



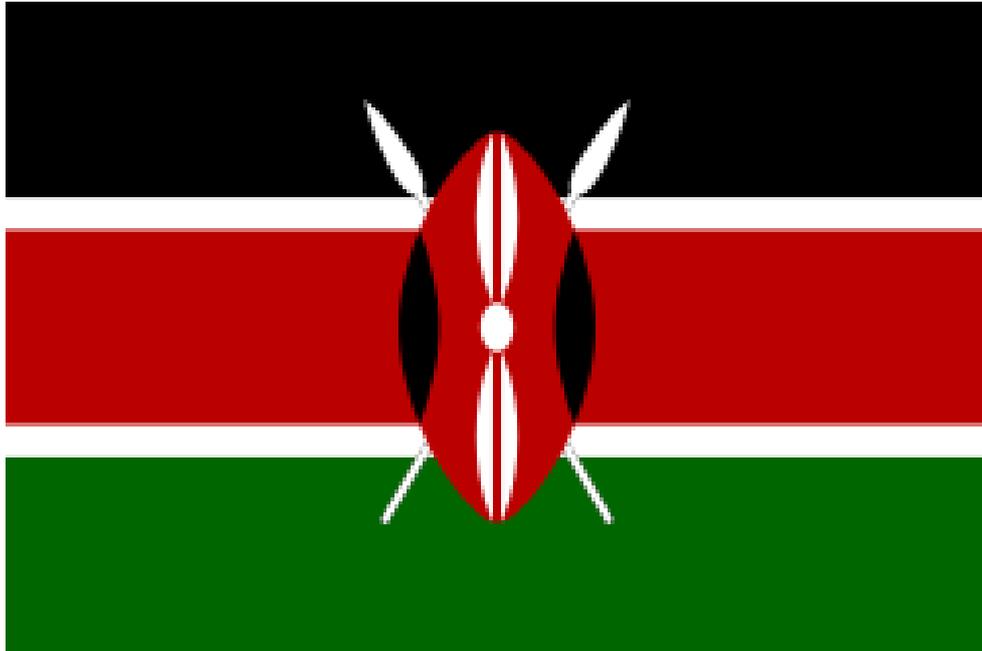
Ministry of Foreign Affairs

Final Energy report Kenya

Commissioned by the Netherlands Enterprise Agency

*>> Sustainable. Agricultural. Innovative.
International.*

Report Kenya



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Date: 30-7-2018

Version: 6 (final)

RVO

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Disclaimer

This document is based on information which is publicly available on the internet. The used publications and websites are mentioned in the Annex 1 of this document.

The information is checked with other sources. The information in Chapter 7 is based on interviews with several experts.

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1. Kenya General overview



Official name	Republic of Kenya
Area (km ²)	580.367 (14x Nederland)
Land Area (km ²)	569.140 (17x Nederland)
Population	47.615.739 (3x Nederland)
GDP per capita (2016 est) (WB)	\$ 1.455
Agriculture	tea, coffee, corn, wheat, sugarcane, fruit, vegetables; dairy products, beef, fish, pork, poultry, eggs The horticultural industry is growing by 20% annually.
Industry	small-scale consumer goods (plastic, furniture, batteries, textiles, clothing, soap, cigarettes, flour), agricultural products, horticulture, oil refining; aluminum, steel, lead; cement, commercial ship repair, tourism, information technology
CO ₂ emissions (t CO ₂ /capita)	0.31
Price of electricity (US cents/kWh)	20.2

Source: CIA Factbook, World Bank and Doingbusiness.org

2. Energy overview

Overview of the energy sector/General description

Kenya's economic growth has put the country's electricity supply under increasing pressure. Between 2004 and 2013 power demand rose by 18.9% annually. Under the Least Cost Power Development Plan, the country is focusing on the development of geothermal and hydroelectric power plants. After a 280 MW geothermal plant was commissioned in early 2015, electricity tariffs were decreased by up to 30% depending on the customer group. [1]

As concerns production of electricity, the existing capacity is barely able to keep up with demand. Given that more than 39% (2015) of Kenya's electricity comes from hydropower, the situation is particularly difficult during the summer months when water levels are low. Capacity gaps are then compensated by expensive thermal generation based on fossil fuels.

Increasing economic activities and a rising national population lead to a higher domestic energy demand in Kenya, which is mostly satisfied by imports of foreign energy. The high cost of energy imports significantly slows economic growth in the country. Imported crude petroleum, for instance, accounts for about 25% of the national import bill. The problem of high energy costs is supplemented by the unreliability of energy supply infrastructure. On average, Kenyan companies lose nearly 10% of their production because of power outages and fluctuations. Sustainable, affordable and reliable domestic energy for all citizens is, therefore, declared a priority factor in national policy. [3]

As utility-scale projects face a lengthy planning process, developers have started to target captive generation projects. The approval process for on-site power generation up to 1MW is far simpler and all projects below 3MW do not require a generation permit, which can be a lengthy process to obtain. The generation technology of choice is typically solar, although small hydro has been favoured in some regions – especially by the Kenya Tea Development Agency.[5]

Primary energy use/Energy supply

Total Primary Energy Supply	ktoe
Coal	349
Crude Oil	701
Oil products	3659
Natural gas	0
Nuclear	0
Hydro	326
Geothermal, solar, wind, etc.	3855
Biofuels and waste	16208
Electricity	2
Heat	0
Total	25100

Source IEA Statistics 2015

Energy consumption

Total final consumption	ktoe
Coal	349
Crude Oil	0
Oil products	3951
Natural gas	0
Nuclear	0
Hydro	0
Geothermal, solar, wind, etc.	0
Biofuels and waste	10771
Electricity	682
Heat	0
Total	15753

Source IEA Statistics 2015

Electricity use per sector

Final Electricity Consumption	GWh
Industry	4229
Transport	0
Residential	2544
Commercial and Public Services	1153
Agriculture/Forestry	0
Fishing	0
Other non-specified	0
Finale Electricity Consumption	7926

Source IEA Statistics 2015

Electricity production

Electricity production	GWh
Coal	0
Oil(12%)	1205
Gas	0
Biofuels (solid biofuels)	122
Waste	0
Nuclear	0
Hydro (39%)	3787
Geothermal (46%)	4479
Solar PV	1
Solar thermal	0
Wind	57
Tide	0
Other sources	0
Electricity production	9651

Source IEA Statistics 2015

Transmission and distribution

The national grid is operated as an integrated network linked by a 220 kV and a 132 kV transmission system; there are also a limited number of 66 kV transmission lines. The grid is one of the main challenges for the sector, and deficiencies lead to frequent power outages as well as technical and non-technical losses. As a result, the grid operators, KPLC and Ketraco, have put the emphasis on system reliability and the introduction of smart grid technologies. The authorities are currently extending transmission lines (4,000 km) and distribution lines (3,200 km), and building substations (4,200 MVA). Two pilot projects are aimed at introducing smart grid technologies in parts of Nairobi and Mombasa. [1]

Access to electricity (2015)	% of the population
Electrification total %	56 %
Electrification urban areas %	78 %
Electrification rural area %	39 %
Access to clean cooking	13 %

Source TRACKING SDG7: THE ENERGY PROGRESS REPORT 2018

Off-Grid Electrification

The Kenyan Government is working to rapidly increase electrification rates in both urban and rural areas. As part of its national Vision 2030—to create a globally competitive and prosperous nation with a high quality of life by 2030— Kenya aims to grow rural electricity access to 40% by 2024. [3]

The low rural electrification rate of 6.7% requires grid extension and electrification projects in remote areas of the country. Kenya's Rural Electrification Authority is concentrating mainly on the expansion of greenfield photovoltaic (PV) mini-grids and on retrofitting existing diesel-powered mini-grids. [1]

Several programs exist to expand distribution lines, reach remote villages, and maximize the utilization of existing transformers by connecting people within their immediate reach or in informal settlements underneath, often subsidized by DFIs. These have started to make an impact on energy access numbers. Kenya's electrification rate rose from 26% in 2012 to 55% as of mid-2016. Mini-grid capacity is rapidly growing in Kenya, despite uncertainties around geographic territory clauses in distribution tariffs. Kenya has become one of the best-served off-grid populations in the world, featuring some of the most advanced pay-as-you-go solar home system companies and innovative business models for mini-grid development.

