD
Location:	WITU in Lamu County.
Project Type:	Electricity Generation Power Plant
Technology:	Solar PV power plant
Capacity:	40 MW
Project Description	Grid connected project considered under FiT.
Project Status	Feasibility study is complete but under review under FiT ESIA has been approved A Power purchase agreement still to be granted A private sector project developer exists Permits, authorisations & licensing in place Land permits approved
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$160 Million <sup>19</sup> 0 Million US\$160 Million Equity/debt

Project Title	Witu Solar PV plant
Procurement Model	Independent investor requires services for an EPC contract that will be secured through a bidding process.
Time Frame	Commissioning by 2016
Risks & Mitigation	For the project to advance owner may need to have equity and considering a 30% equity share, this becomes exorbitant for a local single investor. The PPA enables the investor to seek for both equity and debt as the market for the electricity is assured.

**Table 6: Kenya Energy Modernisation Programme**

Project Title	Kenya Energy Modernisation Programme
SE4All Goal and Action Area	Energy Access
Project owner / developer:	MoEP
Location:	Nairobi.
Project Type:	Access to Electricity
Technology:	Grid extension and reinforcement of distribution system.
Capacity:	618,750 HHs connected to national electricity, 13,500HHs connected to 6 renewable energy Off- grid/mini -grid only
Project Description	Improvement in Service Delivery and Reliability (1000 Automatic load break switches installed in the Nairobi distribution network in the project areas, 146 Substations added to the SCADA/EMS; Efficiency in the distribution system reduced from 6.7% to 3.7%), 3,500 km of distribution lines constructed or rehabilitated under the project; 1,000 distribution transformers installed and Technical Assistance and Capacity Building (National Electrification Strategy adopted, Implementation by ERC of a regime on service quality)
Project Status	Feasibility study is complete ESIA has been approved Permits, authorisations & licensing in place Land permits approved
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 312 Million <sup>20</sup> 0 Million US\$ 312 Million Equity/debt
Procurement Model	Independent investor requires services for an EPC contract that will be secured through a bidding process.
Time Frame	On-going
Risks & Mitigation	For the project to advance owner may need to have equity and considering a 30% equity share, this becomes exorbitant for a local single investor. The PPA enables the investor to seek for both equity and debt as the market for the electricity is assured.

<sup>19</sup> Estimated from unit costs

<sup>20</sup> Financial gap

**Table 7: Solar hybrid micro-grids for off-grid counties**

Solar hybrid micro-grids for off-grid counties	
SE4All Goal and Action Area	Energy Access
Project owner / developer:	MoEP/Petroleum Institute
Location:	Nairobi.
Project Type:	Access to Electricity
Technology:	Solar hybrid micro-grids
Capacity:	
Project Description	The project to install 23 hybrid systems of combination of solar/wind ranging from 100 kW to 1100 kW. Other off-grid projects are found in Annex 1.
Project Status	Feasibility study is complete ESIA has been approved Permits, authorisations & licensing in place Land permits approved
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 85 Million <sup>21</sup> 0 Million US\$ 85 Million Equity/debt
Procurement Model	Independent investor requires services for an EPC contract that will be secured through a bidding process.
Time Frame	Commissioning 2016
Risks & Mitigation	For the project to advance owner may need to have equity and considering a 30% equity share, this becomes exorbitant for a local single investor. The PPA enables the investor to seek for both equity and debt as the market for the electricity is assured.

<sup>21</sup> Estimated financial gap



**Table 8: The Last Mile Connectivity Project**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Energy Access
Project owner / developer:	MoEP
Location:	Nairobi.
Project Type:	Access to Electricity
Technology:	Grid extension
Capacity:	500,000 customers targeted for second and third phases
Project Description	The Last Mile Connectivity Project, the initiative is intended to add an additional 1.5 million Kenyans in rural areas to the national grid. The project involves extending the low voltage network to reach households located within a 600 metre-radius from a transformer, thereby reducing the cost of accessing electricity for the customer and supply for the power provider. Overall, the Last Mile Connectivity Project is intended to connect 70% of Kenyan households by 2017. The second and third phases will include installation and extension of the low voltage network to reach an additional 500,000 customers.
Project Status	Feasibility study is complete ESIA has been approved Permits, authorisations & licensing in place Land permits approved
Financial analysis Total project cost Secured financing Financing gap Financing structure	US\$ 375 Million <sup>22</sup> 0 Million US\$ 375 Million Equity/debt
Procurement Model	Independent investor requires services for an EPC contract that will be secured through a bidding process.
Time Frame	On-going
Risks & Mitigation	For the project to advance owner may need to have equity and considering a 30% equity share, this becomes exorbitant for a local single investor. The PPA enables the investor to seek for both equity and debt as the market for the electricity is assured.

## 2.2 Investment Projects/Programmes in Clean Cook stoves and fuels

**Table 9: LPG Storage and Bottling facilities in Nairobi**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	MoEP
Location:	Nairobi
Project Type:	LPG supply infrastructure
Technology:	Storage tanks and cylinder bottling systems

<sup>22</sup> Estimated financial gap for second and third phases

**Table 9: LPG Storage and Bottling facilities in Nairobi cont...**

Project Title	Kenya Energy modernisation programme
Capacity:	2,225 million tonnes of LPG storage capacity
Project Description	The project is to develop a depot with LPG storage tanks and bottling machines and stock cylinders of various sizes. Similar projects are planned for 4 more towns throughout Kenya but these constitute a separate project.
Project Status	Feasibility study is complete ESIA has been approved IPPs are required to invest in infrastructure also under a PPP arrangement Permits, authorisations & licensing will be granted Land permits can be secured
Financial analysis Total project cost Secured financing Financing gap Financing structure	US\$ 30 Million 0 Million US\$ 30 Million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Pricing, cost and availability of appliances and cultural shift from biomass all will determine the shift to LPG. As a fossil fuel LPG may not easily get funding from clean energy funds e.g. some climate change streams. However, the potential reduction in deforestation and improvement in indoor air quality can be marketed persuasively. The potential participation of SMEs of various sizes (including women and men) and in widespread locations means that the industry can easily be scalable.

**Table 10: Scaling Up Kenya National Domestic Biogas (Biogas for Better Life) Programme**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	MoEP
Location:	Nairobi
Project Type:	Biogas for household cooking
Technology:	Fixed and tubular
Capacity:	8 to 13 cubic metres
Project Description	The project is to scale up the biogas for life initiative to increase access to clean energy to more households across the country. The project targets to construct, 6,500 digesters every 5 years.
Project Status	Feasibility study done Permits, authorisations & licensing will be granted once ESIA is approved
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 12 Million 0 Million US\$ 12 Million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Cost of installation and cultural shift from biomass all will determine the shift to biogas as a clean household fuel. However, the potential reduction in deforestation and improvement in indoor air quality and health impacts can be marketed persuasively. The success for Kenya Domestic Biogas Program means that the biogas can be scalable with remarkable gender equity impacts.

**Table 11: Development of Cookstove sector**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	Private sector
Location:	Nairobi
Project Type:	Cookstove
Technology:	Improved cookstoves
Capacity:	300 stoves per day
Project Description	The project is to establish a local cookstove manufacturing plant to produce improved, efficient and affordable cookstoves.
Project Status	Feasibility done ESIA not done Permits, authorisations & licensing will be granted once ESIA is approved Land permits can be secured
Financial analysis Total project cost Secured financing Financing gap Financing structure	US\$ 5 Million 0 Million US\$ 5 Million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Sub-standard technology, leading to lack of confidence in the adoption of the cookstoves. Enforcement of standards, capacity development and user education required as a mitigation measures.

