

Kenya Country Assessment Report

Country/Region name: Republic of Kenya

The Republic of Kenya is located along the East Coast of Africa. Tanzania, Uganda, South Sudan, Ethiopia and Somalia border it. It has a population of about 55 million and a GDP of US \$ 118.13(IMF,2023). Renewable energy accounts for about 80% of the total installed electricity capacity and 92% of the total energy generated. Electricity access is 75% as the country targets universal electricity access by 2026.

Generation and demand: (type, MW, TWh)

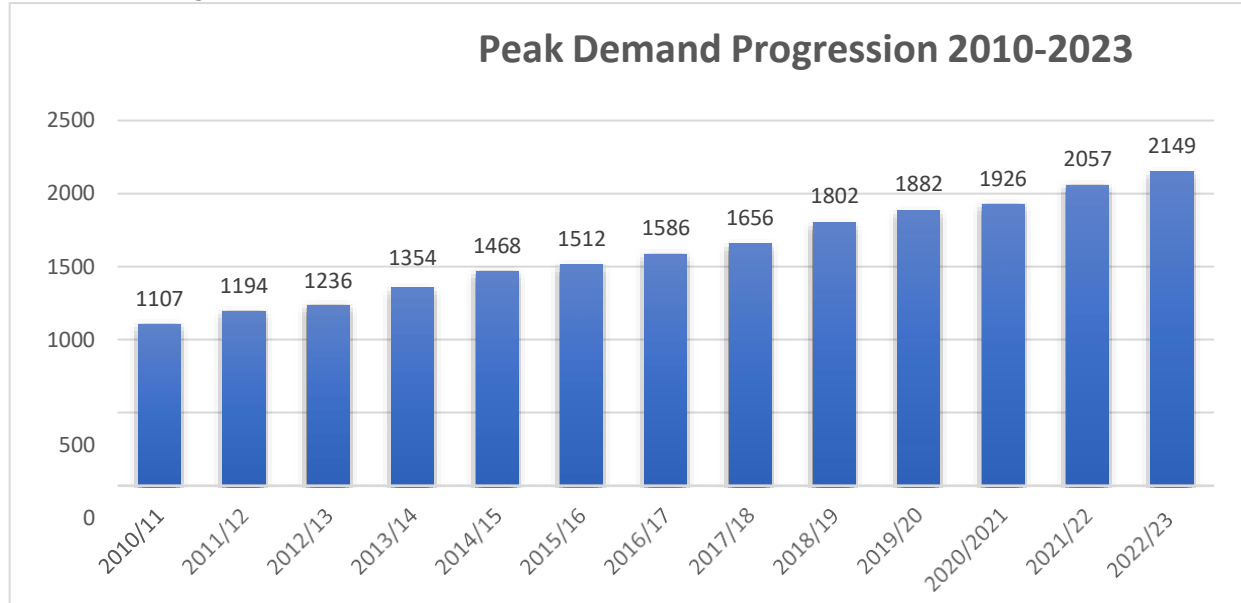
The installed generation capacity in Kenya as of 2023 is as follows;

Technology	Interconnected Capacity (MW)		Captive Capacity (MW)	Total Installed Capacity (MW)	% Total Installed (MW)
	Installed	Effective			
Hydro	838.5	809.6	33.0	871.5	24.80%
Geothermal	940.0	861.1	3.7	943.7	26.86%
Thermal	681.9	645.4	21.3	703.2	20.02%
Wind	436.1	425.5	-	436.1	12.41%
Solar	212.6	212.2	154.9	367.5	10.46%
Bioenergy	2.0	2.0	105.9	107.9	3.07%
Imports	200.0	200.0	-	200.0	
WHRC	-	-	83.5	83.5	2.38%
Total	3,311.1	3,155.8	402.3	3,713.40	100.00%

The energy generated in Kenya has been on an upward trajectory driven by positive economic and population growth rates.

