

## Getting the Finance Flowing: Kenya

### Case Study 23. Power Sector Reform in Kenya

Contributors: Vivien Foster and Mumba Ngulube

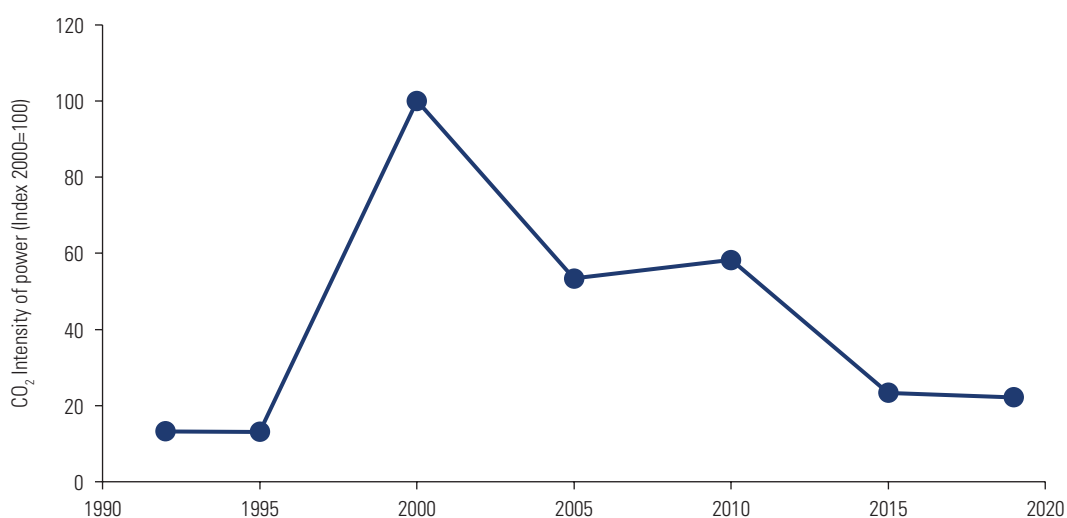
#### Context

After independence, Kenya relied primarily on hydropower to meet its demand for electricity. But this left it heavily exposed to hydrological risks. As drought periods intensified during the 1990s, the country was pushed into a situation of acute supply insecurity, forcing it to ramp up fossil fuel–based generation by the end of the decade, which increased both the cost and carbon intensity of the power supply (figure 3.19). High fossil fuel generation costs combined with low electricity tariffs, heavy government involvement in state-owned enterprise operations and management, and inadequate coverage of aging transmission and distribution networks resulted in a poorly performing and financially constrained energy sector.

#### Policy

It was under these conditions of acute supply insecurity and poor financial performance that the country's first wave of power sector reforms took place in the early 2000s. Given the pressing need to release the aid embargo in place at that time and

**FIGURE 3.19** CO<sub>2</sub> Intensity of Power in Kenya, 1990–2020



Source: World Bank calculations based on data from IEA 2019.

Note: CO<sub>2</sub> = carbon dioxide.

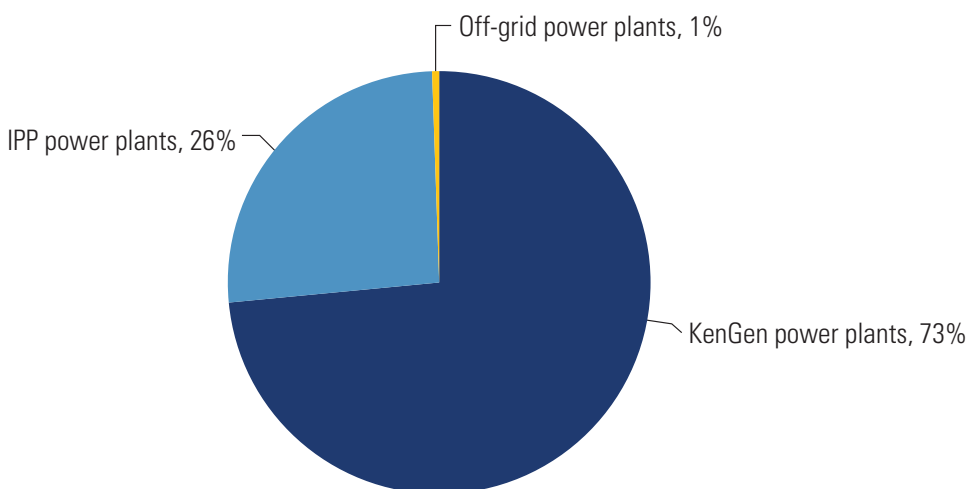
attract private investment into the sector, Kenya overhauled its approach to planning and funding power generation, unbundling it from transmission and distribution and putting the national generation company KenGen in charge of all state-owned generation capacity. The first phase reforms also separated policy and regulatory functions from commercial activities, introduced cost-reflective tariffs, and attracted private capital by liberalizing generation activities.