[5]

3. Renewable energy

Kenya has promising potential for power generation from renewable energy sources. Abundant solar, hydro, wind, biomass and geothermal resources led the government to seek the expansion of renewable energy generation to central and rural areas. Following a least-cost approach, the government has prioritised the development of geothermal and wind energy plants as well as solar-fed mini-grids for rural electrification. [1]

Bio-energy

The country's agricultural activity produces large amounts of agricultural waste. These can be used to produce electricity by implementing biogas and biomass technologies. The 2014 National Energy Policy Draft also sets out biogas expansion targets of 10,000 small and medium-sized digesters by 2030. Biogas is considered a viable energy solution by a number of agricultural producers. [1]

Wind

Kenya has promising wind power potential. Thanks to its topography, Kenya has some excellent wind regime areas. The northwest of the country (Marsabit and Turkana districts) and the edges of the Rift Valley are the two windiest areas (with average wind speeds of over 9m/s at 50 metres). The coast has lower but promising wind speeds (about 5-7m/s at 50m).

It is expected that about 25% of the country will be suited to current wind technology. There is significant potential to use wind energy for wind farms connected to the grid, as well as for isolated grids and off-grid community electricity and water pumping. Kenya recently experienced a surge in wind energy installations for electricity generation. The largest windfarm in Africa (300 MW) is under construction in the Turkana area of north-western Kenya. The Ngong hills area close to Nairobi also has 5.1 MW installed and private investors plan to install several MW of capacity. An average of 80-100 small wind turbines (400 W) have been installed to date, often as part of a hybrid PV-wind system with battery storage. [1]

Land access has been a challenge for both site selection and transmission connection. The 310MW Lake Turkana wind farm, by far the largest clean energy project currently under construction, is expected to connect to the grid in 2018 after facing severe delays in the construction and transmission phases. Several other wind projects are in early planning stages, but are not expected to see a breakthrough soon.

[5]

Solar

Kenya has high insolation rates, with an average of 5-7 peak sunshine hours and average daily insolation of 4-6 kWh/m². The total potential for photovoltaic installations is estimated at 23,046 TWh/year.

Solar power is largely seen as an option for rural electrification and decentralised applications. Photovoltaic stand-alone systems for households and public institutions have been subsidised for some time. The government is aiming to install an additional 500 MW and 300,000 domestic solar systems by 2030. Commercial and industrial applications are also becoming increasingly important: flower and vegetable farms have already pioneered and installed captive renewable energy systems to contribute to the power supply on their premises. In addition, hybrid PV-diesel island grids are multiplying: 18 MW of existing diesel-run stations will be retrofitted for the use of solar power in the next few years. The Rural Electrification Authority (REA) also plans to install green-field hybrid island grids at a total investment of about USD 40m.

[1]

There are also a handful of large solar projects, each around 40MW, which received PPAs in late 2015. While the going feed-in-tariff for utility-scale solar is \$0.12/kWh, several projects have bid for PPAs at just two-thirds this price level. Once built, these solar projects will be among the largest PV plants in sub-Saharan Africa. However the stamina and risk appetite required to overcome challenges in PPA negotiation and land access, combined with slowing power demand growth, also casts a shadow on the other PV projects whose initial 'expression of interest' has been approved but whose permitting status is less advanced.

[5]

Hydro

The potential for large-scale hydroelectric power development is estimated to be 1,500 MW, of which 1,310 MW is feasible for projects with a capacity of at least 30 MW. Of these, 434 MW has been identified in the Lake Victoria basin, 264 MW in the Rift Valley basin, 109 MW in the Athi River basin, 604 MW on Tana River basin and 146 MW on Ewaso Ngiro North River basin. However, the projected generation costs for these sites mean they are excluded from the Least Cost Power Development Plan.

Small, mini and micro hydroelectric systems (with capacities of less than 10 MW) are estimated to generate 3,000 MW nationwide. In 1997, Kenya's Electric Power Act allowed independent power producers to supply electricity to the grid, but small decentralised schemes, such as micro hydropower, were not fully addressed. Around 55 river sites suitable for rural electrification have been identified as attractive commercial opportunities. Their maximum mean capacities would range from 50 kW to 700 kW. [1]

Geothermal

Kenya is endowed with geothermal resources, mainly in the Rift Valley. Conservative estimates suggest geothermal potential in the Kenyan Rift at 2,000 MW, whereas the total national potential is put at between 7,000 and 10,000 MW. Production started in 1981 when a 15 MW plant was commissioned in Olkaria. KenGen and an independent power producer currently produce a total of 129 MW. Geothermal power has been identified as a cost-effective power option in Kenya's Least Cost Power Development Plan. Exploration for geothermal energy in the high-potential areas of the Kenyan Rift are ongoing. [1]

The target for 2030 is 5,000 MW of geothermal power. [3]

The nation offers three pathways for geothermal engagement: contracts for sites owned by Kengen, partnerships with government-owned Geothermal Development Company (which takes on the exploration risk and sells the geothermal resource to power plant developers), or independent development on sites allocated by the government (in which the private developer takes on the exploration risk). Kenya's feed-in tariff price and significant past experience in geothermal development means that there is relatively reduced uncertainty in exploration and development of new projects or capacity additions, as well as ready access to development finance institution loans, within Kenya as compared to other regions in the world. Geothermal accounted for 27% of installed capacity in 2016, following the addition of a unit at Orpower's Olkaria geothermal project. Yet geothermal development is a lengthy process in the best of scenarios, requiring several years from conception to commissioning.

[5]

4. Energy efficiency

In Kenya, it is estimated that between 10-30% of the primary energy input is wasted (IEEN, 2002).

Significant opportunities exist for improving energy in all sectors, in particular, the industrial sector. Food, beverage and tobacco, paper and paper products, chemicals, petroleum, rubber and plastic products are among the major consumers of energy. Energy savings of up to 25 per cent are possible in steam systems, largely by improving the efficiency of steam boilers, better steam distribution, and the use and recovery of waste heat and condensate. Motor systems, the largest users of electricity in industry, are often oversized, resulting in lower efficiency of operation. Potential savings are of the order of 20-50 per cent through motor system efficiency.

The Kenya Association of Manufacturers (KAM, <http://www.kam.co.ke/>) provides training and energy audits on energy efficiency through the Centre for Energy Efficiency & Conservation (CEEC). KAM also manages the annual Energy Management Award (EMA), which recognizes major and sustainable gains in energy efficiency, energy and cost reductions.

The production of energy efficient charcoal and fuel-wood stoves has provided significant employment opportunities in urban and rural areas. For example, the Ceramic jiko, an energy efficient charcoal stove which are produced by over 200 businesses, the bulk of which are informal sector manufacturers. [3]

5. Governmental framework

The institutional arrangement in the electricity sub sector in Kenya currently comprises the Ministry of Energy (MOE), Energy Regulatory Commission (ERC), Kenya Generating Company (KENGEN), Kenyan Power and Lighting Company (KPLC), the Rural Electrification Authority (REA), Kenya Transmission Company (KETRACO), Geothermal Development Company (GDC) and Independent Power Producer (IPPs). [3]

Relevant governmental stakeholders are:

Ministry of Energy (MOE)

The ministry oversees policy and strategy development for the entire sector.

<http://www.energy.go.ke/>

[1]

MOE is mandated by both the Policy and the Law for the stewardship of the sector through energy policy development. The Ministry is in charge of creating energy policies to enable the efficient operation and growth of the sector, and facilitating the mobilization of resources for the sector investment. [3]

Energy Regulatory Commission (ERC)

The Energy Regulatory Commission was established under the Energy Act 2006. In terms of renewable energy, the ERC drafts and publishes regulations, coordinates the indicative energy planning process, sets electricity tariffs, collects and maintains data and carries out the licensing process for independent power producers looking to connect power plants to the national grid.