**Table 12 : Development of Standard and Labelling (S&L) for Cookstoves in Kenya**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Energy Access
Project owner / developer:	MoEP/CCAK/GACC
Location:	Nairobi
Project Type:	Access to Clean Cooking
Technology:	Cooking Technologies
Capacity:	
Project Description	The project aims to develop an S&L strategy for clean cooking in Kenya and its implementation which will be done in three phases: Phase I: Strategy development; Phase II: Piloting; Phase III: Nationwide roll-out
Project Status	• Consultant selected for phase I
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 3 million US\$ 0 US\$ 3 million Grant/Equity
Procurement Model	Open binding
Time Frame	Commissioning 2016
Risks & Mitigation	<ul style="list-style-type: none"> <li>• Failure to enforce the standard and labelling</li> <li>• Financing to roll out phase II &amp; III Mitigation:</li> <li>• Early fundraising</li> <li>• Ministry to lead the process</li> </ul>



**Table 13: Development of Communication Strategy for Clean Cooking sector in Kenya**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Energy Access
Project owner / developer:	MoEP/CCAK/GACC
Location:	Nairobi.
Project Type:	Adoption of clean cooking
Technology:	Cooking Technologies
Capacity:	
Project Description	The project aim to develop a framework for communication in cookstove sector that will help the sector to be coordinated in terms of how the communication is done. The initiative will be done in phases. Phase I: Development of Communication strategy; Phase II: BCC campaign in targeted regions ; Phase III: Nationwide BCC campaign
Project Status	<ul style="list-style-type: none"> <li>• Consultant for phase I identified – Communication strategy development</li> </ul>
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 4 million US\$0 US\$ 4 million Grant/Equity/Debt
Procurement Model	Open bidding
Time Frame	Commissioning 2016
Risks & Mitigation	<ul style="list-style-type: none"> <li>• Lack of adequate resources</li> </ul>

**Table 14 : Strengthening distribution of clean Cookstoves and fuels in Kenya**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Energy Access
Project owner / developer:	MoEP/CCAK/GACC
Location:	Nairobi.
Project Type:	Access to clean cooking
Technology:	Cooking Technologies
Capacity:	
Project Description	The aim of this initiative is to help reach 5 million households with clean cooking. The project will work in conjunction with the private sectors and development partners. The overarching aim is to make the cleaner and more efficient cooking technologies and fuel more accessible and affordable by the market that needs it.
Project Status	TOR Finalised Consultant selected
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 5 million US\$ 0 US\$ 5 million Grant/Debt & Equity
Procurement Model	Open Bidding
Time Frame	Commissioning 2016
Risks & Mitigation	<ul style="list-style-type: none"> <li>• Lack of adequate resources</li> </ul>

**Table 15: Clean Cookstoves Market Acceleration Project**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	The project is being undertaken by Entec Consultants
Location:	Nairobi
Project Type:	Scale up of Cook stoves production, marketing and utilization
Technology:	Cookstoves
Capacity:	
Project Description	The project aims to scale up consumer uptake and utilization of quality cookstoves by awareness creation, market development, capacity building and linkages to Microfinance institutions.
Project Status	Feasibility not done ESIA not necessary as project will leverage on existing entrepreneurs Permits, authorisations & licensing will be granted Land permits
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$2.31 million 0 million US\$ 2.31 million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Pricing, cost and availability of appliances and cultural shift from traditional three stones all will determine the shift to improved cookstoves. The enabling environment will remain instrumental in the adoption for the clean cookstoves as an alternative to traditional three stones.

**Table 16: Setting up of Bioethanol Distillers**

SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	The project is being undertaken by International Research and Development Africa Limited
Location:	Nairobi
Project Type:	Bioethanol supply infrastructure
Technology:	Bioethanol refinery distillers
Capacity:	300,000 litres per day
Project Description	The project is to establish a bioethanol refinery of capacity 300,000 litres per day. The plant to use second generation feedstock.
Project Status	Feasibility study is complete ESIA has been approved: Permits, authorisations & licensing will be granted Land permits can be secured
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 10 Million 0 Million US\$ 10 Million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Unsustainable supply of feedstock, price fluctuation on the alternative fuels. Government to support in the feedstock production and also regulate prices for alternative fuels as well as user education.

**Table 17: Scaling up Bioethanol as an Alternative Household Fuel in Kenya**

Project Title	Kenya Energy modernisation programme
SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	The project has been piloted by MoEP/UNDP
Location:	Nairobi
Project Type:	Scale up
Technology:	Bioethanol as an Alternative Household Fuel
Capacity:	300,000 litres
Project Description	The project is to scale up on the Bioethanol as an Alternative Household Fuel in Kenya. The project will put in place the necessary structures for commercialization for the use of bioethanol as cooking fuel.
Project Status	Feasibility study is complete ESIA has been approved: Permits, authorisations & licensing will be granted
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$7 Million 0 Million US\$ 7 Million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Pricing, cost and availability of appliances and cultural shift from biomass all will determine the shift to bioethanol. The enabling environment will remain instrumental in the adoption for the bioethanol as a household fuel. User education on benefits of fuel switching also required.

**Table 18: Establishing briquetting plant**

SE4All Goal and Action Area	Modern Cooking Appliances and Fuels
Project owner / developer:	The project is being undertaken by Restart Africa
Location:	Nairobi
Project Type:	Briquette infrastructure
Technology:	Charcoal briquettes
Capacity:	
Project Description	The project entails awareness creation, market development, capacity building and capital investments for constructing a briquetting plant.
Project Status	Feasibility not done ESIA not approved: Permits, authorisations & licensing will be granted Land permits can be secured
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$1.21 million 0 million US\$ 1.21 million Equity/debt model
Procurement Model	PPP model
Time Frame	Commissioning by 2016
Risks & Mitigation	Pricing, cost and availability of appliances and cultural shift from biomass all will determine the shift to briquettes. The enabling environment will remain instrumental in the adoption for the briquettes as a household fuel.



## 2.3 Investment Projects In Renewable Energy

### 2.3.1 Investment in geothermal steam by-product for process heating

The primary forms of direct-use include agriculture (mainly greenhouse heating, crop drying, and some animal husbandry), providing heat for industrial processes. In industrial applications, thermal energy in the temperature range being considered here (below 150 °C) is used in the basic processes of: preheating, washing, peeling and blanching, evaporation and

distilling, sterilising, drying and refrigeration. GDC is promoting setting up of industrial parks and Agro-based industries around the geothermal field to make use of cheap energy that is not currently being utilised. Table 19 gives an overview of the many investment opportunities

**Table 19 : Geothermal steam for heat process investment opportunities**

Project Title	Direct Off-grid Electricity Connections & Direct Use Opportunities
SE4All Goal & Sectoral Action Area	Renewable Energy RE - Industrial & Agricultural Processes
Location	Around GDC Geothermal Project Areas The Pilot demonstration project is located at Nakuru County in Menengai field
Project Description	A pre-feasibility study of potential direct use applications has been carried out by GDC with support of United States Agency for International Development (USAID), on low heat use from geothermal energy applications in Kenya. Opportunities in different market sectors include industrial applications and agricultural applications. The project objective is to promote local socio-economic growth near geothermal project areas resulting in improved livelihoods through establishment of Large, Medium & Cottage industries.
Project Status	GDC launched its first Direct Use Pilot Project at Menengai in August 2015. This is a demonstration project of alternative uses of geothermal including milk pasteurization, greenhouse heating, drying, and aquaculture.  Activities requiring funding:  Promotion of Direct Use opportunities, , set-up of demonstration projects, capacity building & Technical Assistance support

### 2.3.2 Investment Projects/Programmes in Power Generation

5000+ MW (2014-2017): Geothermal 2,095MW, Natural Gas 750MW, Wind 630MW, Coal 1,920MW, Thermal 163MW, Cogeneration 18MW and Imports 400MW. Of the total additional capacity, 921MW is from KenGen, 1,619MW from IPPs while both will competitively

develop 2,987MW. The balance of 400MW will be imported from Ethiopia. The total generation capital expansion cost up to 2018 cost is estimated at US\$ 15.023 billion under the fast-tracked scenario and US\$ 7.78 billion under the moderate.