The Energy Act 2006 initiated a second wave of reform, including the establishment of the Energy Regulatory Commission (ERC) as the regulatory body responsible for overseeing and regulating the energy sector in Kenya. The ERC was given powers to set tariffs, issue licenses, and monitor the performance of market participants, including KenGen. Retaining its long-standing capacity for comprehensive and technically sound planning of the power sector, Kenya moved away from the more traditional industry model to the complex hybrid sector created by the reform, and third-party access was established to the grid. Significantly, the Energy Act vested responsibility for power development planning in the ERC, which works through multistakeholder steering and technical committees to produce a rolling Least Cost Power Development Plan for the power sector.

## **Results and Impacts**

Kenya has been one of East Africa's most successful countries at attracting private-sector financing for developing power generation assets. This has happened in two distinct ways. First, KenGen raised private finance from the capital market by issuing corporate bonds and rights, listing 30 percent of its shares on the securities exchange to bolster its ability to secure commercial lending, which accounted for 15 percent of its debt as of 2021 (KenGen 2021). Second, by modernizing the legal framework and establishing a regulatory framework for the power sector, Kenya became an investment destination for independent power producers (IPPs). By the end of 2020, 28 IPPs were operating in Kenya, supplying 26 percent of its total electricity supply (figure 3.20; Kenya National Bureau of Statistics 2021). As of 2022, generation capacity financed and installed by IPPs had reached a cumulative total of 1,172 MW (Energy and Petroleum Regulatory Authority 2021). Although Kenya's early IPPs used diesel-fired generation, over time, this has shifted markedly toward clean power generation sources. Today, as much as 70 percent of IPP-installed capacity has an RE source, including geothermal, wind, and solar.

Notwithstanding the growth in IPPs, the public sector has retained a significant role in power generation. The major expansion of geothermal energy in Kenya would not have been possible without publicly funded exploration between 2007 and 2015, and subsequent investment by KenGen to develop generation capacity, as the private exploration of steam fields would otherwise have proved too risky. In the process, KenGen has become Africa's largest developer of geothermal power and ranks in the world's top 10.

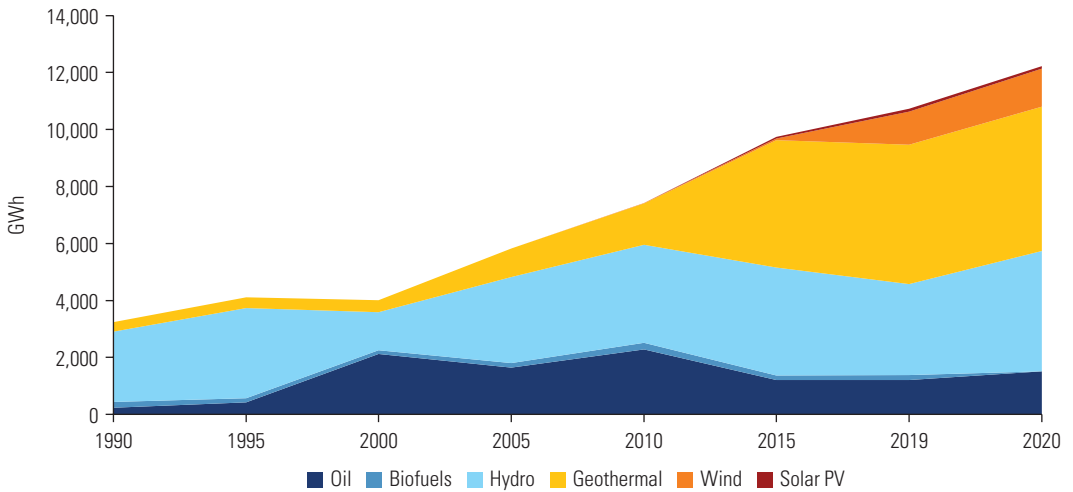
**FIGURE 3.20 Electricity Suppliers in Kenya, 2020**

Source: World Bank calculations based on data from Kenya National Bureau of Statistics 2021b.

Note: IPP = independent power producer.