<http://www.erc.go.ke/>

[1]

The ERC is responsible for aiding the Ministry in the formulation of national energy policy with statistics and information as necessary. [3]

ERC is the single sector regulatory agency responsible for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review, licensing enforcement, dispute settlement, and approval of power purchase and network service contracts.

It oversees pricing and plays a role in negotiation of Power Purchase Agreements (PPAs) between KPLC and the power producers as private entities.

[3]

The ERC is operationally independent. The ERC finances its activities from a levy in electricity tariffs, license fees, the petroleum levy and appropriations by Parliament. The Commission's Chairman is appointed by the President for four years with a possibility of reappointment for another four years. The President may terminate the appointment of the Chairman on the advice of the Commission for specific reasons stated in the Energy Act 2006. [3]

Rural Electrification Authority (REA)

The Rural Electrification Authority was set up in 2007. It implements the Rural Electrification Programme, which involves planning and commissioning power plants in off-grid areas. Its aim is to accelerate the pace of rural electrification in order to promote sustainable socio-economic development. Under the Energy Act, the REA is mandated to perform the following functions:

- Managing the Rural Electrification Programme Fund

- Developing and updating the rural electrification master plan
- Promoting the use of renewable energy sources including small hydro installations, wind, solar, biomass, geothermal, hybrid systems and oil-fired components, taking into account the specific needs of certain areas including the potential use of electricity for irrigation and in support of non-farm income-generating activities.
- Implementing and sourcing additional funds for the rural electrification program
- Managing the delineation, tendering and award of contracts for licenses and permits for rural electrification

<http://www.rea.co.ke/>

[1]

Kenya Power and Lighting Company (KPLC) Ltd.

Kenya Power is the main off-taker in the power sector. The publicly-listed utility signs purchase power agreements (PPAs) with KenGen and all independent power producers looking to inject electricity into the national grid. It is responsible for power transmission and distribution as well as supplies to consumers. Kenya Power's mandate is expected to decline as the ERC plans to create an independent power system operator (ISO). The entity is intended to operate as a middleman between the distributor, transmitter and generator in order to ensure that only the cheapest energy available in the market is fed into the power grid.

<http://www.kplc.co.ke/>

[1]

Kenya Electricity Generating Company (KenGen)

KenGen is Kenya's largest power producer and operates hydro, geothermal, and gas- and diesel-fired power plants. The company's output accounts for 72% of the electricity consumed in the country. KenGen is 70% state-owned, with the remaining 30% held by private investors.

<http://www.kengen.co.ke/>

[1]

Kenya Electricity Transmission Company (KETRACO)

KETRACO is a transmission company. As a government-owned entity, KETRACO plans, designs, builds, operates and maintains all new transmission lines above 132 kV. Existing lines are operated and maintained by Kenya Power.

<http://www.ketraco.co.ke/>

[1]

Geothermal Development Company (GDC)

The Geothermal Development Company (GDC), a 100% state-owned company established in 2008 under the Companies Act. The GDC falls under the MOE and is responsible for the exploration of geothermal fields, exploration and production drilling, development of steam fields and concluding contracts for the off-take of steam by power plant operators.

<http://www.gdc.co.ke/>

[1] [3]

Independent power producers

The liberalization of the generation market has seen 13 independent power producers cut into KenGen's market share, and the government has mandated Ketraco to compete with Kenya Power on transmission. Distribution and retail are also beginning to open up to independent players, with

mini-grid developer PowerHive receiving the first independent distribution license from the Energy Regulatory Commission in 2016.

Kenya still has an oversupply of power generation relative to demand and demand growth has continued to slow. However, low hydro levels due to drought and the idling of diesel generators create some opportunities for new generators. [5]

A number of Independent Power Producers (IPPs) are currently active in Kenya. Power Purchase Agreements are negotiated with KPLC on a project by project basis. [3]

Private investors such as IberAfrica, Tsavo and Or-Power produce and sell electricity to KPLC. They currently run 28% of Kenya's generating capacity. [1]

Climate Innovation Centre (CIC)

This business hub for African climate technology entrepreneurs was launched in Nairobi to boost locally sourced green technologies in the Africa region. The Kenya Climate Innovation Centre (CIC), a cutting-edge facility, will offer financing and other services to a growing network of climate innovators and entrepreneurs. The first of its kind in the world, it is expected to support up to 70 sustainable climate technology ventures in the first five years, and is set out to generate 4,600 direct and over 24,000 jobs in total within 10 years. [3]

6. Regulatory framework

The Kenyan government is dedicated to putting in place the conditions for renewable energy. The electricity sector is unbundled. Generation by independent power producers is permitted by law and is regulated. The private sector produces 28% of Kenya's centralised electricity supply. The Energy Act 2006 set out a framework for regulation and rural electrification. Renewable energy sources will play a major role in the expansion of centralised generating capacity and rural electrification over the coming decades. The government has drawn up a least-cost development plan and prioritises resources that enable the power sector to grow as efficiently as possible. Another sign of the government's commitment is the feed-in tariff. The tariff was revised twice after the private sector criticised it as being too low to enable economically viable renewable energy projects. A net metering regulation is under development. [1]

Future wind and solar projects will likely find themselves in a new policy environment before 2020. Kenya intends to roll out an auction for wind and solar, to replace the ongoing feed-in tariff. The country has been seeking to amend its National Energy and Petroleum Policy since 2014, although the new draft is still undergoing approval. The Energy Ministry also intends to introduce net metering for customer-sites generation (dependent on the enactment of the energy bill), establish regulations for mini-grids, and has started exploring the idea of local-currency-denominated tariffs in a bid to encourage local commercial banks to participate in energy projects. These proposed policies are unlikely to progress until after the August 2017 elections, and demark a time of policy upheaval in a country that has seen otherwise stable support for renewable energy in recent years. [5]

Energy Act 2006

The Energy Act 2006 outlines national policies and strategies for short- and long-term energy development. The broad objective of the new energy policy is to ensure the adequate, high-quality, cost-effective and affordable supply of energy while also protecting the environment. Furthermore, the Act created the ERC and the REA. A series of additional regulations, including the Electricity Licensing Regulations and the Energy Solar PV Systems Regulations that set out licensing procedures, have been published under the Energy Act 2006. [1]

Least Cost Power Development Plan 2010 (LCPDP)

Kenya's generation and transmission system planning is based on a 20-year, rolling Least Cost Power Development Plan, which is updated every year. As a result of the power production costs, a mix of geothermal (20%), nuclear (19%), coal-fired (13%), wind (9%), hydroelectric (5%), medium-speed diesel (9%) and gas-fired (11%) power plants will be commissioned by 2030 to ensure reliable energy supply. Furthermore, the plan accounts for 9% of imports. The total estimated cost of system expansion for the 2011-2031 period is USD 41.4bn. [1]

Feed-in tariff

Feed-in tariffs (FITs) were introduced in 2008 and revised in 2010 and 2012. The regulation enables independent power producers to sell electricity to KPLC at a fixed price for a fixed term of 20 years. The tariffs vary depending on the technology. Inflation is taken into account by the percentage escalable portion. The tariffs should reflect the power generation costs and should not exceed the long-term marginal costs for on-grid systems of 12 US cent/kWh.

Further conditions include:

- The off-taker is obliged to buy the electricity produced.
- All connection costs are borne by the project developer/Investor.