**Table 20: Project Menengai Phase I: 465 MW**

Project Title	Geothermal Power generation in Kenya
SE4All Goal and Action Area	RE- Large RE Power Generation
Project owner / developer:	The development is being undertaken by the Geothermal Development Company Limited (GDC), a state corporation under the oversight of the Ministry of Energy & Petroleum.  The private sector will finance, design, construct, operate and maintain the power plants.
Location:	Menengai, Nakuru County, about 10 km north of Nakuru town and 180 km from Nairobi.
Project Type:	Geothermal Development Project to increase the installed national generation capacity by an additional 460 MW from geothermal sources by December 2016.

**Table 20: Project Menengai Phase I: 465 MW...**

Project Title	Geothermal Power generation in Kenya
Technology type	Geothermal Electricity Generation Power Plants
Capacity:	Project Capacity is 460 MW
Project Description	GDC will develop the steam resource and sale the steam to Independent Power Producers who will install the power plants and generate electricity to be sold to the off taker, Kenya Power. GDC will therefore offer the private sector the generation opportunities and in turn enable the sector mobilize private development capital.
Project Status	Feasibility study completed 31 production wells drilled Drilling of additional wells is in progress using 7 GDC owned rigs.
Total project cost	Project Success Current available steam is about 130 MW Three (3) IPPs on board for first 100 MW Steam Gathering System underway Two (2) IPPs shortlisted for 60 MW Procurement for the other capacity plants are to be procured as drilling progresses as scheduled Seeking Investors for 300MW
Secured financing	Estimated cost at US\$ 1,598 million for Menengai.
Financing structure	Financing through GoK / Development Partners/IPP's
Financing Gap	GDC is seeking strategic development partners to fund steam development and also to generate power from the developed steam through a Joint venture. Their upfront investment in steam development would be recouped from steam sales.  Funding for the Steam Gathering System for the 300 MW at a cost of US\$120 Million
Procurement Model	Joint Venture: Steam resource development by GDC; IPPs to install power plants
Time Frame	Commissioning dates: 105 MW June 2017 60 MW December 2017 300 MW December 2019
Risks & Mitigation	GDC will develop the steam resource thereby shielding the private sector from the resource related exploration risks that have deterred their participation. Therefore, the risks associated with the project are minimal.  The Government will facilitate the private sector in obtaining partial risk guarantees and letter of support

**Table 21: Project Suswa: 150 MW**

Project Title	Geothermal Power generation in Kenya
SE4All GOAL and Sectorial Action Area	RE- Large RE Power Generation
Project owner / developer:	The development is being undertaken by the Geothermal Development Company Limited (GDC), a state corporation under the oversight of the Ministry of Energy & Petroleum.  The private sector will finance, design, construct, operate and maintain the power plants.
Location:	The prospect extends West to Narok County, South to Kajiado County and Nakuru County to the North. It is located about 20 km southwest of Longonot volcano in the southern Kenya Rift and is 120 km from Nairobi.

**Table 21: Project Suswa: 150 MW...**

Project Type:	Geothermal Development Project to increase the installed national generation capacity by an additional 150 MW from geothermal sources by December 2019.
Technology type	Geothermal Electricity Generation Power Plants
Capacity:	Project Capacity is 150 MW
Project Description	GDC will develop the steam resource and sell the steam to Independent Power Producers who will install the power plants and generate electricity to be sold to the off-taker, Kenya Power. GDC will therefore offer the private sector the generation opportunities and in turn enable the sector mobilize private development capital.
Project Status	Detailed Surface studies were completed in 2013, EIA Licence obtained Community engagement commenced Drilling expected to commence in 2015 Seeking investors for the construction of power plants:
Total project cost	Estimated cost of US\$ 850 million
Secured financing	Financing through GoK /Development Partners/IPPs
Financing structure	GDC is seeking strategic development partners willing to fund steam development and also to generate power from the developed steam through a Joint venture. Their upfront investment in steam development would be recouped from steam sales.
Financing Gap	Funding requirements: Steam gathering system US\$ 80 Million Drilling programme US\$ 200 Million Power Plant construction (IPP) US\$ 450 Million
Procurement Model	Steam resource development by GDC; IPPs to install power plants
Time Frame	Commission dates; December 2019
Risks & Mitigation	GDC will develop the steam resource thereby shielding the private sector from the resource related exploration risks that have deterred their participation. Therefore the risks associated with the project are minimal.  The Government will facilitate the private sector in obtaining partial risk guarantees and letter of support

**Table 22: Project Baringo-Silali: 200 MW**

Project Title	Geothermal Power generation in Kenya
SE4All GOAL and Sectorial Action Area	RE- Large RE Power Generation
Project owner / developer:	The development is being undertaken by the Geothermal Development Company Limited (GDC), a state corporation under the oversight of the Ministry of Energy & Petroleum.  The private sector will finance, design, construct, operate and maintain the power plants.
Location:	The project stretches over two counties namely: Baringo and Turkana about 140 km north of Nakuru.
Project Type:	Geothermal Development Project to increase the installed national generation capacity by an additional 200 MW from geothermal sources by December 2018.
	The 200 MW Baringo-Silali Project is part of the larger 800 MW Bogoria-Silali Block Phase I geothermal development which comprises Bogoria, Baringo, Arus, Korosi, Chepchuk, Paka and Silali prospects.
Technology type	Geothermal Electricity Generation Power Plants
Capacity:	Project Capacity is 200 MW



**Table 22: Project Baringo-Silali: 200 MW...**

Project Description	GDC will develop the steam resource and sell the steam to Independent Power Producers who will install the power plants and generate electricity to be sold to the off-taker, Kenya Power. GDC will therefore offer the private sector the generation opportunities and in turn enable the sector mobilize private development capital.
Project Status	Surface studies completed and the Environmental license obtained. Community engagement framework has been established and Land – Approval by Baringo County Government has been obtained. Infrastructure development is in progress for roads and water reticulation system
Total project cost	Estimated costs of US \$ 1062 million
Secured financing	Financing through GoK / Development Partners/IPPs.
Financing structure	GDC is seeking strategic development partners willing to fund steam development and also to generate power from the developed steam through a Joint Venture. Their upfront investment in steam development would be recouped from steam sales.
Financing Gap	Funding requirements: Steam gathering system US\$ 80 Million, Drilling programme US\$ 334 Million, Power Plant construction (IPP). Procurement of IPPs through competitive bidding
Procurement Model	Joint Venture
Time Frame	Commissioning dates; Dec 2018
Risks & Mitigation	GDC will develop the steam resource (fuel) thereby shielding the private sector from the resource related exploration risks that have deterred their participation. Therefore the risks associated with the project are minimal. The GoK to facilitate the private sector in obtaining partial risk guarantees and letter of support

**Table 23: High Grand Falls hydropower project**

Project Title	High Grand Falls hydropower project
SE4All Goal and Action Area	RE- Large RE Power Generation
Project owner / developer:	KenGen
Location:	High Grand Falls on the Tana river
Project Type:	Electricity Generation Power Plant
Technology:	Large hydropower
Capacity:	450 MW
Project Description	The project is to raise the dam wall to increase water holding capacity and then install additional 700 MW capacity.
Project Status	Feasibility study has been completed ESIA has been approved Permits, authorisations & licensing is in place since site is operating Land permits exist
Total project cost	US\$1,400 million
Secured financing	0 million
Financing gap	US\$1,400 million
Financing structure	GoK budget/ soft loan DP/ private loan
Procurement Model	
Time Frame	Commissioning of power plant after 2016
Risks & Mitigation	Primary risks to investment in hydropower surround the relative (as compared with other resources) uncertainty regarding the future reliability of the resource. Climatic and hydrological conditions are changing, which makes further dependence on hydropower a potential risk. This is being mitigated by simultaneous development of a diverse range of other RE resources for firm power, including LNG, coal and geothermal.

