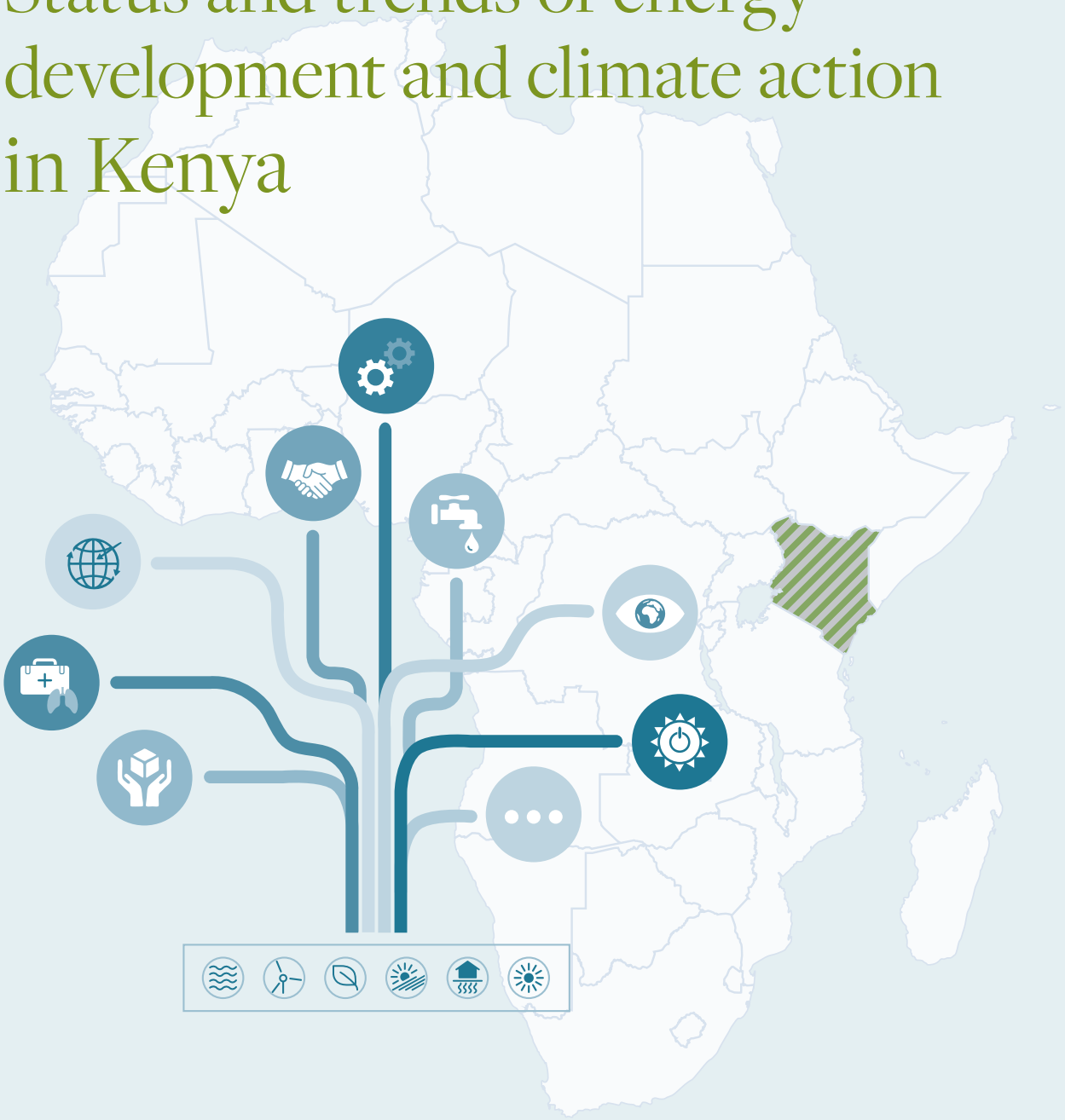
COBENEFITS IMPULSE

Institute for Advanced Sustainability Studies (IASS)
July 2021

Status and trends of energy development and climate action in Kenya



Strathmore University
Energy Research Centre

Imprint

This COBENEFITS Impulse has been realised in the context of the project “Mobilising the Co-Benefits of Climate Change Mitigation through Capacity Building among Public Policy Institutions” (COBENEFITS). This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag. The COBENEFITS project is coordinated by the Institute for Advanced Sustainability Studies (IASS, lead) in partnership with the Renewables Academy (RENAC), the Independent Institute for Environmental Issues (UfU), International Energy Transition GmbH (IET) and in Kenya Strathmore Energy Research Centre (SERC).

July 2021

Authors: Grace Mbungu, Sarah Odera, Patrick Mwanzia, Victor Otieno, and Phoebe Koester – IASS and SERC

Editors: Laura Nagel and Sebastian Helgenberger – IASS

Suggested citation: IASS/SERC. 2021. Status and trends of energy development and climate action in Kenya. COBENEFITS Impulse. Potsdam/Nairobi. www.cobenefits.info

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

INTERNATIONAL CLIMATE INITIATIVE (IKI)

Background and motivation

Kenya is seen as one of the handful countries on the African continent expected to achieve universal electricity access by 2030. However, despite continued progress in electricity access, for most Kenyans injustices and inequalities persist in relation to sustained access and use of clean energy services to meet needs and to enable quality of life improvements and general well-being. This report reviews the current energy and climate protection processes in Kenya. The goal is to understand and highlight the challenges and opportunities for moving Kenya to the next level, namely: ensuring that investments, energy development, and implementation processes provide opportunities and capabilities that enable all Kenyans to improve their quality of life; enhance their general well-being on a long- term basis; and in so doing achieve national and international goals such as those of Kenya Vision 2030, the United Nations 2030 Agenda on Sustainable Development (SDGs), and the Paris Agreement. The analysis also provides contextual background on the social performance studies conducted in partnership with local research organisations, local and regional governments, and civil society organisations (CSO).

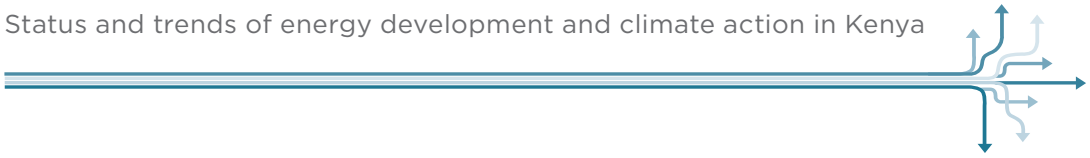
The paper is developed by researchers from the Institute for Advanced Sustainable Studies (IASS) in Potsdam, Germany and Strathmore Energy Research Centre (SERC) in Nairobi, Kenya, in the context of the COBENEFITS project[1]. The COBENEFITS project aims to quantify the social and economic opportunities of climate action through decarbonising the power sector, as the basis for enhanced NDCs with the ambition to deliver on the Paris Agreement and the 2030 Agenda on Sustainable Development (SDGs). Moreover, the COBENEFITS projects helps facilitate knowledge co-creation, international mutual learning, and capacity building among policymakers, expert organisations, and multipliers through country-specific co-benefits assessments, stakeholder dialogues, and an international training programme. The COBENEFITS project is led by IASS, Potsdam under Germany's International Climate Initiative (IKI) in a consortium with the Renewables Academy (RENAC), the Independent Institute for Environmental Issues (UFU), and International Energy Transition GmbH (IET). The paper also connects to ongoing research by the IASS, Potsdam on the social sustainability and social performance of the energy transition in Germany and the Global South.

[1] www.cobenefits.info

Status and trends of energy development and climate action in Kenya: key lessons

- Kenya had one of the fastest growing economies in Sub-Saharan Africa prior to the COVID-19 pandemic.
- Kenya experienced one of the fastest increases in electrification rate within Sub-Saharan Africa since 2013. As a result, it is seen as one of the handful countries on the African continent expected to achieve universal electricity access by 2030. However, inequalities in access to and sustained use of clean energy services remain a challenge for most Kenyans.
- Access to clean, safe, reliable, and affordable cooking energy services has remained a persistent challenge for the country, such that biomass remains one of the most dominant sources of energy in Kenyan households.
- Surplus energy capacity is forecast to become a very significant issue from 2020 onwards, as capacity expansion outpaces projected demand growth, mainly due to affordability. However, surplus capacity is an opportunity for Kenyans to diversify their uses of energy for productive uses, especially in the agricultural sector, small and medium-sized enterprises (SMEs), and family-owned business sectors.
- The low demand and use of energy at the domestic level and for productive uses demonstrates that, while Kenya is making progress in access to electricity, available energy is not being directed to enable quality of life and general well-being improvements, beyond access to lighting services.
- Moreover, the COVID-19 pandemic has shed light on the needs and gaps in Kenya's energy development, especially the availability and access to affordable, secure, and reliable energy services for the healthcare and household sectors.
- Kenya has the potential to be one of Africa's success stories, especially given its dynamic young population, growing private sector, innovative digital technologies, and its pioneering financial infrastructure, as well as an enabling policy environment.
- Kenya needs to address matters of corruption and good governance, especially in respect to energy development and procurement processes, in order to reap the enormous benefits for both people and planet presented by its vast RE resources.
- Last, but not least, while Kenya is hailed for providing an environment that enables energy development, it is lagging behind in developing inclusive human capacity, including providing all citizens with an appropriate enabling environment to access and use available energy services to improve their quality of life and general well-being. Such enabling conditions would entail incorporating the social performance of energy development and access processes, such as social ownership and acceptance, affordability and willingness to pay, reliability and secure services, and just and inclusive energy development processes in the design, development, and implementation of energy systems.

The paper is organised as follows: the first chapter looks at Kenya's progress in sustainable development and climate action, including the effects of the ongoing COVID-19 pandemic. Chapter two focuses on matters of sustainable development and climate mitigation in the context of energy development and uses in Kenya, while chapter three addresses the prospects of renewable energy development for the people and climate. Lastly, chapter four concludes with an outlook for maximising the social performance of renewable energy for all Kenyans.