Technology	2021/2022	2022/2023	% Change
HYDRO	3,348.71	2,569.18	-23.28%
THERMAL	1,647.75	1,395.49	-15.31%
WIND	2,052.26	2,201.72	7.28%
GEOHERMAL	4,953.15	6,035.00	21.84%
BAGASSE/BIOGAS	0.38	0.21	-44.83%
IMPORTS	337.50	644.07	90.83%
SOLAR	312.99	443.95	41.84%
TOTAL	1,2652.74	13,289.63	5.03%

Peak demand growth;



RE Market Potential:

Kenya as a signatory to the Paris Agreement has committed to abate GHG emissions by 32% by 2030 compared to the business-as-usual emissions scenario, according to the updated Nationally Determined Contribution (NDC). One of the strategies that the country is implementing is to achieve 100% renewable generation on the national grid by 2030. As of August 2023, renewables accounted for 92% of the electricity generated. The Government of Kenya, as part of reducing its carbon footprint, has prioritized the replacement of carbon-intensive fossil fuels and the exploitation of renewable energy sources. This is being achieved through decommissioning thermal plants at the expiration of their existing Power Purchase Agreements (PPAs). Four thermal plants namely; Iiberafrica, Tsavo, Muhoroni GT and Kipevu I power plants have so far been decommissioned. In addition, there are no new approvals for PPAs that include generation from thermal plants. Forecasts from the Least Cost Power Development Plan (LCPDP) 2022-2041, indicate that the country will continue to meet its growing energy demand through a mix of largely renewable energy technologies and following a least-cost approach as illustrated in Figure 1.

