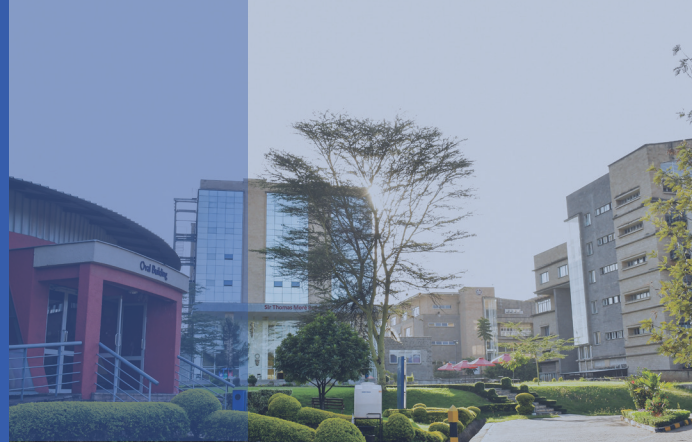




POLICY BRIEF

POLICY BRIEF NO. 6 (2026)



TOWARD A CARBON-FREE FUTURE: KENYA'S LEADERSHIP IN RENEWABLE ENERGY

Francis Kangure, Izael Da Silva, Maria Namale

Executive Summary

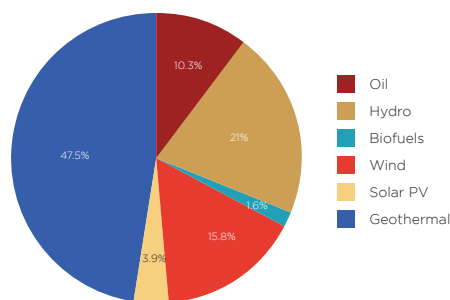
The shift to a carbon-free future has become a global priority, with growing focus on integrating renewable energy into national systems to meet increasing demand sustainably. This study examines Kenya's progress in adopting renewable energy and reducing fossil fuels in electricity generation. By 2020, more than 90% of Kenya's electricity came from renewables such as geothermal, hydropower, wind, and solar. Geothermal is the largest due to Rift Valley resources. Using a mixed-methods approach, this policy brief covers policies and initiatives that support the sector. Key findings highlight the need for progressive laws, targeted investments, and research and development to advance Kenya's renewable energy. The progress could serve as a model for other developing countries. Achieving the 2030 goal of 100% renewable energy requires an investment plan covering clean energy, grid upgrades, demand stimulation, and public engagement. With these efforts, Kenya can maintain economic growth while achieving global sustainability goals.

Keywords: Energy transition, decarbonization, renewable energy, energy policy, sustainability, development, net-zero.

Background

Kenya is one of the nations with steadfast plans to achieve a near carbon-free future. In line with the country's National Development Goals (NDGs) and through the various five-year National Climate Change Action Plans, one of the mitigation goals is to increase the share of renewables in the national grid's electricity generation mix, which was estimated at 90% in 2023. Figure 1 shows the percentage of each source being used to generate electricity as of 2022.

Figure 1: Electricity generation mix in Kenya, 2022



Source: IEA, 2024 <https://www.iea.org/countries/kenya/electricity>

Geothermal

Globally, Kenya ranks as the seventh-largest geothermal producer and leads in Africa. By 2022, the country had installed 949MW of geothermal energy capacity. This accounts for about an eighth of the estimated potential of

10,000 MW from the geothermal sources spread in the Rift Valley.

Hydro Energy

Hydro energy, the oldest source of electricity generation in Kenya, is another key renewable energy contributor in Kenya. With a total installed capacity of more than 800 MW, Kenya has a hydro potential of more than 4,000 MW, comprising pico, micro, mini, small, and large hydro systems. The Kenya Electricity Generating Company (KenGen) has primarily done the installation of large hydro systems. The company has played a vital role in installing more than 820 MW of total hydropower in the country. Independent power producers have also taken part in hydropower installation, mainly private or communally owned hydropower plants.

Wind Energy

Electricity generation from wind has increased from 0.24% to 11.74% of Kenya's total electricity generation over the past decade. The increase can be attributed to more than 70% of the country having favourable wind speeds of above 6 m/s. Through a combination of public and private investment, the Kenyan government is working to increase the country's installation of infrastructure to capture the untapped full wind potential, which is about 4,600 MW5.

Solar Energy

Solar power is another renewable source in Kenya. The country receives average daily insolation of 4-6 kWh/m²/day, with a potential of almost 15,000 MW. By 2022, only slightly more than 170 MW of capacity had been installed, contributing to 1.3% of the supply to the national grid. The government has invested in solar power installation, with various institutions such as the Rural Electrification and Renewable Energy Corporation (REREC) established to enhance rural electrification, mainly using solar power plants and off-grid connection of rural homes and schools.