<sup>23</sup> Estimated from unit costs

**Table 24: Renewable generation projects seeking private public partnership**

Sectoral Action Area	Priority Areas	Project Owner/ title	Description capacity, estimated total cost	Development Status	Financing Status <sup>24</sup>
Large Scale renewable	Geothermal	KenGen/Olkaria V	Olkaria capacity additions by 2016 estimated at 300-450MW  Immediate target 140 MW		Japanese International Cooperation Agency (JICA) has also expressed interest to extend a loan to KENGEN for development of a further 140 MW of geothermal at Olkaria.
	Hydropower	KenGen/Karura HPP-Tana River	Capacity 100 MW	Feasibility study completed	Seeking PPP
		KenGen/Ewaso Ngiro South River	Capacity 200 MW	Feasibility study completed	Seeking PPP

**Table 25: Lamu- Kitui- Nairobi Transmission line**

Project Title	High Grand Falls hydropower project
SE4All Goal and Action Area	EA, EE -Grid Infrastructure and Supply efficiency
Project owner / developer:	KETRACO
Location:	Lamu-Kitui-Nairobi
Project Type:	Transmission Line
Technology:	Double circuit 400 kV
Capacity:	400 kV
Project Description	The project is to extend transmission line from Lamu to Kitui to reach Nairobi. The line will evacuate power from a planned coal power station but will also allow sustainability of the network from the coast to Nairobi.
Project Status	Feasibility study is complete ESIA has been approved: Power purchase agreement- granted IPPs are invited to invest Permits, authorisations & licensing will be granted Land permits still to be secured in certain portions of the line
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 170 million 0.0 million US\$ 170 million GoK budget/ EPC plus financing
Procurement Model	Engineering design, procurement and construction (EPC)
Time Frame	Commissioning by 2016
Risks & Mitigation	Risks associated with transmission projects are largely with regard to land rights considerations. Land issues are a problem to most electricity projects and GoK is dealing with the situation on a case by case basis and looking forward to a more holistic approach.

<sup>24</sup> Published data indicate that installation costs ranges between 2.5 to 6.5 million US\$ per MWe. Kenya average installation cost is about 3.6 million US\$ per MWe.

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## Four Power Evacuation projects under 5000+MW programme

**Table 26: Menengai-Rongai Transmission line**

Project Title	High Grand Falls hydropower project
SE4All Goal and Action Area	EA, EE -Grid Infrastructure and Supply efficiency
Project owner / developer:	KETRACO
Location:	Nakuru
Project Type:	Transmission Line
Technology:	Double circuit 400 kV
Capacity:	To be determined
Project Description	The project is to construct transmission line from Menengai to Rongai. The line will evacuate power from a planned geothermal power station at Menengai geothermal field to the national grid.
Project Status	ESIA has been completed Permits, authorisations & licensing will be granted. Land permits still to be secured.
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$36 million 0.0 million US\$ 36 million GoK budget/ EPC+ Financing
Procurement Model	Engineering design, procurement and construction (EPC) + Financing
Time Frame	Commissioning by 2016
Risks & Mitigation	As above

**Table 27: Silali-Rongai Transmission line**

Project Title	High Grand Falls hydropower project
SE4All Goal and Action Area	EA, EE -Grid Infrastructure and Supply efficiency
Project owner / developer:	KETRACO
Location:	Nakuru, Baringo
Project Type:	Transmission Line
Technology:	Double circuit 400 kV
Capacity:	To be determined
Project Description	The project is to construct transmission line from Silali to Rongai. The line will evacuate power from a planned geothermal power station at Silali geothermal field to the national grid.
Project Status	ESIA has been completed Permits, authorisations & licensing will be granted. Land permits still to be secured.
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 66 million 0.0 million US\$66 million GoK budget/ EPC+ Financing
Procurement Model	Engineering design, procurement and construction (EPC) + Financing
Time Frame	Commissioning by 2016
Risks & Mitigation	As above



**Table 28: Isinya-Nairobi East Transmission line**

Project Title	High Grand Falls hydropower project
SE4All Goal and Action Area	EA, EE -Grid Infrastructure and Supply efficiency
Project owner / developer:	KETRACO
Location:	Nairobi
Project Type:	Transmission Line
Technology:	Double circuit 400 kV
Capacity:	To be determined
Project Description	The project is to construct transmission line from Isinya to Nairobi East substation. The line will serve as an alternative supply path to the grid.
Project Status	ESIA has been completed Permits, authorisations & licensing will be granted. Land permits still to be secured.
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 51 million 0.0 million US\$ 51 million GoK budget/ EPC+ Financing
Procurement Model	Engineering design, procurement and construction (EPC) + Financing
Time Frame	Commissioning by 2016
Risks & Mitigation	As above

**Table 29: Dongo Kundu- Mariakani Transmission line**

Project Title	High Grand Falls hydropower project
SE4All Goal and Action Area	EA, EE -Grid Infrastructure and Supply efficiency
Project owner / developer:	KETRACO / Contact Details
Location:	Mombasa
Project Type:	Transmission Line
Technology:	Double circuit 400 kV
Capacity:	To be determined
Project Description	The project is to construct transmission line from Dongo Kundu to Mariakani. The line will evacuate power from a planned LNG plant at Dongo Kundu terminal to the national grid.
Project Status	ESIA has been completed Permits, authorisations & licensing will be granted Land permits still to be secured
<b>Financial analysis</b> Total project cost Secured financing Financing gap Financing structure	US\$ 46 million 0.0 million US\$ 46 million GoK budget/ EPC+ Financing
Procurement Model	Engineering design, procurement and construction (EPC) + Financing
Time Frame	Commissioning by 2016
Risks & Mitigation	As above

### 2.3.3 Investment Projects in Power Transmission

Projects with Feasibility Studies Completed in 2012/2013 (K Shs. 38.2 billion= US\$0.42 billion)