Content

Background and motivation **1**

Status and trends of energy development and climate action in Kenya: key lessons **2**

1. Progress in sustainable development and climate action in Kenya **5**
1.1 Kenya and the COVID-19 pandemic 6
1.2 Kenya's sustainable development goals 7
1.3 Implementation of the Paris Agreement 7

2. Status & trends of Kenya's power sector and energy policy development **9**
2.1 The state of access to energy services 9
2.2 Renewable energy resources and trends 10
2.3 Fossil fuel resources and trends 12
2.4 Current challenges in energy development 12

3. Prospects of renewable energy development for people and economy in Kenya **13**
3.1 Employment opportunities 13
3.2 Sustained access and effective use of affordable, reliable, sustainable energy services 14
3.3 Gender inclusivity and equity 14
3.4 Climate and environmental protection 14
3.5 Local value creation and community development 15
3.6 Health, air quality, and well-being 15

4. Maximising the social performance of renewable energy for all Kenyans **16**

References **18**

Abbreviations **23**

Annex **24**

List of Tables

Table 1: Development of CO_2 Emissions in Kenya (Source: IEA 2019) 7

Table 2: Electricity generation capacity in Kenya 2019 (Source: Ministry of Energy 2019) 9

Table A. 1: Kenya Energy Policies 2010 – 2019 (Source: author's compilation based on policy, projects and activities review) 24

Table A. 2: The Last Mile Connectivity Project of the Rural Electrification Authority (Source: author's compilation based on policy, projects and activities review) 28

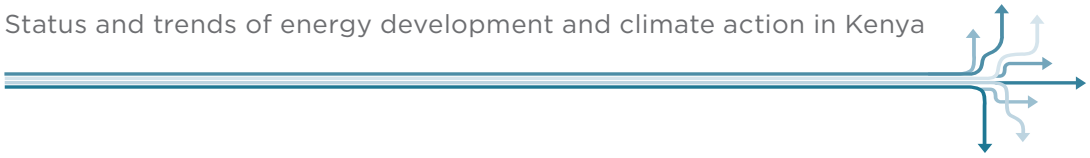
List of Figures

Figure 1: Reported COVID-19 Cases Kenya as of April 2021 (Source: Johns Hopkins University 2021) 6

Figure 2: Access to electricity and clean cooking and share of renewables in Kenya 2018 (Source: IEA 2020) 10

Figure 3: Energy consumption by source in Kenya in 2017 (Source: Ministry of Energy 2020) 11

Figure 4: Estimated formal, informal and productive use employment (in thousands), 2017 – 2018, Kenya (Source: IRENA 2020) 13



1. Progress in sustainable development and climate action in Kenya

Despite its long struggles with poverty and inequality, Kenya continues to enjoy significant progress in its social, economic, governance, and political structures. One of the most notable developments in Kenya during the last ten years was the adoption of the new constitution in 2010, which ushered in a new system of governance characterised by: devolved county governments, a bicameral legislature, and a tenured judiciary and electoral body. Prior to the COVID-19 pandemic, Kenya had one of the fastest-growing economies in Sub-Saharan Africa, which grew an estimated 5.4–5.7% in 2019 (Government of Kenya 2020). This growth is propelled by its young, vibrant, and innovative population and an active and growing private sector, which accounts for almost 70% of total employment (Kenya National Bureau of Statistics 2019). This has resulted in a significant reduction in the numbers of people living in poverty. Notably, senior citizens have seen improvements in their quality of life as a result of the government-initiated scheme for affordable health insurance and the 'Older Persons Casher Transfer' (National Social Protection Secretariat n.d.)[2], the social support system for senior citizens, which covered 783,089 and 753,314 persons in the years 2017/18 and 2018/19, respectively (Government of Kenya 2020). Moreover, the share of the population living below the poverty line decreased from 44% to 37% between 2005 and 2015 (World Bank 2020). However, Kenya, like many African countries, must overcome challenges of poor governance and weak institutions (Transparency International 2020) and growing social and economic inequalities.

Moreover, despite abundant renewable energy (RE) resources and continued progress in electricity access, most Kenyans still face access inequalities and challenges in the sustained use of clean energy services to meet needs and to enable improvement of quality of life and general well-being. Universal access to affordable, reliable, sustainable, and modern energy for all is one of the prerequisites for social and economic development and the well-being of humanity and the planet. This realisation is also underscored in the country's development blueprint, the Vision 2030, where the social and economic development and well-being of Kenyans is said to depend on a resilient and sustainable planet. According to the Kenyan government, "[r]ealising the Vision 2030 objectives is feasible only if all sectors of the economy—from manufacturing, services, mining, agriculture and agro-based industry for food security to households—have quality energy services provided in a sustainable, cost effective, and affordable manner" (Ministry of Energy 2018b: 12). Furthermore, in its Intended Nationally Determined Contribution (INDC) report of 2015, the Kenyan government emphasises its commitments to adopt low-carbon energy development pathways to mitigate climate change and its social and economic effects on Kenyans (Ministry of Environment 2015).

Against this background, this paper seeks to review the current energy and climate protection processes in Kenya, with the goal of understanding and highlighting the challenges and opportunities available to move Kenya to the next level—ensuring that energy-related investments, development, and implementation processes seize the opportunities presented by its vast RE resources in order to protect the environment and guarantee quality-of-life improvements and the general well-being of all Kenyans by 2030. The analysis is based on available literature from academia, local, and national governments, regional and (inter-)national policies as well as other national and international institutional reports.

[2] The Older Persons Cash Transfer (OPCT) is a national safety net programme, funded by the Kenyan government, that provides cash payments to support Kenyans aged 65 and older.

1.1 Kenya and the COVID-19 pandemic

In response to the COVID-19 pandemic Kenya faced a rigid lockdown from March 2020, with major implications for social and economic progress. Despite the government's efforts to shield Kenyans from the negative impacts of the pandemic, such as the KES 40 billion allocated for health and social protection, and tax exemptions (Akrofi & Antwi 2020), Kenya, like many countries around the world, is experiencing economic contraction and social pressure as a result of the pandemic. Among the major fundamental economic and social sectors affected by the pandemic are education and the tourism sector. There were also observable impacts on the energy sector, especially with regard to energy demand and prices (IRENA 2020; UN 2020). More specifically, the lockdown measures resulted in a drop in peak power, compared to two months prior to the COVID-19 outbreak (January and February 2020), of approximately 6.5% (i.e., 117 MW) and approximately 11% drop in energy demand (3,609 MWh). This was attributed to slow growth in electricity sales for the commercial sector as a result of reduced economic activity (Hassan 2020; Invhestia 2020) and inability to pay due to loss of income at the household level. With RE accounting for more than 90% of the national grid energy mix (The Kenya Power and Lighting Company 2021), the ongoing COVID-19 outbreak is expected to continue having direct or indirect impacts on renewable energy development in Kenya. A survey of businesses and project developers supported by GET.invest's Finance Catalyst service identified current and expected challenges, which include a decrease in revenue, shortage of working capital, and supply chain suspension (GET.invest 2020). The pandemic also shed light on the needs and gaps in energy development in Kenya, especially the availability and access to affordable, secure, and reliable energy for the healthcare sector. For example, RES4Africa, through its Renew-ABLE against COVID initiative, identified 12 centres in Kenya whose ordinary activities were hindered by multiple energy disruptions due to the absence or unreliability of national grids (RES4Africa Foundation 2020). While COVID-19 cases have remained relatively low in Kenya compared to other parts of the world, the lack of affordable, reliable quality energy services poses a threat to healthcare services and the well-being of Kenyans. More immediately, the lack of affordable and reliable quality energy services could pose a threat to the management of the COVID-19 pandemic, especially the rollout of vaccination programmes in rural and remote areas of the country.

However, despite such disruptions, the renewable energy sector was thought to be more resilient than the fossil fuel sector. An ongoing study by GOGLA, on consumer insights with regard to off-grid energy products during COVID-19, shows that the utilisation of such products increased slightly as a result of the pandemic (GOGLA 2020). These preliminary results underscore the increasing importance of renewable energy sources in Kenya. Moreover, while the important role of renewable energy in reaching national and international development and climate mitigation goals is well known, the pandemic has highlighted its increasing role in addressing the needs of those who lack energy access. This is especially important in light of the energy needs of rural and marginalised populations and those disproportionately affected by the COVID-19 pandemic (Africa Clean Energy Technical Assistance Facility 2020). In recognition of the important role played by RE in addressing these gaps, the Kenyan government approved a request by SE4All and its partners to consider decentralised renewable energy (DRE) as an essential service (Brent 2020). Other efforts, such as the African Enterprise Challenge Fund (AECF), launched the REACT Kenya Relief Fund, a USD 2 million fund intended to provide emergency grants to distributed energy service companies facing liquidity challenges due to COVID-19 (AECF 2020); these efforts are also a step towards addressing the disruption caused by the COVID-19 pandemic.

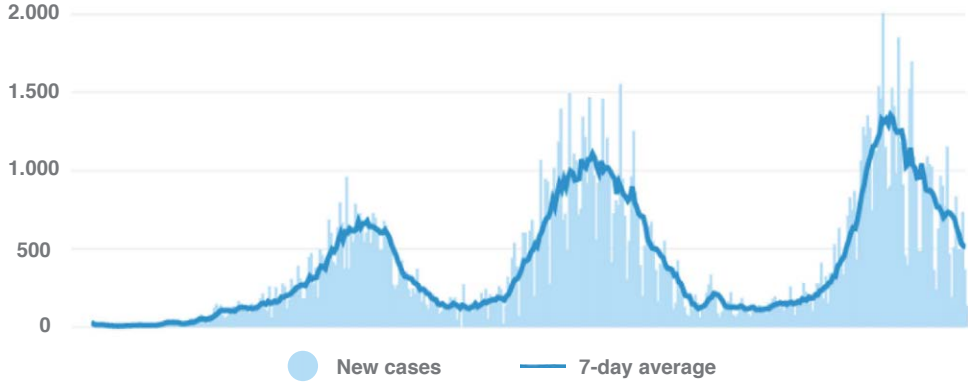
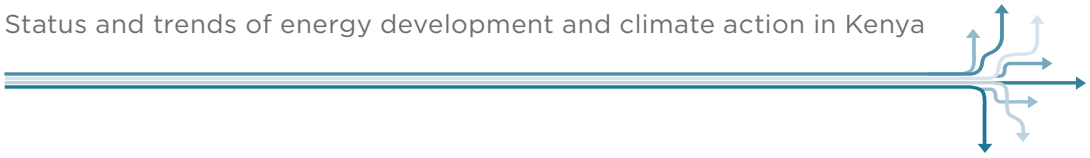


Figure 1:
Reported COVID-19 Cases Kenya as of April 2021

Source: Johns Hopkins University 2021



1.2 Kenya's sustainable development goals

Kenya's overall development agenda is anchored in its Vision 2030 agenda, which came into force in 2007 (Ministry of Planning and Devolution 2007). The main goal of Vision 2030 is to ensure that Kenya is a middle-income country that enables a high quality of life and a clean and secure environment for all its citizens by 2030. Moreover, Kenya is determined to meet its UN Sustainable Development Goals. Kenya completed its 2020 Voluntary National Reviews (VNRs)[3] in June (Government of Kenya 2020). The first VNRs were conducted in 2017 (Government of Kenya 2017). While the Kenyan government acknowledges progress, especially in the areas of poverty reduction (SDG 1), health (SDG 3), education (SDG 4), provision of clean water (SDG 6), and ensuring sustainable cities (SDG 11), much work still remains to be done to meet all the targets by the year 2030. To ensure that these goals are met, the government has designated the Ministry of Devolution and Planning as the main institution responsible for the coordination, implementation, and monitoring of Kenya's development agenda, including the Sustainable Development Goals[4]. The SDGs and the Agenda 2030 development pillars are closely intertwined, with numerous intersections; however, for the purposes of this paper, which aims to highlight the energy development and climate protection processes and their effects on the improvement of quality of life and general well-being for all Kenyans, we focus exclusively on SDG 7 (i.e., ensure access to affordable, reliable, sustainable and modern energy for all) and SDG 13 (i.e., immediate action to combat climate change and its impacts).