Nuclear Energy

Kenya also anticipates adding a nuclear energy option by 2034 to address the needs of its growing population, which is expected to drive increased energy demand. According to the Ministry of Energy and Petroleum, the Nuclear Power and Energy Agency (NuPEA) is charged with fast-tracking the development of safe and secure nuclear technology in the country. Nuclear energy's integration with the other renewable energy sources will bring the country closer to attaining a near-carbon-free future.

Problem Statement

Kenya has abundant renewable energy sources, including geothermal, hydro, solar, and wind, contributing to around 90% of its energy mix. However, only about half of the potential of these resources is currently exploited, offering significant investment opportunities.

The country has established a robust legal framework for the energy sector, including the Energy Act 2019, which regulates renewable energy production and consumption. The National Energy Policy, the Least-Cost Power De-

velopment Plan (LCPDP), and the Integrated Energy Plan guide the development of the energy sector, ensuring sustainability and the efficient use of resources.

Other key institutions include the Ministry of Energy and Petroleum (MoEP), Kenya Power (KP), KenGen, and Kenya Electricity Transmission Company (KETRACO), which manage various aspects of the energy sector. There are also financial policies, such as the feed-in tariff and net-metering systems, the government's integration of renewable energy into the educational curriculum, and promotion of research and development to foster innovation and knowledge-sharing.

Despite remarkable strides to ensure a carbon-free future, especially by increasing citizens' uptake of renewable energy, these impressive achievements require regular maintenance to sustain the renewable energy uptake and transition from 90% to 100% by 2030.



Policy Options

To sustain the achievements of renewable energy in Kenya and achieve 100 % by 2030, various policy options are available:

Infrastructure Investment

Although the country has focused heavily on increasing generation capacity from renew-

able sources, the infrastructure to deliver this energy reliably to consumers has not kept pace. The national electricity grid does not service large portions of the country. Kenya must prioritize modernization, upgrading, and expansion of its transmission and distribution networks, to improve energy access guided by short, medium, and long-term goals.

The construction of new transmission lines and substations will be essential to improve coverage, particularly in underserved areas. This step should include deploying smart-grid technologies that can optimize energy flow, reduce losses, and enhance grid stability. Smart grids will enable better integration of diverse energy sources, allowing for real-time adjustments to supply and demand.

Energy Mix Diversification

The statistics for installed capacity do not account for the intermittent nature of sources such as wind and solar, or the limitations of hydropower under drought or low rainfall conditions. In response to such uncertainties, Kenya is implementing its first-ever battery energy storage system (BESS) on its network. BESS technology is being implemented globally, among other benefits, to improve grid stability. The BESS engineering solution will help address Kenya's demand for backup power, which would otherwise require supplementation via thermal electricity generation (i.e., steam power from burning fossil fuels). BESS will also provide additional power during peak periods.

Policy Recommendations

To ensure a carbon-free future and the achievement of renewable energy in Kenya (100 % by 2030), various interventions should be implemented:

1. Ensure policy accountability through the implementation of robust monitoring, evaluation, and change-management plans for timely policy achievements.
2. End restrictions on independent power producers by lifting the 2021 moratorium on renewing power purchase agreements that has led to a low power supply and curtailed new power generation.
3. Address high electricity tariffs by reducing transmission losses and reliance on expensive thermal plants to enhance affordability and foster economic growth by improving industrial competitiveness.
4. Discard bottlenecks, like the moratorium on independent power producers, who hinder progress and adopt a flexible approach to licensing to meet growing energy demand.
5. Enhance public sensitization and campaigns to encourage renewable energy adoption and energy efficiency.
6. Intensify campaigns for productive use of energy, to ensure that consumers use electricity to improve their living conditions and that they have income to pay for the electricity they use.
7. Augment domestic efforts by engaging in international partnerships to enhance collaborations with international bodies and foreign governments.
8. Enhance the sustainability and equity of international partnerships to negotiate terms that prioritize technology transfer, local capacity building, and the development of domestic industries.

9. Promote research and development to enhance advancements in technology and further innovation.



Conclusion

Kenya's efforts to move toward a carbon-free future have proven fruitful, as the country has realized an increase in renewable energy production over the past two decades. This increase can be attributed to its regulatory and policy frameworks, international partnerships, and effective utilization of abundant renewable energy sources. However, to sustain this progress and move even closer to becoming carbon-free, further actions are necessary, such as increasing investments in research and carrying out appropriate planning.

Decisions should be made on the renewable energy sources to adapt to various parts of the nation and serve best. In addition, since climatic changes have affected hydropower sources, more investments should be directed toward developing geothermal resources, which are not affected by varying climatic conditions and could thus be a more reliable and nearly boundless source of electricity for the main grid.

The government should offer tax breaks and subsidies to investors for their renewable energy inputs and promote local manufacturing of renewable energy equipment to reduce the heavy dependence on imported equipment and technological expertise.

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Published by: Strathmore University Press, Research and Innovation Department

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