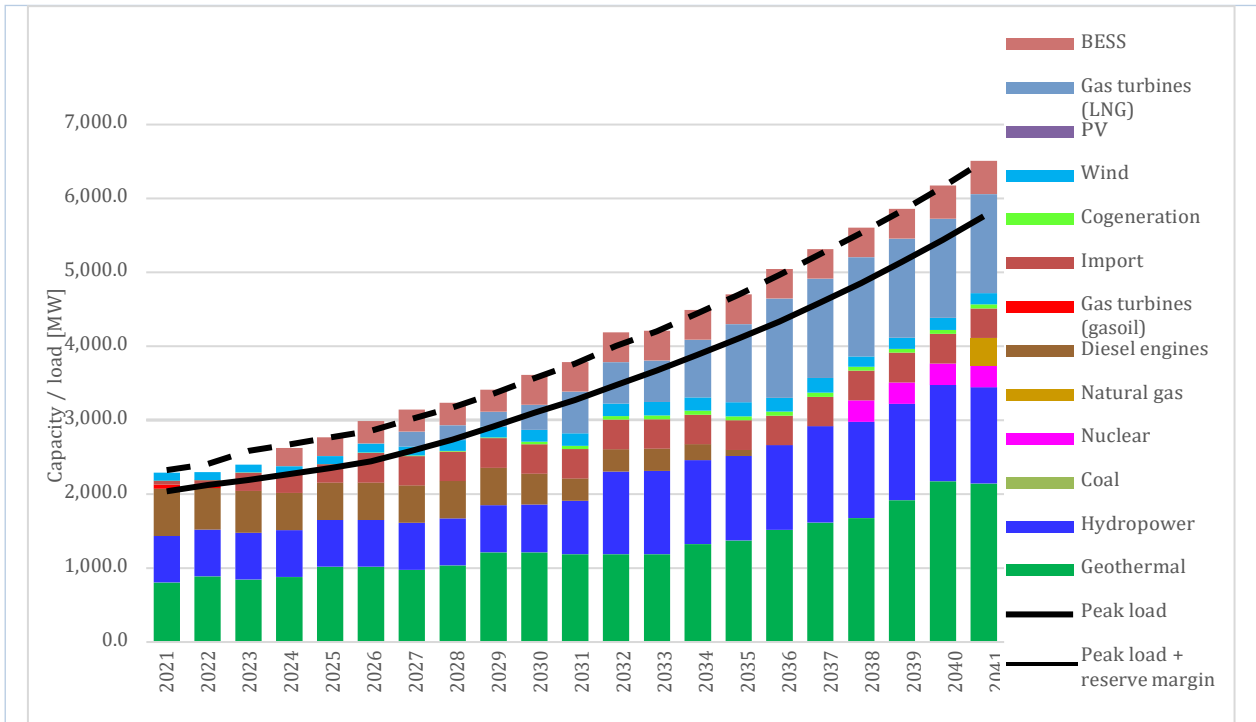


Figure 1: Projected Installed Capacity - Reference Scenario: LCPDP 2022-2041

The achievement of 100% renewable energy generation will be made possible by the immense renewable energy potential in the country. The geothermal energy potential in Kenya is estimated at 10,000 MW out of which about 10% (940MW) has been exploited. Hydropower potential is estimated at 9000MW out of which about 10% has been exploited. Kenya is uniquely located along the equator which allows it to get good solar insolation all year round estimated at 4 - 6 kWh/m²/day. Kenya has a proven wind energy potential of as high as 346 W/m² and speeds of over 6m/s in parts of Marsabit, Kajiado, Laikipia, Meru, Nyandarua, Kilifi, Lamu, Isiolo, Turkana, Samburu, Uasin Gishu, Narok, Kiambu Counties among others. Marsabit area where the largest wind power plant in Africa is located has the highest wind potential of about 1426 W/m² and wind speeds of over 10 m/s.

Site Average wind speed data

Site	Windspeed(m/s)	Site	Windspeed(m/s)
Narumoru	5.39	Meru (Kiremu)	6.82
Maralal	5.67	Meru (Mweromalia)	8.44
Malindi	7.78	New Marsabit	9.67
Ngong I	8.85	Bubisa West	11.11
Ngong III (50)	9.24	Bubisa East	9.71
Ngong III (80)	9.17	Kerio Valley	5.55
Meru (Mugae)	7.71	Kisii	5.06
Narok	5.49	Kinangop	7.02

Source: National Energy Policy(2018)

Electrical interconnection and import/export:

Kenya is interconnected with Uganda and Ethiopia. It is connected to Ethiopia via a 500kV HVDC line with a capacity to evacuate 2000MW of power. Kenya has signed a Power Purchase Agreement with Ethiopia to provide 200MW of firm power. This capacity will increase to 400MW in three years' time. The interconnection with Uganda is via a 132kV line with a capacity of 160MW. The interconnection to Tanzania is almost complete and will provide an avenue for the transfer of up to 2000MW of power from Ethiopia to Tanzania. This interconnection will be useful in connecting the Eastern Africa Power Pool and the Southern Africa Power Pool. In the last financial year 2022/23 Kenya imported a total of 644.07 GWh from Ethiopia and Uganda.