Table 30: Investment Projects in Power Transmission

S/N	PROJECT NAME	DESCRIPTION/SCOPE	COST Billion KShs.	STATUS	CHALLENGES
1	Meru -Maua Line	50 km 132 kV Line and 1 Substation at Maua Counties Covered: Meru	1.3	Feasibility study & bid documents complete.	Lack of Financing
2	Nyahururu (Rumuruti) - Maralal Line	148 km 132 kV Line and Sub-station at Maralal Counties Covered: Laikipia, Samburu	2.6	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
3	Rabai-Bamburi-Shanzu-Kilifi line	60 km, 132 kV double circuit line with associated substations Counties Covered: Kilifi, Mombasa	1.7	Feasibility study & bid documents complete. Seeking Financing	Financing agreement on going
4	Voi - Taveta Line	107 km, 132 KV single circuit transmission line, with substation at Taveta. Counties Covered: Taita Taveta, Voi	2	Feasibility study & bid documents complete. Seeking Financing	Financing agreement on going
6	Garsen -HOLA -Garissa Line	240 km 220 kV single circuit Line and Sub-station at HOLA and Bura Counties Covered: Tana River, Garissa	9.3	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
7	Kisumu - Kakamega – Musaga*	73 km, 220 kV line with 220/132/33 kV 2x150 MVA substation at Kakamega and bay extensions at Kisumu and Musaga.		Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
8	Webuye - Kimilili – Kitale*	73 km, 132 kV d/c Line, s/c strung with establishment of 132/33 kV substations; 2X23 MVA at Webuye, 2x23 MVA at Kimilili and bay extension at Kitale.		Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
9	Sotik – Kilgoris*	48 km, 132 kV d/c Line, s/c strung with a new 2x23 MVA 132/33 kV substation at Kilgoris		Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
10	Garissa -Wajir Line	330 km 220 kV single circuit Line and 1 No. 23 MVA Sub-station at Wajir Counties Covered: Garissa, Wajir	9.5	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
11	Awendo - Isebania Line	50 km 132 kV single circuit Line and Sub-stations at Isebania Counties Covered: Migori	1.8	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
12	Galu - Lunga Lunga Line	60km 132kV single circuit Line and 23 MVA Sub-stations at Lunga Lunga Counties Covered: Kwale	1.4	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
13	Ishiara - Chogoria Line	40 km 132 kV single circuit Line and 1x23 MVA Sub-station at Chogoria Counties Covered: Embu, Tharaka Nithi	1.3	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
14	Narok-Bomet Line	88km 132kV double circuit Line Counties Covered: Narok, Bomet	2.3	Feasibility study & bid documents complete. Seeking Financing.	Lack of Financing
15	Sultan Hamud-Loitoktok	88km 132kV double circuit Line	2.3	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
16	Kabarnet - Nyahururu Line	111 km 132 kV double circuit Line Counties Covered: Laikipia, Baringo	2.7	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing

Transmission Lines' Projects 2013/14 Feasibility Studies (KShs 70.206489 billion= US\$ 0.77 billion)

Table 31: Transmission Lines' Projects

S/no	PROJECT NAME	PROJECT DESCRIPTION	ESTIMATED COST (Billion KShs)	STATUS	CHALLENGES
1	Kamburu - Embu - Thika	196 km, 220 kV d/c line with bay extension at Kamburu and establishment of 1x150 MVA 220/132 kV substation at Embu, Kiganjo & Thika	9.33498	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
2	Isinya – Konza (Techno City)	38 km 400 kV d/c line, with 3x350 MVA 400/132 kV & 5x45 MVA 132/33 kV substations at Konza and bay extensions at Isinya	6.22332	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
3	Longonot - Thika - Kangundo - Konza	205 km, 400 kV d/c line with 1x350 MVA 400/220 kV & 2x90 MVA 220/33 kV at Thika, 1x350 MVA 400/132 kV & 2x45 MVA 132/33 kV at Kangundo and bay extensions at Longonot and Konza.	13.21137	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
4	Kitui - Mutomo - Kibwezi	144 km, 132 kV d/c line with bay extensions at Kitui and establishment of 2x45 MVA 132/33 kV substations at Mutomo & Kibwezi.	1.5822	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
5	Ngong - Magadi	84 km, 220 kV Line and new substation at Magadi	2.93586	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
6	Lessos-Juja Tee - Uplands	Establishment of 2x60 MVA substations at Uplands off the existing Lessos-Juja 132 kV line.	1.62615	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
7	Menengai-Nyahururu (OI Kalau) - Rumuruti	Approximately 70 km of 132 kV and establishment of 132/33 kV substation at OI Kalau and bay extensions at Menengai and Rumuruti	1.5822	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
8	Rabai - Galu T-off - Likoni	15 km 132 kV double circuit line substation at Likoni	1.54704	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
9	Kisumu - Kakamega - Musaga*	73 km, 220 kV line with 220/132/33 kV 2x150 MVA substation at Kakamega and bay extensions at Kisumu and Musaga.	2.03928	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
10	Webuye - Kimilili – Kitale*	73 km, 132 kV d/c Line, s/c strung with establishment of 132/33 kV substations; 2X23 MVA at Webuye, 2x23 MVA at Kimilili and bay extension at Kitale.	1.5822	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
11	Sotik – Kilgoris*	48km, 132 kV d/c Line, s/c strung with a new 2x23 MVA 132/33 kV substation at Kilgoris	1.0548	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
12	Rongai - Kilgoris - Lake Victoria Ring	235 km, 400 kV d/c Line with possible interconnection to Tanzania to complete the Lake Victoria Ring with 400/132 kV	4.395	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
13	Lessos/Tororo Tee off at Myanga - Busia	41 km 132 kV d/c Line, s/c strung with new 132/33 kVx23 MVA substations at Myanga and Busia.	0.75594	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
14	Rangala - Bondo - Ndigwa	72 km, 132 kV d/c Line, s/c strung, bay extensions at Rangala & establishment of 1x23 MVA 132/33 kV substations at Bondo and Ndigwa.	0.90537	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
15	Homa Bay – Sindo/Karungo	72 km, 132 kV d/c line, s/c strung from Homa Bay to Sindo through Karungo, bay extensions at Homabay and establishment of 1x23 MVA 132/33 kV substation at Sindo.	1.125999	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
16	Kiambere - Maua - Isiolo	145 km, 220 kV d/c line with bay extensions at Kiambere and establishment of 2x90 MVA 220/132 kV substations at Maua and Isiolo.	4.2192	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
17	Isiolo - Maralal	165 km, 132 kV d/c line with bay extension at Isiolo and Maralal.	1.9338	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
18	Isiolo - Marsabit	240 km, 220 kV d/c line with bay extension at Isiolo and establishment of 2x90 MVA 220/33 kV substation at Marsabit	3.6039	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
19	Turkwel - Lodwar - Lokichogio	330 km 220 d/c line with establishment of 2x45 MVA substations at Lodwar and Lokichogio, bay extension of substations at Turkwel.	5.8014	Feasibility study & bid documents complete. Seeking Financing	Lack of Financing
20	Loiyangalani - Marsabit	136 km, 220 kV d/c line with establishment/extension of substations at	4.7466	Feasibility study & bid documents complete.	Lack of Financing



## 2.4 Investment Projects In Energy Efficiency

**Table 32: Investment Project in Energy Efficiency and Renewable Energy (Phase II)**

Project Title	Implementation of EE/RE project pipeline
SE4All GOAL and Sectorial Action Area	EE-Industrial and agricultural processes
Project owner / developer:	Kenyan commercial Banks + Kenya Association of Manufacturers
Location:	Various locations in the country
Project Type:	Energy efficiency and RE in industry
Technology	<p><b>Energy efficiency measures</b> (saving of at least 20% in absolute or relative term) can include (but not limited to): Fuel switching, replacement of boilers, Energy efficiency measures in buildings (heating/cooling, thermal insulation, windows, energy efficient appliances, etc.). Efficient Lighting for counties could also be eligible.</p> <p><b>Renewable energy measures</b> (financially viable projects over period of 15 years, positive NPV) can include (but not limited to): biomass, solar thermal, biogas, wind farms, small hydro power plants, solar photovoltaic power plants, Geothermal energy.</p> <p><b>Access to energy:</b> off grid mini-grid (production and distribution by "electric" co-operatives*/SACCOs, hotels, telecoms or by a contract with KPLC) or if possible on-grid mini-grid (e.g. of KTDA projects), energy centers (eg. Ikisaya or other Philips projects).</p>
Capacity:	>200 MW RE generation + energy savings
Project Description	<p>The credit line has been availed to Kenyan commercial banks for onward lending to businesses that wish to invest in <b>renewable energy technologies projects</b> (small hydro, biomass, biogas, solar, geothermal) as well as energy efficiency measures.</p> <p>The credit line also comes with a technical assistance program that will be managed by Kenya Association of Manufacturers. This will help the bank improve their knowledge on lending to and involvement in sustainable energy projects. In addition, Kenya Association of Manufactures will assist the projects sponsors on feasibility studies and technical support.</p>
Project Status	<p>The technical assistance program is in place since May 2014 in order to identify new EE and RE projects.</p> <p>AFD has signed credit loans agreement with Chase Bank and Commercial Bank of Africa for a total amount of 20 M€.</p>
Financial analysis	2,1 M€
Total project cost	60 M€ for 5 Kenyan banks
Secured financing	
Procurement Model	Independent investors
Time Frame	May 2014 – May 2017
Risks & Mitigation	Embedded EE and RE projects may not deliver the extent or longevity of savings indicated in a feasibility study due to technology, human management, grid power pricing and other factors. This may be mitigated by technical assistance to ensure project deliver on assessed technical feasibility.