1.3 Implementation of the Paris Agreement

In its Intended Nationally Determined Contribution (INDCs) report of 2015, the Kenyan government makes clear its commitments to adopt a low-carbon energy development pathway to mitigate climate change and its social and economic effects on Kenyans (Ministry of Environment 2015). However, Kenya continues to struggle with impacts induced by climate change. The government acknowledged in its 2020 VCRs report that climate change had a direct effect on many of its social and economic sectors, including the agricultural and tourism sectors, which together are the main sources of revenue and livelihoods for most Kenyans (Government of Kenya 2020). This reality was evident in events such as droughts, locust invasions, and flooding in parts of Kenya, including in the years 2019 and 2020 (FOA 2020). These climate-change-induced impacts are especially acute in Kenya's vast arid and semi-arid areas, where livelihoods and well-being depend on stable climatic conditions and weather patterns. Moreover, while Kenya is responsible for low greenhouse gas (GHG) emissions compared to most developed countries, its CO_2 emissions doubled between 2000 and 2018, from 8 to 16 (Mt CO_2) as shown in Table 1.

			Stated Policies		Africa Case		CAAGR 2018–40	
	2000	2018	2030	2040	2030	2040	Steps	AC
GDP ($2018 billion, PPP)	**76**	**177**	**358**	**627**	**453**	**1.176**	**5.9%**	**9.0%**
Population (million)	**31**	**51**	**66**	**79**	**66**	**79**	**2.0%**	**2.0%**
with electricity access	8%	75%	100%	100%	100%	100%	1.3%	1.3%
with access to clean cooking	3%	15%	46%	70%	100%	100%	7.2%	9.0%
CO_2 emissions (Mt CO_2)	**8**	**16**	**27**	**40**	**33**	**60**	**4.3%**	**6.2%**

Table 1: Development of CO_2 Emissions in Kenya

Source: IEA 2019

[3] For more information about the VNRs see: https://sustainabledevelopment.un.org/hlpf/2019#vnrs

[4] A list of the sustainable development goals is available at: https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals

To address these ongoing climate-related risks, and in line with Kenya's determination to mitigate climate change and its negative effects on the lives and livelihoods of Kenyans, the government has developed several climate change action plans and strategies, including the 2010 National Climate Change Response Strategy (NCCRS), the 2015–2030 Kenya National Adaptation Plan, the 2016 Climate Change Act and the 2018–2022 National Climate Change Action Plan (NCCAP), which provide for low-carbon, climate-resilient development. Moreover, Kenya has developed and implemented other programmes to mitigate climate change, such as the Scaling Up Renewable Energy Program (SREP), which began in 2011. The SREP supports Kenya's initiative to achieve transformational change towards lowering greenhouse gas emissions (Republic of Kenya 2011). Additionally, several strategies are proposed in the 2020 VCR report, which include: mainstreaming climate change into a planning framework and the development of policies and regulations, the integration of climate finance in the Kenya School of Government (KSG) at the national and county levels, and the establishment of climate change units to support coordination of climate change adaptation and mitigation interventions (Government of Kenya 2020: 68). The Kenya Ministry of Environment and Natural Resources coordinates all national and international climate change efforts through its National Climate Change Secretariat (NCCS). The NCCS also acts as the National Focal Point for the UNFCCC. In addition, disaster risk-management planning has been mainstreamed to all county governments through the County Integrated Development Plans (CIDP) (Government of Kenya 2020). In view of facilitating the achievement of Kenya's development and climate protection goals, the next chapters examine Kenya's energy development processes, outcomes, gaps, and opportunities.

Access to clean and affordable cooking energy services remains a challenge for Kenya, where biomass is one of the most dominant sources of energy for cooking.

© Grace Mbungu

2. Status & trends of Kenya's power sector and energy policy development

Kenya has an abundance of stable renewable energy sources, including solar, wind, and geothermal (IASS 2016). The installed electricity capacity in Kenya by end of December 2019 was estimated at 2819 MW while total effective capacity was 2736 MW (EPRA 2020) The share of renewables in the national grid in was estimated to be at 90% in 2019 (The Kenya Power and Lighting Company 2021). The installed renewable power capacity in Kenya is summarised in Table 2.

Source	Installed capacity (MW)
Hydropower	820
Thermal generators	716
Geothermal	877
Wind	336
Solar PV	54
Thermal (gas turbine)	60
Off-grid and temporary thermal	57
Biomass	30
Total	**2,950**

Table 2: Electricity generation capacity in Kenya 2019

Source: Ministry of Energy 2019

Kenya's speed and scope of RE development is partly attributed to its enabling environment, especially its energy policies and regulatory frameworks (IEA 2019). The government has made concerted efforts in the development of appropriate policy, legal, regulatory, and institutional frameworks to provide an enabling environment for the development and utilisation of these resources to meet the country's energy needs. Some of the major energy policies and frameworks are summarised in the Annex. With these policies, Kenya recognises that climate and environmental protection can be a strategic path towards economic and social prosperity and a sustainable future for all Kenyans, as envisioned in Kenya's Vision 2030. However, as the government acknowledged in its 2020 VCR report, challenges remain, especially for populations in Kenya's vast arid and semi-arid areas, where livelihoods and well-being depend on stable climatic conditions and weather patterns.

2.1 The state of access to energy services

In line with Sustainable Development Goal 7 (SDG 7), Kenya aims to achieve universal access to electricity and modern cooking solutions by 2030. SDG 7 includes several targets: Target 7.1 focuses on universal access to affordable, reliable, sustainable, and modern energy services. This is further specified in target 7.1.1, which concentrates on access to electricity; and target 7.1.2, on clean cooking solutions. Kenya experienced one of the fastest increases in electrification within Sub-Saharan Africa since 2013, increasing from 20% in 2013 to almost 75% in 2019 (IEA 2020). This demonstrates that Kenya is well on its way to achieving universal access to electricity much earlier than expected (Dubey et al. 2019). According to the IEA (International Energy Agency), grid and solar constitute the majority of connections, with more than 50.4% of households connected to the national grid and more than 19.3% connected to solar systems and/or off-grid solutions in 2019 (Ministry of Energy 2020; Dubey et al. 2019).

Figure 2:
Access to electricity and clean cooking and share of renewables in Kenya 2018

Source: IEA 2020

Kenya's success in increasing access to electricity is driven by its development of renewable energy, and by innovative and strategic policies and integrated implementation strategies that incorporate both grid and off-grid solutions (IEA 2020). Off-grid solutions, especially the pay-as-you-go solar home systems, enabled by the mobile money revolution in Kenya, have been a key boost to electrification in rural and remote communities. Moreover, despite a slight decrease in 2019 from the 2018 baseline, Kenya also made progress with its 7.2.1 targets: The share of renewable energy in total energy consumption. According to the 2020 VNRs, the share of renewable energy in the total energy consumption declined from 26.1 in 2018 to 25.5 watts per capita in 2019 (Government of Kenya 2020). However, this decrease is expected to be offset by the now on-line Lake Turkana Wind Power Project, the commissioning of the 100 MW Kipeto wind power, and the geothermal development efforts currently underway. Access to clean, safe, reliable, and affordable cooking energy services, however, remains a persistent challenge for the country, with only 10% of the population thought to have access to clean cooking-energy services.

2.2 Renewable energy resources and trends

While hydropower remains Kenya's main source of RE, other renewables are gaining prominence. For example, geothermal was identified by the government as the least cost-effective power generation option to meet the energy growing demand in Kenya's Least Cost Power Development Plan (LCPDP), which came into force in 2011 (Republic of Kenya 2018). The overall geothermal potential is estimated to be at 10,000 MW, with the Rift Valley alone accounting for a geothermal potential of 2,000 MW (GET.invest 2020). Kenya is the seventh-largest user of geothermal energy worldwide (IEA 2020) and it is estimated that geothermal will account for almost 50% of power generation in Kenya by 2040 (IEA 2019). Moreover, Kenya has promising potential for wind generation, especially in the northwest part of the country, home to the largest wind power project in Africa—the Lake Turkana Wind Power Project (LTWP). The LTWP went on-line in 2018 and comprises 365 wind turbines capable of producing an estimated 310 MW, with the potential for 2,000 GW of new capacity by 2030 (Africa Sustainability Hub 2020). Kenya also enjoys on average 5 to 7 hours of sunshine daily, providing the country with the potential for photovoltaic installations capable of producing an estimated 23,046 TWh/year (GET.invest n.d.). However, compared with this potential, the percentage of solar energy currently harnessed for commercial and domestic use is insignificant (Ministry of Energy 2018a). The government has utilised policies to spur the uptake and use of solar in the domestic, institutional, and small commercial sectors (Solar Water Heating Regulation 2012). Moreover, through its Off-grid Solar Access Project-KOSAP the government aims to invest heavily in mini-grids for community facilities, enterprises, and stand-alone solar systems, clean cooking solutions for households, and solar water pumps for communities (Ministry of Energy 2020). Overall, the objective is to distribute 250,000 solar home systems by 2030 to power households, schools, health facilities, and agriculture (IEA 2019). Current estimates show that solar PV will represent 40% of all new capacity additions in Kenya over the time period 2019–2040 (IEA 2019).