Figure 2: Status of Interconnections with Kenya in the Eastern Africa Power Pool

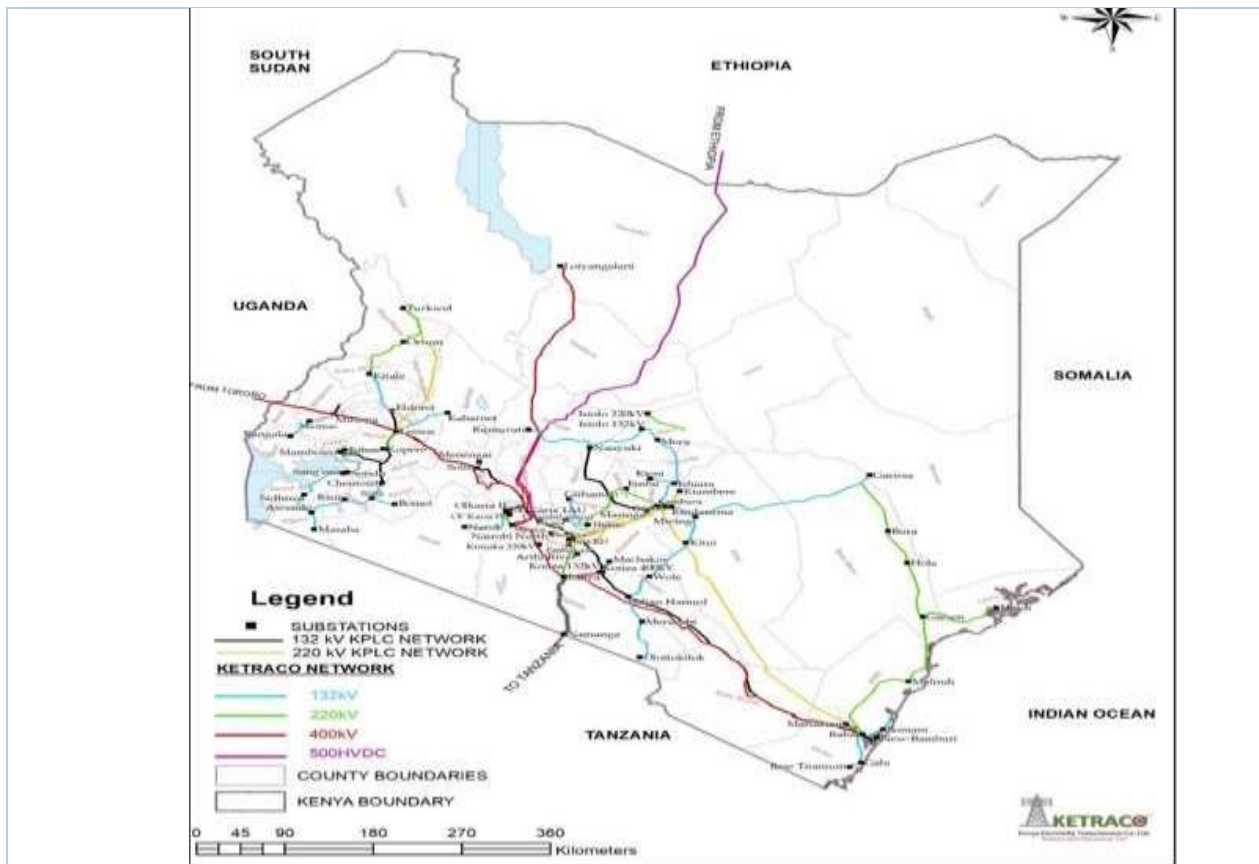


Figure 3: Kenya Transmission Network (KETRACO,2022)

Historical support or development of renewables in the country/region:

The government of Kenya has prioritized the scaling up of renewables in the country in its objective to achieve 100% renewable energy generation by 2030. To achieve this various policy and regulatory instruments have been developed to create an enabling environment for the uptake of renewables. These include fiscal incentives, feed-in-tariff policy and more recently renewable energy auctions. The Feed-in tariff policy provides a guaranteed tariff for the sale of renewable energy-generated electricity to the off-taker. This has substantially scaled up the capacity of renewables.

The Energy Policy, 2018 provides the overarching policy support mechanisms for the various renewable energy technologies in Kenya. Some of the key strategies highlighted in the policy include awareness creation, capacity building, research and development and the development and enforcement of standards and regulations.

The Energy Act of 2019 provides the legal framework for the development of renewables in Kenya. Some of the key support mechanisms in the Act include the development of renewable energy plans, the promotion of renewable energy, development and publication of a renewable energy resources inventory which will guide potential investors in renewables. The Act has also established a dedicated entity to promote the adoption of renewables in Kenya that is the Rural Electrification and Renewable Energy Corporation (REREC). REREC is charged with developing Kenya's renewable energy master plan, undertaking feasibility studies and sharing the same with developers, undertaking research in renewables.

In enhancing the legal framework for renewables, the Energy and Petroleum Regulatory Authority developed regulations to enhance fair market practices and promote the use of quality products and installations. These regulations include; the Energy (Solar Photovoltaic Systems) Regulations 2012 and the Energy (Solar Water Heating) Regulations 2012.