**Table 33: Investment Project for direct use of geothermal**

Project Title	Direct Off-grid Electricity Connections & Direct Use Opportunities for geothermal
SE4All GOAL and Sectorial Action Area	Energy Efficiency EE – Industrial & Agricultural Processes
Project owner / developer:	<p>GDC to provide upstream supply of geothermal steam for industrial process heating.</p> <p>Private Investors to set up enterprises for Direct Use application through PPP model. It is envisaged that the County Government will set up the industrial parks.</p>
Location:	<p>Around all GDC Geothermal Project Areas</p> <p>The pilot demonstration project is located at Nakuru County in Menengai field</p>
Project Type:	Energy efficiency and RE in industry
Project Description	<p>GDC launched its first Direct Use Pilot Project at Menengai in August 2015. This is a demonstration project of alternative uses of geothermal including milk pasteurization, greenhouse heating, drying, Laundromat and aquaculture.</p> <p>Opportunities in different market sectors include industrial applications and agricultural applications (Ref: The Geothermal Direct Use Guide Book. An assessment of potential direct use &amp; small power applications, 2013)</p> <p>Project objective is to promote local socio-economic growth near geothermal project areas resulting in improved livelihoods through provision of geothermal heat for direct use in Large, Medium &amp; Cottage industries which will open up business &amp; employment opportunities for communities, including youth and women. Direct use applications can be developed together with power production or as stand-alone projects.</p>
Project Status	<p>A pre-feasibility study of potential direct use applications has been carried out by GDC with support of USAID, on low heat use from geothermal energy applications in Kenya.</p> <p>GDC is actively seeking partnership with energy users for direct off-grid electricity connections &amp; direct geothermal steam applications including industrial power consumers and communities. GDC will supply heat for direct use application, provide capacity building and consultancy services. The respective County Governments are to acquire land, set up Industrial Parks &amp; facilitate for the Investors to set up industries.</p>

## 2.5 Investment Projects Addressing Nexus Issues

**Table 34: Investment Projects Addressing Nexus Issues**

S/N	PROJECT NAME	DESCRIPTION/SCOPE	COST Billion KShs.	STATUS	CHALLENGES
1	Water, Energy and Food	Energy for mechanisation; labour/time saving freeing more time for women and men to engage in more productive activities; Energy for water pumping for irrigation; to increase food security; Energy for value addition of agriculture products-post harvest energy processes to improve livelihoods Direct use of geothermal steam in agricultural/industrial process heating Exploit the underground water in Turkana	2	There exist potential for energy use in irrigation, post harvest handling and mechanization. This potential remains untapped.	Insufficient technical capacity, limited awareness and financing limitation. Inadequate gender disaggregated data for planning
2	Energy, Women, Children and Health	Universal adoption of Clean Cooking Solutions (modern cooking appliances and fuels) to improve indoor air quality and reduce drudgery Scale up Mkopa Model, Lighting Africa Programme type initiative to provide energy for lighting Lighting programme for schools market places, health centres using solar and other decentralised options to be scaled up to improve maternal health care services, childcare. and even staff amenities Clean Cook stoves programmes including involvement of women as actors in the value chain as energy entrepreneurs.	4.5	There exist programmes which are on-going and need for scaling them up.	- Inadequate capacity for implementation. - Inadequate gender disaggregated data for planning
3	Energy and Education	The Rural Electrification Authority in Kenya had set a target of electrifying all primary schools by June 2015 to improve performance for boys and girls.	2.5	Over 17,000 public schools have been electrified out of the 21,158 that were mapped out by the Authority, and connection for 3,880 others is under way.	- Limited financing - Inadequate sex disaggregated data for planning
4	Energy and Gender	Gender mainstreaming in ongoing energy planning policies and programs to help ensure that projects achieve greater livelihood enhancements. and contribute to women's economic empowerment and increased participation in decision making. Gendered perspectives incorporated in all energy programmes to ensure participation and equitable benefit for women and men	1	- Unsustainable use of energy and limitation to access to clean energy for cooking - A gender aware proposed energy policy but strategy for implementation of gender commitments required. - Gender Audit of MoEP as well as capacity gap assessments and audits of some of the agencies have been carried out. - Inadequate capacity to mainstream gender in energy planning and implementation in the sector.	- Insufficient awareness - Inadequate gender disaggregated data for planning - Inadequate financing for operationalisation of the policy commitments by MoEP and its agencies.

### Notes:

The risks under nexus issues include;

- Lack of finance at the county level to implement the planned interventions to address energy nexus issues.
- Some counties may lack substantial energy resources to support planning and implementation to addressing energy nexus issues. Lack of capacity at county level to mainstream nexus issues into the county energy plans.
- Political interference

The mentioned risks can be mitigated through the following approaches;

- Mobilising community initiatives-Energy cooperatives model to be funded by counties
- Sensitize County government to allocate resources for capacity building on energy planning/ nexus issues at county level.
- Involve counties in grid infrastructure initiatives- funding/ policy to support initiatives; Participatory planning involving community- seek funding to enhance this; segmented distribution systems for other areas and addressing identified needs.
- Capacity building at county level and technical support to incorporate energy nexus issues in energy plans.

## 2.6 Programme Investment Opportunities

Programme investment opportunities that the GoK would like to develop to achieve its SE4All objectives are summarised below. Details on the programmes are provided in Annex 2.

### 2.6.1 Management Support to SE4All Secretariat at Kenya's MoEP

**Table 35: Programme Investment Opportunity 1**

<p><b>Programme Description:</b></p> <p>The programme aims to provide SE4All Technical Advisory services to MoEP on the establishment of the SE4All Secretariat that will be responsible for the overall development, implementation and monitoring of the SE4All activities in the Country.</p>	<p><b>Implementation:</b></p> <p>Searching for TA implementation partners Lead: MoEP Partners: To be defined.</p>
<p><b>Specific Objectives/Outcomes:</b></p> <p>SE4All Secretariat established with a clear mandate, defined functions, implementation programme and an operational budget to fund its SE4All activities;</p> <p>SE4All Secretariat with personnel's capacity developed in the different areas integrated in Kenya's SE4All AA;</p> <p>SE4All and County Energy Desks' personnel's capacity developed on SE4All related activities.</p> <p>Information on SE4All AA initiatives and objectives and IP investment opportunities disseminated.</p>	<p><b>Financing:</b> Proposal from TA assistance facility solicited <b>Allocated: 0€</b></p>
<p><b>Proposed activities</b></p> <p>(i) Prepare a programme document in support of the institutionalisation and operation of Kenya's SE4All Secretariat. This document should include a budget and proposed sources of funding. Once this programme document is approved, support should be provided to MoEP in pursuing the funding request.</p> <p>(ii) Support the SE4All Secretariat in designing and implementing SE4All AA at County level:</p> <ul style="list-style-type: none"> <li>■ Creation of county energy desks to report on SE4All planning and implementation and monitoring activities.</li> <li>■ Establish a programme for institutional and human resources at county level to increase the role of County Governments on energy planning needs and monitoring.</li> </ul> <p>(iii) Build capacity of SE4All Secretariat and county energy desk personnel:</p> <ul style="list-style-type: none"> <li>■ Management of SE4All activities implementation;</li> <li>■ SE4All related subjects and nexus areas including gender ; and</li> <li>■ Monitoring, evaluation and reporting of the SE4All activities.</li> </ul>	
<p><b>Resources:</b> To be implemented during the transitional period, with approximately 9 man/months of resources allocated.</p>	
<p><b>Timeline:</b> 2015-2016.</p>	
<p><b>Contact:</b> MoEP.</p>	