Kenya aims to distribute 250,000 solar home systems by 2030 to power households, schools, health facilities, and agriculture.

© Strathmore University training

Moreover, captive PV generation is gaining momentum in the commercial and industrial (C&I) sector, especially as a backup to alleviate grid unreliability and blackouts (Gregersen & Bhamidipati 2020). Last but not least, Kenya's energy mix is strongly dominated by traditional biomass, which accounts for 68% of the country's final energy consumption (see Figure 3), the majority of which is used for domestic purposes such as cooking (Mbungu 2020).

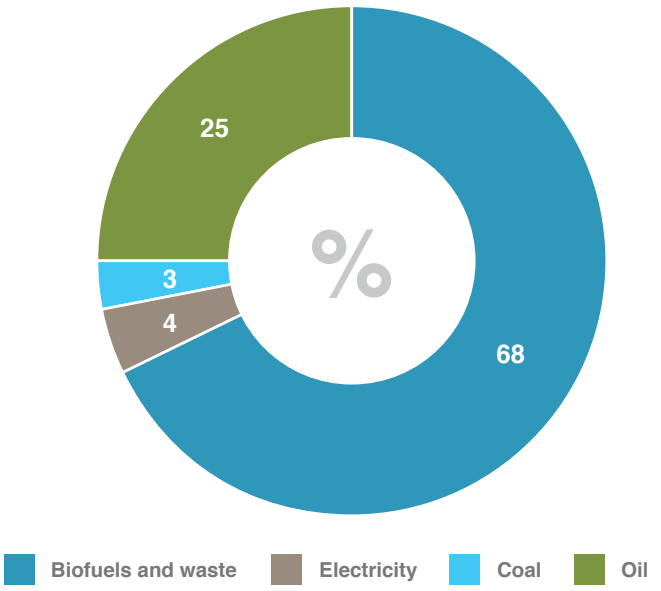


Figure 3: Energy consumption by source in Kenya in 2017

Source: Ministry of Energy 2020

2.3 Fossil fuel resources and trends

While Kenya's grid energy mix is dominated by renewable energy, with fossil fuels only used to stabilise the grid, discoveries of oil and coal have been hailed as an opportunity to diversify energy supply and ensure security of supply. In that respect, the Ministry of Energy has made concerted efforts to develop an appropriate legal, regulatory, and institutional framework for the utilisation of these resources to meet growing energy needs (Ministry of Energy 2018b: 8). A case in point is the proposed Lamu coal power plant. The Kenyan government awarded Amu Power Company (a joint venture between Gulf Energy, a petroleum company, and Centum), a contract to construct a 1050 MW coal plant in Lamu. While the project is currently suspended on the grounds of its environmental and social impacts, the government position has remained that building a coal power plant in Lamu will serve to stabilise the grid in the region and drive economic growth. However, the development of coal power in Lamu is likely to increase the country's greenhouse emissions and thereby detract from its INDC commitments as well as risk compromising the health and well-being of citizens through air pollution (Kurdziel et al. 2020)

2.4 Current challenges in energy development

Despite the noteworthy progress realised over the years in developing the RE energy sector, affordable and reliable access, as well as consumption at the household level[5] and for productive uses remains low in Kenya (Mbaka et al. 2019). The low access and consumption rates as a result of the poor affordability and reliability of energy services pose several challenges for sustainable development and climate change mitigation goals, to which Kenya is committed. Firstly, while the proportion of households using solar as the main source of lighting increased significantly from 1.6% in 2009 to 19.3 % in 2019 (KNBS 2020; Ministry of Energy 2020), primary clean energy consumption is low and often limited to lighting. Lighting services, while important, cannot guarantee the kinds of social and economic improvements in livelihoods and quality of life envisioned for all Kenyans in its Vision 2030 and in other regional and global goals such as the Agenda 2063 and the SDGs. Moreover, access to clean, safe, reliable, and affordable cooking energy services remains a persistent challenge for the country, with only 10% of the population thought to have access to clean cooking energy services. This leaves almost 90% of the Kenyan population without access to clean cooking energy services. The unsustainable use of biomass poses social, economic, health, and environmental risks and burdens to all Kenyans and beyond (Mbungu 2020).

Lastly, surplus capacity is forecast to become a significant issue in Kenya, as capacity expansion outpaces projected demand growth (Kahlen et al. 2018). For example, in December 2019, the country had installed and effective capacities of 2,819 MW and 2,736 MW respectively, against a peak demand of 1,912 MW (EPRA 2019; KNBS 2020). Surplus capacity still incurs costs for the continued maintenance and partial operation of the energy system, resulting in consumer cost burdens in the form of higher energy tariffs (Nicholas 2020). Therefore, if surplus capacity remains the norm in Kenya, the proposed addition of 981.5 MW by the Lamu coal plant in 2024 would aggravate the projected supply–demand imbalance as the surplus margin would surpass 1,500 MW, being 43% above the sum of peak and required reserve, with 32% excess energy (LCDPDP 2018). This issue of overcapacity is not only a potential problem with fossil fuel development. The lack of proper energy planning and independent implementation of the procurement framework could also result in surplus capacity in the RE sector. For instance, the power purchase agreement (PPA) for the privately-owned Lake Turkana Wind Plant includes a take-or-pay clause that compels Kenya Power to buy wind power at any given time, with failure to do so obliging it to then pay compensation for deemed energy. Full construction of the 310 MW capacity wind farm was completed by mid-July 2017, however, the company had been unable to generate and evacuate power due to delays in the construction of a 428 km transmission line connecting the project to the grid (Resource Global Network n.d). This led to EUR 46 million (USD 56 million[6]) being paid by the Government of Kenya (GOK) to LTWP for Transition Interconnector Delay Deemed Generated Energy Payments in 2017 and a corresponding 0.00845 euros (USD 0.010) per kWh being added on to consumer power bills for the next six years to cover the cost (LTWP 2018).

[5] In this paper, a household is defined as a small group of persons who share the same accommodation, who pool some or all of their income and wealth, and who consume certain types of goods and services collectively, mainly housing and food. According to the National Energy Efficiency and Conservation Strategy (NEECS), Kenya's population in 2019 was 47.6 million, comprising 12,143,913 households, meaning that a household consists of an average of 4 persons.

[6] Exchange rate on 09.06.2021.

3. Prospects of renewable energy development for people and economy in Kenya

Improved quality of life for all Kenyans is at the core of Vision 2030, the country's development blueprint. The ultimate objective of mobilising RE is based on its potential to protect the climate and the physical environment, to trigger sustainable social and economic development co-benefits (IASS 2017; Helgenberger et al. 2019; Mbungu & Helgenberger 2021), as well as to contribute to secure livelihoods and the general well-being of humanity. These objectives are therefore in line with the government's main development objectives underlined in Vision 2030. However, despite Kenya's economic and social progress, poverty and inequalities persist and, as a result, many Kenyans have been left behind. This section highlights the potential benefits of accelerating RE development in Kenya, especially in the interest of achieving national goals, such as those outlined in the Vision 2030, regional goals such as Agenda 2063, the African continent's development framework, and other internationally agreed goals—mainly the United Nations Sustainable Development Goals and the Paris Agreement.

3.1 Employment opportunities

According to the IRENA renewable energy and jobs report, distributed renewable energy (DRE) solutions have the potential to create a substantial number of much-needed employment opportunities, including in Kenya (IRENA 2020). Overall, the IEA's sustainable recovery plan notes that rooftop solar has the greatest job creation potential among all clean energy technologies (IEA 2020). Kenya's abundant solar energy resource capacity, along with proper planning and implementation processes, presents an opportunity to create additional direct and indirect jobs, as well as the provision of energy services for both domestic, small-scale productive, and commercial uses, especially in poor and marginalised communities. A recent analysis of the role of renewable energy mini-grids in Kenya's electricity sector found that, for every 1 MW of solar mini-grid capacity installed, more than 800 full-time-equivalent job-years would be created for Kenyan workers (Barasa et al. 2019).

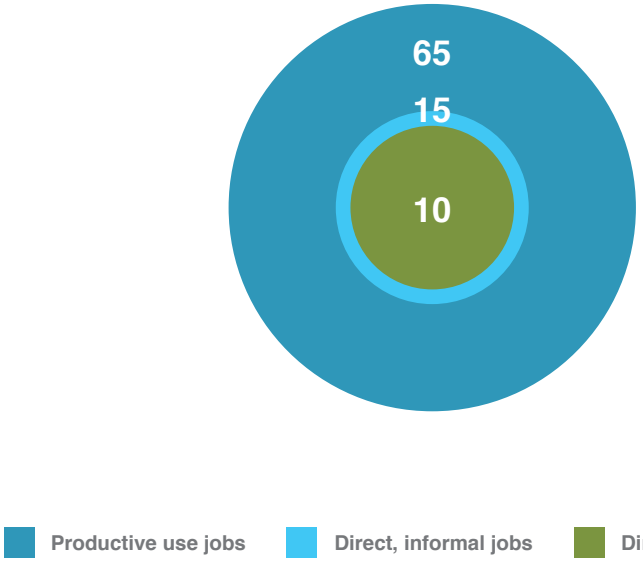


Figure 4: Estimated formal, informal and productive use employment (in thousands), 2017–2018, Kenya

Source: IRENA 2020

3.2 Sustained access and effective use of affordable, reliable, sustainable energy services

Despite progress in RE development, Kenya, like many other African countries, faces an ongoing challenge to meet the energy demands and needs of its growing population. However, while work is underway to electrify marginalised and vulnerable communities in Kenya, through the implementation of the Kenya Off-grid Solar Access Project (KOSAP) (KPLC & REA 2017), the goal for Kenya should not only be to reach everyone. In addition to universal access, intentional effort needs to be incorporated within the planning and implementation phases to guarantee affordability, reliably, safety, and productive uses of energy services for all, when desired. The issue of surplus capacity also presents Kenya with an opportunity to address the challenge of providing access to clean cooking solutions in a sustainable way. Idle capacity can be used to power cooking technologies and other domestic services thorough innovations that speak to the diverse cooking energy needs of Kenyans, taking into account affordability, health, and safety concerns; and the social and cultural values of the dynamic and growing population; as well as the nature of changing living environments, as the country becomes increasingly urbanised (Mbungu 2020).