- The standardized PPA is applicable to all systems with a capacity of up to 10 MW.
- The FIT regulation is revised every three years or less. The changes only apply to new systems.
- The regulation sets out the application process. [1]

Significant technology cost declines, especially for solar, have increased the appeal of the tariffs and led to an oversupply in proposed sites. By late 2016, Kenya had 2-3GW of proposed renewable energy projects in its FIT, compared to an installed grid capacity of just over 2.3GW. The surplus of projects reduces the incentive to rush large renewables projects to commissioning, and has led to growing uncertainty around permitting and PPA timelines for developers. Several clean energy projects have also been held back while renegotiating clauses in the default PPA template. [5]

Standardized power purchase agreements

In order to keep transaction costs to a minimum, Kenyan authorities have published standardised power purchase agreements for systems with capacities above and below 10 MW. The agreements are open to technologies. In regard to PPA contracts the following principles apply:

- There are no bidding procedures for locations or resources in place. Applications are considered on a first come, first served Basis.
- The systems are embedded and the national control centre cannot command add or switch off Systems.
- The standardised PPA has a “step-in” clause.

[1]

Electricity Licensing Regulations

The Electricity Licensing Regulations published by the ERC sets out the conditions and requirements for obtaining an electricity licence, as well as the duties of a licensee. [1]

Connection Guidelines for Small-Scale Renewable Generating Plant

The Connection Guidelines for Small-Scale Renewable Generating Plant published by the regulator establish procedures and the use of equipment to ensure the sound injection of electricity from small renewable energy systems into the distribution network. [1]

Energy Management Regulations

The Energy Management Regulations 2012 are aimed at expanding the use of energy-efficient technologies in industrial and commercial businesses, as well as in public institutions. The application of renewable energy also counts towards the increase in energy-efficient measures.

[1]

Climate change

Kenya has an ambitious INDC which it submitted to the UN, underpinned by a 30% emissions reduction target in 2030 compared to business-as-usual. Its stable and lucrative feed-in tariff policy has attracted a lot of interest from developers and sustained large pipeline of renewable energy projects. However, few of these projects have been able to move forward and proposed policy changes may signal uncertainty for new investors. Clean energy (excluding large hydro) accounted for 51% of total power generation in 2016. This value rises to over 80% inclusive of large hydro. Kenya does not have a specific renewable energy target. [5]

Regulatory barriers

The lack of access to comprehensive, accurate and reliable information on the renewable energy regulatory landscape in Kenya has been a significant barrier to private sector participation. Types and

number of licenses/clearances, application procedures, associated costs, contacts of related government agencies, expected turn-around time and the sequence of application process remains a mystery to many local and international investors interested in the renewable energy subsector in Kenya. [3]

7. Access to finance

The financial sector in Kenya is starting to embrace the renewable energy sector. Most renewable energy companies initially started offering their own financing services to their customers. In Kenya the financial institutions are starting to take over this financing component from the renewable energy companies. One good example is Equity bank, who is taking on an increased role in the distribution of solar home systems and cookstoves. Another observable trend is that the financial sector is now offering to take over accounts receivables from renewable energy companies. This is a clear sign that the market for renewable energy is becoming more mature in Kenya.

8. Opportunities and barriers for Dutch companies

Opportunities

There are many interesting opportunities in Kenya regarding renewable energy. Despite the fact that already many serious players are active in Kenya, the market that remains to be served is enormous. Compared to other African countries it is rather easy to do business in Kenya. This is reflected by their rank in World Banks ease of business index, where they are ranked 80th.

Another important benefit is the relatively high price for electricity. As previously mentioned in this report the retail price for one KWh is roughly 20 USD cents. With the high solar irradiation and favourable taxation regime for renewable energy products and services this seems to be a promising business opportunity.

The market for renewable energy is becoming more mature, which means that the existing banks are also willing to support part of the financial process related to supplying renewable energy technology and services.

Another facilitating factor in Kenya has been the penetration of mobile phone based money transfers. 96%¹ of the adult population has access to 'mobile money'. Mobile money enables people to transfer money and make payments without using a formal bank account. The high penetration rate of mobile money enables companies providing renewable energy products and services to apply the pay as you go model. In this model households pay a monthly fee instead of the full investment up front. This enables companies to serve far more people as most rural households would not be able to make the total investment that is required up front, while many are able and willing to pay such a monthly fee for access to electricity.

Another sign of the market becoming more mature is the fact that households are starting to demand bigger systems. Previously people were satisfied with a system of two lamps and a phone charger. Nowadays people demand higher tier systems that provide a higher level of energy service. Also people who had previously bought a low capacity solar home system are now starting to exchange them for systems with a higher energy output. Companies are also looking to sell larger systems, because this results in a higher profit margin per product while the costs related to the sale are virtually the same as for smaller systems.

Energizing development has implemented Result Based Finance in Kenya, according to one of the interviewed experts this has had a positive impact on the sector. Besides the additional connections the sector has become much more professional. This is exemplified by the way companies operate and the way they manage their own administration. This in turn attracts other serious players. For banks it is also much easier to work with these more professional players.

Kenya furthermore serves as a regional hub. Most large companies are present in Kenya which has a positive networking effect. Many of the investors are also based in Nairobi which makes it easier to find the required funding. Nairobi can furthermore be considered as the heart of innovation, the ecosystem has a lot of interesting companies trying new business models.

The market for solar home systems is already rather developed in Kenya, people are aware of the technology and benefits but there remains a very large market to be served.

¹ <https://www.cnet.com/news/kenya-mobile-money-vodafone-mpesa-10-years/>

Another interesting upcoming market is for renewable energy for productive use, such as solar water pumps, solar based refrigeration and solar drying. The use of these technologies is not yet widespread but demand appears to be high.

Solar water heaters are also commonly used for companies that have a significant low-temperature heat demand.

Considering the relatively high prices of electricity there also seems a good business case for providing either electricity directly or selling larger scale pv systems to enterprises that use a large amount of electricity.

The power supply in Kenya is still unreliable with blackouts and brownouts still occurring every now and then. More importantly the variability of the voltage delivered in the grid is rather high. This can damage the equipment connected to the grid. For this reason many companies with expensive equipment have backup generators that are automatically turned on when the voltage is outside the specified limits. This could be interesting for companies that supply generators.

Another interesting development is the regulation regarding solar water heaters that came into force since November 2017. Any building with a hot water requirement of 100 litres of hot water or more, is required to install a solar water heater. In practice any house with more than 3 bedrooms is expected to have this water requirement and therefore needs to install a solar water heater. The fines for not doing so amount to 1 million Kenyan Shilling or jail time. So far only around 77.000 solar water heaters are installed². This means there is a huge remaining market, with a serious incentive for people to invest.

Finally there is an interesting opportunity regarding the 100 million euro fund for 14 marginalized counties, part of this fund will be allocated to energy infrastructure.

Challenges

As described above there are many opportunities in the Kenyan market. This has already attracted a lot of companies to Kenya. This also means that one can expect fierce competition, making it difficult for new entrants. Especially in the easier segments such as solar home systems one would have to compete with large companies such as Mobisol and D.Light.

Kenya already has very strong institutions such as the rural electrification authority and Kenya Power and Lighting Company. These are very well capitalized by the World Bank. REA and KPLC naturally target the lowest hanging fruit first, meaning that for example in the mini grid market only projects below 10MW are left, that are rather difficult to make profitable.

Another challenge is to find sufficient talented people. According to one interviewed expert local talent is about 50% more expensive than similar quality talent in the EU as there is a high demand but relatively limited supply. Making use of expatriates is even more expensive.

According to one of the companies that was interviewed it is rather difficult to import goods into Kenya. Goods need to be inspected before they are loaded onto a container to be transported to Kenya, this is done either by SGS or Intertec. These types of inspections typically take long according to the interviewee, additionally it was reported that often reasons for not providing permission or to delay the process appear to be made up. He advised to always work with a local partner when importing goods into Kenya.