## 2.6.2 Analysis of Investment Projects to be included in Kenya's IP

**Table 36: Programme Investment Opportunity 2**

<p><b>Programme Description:</b></p> <p>This programme aims to provide technical advisory services to support the SE4All Secretariat/MoEP in the identification, analysis, design, and implementation of other actions and interventions that will contribute to the achievement of the SE4All goals in Kenya, with a special focus on the identification of investment programmes and projects to be included in Kenya's IP for its integration into the MTP and throughout the AA implementation process.</p>	<p><b>Implementation:</b></p> <p>Searching for TA implementation partners Lead: MoEP Partners: To be defined.</p>
<p><b>Specific Objectives/Outcomes:</b></p> <p>Identify, analyse, design and implement other SE4All actions and initiatives;</p> <p>Identify projects on energy access, energy efficiency and renewable energy to be implemented in Kenya that complement on-going projects and initiatives that contribute to the achievement of the Kenya SE4All goals.</p>	<p><b>Financing:</b> Proposal from TA assistance facility solicited <b>Allocated: 0€</b></p>
<p><b>Proposed activities</b></p> <ol style="list-style-type: none"> <li>i. Support the SE4All Secretariat in the development of Renewable Energy programmes for biomass, solar, wind, mini-hydro and geothermal.</li> <li>ii. Support the SE4All Secretariat in the implementation and consolidation of Energy Efficiency Programmes, including: <ul style="list-style-type: none"> <li>■ Assessment of opportunities for energy efficiency in multiple sectors.</li> <li>■ Demand side management programmes across the different sectors of activity.</li> </ul> </li> <li>iii. Create a mechanism to support early stage renewable energy projects into maturity and late stage renewable energy projects into financial close;</li> <li>iv. Develop a programme to identify, develop and implement renewable energy projects for heat and power, with particular emphasis in clean cooking and off-grid electricity services.</li> <li>v. Revise and update Kenya's IP to include the identified programmes and projects</li> <li>vi. Develop a capacity building programme for SE4All Secretariat/MoEP and County Energy Desks on these subjects.</li> </ol>	
<p><b>Resources:</b> To be implemented during the transitional period, with approximately 6 man/months of resources allocated.</p>	
<p><b>Timeline:</b> 2015-2016.</p>	
<p><b>Contact:</b> MoEP.</p>	

## 2.6.3 Capacity Building –production and end-users of REs

**Table 37: Programme Investment Opportunity 3**

<p><b>Programme Description:</b></p> <p>Replication of the JICA/ JKUAT where they do Solar PV training; there appears to be limited understanding in terms of the effective use of solar energy even at some University and TTI lecturers' levels and in the private vendors/installers. Such efforts for end users of RE shall be made through the Energy Institute.</p>	<p><b>Implementation:</b></p> <p>Searching for TA implementation partners Lead: MoEP Partners: To be defined.</p>
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**Table 37: Programme Investment Opportunity 3...**

<p><b>Specific Objectives/Outcomes:</b> Courses.</p>	<p><b>Financing:</b> Proposal from TA assistance facility solicited <b>Allocated: 0€</b></p>
<p><b>Proposed activities</b></p> <ul style="list-style-type: none"> <li>• Undertake a national research and human resource development road-mapping to assess the status of research in key energy technologies;</li> <li>• Promote local production of energy technologies and end –users of REs capacity building;</li> <li>• Form an inter-agency committee that shall ensure close collaboration with institutions that collect, analyze and prepare policy papers in order to access energy sector specific information;</li> <li>• Enhance research linkages between industry and academia; and</li> <li>• Continuously train and upgrade human resource capacity in the sector to keep up with the changing technological issues in collaboration with training institutions to develop appropriate training curriculum targeting key areas in the energy sector.</li> </ul>	
<p><b>Resources:</b> To be implemented during the transitional period, with approximately 6 man/months of resources allocated.</p>	
<p><b>Timeline:</b> 2015-2016.</p>	
<p><b>Contact:</b> MoEP.</p>	

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## 1.0 ANNEX: Development Process

The process of developing the AA/IP was conducted in 6 key stages.

**Stage 1** included literature review and interactions with MoEP and key stakeholders to enable identification of initiatives underway (or already undertaken) on which this AA/IP development could be built. This was provided for at the Kick-off meeting and at the Coordination meeting where the Inception Report was discussed with key stakeholders from public, private and civil society.

**Stage 2** involved bilateral consultations with public, civil, private and development partners to get inputs on required priority projects and reforms areas for consideration in the AA/IP. Consultation was enhanced by the formation of the SE4All Technical Team and SE4All Technical Committee as working group on the development of AA/IP.

**Stage 3** involved group stakeholder workshops of private sector, public sector and civil society. The workshop stakeholders reviewed results of the stock-taking and gap-analysis and contributed their inputs on;

- (i) Reforms required to create a conducive enabling environment for private and public investment in the energy sector;
- (ii) Identification of priority projects to meet SE4All goals for Kenya. In this stage, each group of stakeholders had a chance to analyse existing policies/plans/strategies/programmes, related gaps and each

provided suggestions on priority project areas and required reforms.

**Stage 4** involved training of Kenya stakeholders to develop the AA and IP documents and also in the prioritization of project and reforms areas identified in stages 1-3.

**Stage 5** involved county awareness forums on SE4All initiatives with focus on formation of SE4All County Technical Committees to oversee the implementation of AA/IP at county levels.

**Stage 6** involved a close consultation with the MoEP and energy sector players to agree on the focus of priority project areas and reforms.

These stages have been elaborated below.

The key sources of information on which this AA was developed were:

Stock taking and Gap Analysis Report produced with support from UNDP

Review of key energy sector documents, as provided by the Ministry and obtained from other sources

Stakeholder consultations (both bilateral and workshops sponsored by BizClim and UNDP) with private sector, public sector and civil society

Training workshop for selected key government and other country stakeholders conducted as part of the project.

### Stock Taking and Gap Analysis Report

Stock taking and gap analysis is the second stage of country process in the implementation of SE4All initiative and the key objective of the exercise is to identify the gaps and barriers to energy use and access with a view to developing an appropriate national action plan to address them.

The project started by building on the Gap analysis report by updating information on the gaps and barriers and soliciting for possible actions to address them. Some of the gaps already identified in the Stock Taking and Gap analysis study were also used in the framing of priority reforms and priority projects below.



**Table 38: Enabling Environment and Project Gaps from Stock Taking and Gap Analysis**

SE4All Goal	Enabling Environment gaps	Priority Project areas
Energy Service Access	Need for Financial frameworks for MFIs and project development and risk guarantees/buy downs Need for PPP policy Inadequate standards and enforcement of standards and regulations Insufficient technical capacity	Inadequate LPG storage and distribution infrastructure Inadequate off-grid and mini-grid power development
Energy Efficiency	Financial frameworks for energy audits Enhanced capacity for energy audit and operationalization & enforcement of regulations and standards Lack of policy incentives Limited awareness on EE cost and benefits	Institute Transmission and Distribution loss reduction Distributed generation close to load centres.
Renewable Energy	PPP model enhancement Financial frameworks for Investment and risk guarantees/interest buy downs Need to finalize power wheeling policy & tariffs, net metering & banking, PPA standards for large projects <sup>26</sup> Adequate standards and enforcement to avoid counterfeits	Local manufacture and assembly to reduce costs and avail RE technologies RE Resource Assessment Mini-grids Testing facilities for RE technologies Geothermal steam use in industry

### Key document review

At the start of the project MoEP provided the team with key reports and documents relevant to the energy sector and the Kenyan government's activities and plans as they link to energy access, energy efficiency and renewable energy. These were reviewed in their entirety, and supplemented by additional documents found online or through other sources.