3.3 Gender inclusivity and equity

Access to both electricity and clean cooking energy services plays a central role in easing the burdens and risks associated with gender inequalities in Kenya (Mbungu 2020). Moreover, there is overwhelming evidence showing a positive relationship between access and productive uses of energy and women's economic empowerment and general well-being (Farioli & Dafrallah 2012; Foster 2011; IEA 2020; IRENA 2019; UNDP 2011). Therefore, RE provides an opportunity to not only increase access to secure energy services, but to boost gender equality through employment opportunities for women and the use of energy services presented by RE development and implementation process (IRENA 2020). Kenya's RE sector is a leading player in supporting women's employment, with 25% of all RE jobs thought to be taken by women (IRENA 2019). However, this lags behind the current estimate of 32% female employees within the global renewable energy industry, and in access to credit for women-owned businesses. Estimates show that 48% of business owners in Kenya are women, but only 7% have access to a formal credit (IRENA 2019: 71). Some of the most commonly cited barriers to the participation of women in RE and other secure income-generating activities relate to: "broader sociocultural challenges involving gender stereotypes, recruitment biases, discriminatory business cultures, perceptions of gender roles and women's representation in STEM education" (IRENA 2020: 19). This is an indication that, for the full potential of RE energy to be realised, Kenya would also need to actively invest in the development of women's abilities and opportunities (Mbungu 2020), to both access the kinds of energy services they need to thrive and improve quality of life, but also to participate in employment opportunities created by the development of RE.

3.4 Climate and environmental protection

Kenya is one of the continent's success stories in respect of RE development. In addition to its global commitments to combat climate change, the government has developed several national climate change action plans and strategies, including the 2010 National Climate Change Response Strategy (NCCRS), the 2015–2030 Kenya National Adaptation Plan, the 2016 Climate Change Act, and the 2018–2022 National Climate Change Action Plan (NCCAP) to mitigate the negative effects of climate change on the livelihoods and well-being of Kenyans. However, gaps persist, causing divesting effects such as floods and droughts which threaten the well-being and livelihoods of Kenyans, as most of the population depends on climate-sensitive sectors and resources to meet their basic needs. One area in which Kenya lags behind is the sustainable use of biomass resources. Unsustainable use of biomass resources for commercial and domestic uses has been shown to have divesting effects on forest, natural environments, and landscapes, resulting in negative effects on the agriculture sector; access to basic needs such as food, fresh water, clean air, and safe living environments; and the general well-being of Kenyans (Mbungu 2020). The demand and the gaps in access to clean and environmentally friendly cooking energy services present an opportunity for Kenya to address climate change, by developing pathways to use currently available surplus RE in developing an inclusive energy system that addresses the energy needs of all its sectors in a clean, environmentally friendly, and just way.

Value creation and community development through renewable energy deployment can help Kenya to achieve its national, regional, and international goals.

© Strathmore University training

3.5 Local value creation and community development

Most industrial activity is concentrated in major cities, and therefore well connected to the national grid. However, Kenya's livelihood activities are in the agriculture sector and in informal small- and medium-scale businesses. This is where DRE can contribute to Kenya's socio-economic development at limited cost and investment. In 2017, the IEA, through its Energy Access Outlook, stated that systems such as mini-grids and solar home systems were the most economical means of providing electricity access to 70% of the rural population in Sub-Saharan Africa that currently lacks electricity access (IEA 2017). Value creation and community development through RE is especially important if Kenya aims to achieve its national, regional, and international goals, especially given its dependence on agriculture as the main source of income and livelihoods. DRE can be especially useful in supporting farming and food-processing activities to add value to final products. Moreover, access to and use of energy services can play an essential role in the education and skills development sector, in developing and enhancing local human capacity.

3.6 Health, air quality, and well-being

Universal health care services for all Kenyans is one of the four medium-term 2018–2022 goals for Vision 2030 and is therefore of high priority for the Kenyan government. Vision 2030's overall objective is to ensure that Kenya becomes a newly industrialised middle-income country, providing a high quality of life to all its citizens by 2030. Secure, reliable, clean, and affordable energy services are a prerequisite for good health and general well-being. As the COVID-19 pandemic has highlighted, well-functioning and equipped health facilities, with reliable and secure energy supply, can save lives. Moreover, the long-term containment of the virus, mainly through universal vaccination, could also depend on access to secure and reliable energy services. Even in normal times, basic lifesaving health services such as medical equipment sterilisation, child vaccinations, blood storage, supply of oxygen, and basic lighting for medical care services and procedures all depend on reliable and secure energy services. The new constitution devolves health care services to the county governments, which presents an opportunity for more localised and context-specific healthcare services on a small scale and in an efficient manner, for example through the development of functional and sufficiently equipped hospitals and health care centres and mobile clinics in remote and isolated communities with secure, reliable, and affordable RE services. More urgent for Kenya is the need to minimise and eventually eliminate the health risks and burdens associated with the lack of clean cooking energy services, especially for women and children.

4. Maximising the social performance of renewable energy for all Kenyans

Kenya must overcome many challenges, such as social and economic injustices, limited opportunities for its growing population, and lack of access to secure, reliable, and affordable energy services. Nevertheless, through its current RE energy development, Kenya has shown the world that it is willing and able to change the lives of all Kenyans, as underscored by its Vision 2030 blueprint for development. Kenya has both the potential and opportunity to develop an RE system that benefits all its citizens and protects the planet on a long-term basis. The political will and commitment expressed and shown by the government through the development of policy guidelines, creating an enabling environment to attract private and public investments and partnerships, as well as the active government involvement in RE development especially (in wind and geothermal), provides hope and an assurance that Kenya is on a path to achieve its energy access goals (at least in respect of electricity access and RE development). With this commitment, and by ensuring that no one is left behind, Kenya can also move with the kind of speed and commitment needed to close the 90% gap in access to clean, reliable, sustainable cooking energy services to guarantee secure livelihoods and general well-being for all its citizens. Achieving universal access to energy services through just and sustainable RE development processes will not only ensure that Kenya meets all its national, regional, and international development goals but will secure a safe and sustainable living environment for all Kenyans.

However, RE in and of itself does not guarantee the kind of success sought by the Kenyan government. In addition to energy systems development, Kenya needs to provide an environment that enables access to and use of energy services, in order to support improvements in quality of life and well-being on a long-term basis. This calls for the incorporation of the social dimensions in the energy planning, development, and implementation processes. Incorporating these dimensions helps in understanding whether energy systems and technologies are designed and implemented to meet users' needs in a just manner; whether governance structures are in place to manage and govern the energy systems and market dynamics; whether the use of energy services is contributing to improving quality of life and well-being; and whether there is societal support and ownership. Such a comprehensive approach to energy development goes beyond standard metrics of energy development success based on the share of renewables in total energy consumption, the number of technologies developed and implemented, or the share of CO_2 emissions, and instead also focuses on the long-term performance of energy development and investments in well-being, taking into account:

1. **Individual- and community-level needs and aspirations;**

2. **Social performance of energy investments, and progress in supporting the livelihoods and well-being of all Kenyans; and**

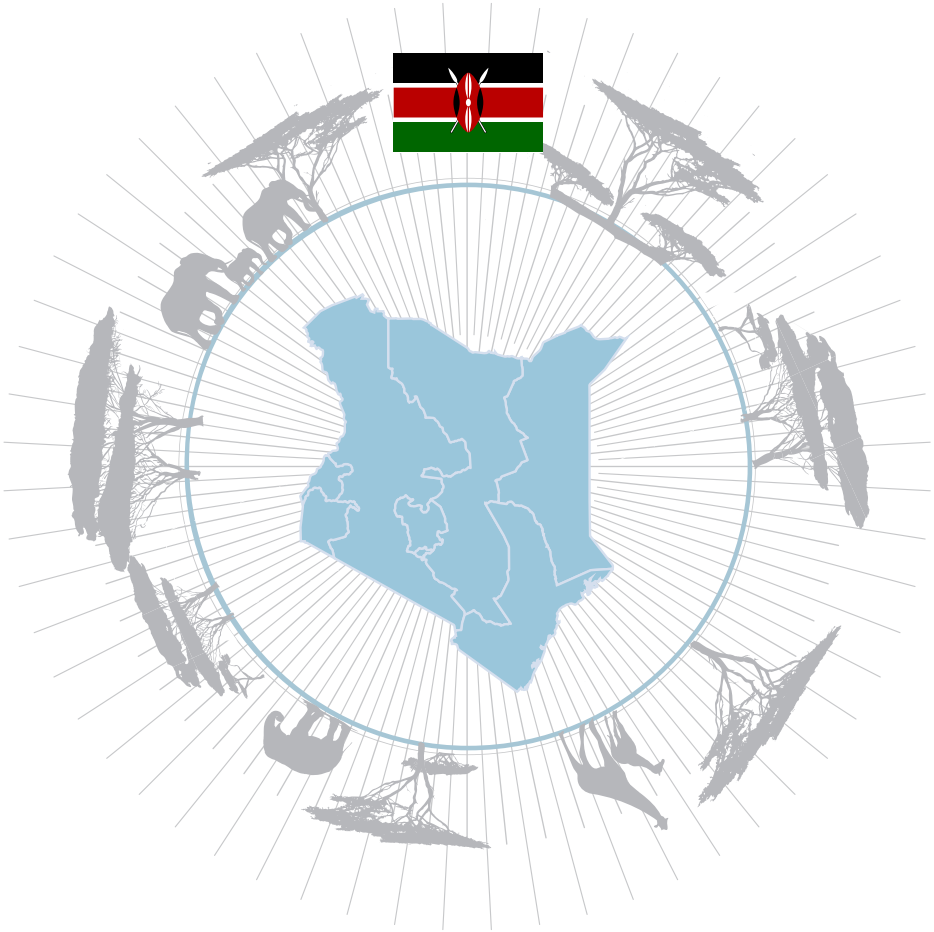
3. **The social sustainability of energy development processes and projects, incorporating issues of acceptance and ownership, justice, access and energy use conditions, environmental compatibility, and governance.**

Indeed, while Kenya is in a strong position compared to most other countries in Sub-Saharan Africa, with respect to electricity access and RE development, Kenya should not rest on its prior achievements but should aim bigger by seeking to identify new and emerging patterns of development where RE can be used to support the well-being of individuals and communities. The COVID-19 pandemic, and the ongoing risks and burdens imposed on Kenyans by climate-change, underscore the importance of aiming for an effective, resilient, sustainable, and just energy system where no one is left behind.