² <https://www.constructionkenya.com/5165/kenya-solar-water-heaters-law/>

9. Dutch companies active in Kenya

Advance consulting*
Barefoot Power
Ecozoom*
Everest Energy
Greenlink
KP&P Africa B.V.
Mimi Moto*
Solar Now*
Solar Techno Europe*
Solarus*
Waka Waka

Companies marked with * took part in an interview related to taking part in a green trade mission

10. Relevant Dutch support schemes

Subsidies & Programmes run by the Netherlands Enterprise Agency (RVO)

This chapter provides a selection of the programmes run by the Netherlands Enterprise Agency (RVO). For a full overview: <http://www.rvo.nl/subsidies-regelingen> (in Dutch)

For country specific information see:

<https://www.rvo.nl/onderwerpen/internationaal-ondernemen/landenoverzicht/tanzania>

Dutch international governmental network

The Dutch government has an extensive network of international offices. This network helps companies by advising them, making contacts for and opening doors. They are present on site, know local players, networks and the market, and know how to deal with language and culture barriers.

They can help Dutch entrepreneurs finding their way abroad when doing business internationally. They can help to find reliable, foreign business partners. They also can make a business partner scan.

<https://www.rvo.nl/onderwerpen/internationaal-ondernemen/netwerken-en-contacten/buitenlandnetwerk>

Dutch Good Growth Fund (DGGF)

The Dutch Ministry of Foreign Affairs provides finance and insurance through the Dutch Good Growth Fund (DGGF) programme, facilitating development related trade and investment in over 60 countries. The fund consists of 3 parts:

Investing

The DGGF provides Dutch SMEs doing business in developing countries and emerging markets with customised financing. Do you want to invest in a DGGF countries, but have trouble getting the necessary financing? The DGGF facility Investing Dutch SMEs offers guarantees and direct financing with a repayment obligation, such as loans and equity investments in projects.

Local SMEs

Do you manage an investment fund that aims to improve the access of local SMEs to finance? Read more about the DGGF facility Investment funds local SMEs.

Exporting

If you need help exporting capital goods to one or more of the DGGF countries, the DGGF facility Exporting Dutch SMEs provides export credit insurance and export financing.

More information: Find information about the qualifications, procedures and transactions on english.dggf.nl.

The Dutch Good Growth Fund is a programme of the Dutch Ministry of Foreign Affairs. It is administered by the Netherlands Enterprise Agency (RVO.nl), Atradius Dutch State Business (for Dutch SMEs) and a consortium of PwC and Triple Jump (for local SMEs).

Dutch Trade and Investment Fund (DTIF)

The Dutch Trade and Investment Fund (DTIF) consists of two components: Investment and Exports. The fund was established in 2016 and replaces the Facility Emerging Markets (FOM) and Finance for International Business (FIB) financing instruments.

For whom?

Dutch companies wanting to invest in or export to foreign markets can apply for DTIF. The fund was established to stimulate the globalisation of Dutch companies.

Budget

DTIF can offer up to € 15 million in financial support for each project. The total budget is € 102 million.

For which countries?

DTIF is available to all countries, with the exception of those which are eligible for DGGF finance and countries under sanction by the United Nations Security Council or the European Union. These applications will be assessed with extra scrutiny. The sanctions policy of the Security Council and/or European Union will be maintained in all cases.

DTIF Investment

DTIF Investment offers support through loans, guarantees and direct or indirect shares with a repayment obligation. The Netherlands Enterprise Agency (RVO.nl) serves as the fund manager for this facility.

DTIF Exports

Interested in exporting capital goods to one or more DTIF countries? The DTIF Exports facility can help by offering export credit insurance and funding. Atradius Dutch State Business serves as fund manager for this resource.

Differences between DTIF and DGGF

DTIF is closely linked to the Dutch Good Growth Fund (DGGF). However, the two funds differ in terms of their target countries. DGGF is mainly focused on developing countries, whereas DTIF targets other foreign markets.

DTIF is open to all Dutch companies, whereas DGGF exclusively services businesses in the SME sector. DTIF does not offer funding for local SMEs, while DGGF does.

Energising Development Partnership Programme (EnDev)

The Energising Development Partnership Programme (EnDev) gives households, social institutions and SMEs in developing countries permanent access to modern energy technologies and energy services. The projects take place in 24 countries in Africa, Latin America and Asia.

What does EnDev do?

EnDev supports the development of markets for modern energy facilities, especially in rural areas. For example, the development of renewable energy to cook, for lighting and for mobile phones. Part of the EnDev programme is the training and coaching of manufacturers and retailers of for example energy-efficient cookstoves and small solar energy systems. The programme also supports the construction of electricity connections via mini-grids and better network coverage. And EnDev stimulates the production of biogas digesters for household purposes.

Outcome-oriented

The EnDev program focuses on supply and demand. On the demand side, financial products can be developed that allow poor households to buy energy products. On the supply side, projects concern the quality and availability of these energy products.

The programme EnDev has no subsidy component. It publishes Specific Calls for Proposals in the form of Result Based Financing (RBF). The calls can be found on the website www.endev.info.

Background

EnDev is a partnership between the Netherlands, Germany, Norway, Australia, the United Kingdom and Switzerland. The programme is coordinated by the German Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Netherlands Enterprise Agency (RVO.nl). RVO.nl does this on behalf of the Dutch Ministry of Foreign Affairs.

More information can be found at www.endev.info.

Starters International Business (SIB)

Exporting goods and services abroad offers your business more opportunities. It can lead to greater sales and serve as a solution to the challenge of increased competition in the domestic market. With its Starters International Business (SIB) programme, the Ministry of Foreign Affairs can help you move into foreign markets.

Vouchers

Export allows you to effectively spread your risks. Buy how do you start? What are your company's strengths? Which markets can offer opportunities and how can you successfully seize them?

Three different SIB vouchers can help you with your plans to take your business abroad:

- Individual coaching voucher (in Dutch) to hire a consultant / coach to look at your opportunities abroad and to work towards a concrete plan of action.
- Collective activity voucher (in Dutch) to participate in an outbound trade delegation or a joint trade fair presentation.
- Knowledge acquisition voucher to hire an international lawyer or tax consultant.

DHI

Subsidy scheme for demonstration projects, feasibility studies and investment preparation studies (DHI)

The DHI scheme supports Dutch enterprises that want to invest in or execute a project in emerging markets and in developing countries.

The DHI scheme is a tender programme. Enterprises can submit a tender during the tender periods. The 1st tender for 2018 closed on 29 March at 3 p.m. The 2nd tender in 2018 opens on 9 August and closes on 21 September, 3 p.m. (Dutch time).

3 modules

The DHI scheme consists of 3 modules:

- Demonstration projects: presentation of a technology, capital goods or service in one of the DHI countries.
- Feasibility studies: assessment of the profitability of a foreign investment in a product or service.
- Investment preparation studies: assessment of the technical and commercial profitability of an investment in a company in one of the DHI countries.

For whom?

DHI focuses on SMEs in the Kingdom of the Netherlands with international ambitions and an interest in emerging markets and developing countries. The SME test tells you whether you are an SME entrepreneur.

Countries

The DHI scheme is open to projects in all countries, with the exception of the European part of the Kingdom of the Netherlands and possibly countries that are subject to international sanctions.

More information (in Dutch) can be found on the Dutch RVO website.

Clean Cooking Programme

The Netherlands Enterprise Agency participates in the Clean Cooking Programme, which supports key stakeholder organisations in the cooking energy sector in Kenya, Ghana, Uganda, Ethiopia and Bangladesh. This programme is not a subsidy programme.

Developing markets for clean cooking

Every year there are more than 4 million deadly accidents in developing countries because of cooking in traditional ovens or on open fires. The commitment of international organisations and local governments, companies and NGOs can help the development of commercial markets for energy-efficient cookstoves with lower emissions or for smoke-free ovens. In this way, these ovens will become widely available to people in developing countries.

Connecting people and networks

The Global Alliance for Clean Cookstoves plays an important role in building international networks. Nationally, this work is done by National Alliances for Clean Cookstoves. The Netherlands Enterprise Agency supports the growth of these key stakeholder organisations.

11. Relevant international donors

The following international donors are active in Africa and are relevant for energy related projects in African countries. The overview below is a shortlist for more details we refer to the websites mentioned in the text.

The World Bank

The World Bank is a vital source of financial and technical assistance to developing countries around the world.