### Stakeholder consultations

Bilateral consultations were carried out at Inception Stage with development partners, government and civil society and association organizations to gather views on what issues need to be addressed with respect to SE4All goals in the country in terms of priority project areas and reforms required. The output of this process was presented in the Inception Report and deliberated in a Coordination meeting held together with the key energy sector stakeholders headed by the MoEP.

Consultation workshops were held for the private sector stakeholder, the government stakeholder and civil society. The Ministry of Energy and Petroleum (MoEP) of Kenya led the organization of all the workshops and officiated at the workshops providing expectations of the Government of Kenya from the project with key ministry officials actively participating in the workshops. The SE4All Africa Hub partners NEPAD, UNDP and AfDB were all represented at in the

workshops and provided their support and guidance.

The overall objectives of the stakeholder workshops were to consult Kenya stakeholders on:

- Creating a conducive enabling environment for both private and public investments to take place in the energy sector;
- Identifying priority areas and projects that can contribute to meeting the SE4All goals for Kenya.

### Training workshop

The training workshop was held from 13-15th August 2014 as part of the Project Result Area 3 and was sponsored from the BizClim project budget. The Ministry of Energy and Petroleum (MoEP) of Kenya identified and invited the participants to the training workshop and a representative of MoEP officiated and chaired all 3 days of training sessions.

The main objective of the training workshop was to equip key Kenya stakeholders to be familiar with the process of developing a national AA and IP under the SE4All initiative hence empowering the stakeholders to actively participate in the development of the AA & IP and to implement Kenya's priority SE4All energy projects.

The Training workshop became an opportunity to deploy stakeholders to prioritize the priority project areas and reforms for the AA and also to initiate formulation of projects for the IP.

<sup>26</sup> Standardized PPA for 10 MW now in place.

## 2.0 ANNEX: Off-Grid Projects Seeking Funding

No.	Station	Proposed Solar (Kw)	Pv	Proposed Wind (Kw)	Estimated Solar Capital Cost (Usd)	Estimated Wind Capital Cost (Usd)	Estimated Total Capital Cost (Us\$)
1	Nachokui	100		100	3,215,016	776,294	3,991,310
2	Turkwel	150			3,470,148		3,470,148
3	Kaeris	100		100	3,215,016	776,294	3,991,310
4	Liboi	150			3,470,148		3,470,148
5	Gari	150			3,470,148		3,470,148
6	Dukana	100		100	3,215,016	776,294	3,991,310
7	Bubisa	100		100	3,215,016	776,294	3,991,310
Sub-total							26,375,684
8	Illeret	150			3,470,148		3,470,148
9	Darade	100		100	3,215,016	776,294	3,991,310
10	Furole	100		100	3,215,016	776,294	3,991,310
12	Kibish	150			3,470,148		3,470,148
13	Lokamarinyang	100			3,215,016		3,215,016
14	Kokuro	150			3,470,148		3,470,148
15	Nadapal	100			3,215,016		3,215,016
Sub-total							24,823,096
16	Napeitom	150			3,470,148		3,470,148
17	Kerio	150			3,470,148		3,470,148
18	Oropoi	150			3,470,148		3,470,148
19	Todonyang	150			3,470,148		3,470,148
20	Loyangalani	100		100	3,215,016	776,294	3,991,310
21	Lowarangak	100			3,215,016		3,215,016
22	Kakuma	100		100	3,215,016	776,294	3,991,310
23	Haut	100		100	3,215,016	776,294	3,991,310
24	Kalokol	100		100	3,215,016	776,294	3,991,310
Sub-Total							33,060,848

## 3.0 ANNEX – Details of Programme Investment Opportunities

**Investment Programme 1:** Management Support to SE4All Secretariat at Kenya's MoEP

### Programme Description

This programme aims to provide SE4All Technical Advisory services to MoEP on the establishment of the SE4All Secretariat that will be responsible for the overall development, implementation and monitoring of the SE4All activities in the Country.

### Relevant Implementation Arrangements

There are no legal issues, authorizations or related infrastructure required to implement this programme.

### Financing Overview

The total cost: 135,200€

Financing allocated: 0€

Financing gap: 135,200€

**Table 39: Cost estimates for Management Support to SE4All Secretariat at Kenya's MoEP.**

Activities	Implementation effort		Cost (€)
	m/d	m/m	
i. Prepare a programme document in support of the institutionalization and operation of Kenya's SE4All Secretariat.	34	1.5	27,200
ii. Support the SE4All Secretariat in designing and implementing SE4All AA at county level:	95	4.5	76,000
• Creation of county energy desks to report on SE4All planning and implementation and monitoring activities.	20	1	16,000
• Establish a programme for institutional and human resources on a regional level to increase the role of Regional Governments on local and regional energy planning needs and monitoring.	5	0.5	4,000
iii. Build capacity of SE4All Secretariat and County energy desk personnel.	15	1	12,000
<b>Total</b>	<b>169</b>	<b>8.5</b>	<b>135,200</b>

### Note:

This costs estimated only include advisory services to be provided. Expenses not included are: Costs of venues and per diems for capacity building activities; Salaries for people hired for the SE4All Secretariat and County Energy Desk as well as fixed costs related to the operation of the SE4All Secretariat and County Energy desks;

There are no particular risks attributed to the implementation of this programme.

The sponsor for the programme implementation has yet to be defined.

**Investment Programme 2:** Support SE4All Secretariat/MoEP in the Identification and Analysis of Investment Projects to be included in the Kenya's IP

### Programme Description

This programme aims to provide technical advisory services to support the SE4All Secretariat/MoEP in the identification, analysis, design, and implementation of other actions and interventions that will contribute to the achievement of the SE4All goals in Kenya, with a special focus on the identification of investment

programmes and projects to be included in Kenya's IP.

### Relevant Implementation Arrangements

There are no legal issues, authorizations or related infrastructure required to implement this programme.

### Financing Overview

The total cost: 108,000€

Financing allocated: 0€

Financing gap: 108,000€

**Table 40: Cost estimates for the Identification and Analysis of Investment Projects**

Activities	Implementation effort		Cost (€)
	m/d	m/m	
i. Support the SE4All Secretariat in the development of Renewable Energy programmes for biomass solar, wind, mini-hydro and geothermal.	20	0.9	16,000
ii. Support the SE4All Secretariat in the implementation and consolidation of Energy Efficiency Programmes.	30	1.4	24,000
iii. Create a mechanism to support early stage renewable energy projects into maturity and late stage renewable energy projects into financial close.	15	0.7	12,000
iv. Develop a programme to identify, develop and implement renewable energy projects for heat and power, with particular emphasis in clean cooking and off-grid electricity services.	40	1.8	32,000
v. Revise and update Kenya's IP to include the identified programmes and projects.	15	0.7	12,000
vi. Develop a capacity building programme for SE4All Secretariat/MEM and Regional Energy Desks on these subjects.	15	0.7	12,000
<b>Total</b>	<b>135</b>	<b>6.1</b>	<b>108,000</b>

**Note:**

These cost estimates only include advisory services to be supplied. To be implemented during the transitional period, with approximately 6 man/months of resources allocated.







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