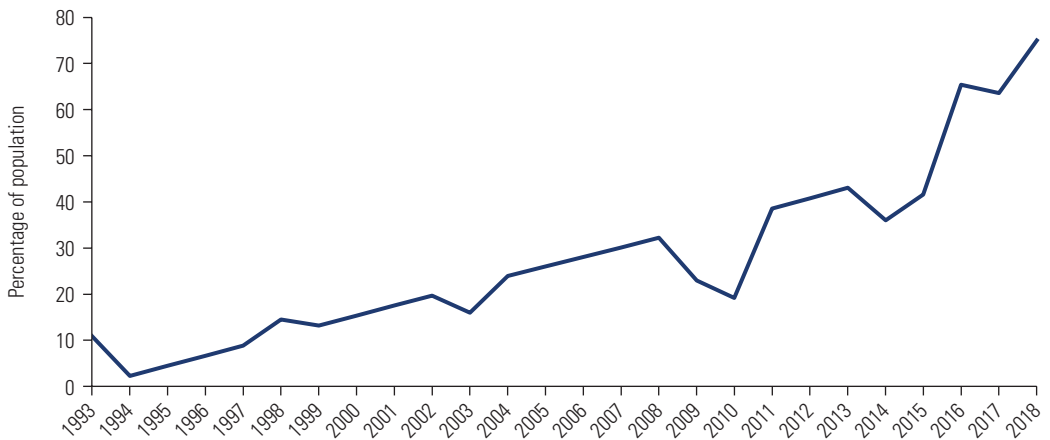
The combined result is that Kenya's generation capacity tripled between 1990 and 2022, from 829 MW to 3,076 MW. Considering a peak demand of 2,036 MW in November 2021, the country's reserve margin is more than 30 percent. Expanding its generation capacity has made electricity supply more reliable in many parts of the country. The marked diversification of the energy mix has also improved security of supply. Kenya now has 949 MW of geothermal capacity and is less exposed to hydrological risk. The increased share of geothermal generation has also displaced energy from thermal plants, which fell from 53 percent in 2000 to just 11 percent in 2019, reducing Kenya's carbon intensity of power index by 62 percent between 2010 and 2019 (figure 3.21). Further, the country is on its way to achieving 100 percent RE supply by 2030, in line with its COP26 commitment, through a combination of developing indigenous geothermal resources, competitive auctions for solar and wind resources, and energy trading through regional interconnections.

Expanding the country's generation capacity has increased people's access to electricity, setting Kenya on a path to achieve universal access before 2030. Kenya's electrification experience has been exceptionally rapid, owing to a combination of grid densification, by targeting more connections in neighborhoods where infrastructure is already present, and off-grid programs. The population with access to electricity increased from 15 percent in 2000 to 75 percent (54 percent on-grid and 22 percent off-grid; Dubey et al. 2020) by 2018 (figure 3.22). This sharp increase, induced by power sector reforms, has positive implications for the economy due to the strong link between electrification and development. Several case studies in Sub-Saharan Africa reveal that increase in electrification is positively associated with increased economic

**FIGURE 3.21 Electricity Generation in Kenya, by Source, 1990–2020**

Source: World Bank calculations based on data from IEA 2019 and Kenya National Bureau of Statistics 2021a.

Note: GWh = gigawatt hours; PV = photovoltaic.

**FIGURE 3.22 Access to Electricity, Kenya, 1993–2018**

Source: World Bank calculations based on data from the World Bank Global Infrastructure Dashboard.

growth, jobs, productivity, incomes, health outcomes, and human capital development (Dinkelman 2011; Jimenez 2017; Foster et al. 2023; Fried and Lagakos 2021; Salmon and Tanguy 2016; World Bank 2015). One review of 50 studies on electrification reports that, on average, electrification leads to increases of around 7 percent in school enrollment, 25 percent in employment, and 30 percent in incomes (Jimenez 2017). Another finds that rural electrification in KwaZulu-Natal positively impacts female employment, increasing it by about 10 percentage points (Dinkelman 2011). Newly electrified communities also experience substantial shifts away from using wood at home

toward electric cooking and lighting, which improves air home quality and health. The rapid electrification, however, has resulted in a deteriorating financial position of Kenya Power and Lighting Company, which is being addressed through a new set of policy and institutional reform measures.

## **Key Takeaways**

Kenya's power sector reform has been successful from a variety of standpoints, including the decarbonization of electricity. Several important lessons emerge from this experience. First, it is important for countries to develop the technical capacity for power system planning and ensure strict adherence to the plan that supports least-cost development of the sector and guides the choice of clean technologies. Second, creating a modern regulatory framework provides the necessary enabling environment to support privately financed IPPs, notably for RE. And third, while the private sector is often willing to invest in RE, state actors retain an important role for addressing early development risks of new technologies, such as geothermal. Partially listing state-owned enterprises, such as KenGen and Kenya Power and Lighting Company, allows them to access significant volumes of private sector finance.