Electricity market structure:

The Electricity market structure in Kenya is largely liberalized with both public and private participants. The structure is unbundled, which has allowed private generators and distributors into the market. The market has historically been a single buyer model but this has changed with the enactment of the Energy Act, 2019. The Act has provided for open access to the grid and consequently allowed private players to buy directly from generators and sell to end consumers. The various entities in the market are as follows;

The Ministry of Energy and Petroleum (MoEP) is responsible for the formulation and overseeing the implementation of energy sector policies and establishing the sector's strategic direction.

Energy and Petroleum Regulatory Authority (EPRA) is responsible for economic and technical regulation of the energy and petroleum sectors.

The Energy & Petroleum Tribunal is responsible for settling disputes and appeals in accordance with the Constitution of Kenya 2010, the Energy Act 2019 and any other relevant law.

Rural Electrification and Renewable Energy Corporation (REREC) is mandated to lead the development of renewable energy resources except geothermal and large hydropower, in addition to its role of implementing rural electrification projects.

Kenya Electricity Generating Company (KenGen) is the main power generation entity in the country accounting for about 60% of the energy generated in Kenya.

Kenya Electricity Transmission Company (KETRACO) is mandated to plan, design, construct, own, operate and maintain high voltage (132kV and above) electricity transmission lines. In addition, KETRACO has been designated the Transmission System Operator (TSO) as per provisions of the Energy Act, 2019.

Nuclear Power and Energy Agency (NuPEA) is mandated to promote the development of nuclear electricity generation in Kenya and carry out research, development and dissemination activities of energy-related research findings.

Kenya Power and Lighting Company (KPLC) is the main off-taker in the power market buying bulk power from all power generators based on negotiated Power Purchase Agreements (PPAs) for onward supply to consumers.

Geothermal Development Company (GDC) is a wholly Government-owned Company undertaking surface exploration of geothermal fields, exploratory, appraisal and production drilling and managing proven steam fields.

Independent Power Producers (IPPs) are private investors in the power sector involved in power generation Mini-grid generators - off-grid generation, storage and distribution networks that supply electricity to localized groups of customers not covered by the interconnected national power grid as approved by EPRA.

Solar Home Systems Companies - Suppliers of solar home systems for households mainly those located far from the grid. These will play a significant role in the attainment of universal access to electricity.

Description of renewables support mechanism:

The support mechanisms for renewables in Kenya have historically been through the Feed-in-Tariff policy. However, in view of improved technology and the reduction in generation costs the government is currently developing a renewable energy auctions policy. This policy will provide for the procurement of intermittent renewable energy sources such as wind and solar whose prices are on a downward trend. Several regulations are being developed that will promote the growth of renewables in Kenya, notably the Energy (Feed-in-Tariff) Regulations, The Energy (Renewable Energy Resources) Regulations and the Energy (Electricity Market, Bulk Supply and Open Access) Regulations.

Responsible government department:

The Ministry of Energy and Petroleum (MoEP) is responsible for the formulation and overseeing the implementation of renewable energy policies and establishing the sector's strategic direction.

Energy and Petroleum Regulatory Authority (EPRA) is responsible for economic and technical regulation of renewable energy through the development and implementation of regulations.

Rural Electrification and Renewable Energy Corporation (REREC) is mandated to lead the development of renewable energy resources except geothermal and large hydropower, in addition to its role of implementing rural electrification projects. REREC is also responsible for developing the renewable energy master plan and carrying out research.

Key Contacts

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██████████, General Manager, Renewable Energy, Research and Development.

<https://www.rerec.co.ke/index.php>

Existing/Planned energy legislation:

The legal framework for renewable energy in Kenya is provided by the Energy Act, 2019 and subsidiary legislations. The agenda of the government is to scale up renewables in the country and therefore, there are no planned or existing legislative bottlenecks that may limit the uptake of renewables.