Recovering from the economic shocks of the pandemic, and avoiding severe future shocks triggered through the climate crisis, do not represent conflicting interests but rather a mutually reinforcing coping strategy. The Paris Climate Agreement and the 2030 Agenda offer important, internationally agreed frameworks for a green recovery: to ensure economic recovery in the shorter term, and to build resilient economies and health systems in the long run.

IASS (2020). Reviving national economies and health systems following the COVID-19 pandemic

Kenya should therefore focus on taking its RE success story to the next level, by ensuring that future energy developments and implementation processes are inclusive, just, and enhance the well-being of individuals and local communities in a sustainable way.



References

Africa Clean Energy Technical Assistance Facility (2020). "How Governments Can Minimize the Impact of Covid-19 On Rural Off-Grid Communities". https://www.ace-taf.org/wp-content/uploads/2020/05/How-Governments-Can-Minimize-the-Impact-Of-Covid-19-On-Rural-Off-Grid-Communities.pdf.

Akrofi, M. M. & Antwi S. H. (2020). "COVID-19 Energy Sector Responses in Africa: A Review of Preliminary Government Interventions". Energy Research & Social Science (68): 101681 – 101681. https://doi.org/10.1016/j.erss.2020.101681.

Barasa, H.; Day, T. & Kurdziel, M. (2019). "The Role of Renewable Energy Minigrids in Kenya's Electricity Sector". https://ambitiontoaction.net/wp-content/uploads/2021/04/A2A_Mini-Grids-in-Kenya_201911.pdf.

Brent, W. (2020). "Off-Grid Renewable Energy Sector Response to COVID-19". Power for All. https://www.powerforall.org/insights/dre-technologies/covid-19-roundup.

Dubey, S.; Adovor, E.; Rysankova, D.; Portale, E. & Koo, B. (2019). "Kenya. Access to Electricity and Clean Cooking in Kenya Based on the Multitier Framework Survey and Data Analysis." https://energydata.info/dataset/8fe22b3d-5fbb-4af9-a50e-0730020eacfb/resource/b27a89d9-118c-4139-b1ad-70d5abd0b508/download/mtf-energy-access-country-diagnostics-report_kenya.pdf.

Energy and Petroleum Regulatory Authority (EPRA) (2014). "Energy (Local Content) Regulations, 2014." https://www.rerec.co.ke/index.php?option=com_phocadownload&view=category&id=16&Itemid=223#.

EPRA (2019). "2019 Energy Sector Overview and 2020 Outlook". https://www.epra.go.ke/wp-content/uploads/2020/01/Press-release-Substantial-Achievements-in-2019-and-2020-Outlook.pdf.

EPRA (2020). "2020. The Energy & Petroleum Statistics Report 2020". https://www.epra.go.ke/downloads/.

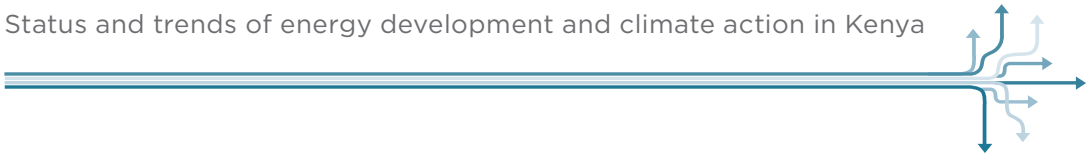
Farioli, F. & Dafrallah T. (2012). "Gender Issues of Biomass Production and Use in Africa". Bioenergy for Sustainable Development in Africa: 345 – 61. Springer.

FAO (2018). "The State of the World's Forests 2018". http://www.fao.org/documents/card/en/c/I9535EN/#:~:text=Time%20is%20running%20out%20for,accelerate%20progress%20towards%20the%20SDGs.

Foster, E. A. (2011). "Sustainable Development: Problematising Normative Constructions of Gender within Global Environmental Governmentality". Globalizations 8(2): 135 – 49.

GET.invest (2020). "GET.Invest Launches Covid-19 Window". https://www.get-invest.eu/2020/04/16/get-invest-launches-covid-19-window/.

GET.invest (n.d.). "Renewable Energy Potential." https://www.get-invest.eu/market-information/kenya/renewable-energy-potential/#:~:text=high-,Renewable%20energy%20potential,to%20central%20and%20rural%20areas.



GOGLA (2020). "Policy Alert: Kenya Introduces VAT on Off-Grid Solar Products". https://www.gogla.org/news/policy-alert-kenya-introduces-vat-on-off-grid-solar-products.

Government of Kenya (2017). "Government of Kenya Sustainable Development Goals Voluntary National Review 2017". High-Level Political Forum. https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=372&menu=3170.

Government of Kenya (2020). "Second Voluntary National Review on the Implementation of the Sustainable Development Goals": 1–124.

Gregersen, L.E. & Bhamidipati, P. L. (2020). "Clean Captive Power: Understanding the Uptake and Growth of Commercial and Industrial (C&I) Solar PV in Kenya". https://unepdtu.org/publications/clean-captive-power-understanding-the-uptake-and-growth-of-commercial-and-industrial-ci-solar-pv-in-kenya/.

Hassan, S. (2020). "Profits Not Forthcoming Due to Covid-19, Warns Kenya Power". The Standard. https://www.standardmedia.co.ke/business/article/2001375390/profits-not-forthcoming-due-to-covid-19-warns-kenya-power.

Helgenberger, S.; Jänicke, M., & Gürtler, K. (2019). "Co-benefits of Climate Change Mitigation". In W. Leal Filho, A. M. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.), Climate Action: Encyclopedia of the UN Sustainable Development Goals: 1–13. https://doi.org/10.1007/978-3-319-71063-1_93-1.

IASS (2016). "The Future of Africa's Energy Supply. Potentials and Development Options for Renewable Energy." IASS Study, Potsdam. https://publications.iass-potsdam.de/rest/items/item_1480920_8/component/file_1504189/content

IASS (2017). "Mobilising the co-benefits of climate change mitigation: Connecting opportunities with interests in the new energy world of renewables". IASS Working Paper, Potsdam. https://publications.iass-potsdam.de/rest/items/item_2348917_7/component/file_2666888/content

IASS (2020). "Reviving national economies and health systems following the COVID-19 pandemic. COBENEFITS Factsheet." Potsdam. https://www.iass-potsdam.de/sites/default/files/2020-05/COBENEFITS-COVID-19_Recovery_factsheet_200511_web.pdf

IEA (2019). "Africa Energy Outlook 2019. World Energy Outlook Special Report". IEA Publications. https://www.iea.org/reports/africa-energy-outlook-2019.

IEA (2017). "Energy Access Outlook 2017 from Poverty to Prosperity". https://www.oecd.org/publications/energy-access-outlook-2017-9789264285569-en.htm.

IEA (2020). "Sustainable Recovery: World Energy Outlook Special Report." World Energy Outlook. https://www.iea.org/reports/sustainable-recovery.

IEA, IRENA, WHO, World Bank & UNSD (2020). "Tracking SDG 7: The Energy Progress Report 2020. Sustainable Recovery: World Energy Outlook Special Report". World Bank. https://openknowledge.worldbank.org/handle/10986/33822#:~:text=Tracking%20SDG7%3A%20The%20Energy%20Progress,share%20of%20renewable%20energy%2C%20and.

InVhestia (2020). "Should Investors Be Worried about Kenya Power's (KP) Ability to Perform?". https://invhestia.com/V2/wp-content/uploads/2020/10/Kenya-Power-Report-by-InVhestia-Africa_01i.pdf.

IRENA (2019). "Renewable Energy: A Gender Perspective". https://irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jan/IRENA_Gender_perspective_2019.pdf.

IRENA (2020). "Renewable Energy and Jobs. Annual Review 2020". https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Sep/IRENA_RE_Jobs_2020.pdf.

Johns Hopkins University Center for Systems Science and Engineering (2021). "COVID-19 Data". https://www.google.com/search?q=covid+19+cases+today&oq=covid+19+cases+&aqs=chrome.2.69i57j0i433i457j0l6.7520j0j15&sourceid=chrome&ie=UTF-8.

The Kenya Power and Lighting Company (2021). Annual report and financial statements for the year ended 30th June 2020 [Financial report]. URL:https://kplc.co.ke/img/full/KPLC-Book-website.pdf

Kahlen, L.; Kurdziel, M.; Day T. & Schiefer, T. (2018). "The Role of Geothermal and Coal in Kenya's Electricity Sector and Implications for Sustainable Development". https://ambitionto-action.net/wp-content/uploads/2019/11/A2A-Kenya_Geothermal-study_201911.pdf.

Kenya National Bureau of Statistics (KNBS) (2020). "Economic Survey 2020". https://www.knbs.or.ke/?wpdmpro=economic-survey-2020.

Kurdziel, M.; Kahlen,L. ; Day, T. (2020). "Climate change and sustainable development in the Kenyan electricity sector". NewClimate Institute.

Kenya National Bureau of Statistics (2019). "2019 Kenya Population and Housing Census Reports". http://housingfinanceafrica.org/documents/2019-kenya-population-and-housing-census-reports/#:~:text=The%20Kenya%20National%20Bureau%20of,and%20Housing%20Census%20(KPHC).&text=From%20this%20report%2C%20Kenya's%20population,average%20household%20size%20is%203.9.

Kenya Power and Lighting Company (KPLC) & Rural Electrification Authority (REA) (2017). "KENYA OFF-GRID SOLAR ACCESS PROJECT (K-OSAP) ENVIRONMENTAL & SOCIAL MANAGEMENT FRAMEWORK". https://kplc.co.ke/img/full/grsajLu4HAVc_KOSAP-ESMF%20.pdf.

KETRACO (n.d.). "Ethiopia – Kenya Interconnector (2013-Ongoing)".

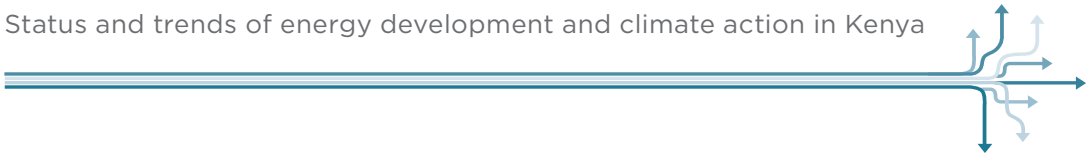
LCPDP (2018). "Updated least cost power development plan 2017 – 2037". https://www.decoalonize.org/wp-content/uploads/2021/03/LCPDP-Least-Cost-Power-Development-Plan-2017-2037-not-2022-updated-June-2018.pdf

Mbaka, C.; Gikonyo, J. & Kisaka, O. M. (2019). "Households' Energy Preference and Consumption Intensity in Kenya". Energy, Sustainability and Society 9(20). https://doi.org/10.1186/s13705-019-0201-8.