The Bank is made up of two unique development institutions owned by 184 member countries:

- the International Bank for Reconstruction and Development (IBRD)
- the International Development Association (IDA)

Each institution plays a different but supportive role in the Bank's mission of global poverty reduction and the improvement of living standards. The IBRD focuses on middle income and creditworthy poor countries, while IDA focuses on the poorest countries in the world.

Together they provide low-interest loans, interest-free credit and grants to developing countries for education, health, infrastructure, communications and many other purposes.

Target group: consultants, businesses, government, industries.

More information: <http://www.worldbank.org/>

International Finance Corporation (IFC)

IFC is a sister organization of the World Bank and member of the World Bank Group. IFC is the largest global development institution focused exclusively on the private sector in developing countries. The Bank Group has set two goals for the world to achieve by 2030: end extreme poverty and promote shared prosperity in every country.

The IFC applies their financial resources, technical expertise and global experience to help their clients and partners to overcome financial, operational, and other challenges.

IFC is also a leading mobilizer of third-party resources for projects.

More information:

https://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/home

Energy Sector Management Assistance Program(ESMAP)

ESMAP is a partnership between the World Bank Group (WBG) and 18 partners to help low and middle-income countries reduce poverty and boost growth, through environmentally sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the WBG's country financing and policy dialogue in the energy sector. Through the WBG, ESMAP works to accelerate the energy transition required to achieve Sustainable Development Goal 7 (SDG7) to ensure access to affordable, reliable, sustainable and modern energy for all. It helps to shape WBG strategies and programs to achieve WBG Climate Change Action Plan targets: 28% of WBG financing with climate co-benefits; scale up 20 GW in renewable energy generation and integrate an additional 10 GW of variable renewable energy sources into grids over 5 years; mobilize \$25 billion in commercial funds for clean energy; invest at least \$1 billion to promote energy efficiency and resilient buildings by 2020; and, increase support to policy actions for sector reform, including for fossil fuel subsidies.

More information: <https://www.esmap.org/>

African Development Bank (AfDB)

The African Development Bank group (ADB) is a multilateral development bank. The Bank group's primary objective is to promote sustainable economic growth in order to reduce poverty in Africa. It achieves this objective by financing a broad range of development projects and programs through:

- loans;
- equity investments;
- technical assistance.

The Bank prioritizes national and multinational projects and programs that promote regional economic cooperation and integration. The Bank group consists of:

- African Development Bank (ADB);
- African Development Fund (ADF);
- Nigerian Trustfund (NTF).

Target group: Small and medium-sized enterprises (SMEs).

More information: <https://www.afdb.org/en/>

Sustainable Energy Fund for Africa: Project Preparation Grants and Seed/Growth Capital. It is an equity/grant. See also: <https://goo.gl/D71MEh>

The European Union (EU)

The EU invests in countries and regions within Europe (internal programs), but also in countries outside Europe (external programs). In addition, the EU also spends orders and services for its own use.

External programs

The European Commission spends part of the EU budget on aid programs in countries outside the EU. https://ec.europa.eu/europeaid/home_en

The responsibility for the implementation of external aid programs and the procurement of contracts lies with the Directorate-General (DG) for International Cooperation and Development (DG DEVCO) . https://ec.europa.eu/europeaid/general_en

DG DEVCO also does this for programs from, among others, the Directorate-General for Neighbourhood and Accession Negotiations (DG NEAR).

On the website of DG DEVCO you will find information on how you can qualify for:

- Financial support from the EU budget for relief activities.
- Assignments in the framework of the European aid programs.

You will also find practical information about procedures, conditions, contracts and more.

European Investment Fund (EIF)

The EIF's activity is centred upon two areas, venture capital and guarantees:

- EIF's venture capital instruments consist of equity investments in venture capital funds and business incubators that support SMEs, particularly those that are early stage and technology-oriented;
- EIF's guarantee instruments consist of providing guarantees to financial institutions that cover credits to SMEs.

Through the leverage effect of its venture capital and guarantee instruments, the EIF is able to contribute to the development of SMEs in the EU Member States and the candidate countries. Both instruments implemented by the EIF for SMEs are complementary to the Global Loans provided by the European Investment Bank to financial intermediaries in support of SME financing. EIF's instruments are implemented on commercial terms.

SMEs in search of finance are requested to contact an EIF intermediary in their country or region for information on eligibility criteria and application procedures.

Target group: Small and medium-sized enterprises (SMEs) in the European Union and the candidate countries

More information: www.eif.org

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH(GIZ)

GIZ is a provider of international cooperation services for sustainable development and international education work. GIZ has over 50 years of experience in a wide variety of areas, including economic development and employment, energy and the environment, and peace and security.

GIZ works for the German Government, European Union institutions, the United Nations, the private sector and governments of other countries. The German Federal Ministry for Economic Cooperation and Development (BMZ) is the main commissioning party.

The registered offices of GIZ are in Bonn and Eschborn. In 2016 GIZ had a business volume of around EUR 2.4 billion and 19,506 employees in 120 countries. Almost 70 percent of them is national personnel working in the field.

More information: <https://www.giz.de/en/html/index.html>

Annex 1 References

- [1] <https://www.africa-eu-renewables.org/market-information/kenya/>
- [2] <http://www.iea.org/statistics/statisticssearch/>
- [3] <http://www.reegle.info/countries/kenya-energy-profile/KE> (This policy & regulatory overview is not updated anymore since 2015. We decided to keep it online due to high demand but would like to make you aware of the fact that it might be outdated).
- [4] <https://www.cia.gov/library/publications/resources/the-world-factbook/>
- [5] <http://global-climatescope.org/en/country/kenya/#/enabling-framework>
- [6] <http://www.doingbusiness.org/data/exploreeconomies/kenya/#getting-electricity>
- [7] <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=TZ-KE-MZ-ZA-UG>
- [8] <http://www.irena.org/publications/2018/May/Tracking-SDG7-The-Energy-Progress-Report>

Annex 2 Legislation

Source [5]

Kenya Climate Fund – Current

Kenya's National Climate Fund will be the key mechanism for raising and allocating funding from development partners (and potentially domestic bodies) to go towards climate change activities. The Climate Change Bill to establish the fund was signed into law by the President on 6 May 2016. Setting up a National Climate Fund was one of the tasks agreed in the National Climate Change Action Plan 2013-17, which was launched on 27 March 2013. The government has estimated that setting up the fund would cost KES 190-470bn (USD 2.2-5.5bn) over 2013-17.

Under the Climate Change Bill, which was signed by the current President Uhuru Kenyatta, the fund is to be managed by the National Climate Change Council, to source financing from within and outside government to support mitigation and adaptation activities by the Authority and civil society. The Council itself is to advise national and regional governments on how to cope with climate change, punish environmental offenders, and implement local and international agreements on climate issues. The body is authorized to coordinate climate negotiations and set greenhouse-gas emission targets. President Kenyatta has faced challenges in confirming his nominees for the Council, and it is not actively administering a Climate Fund as of yet.

In addition to the proposed National Climate Change Fund, Kenya has an Adaptation Fund administered by the National Environment Management Authority (NEMA). While labelled as climate finance, the fund has mostly assisted food security, agriculture and conservation. The 2016-17 Budget allocated 437.107 million shillings (4.3 million US dollars) to the Adaptation Fund. NEMA also administers a Green Climate Fund, after gaining accreditation in late 2016. Both the Adaptation Fund and the Green Climate Fund are UNFCCC programs.

In its Intended Nationally Determined Contribution (INDC) submitted to the UN Kenya estimated it will require \$40bn through 2030 to achieve its targets and keep emissions 30% below the business as usual scenario. Due to its growing population and expanding economy, Kenya's greenhouse-gas emissions are expected to rise from 59MtCO₂e in 2010 to 102MtCO₂e in 2030. The livestock, agriculture and forestry sectors are the biggest emitters.