Environmental legislation for RE:

Climate Change Act, 2016 (attached)

Section 23 (a) of the Act, provides for the regulation of carbon markets, 23 (b) trade in carbon markets, 23 (c) participation in carbon markets, 23(d) requirement for all carbon trading projects to undergo environmental and social impact assessments and 23 (g) establishment of the national carbon registry.

The implication of the legislation is that if the Energy Attribute Certificates are to be traded in the carbon market, the process will need to be aligned to the Act and subsidiary carbon market regulations.

Existing/Planned energy certificate systems:

Kenya does not currently issue Energy Attributable Certificates (EAC). The I-REC Standard would be adopted and implemented without restrictions.

Extent of engagement with government:

There have been several engagements with key stakeholders in government and the private sector where the viability of Energy Attribute Certificates (EAC) in the Kenyan electricity market was presented. These include the Ministry of Energy and Petroleum, the Energy and Petroleum Regulatory Authority and public and private generators. The government in Kenya is keen on actualizing the IREC Standard for the Kenyan market and will support its implementation. I-RECs in Kenya are expected to operate voluntarily.

Response from Government in relation to attribute tracking systems:

The government of Kenya is keen on promoting energy attribute certificates as one of the strategies for scaling up renewables in the country. The Energy and Petroleum Regulatory Authority being the custodian of energy sector data commits to share timely and accurate data on energy generation in support of the I-REC Electricity standard.

Demand-side market potential or strategic nature of market development:

Kenya being a trailblazer in Africa in renewable energy generation has a growing market for Energy Attribute Certificates (EAC). It is further envisioned that with the growth of the Eastern Africa Power Pool, the country anticipates more investments in renewable energy projects to meet the local and regional demand. Various renewable energy market participants have expressed interest in EACs and are considering trading in Kenya and the larger Eastern Africa region.

Analysis of political disruptions or market risks:

Kenya is a democratic nation that enjoys stable political and economic stability. Therefore no political disruptions are envisioned that will affect the electricity market.

In the power market, the private accounts for almost 40% of the energy generated. This attests to the stability in Kenya that has attracted private-sector investments. Further, power purchase agreements between developers and the off-taker are honoured and the country has not experienced any default.

The country has robust policy and regulatory frameworks that have created an enabling environment for the energy market.

Analysis of regulatory risks including linkages with carbon markets and support systems:

In Kenya, there is a CDM market administered by the National Environment Management Authority (NEMA) which is the Designated National Authority (DNA). Some of the Energy projects include; 35 MW Olkaria II Geothermal Project

- i) Redevelopment of Tana Hydropower project
- ii) Optimization of Kiambere Hydropower project
- iii) Olkaria IV Unit 1 & 2 Geothermal Project
- iv) Olkaria I AU 4 & 5 Geothermal Project
- v) 5.1 MW Ngong Wind Project

Kenya reports on its Nationally Determined Contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC) being a signatory to the Paris Agreement. It is not expected that joining and implementing the I-REC Standard will undermine NDCs or the existing CDM market.

Current environmental reporting in energy:

The use of RECs is growing in Kenya as the country transitions to a more sustainable energy future. RECs support the development of renewable energy while offsetting carbon emissions. Examples of RECs in Kenya include the Kenya Renewable Energy Certificate (KREC), Green Energy Certificate (GEC), and Clean Development Mechanism (CDM) certified emission reductions (CERs). The most prominent is the CDM which is administered by the National Environment Management Authority (NEMA).

Mechanisms in place to support the reliable verification and issuance of I-RECs:

Kenya will fully implement the I-REC Standard and provide statistics on generation and consumption from the Energy and Petroleum Regulatory Authority. Further, recommendations from the IREC Standard secretariat will be implemented to increase transparency.

Local organizations of importance and their opinion on local I-REC market development:

Ministry of Energy and Petroleum
Energy and Petroleum Regulatory Authority
Rural Electrification and Renewable Energy Corporation

Any other relevant information:

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