Mbungu, G. (2020). "Factors that enable or hinder sustained access to sustainable and effective cooking energy services. The case of the informal settlement of Kibera in Nairobi, Kenya". PhD Thesis, Stuttgart.

Mbungu, G. K.; Opfer, K. & Adow, M. (2020). "The EU-Africa-Strategy: An Opportunity to set Ambitious New Targets and Approaches to Guarantee the African People's Wellbeing". Policy Brief. https://publications.iass-potsdam.de/pubman/item/item_6000509.

Mbungu, G. & Helgenberger, S. (2021). Social Performance Approach: Fostering community well-being through energy-sector investments. Discussion Paper, IASS Potsdam.



Ministry of Energy (2012). "Feed in Tariff Policy 2012". https://www.iea.org/policies/5635-2nd-revision-of-feed-in-tariffs-for-renewable-energy?country=Kenya https://renewableenergy.go.ke/asset_uplds/files/Feed_in_Tariff_Policy_2012.pdf http://admin.theiguides.org/Media/Documents/FiT%20Policy%202012.pdf.

Ministry of Energy (2010). "Feed-in-Tariffs Policy on Wind, Biomass, Small-Hydro, Geothermal, Biogas and Solar Resource Generated Electricity". https://kerea.org/wp-content/uploads/2012/12/Feed-in-Tariff-Policy-2010.pdf.

Ministry of Energy (2018a). "Kenya National Electrification Strategy: Key Highlights". http://pubdocs.worldbank.org/en/413001554284496731/Kenya-National-Electrification-Strategy-Key-Highlights-2018.pdf.

Ministry of Energy (2020). "Kenya Off-Grid Solar Access Project (KOSAP) (2017 – 2023)". https://www.kosap-fm.or.ke/.

Ministry of Energy (2018b). "National Energy Policy". https://kplc.co.ke/img/full/BL4PdOqK-txFT_National%20Energy%20Policy%20October%20%202018.pdf.

Ministry of Energy (2011). "Updated Least Cost Power Development Plan (LCPDP). 2011-2031". https://kerea.org/wp-content/uploads/2016/08/Least-Cost-Power-Development-Plan-2011-2031.pdf.

Ministry of Energy (2020a). "Kenya National Energy Efficiency and Conservation Strategy". https://unepdtu.org/wp-content/uploads/2020/09/kenya-national-energy-efficiency-and-conservation-strategy-2020-1.pdf.

Ministry of Energy (2020b). "PRESS RELEASE: Government of Kenya Provides Support to the Private Sector to Enable the Sale of Quality Solar and Clean Cooking Products in Off-Grid Areas". https://snv.org/cms/sites/default/files/explore/download/press_release-_sale_of_quality_solar_and_clean_cooking_products_under_ministry_of_energy_kosap_initiative_commences_-october_15_2020.pdf.

Ministry of Energy & Energy and Petroleum Regulatory Authority (EPRA) (2012). "Solar (Water Heating) Regulations 2012". http://www.fao.org/faolex/results/details/en/c/LEX-FAOC119225.

Ministry of Environment and Natural Resources (2015). "Kenya's Intended Nationally Determined Contribution".https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Kenya/1/Kenya_INDC_20150723.pdf.

Ministry of Planning and Devolution (2007). "The Kenya Vision 2030. The Popular Version". https://vision2030.go.ke/publication/kenya-vision-2030-popular-version/.

National Social Protection Secretariat (n.d.). "Older Persons Cash Transfer (OPCT)". https://www.socialprotection.or.ke/social-protection-components/social-assistance/national-safety-net-program/older-persons-cash-transfer-opct.

Nicholas, Simon (2020). "High Fossil Fuel Costs and Unnecessary Power Developments like Lamu Will Lead to Expensive Electricity Bills for Kenyans". Institute for Energy Economics and Financial Analysis. https://ieefa.org/high-fossil-fuel-costs-and-unnecessary-power-developments-like-lamu-will-lead-to-expensive-electricity-bills-for-kenyans/.

Republic of Kenya (2018). "Least Cost Power Development Plan 2017-2037". http://gak.co.ke/wp-content/uploads/2019/02/Updated-Least-Cost-Power-Development-Plan-2017-2022-min.pdf.

Republic of Kenya (2011). "Scaling-Up Renewable Energy Program (SREP)". https://www.climateinvestmentfunds.org/sites/cif_enc/files/Kenya_post_mission_report_March_10_2011.pdf.

RES4Africa Foundation (2020). "Renewable against COVID Successfully Repowers a Health Centre in Kenya". https://www.res4africa.org/2020/11/24/renew-able-against-covid-successfully-repowers-a-health-centre-in-kenya/.

Resource global network (n.d.). "Lake Turkana Wind Power". https://resourceglobalnetwork.com/portfolio_page/laketurkanawindpower/.

Rural Electrification & Renewable Energy Corporation (n.d.). "Electrification of Public Facilities". https://www.rerec.co.ke/index.php?option=com_content&view=article&id=6&Itemid=148.

Rural Electrification & Renewable Energy Corporation (n.d.). "Turkwel Lokichar Powerline". https://www.rerec.co.ke/index.php?option=com_content&view=article&id=8&Itemid=150.

The Government of Kenya (2019). "The Energy Act 2019". https://kplc.co.ke/img/full/o8wccHsFPaZ3_ENERGY%20ACT%202019.pdf.

The Kenya Power and Lighting Company (2019). "Annual Report and Financial Statements 2018/2019". https://kplc.co.ke/img/full/ypSsKdhsre3z_KPLC%20ANNUAL%20REPORT%202019_20%20FOR%20WEB.pdf.

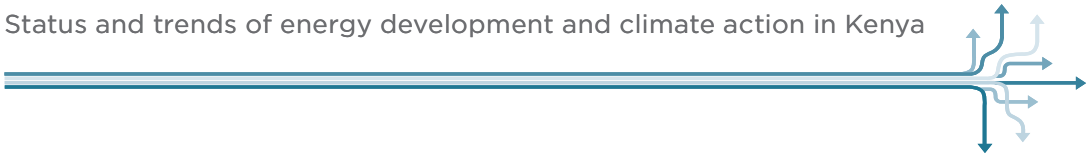
The Republic of Kenya (2013). "Value Added Tax Act". https://kra.go.ke/images/publications/ValueAddedTax_ActNo35of2013.pdf.

Transparency International (2020). "Corruption Perceptions Index". https://www.transparency.org/en/cpi/2018/index/dnk.

United Nations Development Programme (2011). "Gender and Energy". http://www.undp.org/content/dam/undp/library/gender/Gender and Environment/PB4-AP-Gender-and-Energy.pdf.

United Nations & Economic Commission for Africa (2020). "The Impact of COVID-19 on Africa's Energy Sector and the Role of Re to Empower a Long Term and Sustainable Recovery". https://www.tralac.org/documents/resources/covid-19/regional/3943-the-impact-of-covid-19-on-africas-energy-sector-res4africa-june-2020/file.html.

World Bank (2020). "The World Bank in Kenya". https://www.worldbank.org/en/country/kenya/overview.



Abbreviations

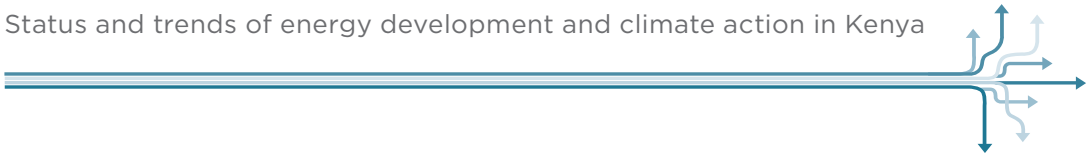
AECF	African Enterprise Challenge Fund
C&I	Commercial and industrial sector
CSO	Civil society organisations
CDIP	County Integrated Development Plans
DRE	Decentralised renewable energy
GOK	Government of Kenya
IASS	Institute for Advanced Sustainability Studies
INDC	Intended Nationally Determined Contribution
IKI	International Climate Initiative
IET	International Energy Transition, GmbH
LTWP	Lake Turkana Wind Power Project
LCPDP	Least Cost Power Development Plans
KOSAP	Kenya Off-grid Solar Access Project
MW	Megawatt
NCCAP	National Climate Change Action Plan
NCCRS	National Climate Change Response Strategy
PPA	Power Purchase Agreement
RENAC	The Renewables Academy, AG
RE	Renewable energy
SERC	Strathmore Energy Research Centre
SDGs	Sustainable Development Goals
SME	Small and medium-sized enterprises
UFU	Independent Institute for Environmental Issues
VNR	Voluntary National Reviews

Annex

Policy	Year	Main objectives of the policy or framework	Enforcing institution(s)
Feed-In-Tariffs Policy on Generated Electricity	2010	■ First revised version of the FiT policy guideline that was introduced in 2008; ■ Seeks more realistic tariffs, since power generation tariffs submitted by investors in the initial scheme were significantly higher than the feed-in-tariffs; ■ Revised tariffs for wind and biomass; ■ Inclusion of new tariffs for geothermal, biogas, and solar resources. The tariffs for small-scale hydropower remained unchanged.	Ministry of Energy (MoE 2010)
Updated Least Cost Power Development Plan (LCPDP) 2011–2031	2011	■ The LCPDP is Kenya's power industry generation and transmission system. It plans and forecasts future demands and costs; ■ This LCPDP updates the version prepared in 2009/2010; ■ Forecasts in the reference case range from 1,227 MW in 2010 to 3,751 MW in 2018; 15,026 MW in 2030; and 16,905 MW in 2031; ■ Candidate generation resources considered in the system plan include geothermal, hydro, wind, coal, oil-fired fuels, and nuclear; ■ The optimum solution indicates that geothermal should be increased from 198 MW to 5,530 MW in the next planning period. The transmission plan indicates the need to develop approximately 10,345 km of new lines at an estimated cost of USD 4.48 billion.	Ministry of Energy (MoE 2011)
Solar Regulations 2012	2012	■ Includes rules and standards for installation, and requires the Energy Regulatory Commission (now EPRA) to maintain a register of all licensed solar water-heating systems, technicians, and contractors; ■ Requires all premises with hot water requirements (>100 l/day) to install and use solar heating systems for at least 60% of their annual hot water demand; ■ Requires all existing premises to comply within a period of five years from the date of the regulation's enforcement.	Ministry of Energy/ Energy and Petroleum Regulatory Authority (MoE/EPRA 2012)
Feed in Tariff Policy 2012	2012	■ Second revision of the feed-in tariffs in Kenya; ■ Introduced new feed-in tariff levels, guidelines for connecting small-scale renewables to the grid, guidelines for a standardised monitoring framework, and a standardised power purchase agreement (PPA) template for capacities up to 10 MW; ■ Introduced improvements to the FiT calculation model, to include a linear interpolation method; ■ Accepts non-solicited renewable projects larger than 10 MW if they pass load-flow and system stability tests.	Ministry of Energy (MoE 2012)