In addition to the National Climate Fund, the 2013 Action Plan recommends the following steps:

- Develop an additional 2,275MW of geothermal capacity by 2030 through a support programme to encourage private-sector investment. Such a programme could include additional grants for early-stage development, loans for later-stage development, and risk-mitigation instruments. This action would have an estimated cost of KES 877-1,115bn (USD 10.3-13.1bn) and could have an abatement potential of 14.1MtCO₂e a year by 2030 (this target has been superseded by the more ambitious National Energy Policy)
- Develop a national energy efficiency policy
- Establish a primary carbon trading platform to market Kenya's carbon market activity
- Create Kenya's greenhouse-gas inventory and emission factors
- Accelerate negotiations with other countries such as the EU and Japan to overcome the lack of carbon market access for Kenya.

The Action Plan follows the National Climate Change Response Strategy, which was published in 2010, to investigate the country's vulnerability and potential future responses. The Plan is expected to be updated every five years.

Process

According to a strategy paper for the fund dated August 2012, the mechanism may provide both direct funding for larger projects and programmes, or indirectly via intermediaries such as commercial banks.

It would not typically finance an entire project or activity cost – instead it would co-finance a project approximately in proportion to the additional costs and risks associated with mitigation projects or integrating climate risk and resilience (in adaptation projects). For example, a geothermal project may receive a capital investment grant due to the high capital costs and first-of-a-kind character of the undertaking in Kenya. The financing would be used to enhance project returns in order to bring them in line with investors' expectations.

The Bill also initiated institutional reforms for the coordination of activities. These include establishing the following institutions besides the Climate Fund:

- A high level National Climate Change Council chaired by the President
- A Climate Change Directorate as the lead agency on national climate change plans and actions

While the Climate Change Bill was signed into law in May 2016, the Climate Fund has not begun yet due to delays in approving nominees for the Council.

On 17 October 2014, Decree 58/2014 was approved creating Mozambique's feed-in-tariff for

Kenya Net Metering

An owner of a renewable power generator of 1MW or under may enter into a net metering system agreement with a distribution licensee or retailer in its service area, according to Kenya's proposed Energy Policy and Bill. The Bill initially passed through Kenya's legislature but was rejected by the President, and has now returned to Senate for re-approval. The Bill must pass through Senate and be signed by the President to enter into force.

If this measure is implemented based on the draft of the Energy Bill, the Cabinet Secretary responsible for energy will first have to formulate and implement regulations before any net metering agreements can be made. These regulations have already been drafted and await the passing of the Bill and Policy. The draft suggests that the owner of the generation asset will be granted a 62% credit for each MWh exported to the grid.

Net metering is also included in the draft of the new National Energy Policy, which gives more detail on government actions than the Bill. To replace the Sessional Paper No. 4 on Energy, this document gives an idea of timing, suggesting that the first priorities for the government will be to devise a net metering framework for solar power and to develop a net metering tariff for all renewable energy sources in the "short term" (2014-18). The framework for wind should then be created in the "medium term" (2014-23)

Kenya Biofuel Blending Mandate - Suspended

Under the 2014 versions of Kenya's draft Energy Policy and Bill, the government was to implement a range of biofuel blending requirements. However, the version published in January 2015 does not include these measures.

The latest draft of the Energy Policy, the government would:

- Undertake R&D on biofuel feedstock as current feedstock is insufficient to produce biofuel for

blending.

- Provide incentives for biofuel production projects and consumption, though it does not specify what these incentives would entail.
- Implement bioethanol and biodiesel blending pilot programmes.

Previous versions of the Energy Policy and Bill, which are due to be sent to Parliament, included the following measures:

By 2017, two pilots would be undertaken looking at:

- A 10% ethanol-gasoline (E-10 Mandate) blend in government and public transport vehicles.
- A 1% biodiesel blend in government vehicles and different blending ratios for use as a hybrid fuel at isolated power-generation plants.

By 2030:

- Gasoline vehicles should use a 10% ethanol-gasoline (E-10 Mandate) blend.
- Government vehicles should use a 5% biodiesel blend.
- Isolated diesel power-generation plants should use 100% biodiesel.

The government would also intend to offer incentives to encourage all diesel vehicles in the country to use at least 5% biodiesel.

Kenya Renewable Energy Targets - Proposed

Under the latest draft of the National Energy and Petroleum Policy published in June 2015, Kenya would aim to install 5GW more power-generating capacity by end-2016, of which 1.6GW will be geothermal, 630MW will be onshore wind, and 18MW will be cogeneration.

The government has released four drafts of the new Energy Policy and an Energy Bill, which had its first reading in the lower house (National Assembly) on 20 August 2015 and was approved by Parliament on 3 May 2016. On 6 October 2016, the President rejected the current version, to give Kenya Power more time to upgrade its systems. The revised bill is currently awaiting Senate approval.

Unlike previous drafts, the latest version of the Policy does not lay out targets for each power generation technology to 2030. Instead, it includes the goals included in the '5,000+MW by 2016' project whereby Kenya aims to reach the following cumulative capacity by end-2016:

- Geothermal: 1,887MW
- Wind: 635MW
- Cogeneration: 44MW

Policy-makers' original goal had been to incorporate legislation on all energy sources in one bill. However, what was one became two, and now the five, pieces of legislation. The need for new legislation arose after the Constitution was passed in 2010, devolving many powers to the county level, though the national government remains responsible for energy policy and regulation.

As well as the targets outlined above, the draft proposes the following actions:

- The country aims to add 5.5GW of additional power-generating capacity by end-2016. This would increase the grid from 1.7GW in 2013 to slightly over 6.7GW.
- A certification scheme will be established for cogeneration projects, green energy and energy efficiency/conservation projects.

- The Rural Electrification Authority will become the Rural Electrification and Renewable Energy Authority – the lead agency for renewable energy resources other than large hydro and geothermal. The latter is within the remit of the Geothermal Development Company.
- An Energy Efficiency and Conservation Agency will be formed, to improve security of supply and lower greenhouse-gas emissions.
- In addition to the Bill and Policy, regulations outline new local content requirements for the energy sector.
- In a last-minute amendment lawmakers also introduced rules that require Kenya Power to compensate its customers for power outages lasting more than three hours

Kenya VAT and Import Duty Exemption

Under the VAT Act 2013 and VAT (Amendment) Act 2014, Kenya offers an exemption from value added tax (VAT) and import duties for supplies imported or bought for the construction of a power-generating plant or for geothermal exploration, as well as certain plant and machinery. The VAT exemption does not cover non-specialized components like steel.

According to the VAT Act 2013 and the 2014 Amendment Act, the power-generating plant must aim to supply electricity to the national grid and the company must have an exploration licence in accordance with the Geothermal Resources Act. Both must be approved by the Cabinet Secretary for the Treasury on recommendation of the Cabinet Secretary for energy or for mining, respectively.

Solar cells and modules that are not equipped with elements such as diodes, batteries or similar equipment are free from import duty and exempt from VAT, as are "wind engines (wind mills)". However, hydraulic turbines and water wheels are free from import duty but pay 16% VAT. Other PV semi-conductor devices including PV cells and light-emitting diodes, together with wind-powered generating sets that have already been assembled, are subject to a 5% import duty and 16% VAT.

In addition, the VAT (Amendment) Act 2014 prescribes that "specialised solar equipment and accessories, including solar water heaters and deep cycle-sealed batteries which exclusively use or store solar power" are also exempt. In practice, all energy-specific equipment have been VAT exempt while non-specialized components (eg, steel) is not.

A full list of the plant and machinery eligible for tax reductions is available at:
www.kra.go.ke/customs/pdf/CustomTariffs.pdf

Kenya Energy Management Regulations

These regulations, enacted on 4 September 2012, aim to reduce energy losses from industry, commercial buildings and large institutions through the introduction of an energy management policy, energy audits and licensing of energy auditors.

Under these regulations, the Energy Regulatory Commission (ERC) assigns an energy consumption rating of the facility (high/medium/low). The owner or occupier of the facility then has one year to devise an energy management policy, which must be filed with the ERC. It then approves the plan, which is then implemented.

A licensed supplier must undertake an energy audit of the facility every three years. The ERC can require the owner or occupier of the facility to pay for an independent energy auditor from an approved list of suppliers.

Within six months of the end of the financial year in which the energy audit is performed, the owner or occupier will submit to the ERC an energy investment plan. This should outline the energy conservation proposals for the following three years. At least 50% of the recommended energy

savings in the plan must be realised. Some components of the plan could form part of a CDM project.

The owner/occupier must submit an annual implementation report to the ERC, or it could be liable for a fine of up to KES 30,000 (USD 326) for each day the breach continues. If it fails to submit an audit report or denies the ERC access to the facility, it could be liable for a fine of up to KES 1m (USD 10,870) or imprisonment of up to one year.

Kenya Solar Water Heating Regulations

By 2017, all buildings in Kenya using over 100 litres a day of hot water must have a solar water heating system, according to regulations implemented in 2012. The solar water heater must be used to meet 60% of the premises' demand. The deadline for compliance was May 25, 2017.

A building may be exempt if:

- It has technical limitations;
- It cannot install a solar water heater "due to their special circumstances";
- It is supplied with hot water from a cogeneration plant;
- It uses electricity generated from renewable sources and the excess is employed to heat water.

All new buildings must comply with these regulations. Non-compliance means a fine of up to KES 1m (\$11,500) or imprisonment for up to a year.

The solar water heater must comply with the national standards and be installed by a licensed technician. The collector must be a glazed or unglazed flat plate, or evacuated tube collector. But the unglazed technology may only be used for heating swimming pools.

Kenya Renewable Energy Targets – Current

Kenya aims to reach some 23GW of power-generating capacity by 2033, of which 42% will come from renewable sources (including large hydro but excluding solar). This compares with total capacity of 2.2GW at end-2014, of which a third was renewable.

This target is laid out in the Least-Cost Power Development Plan 2013-33 – a rolling 20-year strategy which forms part of Kenya's 'Vision 2030' (the national economic development blueprint). The plan replaces the 2011-31 version, which projected an overall power mix of 19GW of domestic capacity, with a 43% renewables share. The main changes have been a reduction in nuclear, diesel and hydro to the advantage of coal, gas, geothermal and wind.

All of these targets will be supplanted by the draft National Energy Policy, which was sent back to Senate in October 2016 after the President rejected it for signature. The acting bodies are not actively enforcing the target from the Least-Cost Power Development Plan 2013-33.

East African Community Import Duty Exemption

The East African Community - Rwanda, Burundi, Kenya, Tanzania and Uganda - has a common agreement on import duty waivers. In clean energy, this applies to equipment for the generation of solar and wind energy, including accessories and deep cycle batteries.

The agreement reduces import duties to 0% for the following technologies:

- "Specialised equipment for development and generation of Solar and Wind Energy, including accessories and deep cycle batteries which use and/or store solar power" (Part B-General Exemptions, paragraph 26).

Kenya Rural Electrification Programme

Under Vision 2030, the government aims to turn Kenya into a middle-income country by the end of the next decade. As part of this goal, Kenya is seeking to reach 100% electricity connectivity by 2020 – 10 years earlier than originally targeted – from a rate of 35% in 2014. The Rural Electrification Authority (REA) is a government agency partially tasked with realizing this goal.

REA is working to extend the national grid in rural areas, install off-grid stations and develop mini-grids, and promote the use of renewable energy sources. REA was granted a 2016-17 budget of 750 million shillings, all of which comes from foreign debt aid. Its primary ongoing project is the Kenya Off-Grid Solar Access Project (K-OSAP), which targets mini-grid and pico-solar for remote communities. K-OSAP is funded by the World Bank and covers 14 of 47 counties in Kenya, 72% of land area, and 20% of Kenya's population.

Funding method

Funding for projects comes from the government of Kenya or development partners, together with a 5% levy on consumer electricity bills. Phase 1 will receive 155 million dollars from the World Bank. The tariff is uniform regardless of whether the plant is connected to the national grid, and is based on consumption of energy. The fuel used for generation is a pass-through cost to all consumers around the country depending on energy consumption.

Kenya Feed-in Tariffs

Tariffs paid to generators of renewable power from wind, hydro, biomass, biogas and solar PV and thermal (on-grid and off-grid) for a period of 20 years. There are different rates for projects smaller and larger than 10MW. The tariff is supposed to be reviewed every three years, but no updates have been taken since 2012. The government harbors a long-term ambition to replace the FiT scheme with an auction mechanism, and minor adjustments have been proposed in the Draft Energy and Petroleum Policy bill proposed in 2014, which has yet to be adopted into law. A large backlog of applications also means that few projects have been able to move forward in the past few years. Feed-in tariff (FiTs) are payable by the electricity distributor for a period of 20 years. The tariff rates are set within minimum and maximum bounds on a case-by-case basis and are revised (for projects developed after the policy revision) every three years, although historically the government has often been delayed in revising the tariffs.

The Kenya Ministry of Energy initially released an FiT policy in March 2008 but it was seen as unattractive and failed to attract significant investment. Tariffs were subsequently reviewed in January 2010.

In December 2012, FiTs for the various technologies were reviewed and the process of negotiating power-purchase agreements (PPAs) streamlined. Projects under this mechanism have priority grid access at the cost of the developer. Tariffs were introduced in two tiers: for project < 10MW and for projects >10MW.

Wind

0.5-10MW: USD 0.11/kWh

10-50MW: USD 0.11/kWh (up to 500MW)

Geothermal

35-70MW: USD 0.088/kWh (up to 500MW)

Hydro

0.5-10MW: USD 0.0825-0.105/kWh (interpolation applied to determine tariff)

10-20MW: USD 0.0825/kWh (up to 200MW)

Biomass

0.5-10MW: USD 0.10/kWh

10-40MW: USD 0.10/kWh (up to 200MW)

Biogas

0.2-10MW: USD 0.10/kWh

Solar

On-grid 0.5-10MW: USD 0.12/kWh

Off-grid 0.5-10MW: USD 0.20/kWh

On-grid 10-40MW: USD 0.12/kWh

Non-solicited proposals may also be submitted and an FiT is offered for them but it shall not exceed the long-run marginal cost of electricity, as established in the Least Cost Power Development Plan (except for off-grid solar power plants).

The basis of the PPA for large projects is a standardised PPA with limited negotiable clauses. The purchase, transmission and distribution of electricity from all projects >10MW is subject to the terms negotiated with the offtaker.

For projects < 10MW a standardised PPA was introduced, with features including: grid connection at distribution network voltages, first come, first served basis (up to 10% of system-wide generation) and limited negotiable clauses. The feed-in tariff is denominated in USD and is applicable for the 20-year life of the PPA, except for the O&M component which is subject to annual indexation using US Consumer Price Index (the base index prevails at the time of signing the PPA). The offtaker shall guarantee priority purchase, transmission and distribution for these projects.

Process

Implementation:

- 1) Developer to undertake pre-feasibility of project site and project proposal.
- 2) Submission of an expression of interest (EOI) Project Application Form to the Ministry of Energy for review.
- 3) The Feed-in Tariff Committee will review the EOI. The EOI may be approved for a three-year exclusivity period or rejected, or the developer may be requested to submit more information. Submissions are reviewed on a first come, first served basis.
- 4) If the project is initially approved the developer must undertake a full feasibility study.
- 5) The Feed-in Tariff Committee will review the full feasibility study.
- 6) The offtaker and the developer must conclude a non-negotiable PPA.
- 7) The PPA must be approved by the national regulator.
- 8) The developer must develop, construct and commission the renewable energy project within three years of the PPA being signed.

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This publication was commissioned by the ministry of Foreign Affairs.

© Netherlands Enterprise Agency | December 2018
Publication number: RVO-206-1801/RP-INT

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs and Climate Policy that implements government policy for Agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs and Climate Policy.