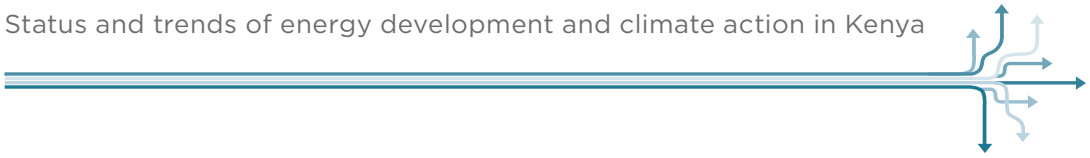
Table A. 1: Kenya Energy Policies 2010–2019

Source: author's compilation based on Kenyan policy, projects and activities review



Policy	Year	Main objectives of the policy or framework	Enforcing institution(s)
Energy (Local Content) Regulations 2014	2014	Requires licensees/contractors/sub-contractors or any other entities carrying out operations in the energy sector to: ■ Ensure that local content is a component of their operational energy activities; ■ Give Kenyan citizens first consideration for employment and training in any operation executed; ■ Submit a Local Content Plan to the Commission, demonstrating compliance with the Kenyan local content requirements in the application for any license, permit, or interest, and before carrying out any energy activity in Kenya.	Energy and Petroleum Regulatory Authority (EPRA 2014)
Value Added Tax Act 2013	2013	■ Includes tax exemption for supplies imported or purchased for the construction of renewable energy, such as wind turbines, solar cells, modules, and solar water heaters; ■ Hydraulic turbines and water wheels are free from import duties but subject to 16% VAT; ■ PV semi-conductor devices—including PV cells and LEDs, together with wind-powered generating sets that have already been assembled—are subject to 5% import duty and 16% VAT.	Republic of Kenya (Republic of Kenya 2013)
National Energy Policy	2018	■ Aligns energy policy and development activities with the objectives of Vision 2030 and the provisions of the 2010 constitution; ■ The overall objective is to ensure sustainable, adequate, affordable, competitive, secure, and reliable supply of energy at least cost; ■ In summary, the policy seeks, among other things, to: ■ Use energy for economic empowerment and urban and rural development; ■ Ensure that environmental, social, health and safety considerations, as well as issues of climate change, are considered in energy and petroleum sector developments; ■ Promote diversification of energy supply; ■ Enhance electricity generation from renewable resources; ■ Promote capacity building in the energy sector.	Ministry of Energy (MoE 2018b)

Policy	Year	Main objectives of the policy or framework	Enforcing institution(s)
The Kenya National Electrification Strategy (KNES)	2018	■ The KNES provides a roadmap to reach universal, adequate, quality, reliable, and affordable energy access to enable economic growth; ■ Its principal objective is to achieve electricity access for all households and businesses by 2022; ■ Key principles are the integration of planning processes, balancing out consumer intensification with service beyond the grid, the development of a geospatial platform to focus investments on equitable expansion of access and scaling up off-grid services; ■ The electrification planning determines the potential for: ▪ 269,000 connections to the grid through grid expansion; ▪ 2.77 million connections to the grid through grid intensification and densification; ▪ 35,000 connections through 121 new mini-grids, which serve housing clusters that are too distant from the network or too small to be connected to the national grid; ▪ 1.96 million connections through stand-alone solar home systems. ■ To achieve universal access to electricity by 2022, USD 2.3 billion of public investment in grid and mini-grid expansion and USD 458 million of private investment in solar home systems are required.	Ministry of Energy in collaboration with the World Bank, African Development Bank, the EU, European Investment Bank, and Power Africa (MoE 2018a)
The Energy Act 2019	2019	■ The Act was developed in 2019 to consolidate energy-related laws, including the distribution of responsibilities between the national and county governments and other energy-sector entities; ■ Mandates the Cabinet Secretary (CS), in consultation with relevant stakeholders, to develop and publish a national energy policy, which shall be reviewed every five years; ■ Mandates each county government to develop and submit a county energy plan to the CS in respect of its energy requirements; ■ Mandates national energy service providers to develop and submit plans for the provision of energy services in accordance with its mandate to the CS; ■ Mandates the CS to consolidate the mentioned plans into an integrated national energy plan, which shall be reviewed every three years; ■ Establishes national entities, including the Energy and Petroleum Regulatory Authority (EPRA), the Energy and Petroleum Tribunal, the Rural Electrification and Renewable Energy Corporation, and the Nuclear Power and Energy Agency; ■ Recognises/allows energy production from coal to licensees;	The Government of Kenya (Government of Kenya 2019)

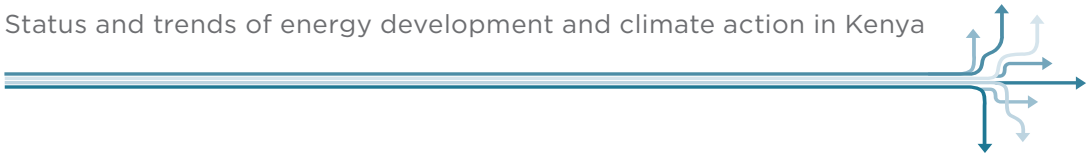


Policy	Year	Main objectives of the policy or framework	Enforcing institution(s)
The Energy Act 2019	2019	■ Mandates the EPRA to coordinate the development and implementation of a prudent national energy efficiency and conservation programme; ■ Opened up the market by authorising the EPRA to issue licenses to other distributors, generators, transmitters, and retailers in the electricity sectors.	The Government of Kenya (Government of Kenya 2019)

Project and timelines	Focus	Main objectives	Geographical cover	Enforcing institution
The Last Mile Connectivity Project (Oct 2016–June 2021)	Electricity access	■ Affordable connection of Kenyan households to the national network grid and geared universal access to electricity; ■ Phase I: Financed jointly by the GoK with a USD 150 million loan from the AfDB: Connecting households located within 600 metres of an existing transformer; ■ Phase II: Financed by the GoK with a USD 150 million loan from the World Bank: involved transformers and the extension of the low-voltage network on the outskirts of cities and towns; ■ Phase III: Financed by the GoK with a USD 150 million loan from the African development Bank (AfDB). Involved new transformers and the extension of the low-voltage network; ■ Phase IV: Financed by the GoK with a EUR 90 million (USD 110 million) loan from the French Development Agency (Agence Française de Développement, AFD), EUR 30 million (USD 37 million) grant from the European Union (EU), and EUR 60 million (USD 73 million) loan from the European Investment Bank (EIB). Involved increasing connections to transformers and distribution transformers.	Slums and rural areas in Kenya	Government of Kenya through Kenya Power, Rural Electrification Authority (Government of Kenya 2020)

Table A. 2: The Last Mile Connectivity Project of the Rural Electrification Authority

Source: author's compilation based on Kenyan policy, projects and activities review



Project and timelines	Focus	Main objectives	Geographical cover	Enforcing institution
Kenya Off-Grid Solar Access Project (KOSAP) (2017–2023	Access to electricity and clean cooking	■ Supports the use of solar and clean cooking technology to drive the electrification of households, enterprises, community facilities, and water pumps, together with capacity building; ■ Implemented in four components over a 5-year period (2018–2023) using USD 150 million of financing from the World Bank.	Targets 14 counties in Kenya that have been defined as 'marginalised areas'	MoE, Kenya Power, and the Rural Electrification Authority (REA) (MoE 2020)
Ethiopia–Kenya interconnector (2013–ongoing)	Access to electricity by 2022 for all public facilities	■ To connect public secondary and primary schools, trading centres and health centres, polytechnics, administrative buildings and offices; ■ Implemented through grid extension for public facilities within grid network and installation of solar PVs for facilities in off-grid areas.	Public facilities throughout the country	Rural Electrification & Renewable Energy Corporation (REREC n.d.)
Electrification of Public Facilities	Grid extension	■ Implemented as a special project to open up the second development corridor in the country from Turkwel to Lokichar in Turkana County; ■ The project involved constructing 120 km of 66 kV Line and the establishment of two sub-stations at Lokichar and Kalimungorok.	Turkwel to Lokichar in Turkana County	Rural Electrification & Renewable Energy Corporation (REREC n.d.)
Turkwel Lokichar Powerline	Transmission line, integration of power systems	■ Construction of 1045 km of 500 kV high-voltage direct current (HVDC) transmission line and 2000 MW HVDC converter sub-stations at both ends of the line; ■ Designated for the development of the Eastern African power market.	Ethiopia and Kenya (Also Rwanda, Tanzania, and Uganda)	KETRACO and Ethiopia Electric Power Company (EEP) (KETRACO n.d.)

COBENEFITS
Mobilising the Co-Benefits of Climate Change Mitigation through Capacity Building among Public Policy Institutions

COBENEFITS works with national authorities and expert organisations in countries across the globe such as Germany, India, Kenya, Mexico, South Africa, Vietnam, and Turkey to quantify and unlock the social and economic co-benefits of early climate action in these countries. With a focus on renewable energy COBENEFITS supports efforts for enhanced NDCs with the ambition to deliver on the Paris Agreement and the 2030 Agenda on Sustainable Development (SDGs). COBENEFITS facilitates capacity building and cross-country learning among policymakers, expert organisations, CSOs and the private sector through a set of connected measures: Country-specific socio-economic assessments, an international COBENEFITS training programme, policy dialogues and briefings on enabling political environments and overcoming barriers to maximise co-benefits of renewable energy and climate action for people, communities and businesses.

COBENEFITS Impulse
July 2021

Contact

Grace Mbungu, Institute for Advanced Sustainability Studies (IASS)
grace.mbungu@iass-potsdam.de

DOI: 10.48481/iass.2021.019

www.cobenefits.info

@IKI_COBENEFITS

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

INTERNATIONAL CLIMATE INITIATIVE (IKI)