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Africa Energy Outlook

Mozambique special report 2024

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Contents

Africa Energy Outlook

Mozambique as a Southern Africa energy hub

Foreword

The Africa Energy Outlook 2023 includes a snapshot of six African economies', including Mozambique. It analyses specifically their respective energy transition strategies, resource endowments, and envisioned energy mixes. **This Mozambique special report provides a deep dive into the country's energy outlook,** and a **critical analysis of the trends** to focus on which will shape its energy mix over the next decade.

Mozambique could position itself to contribute significantly to the world's energy needs, both during the energy transition period and by establishing a strong capabilities across the renewables value-chain. The transition to renewables presents an opportunity to both address the country energy needs while leapfrogging technology adoption and developing local value chains and the new skills to meet these industry needs.

The country's vast gas reserves could make Mozambique a **top 10 global producer, responsible for 20% of Africa's output by 2040.**

Natural gas is expected to play a pivotal role in the near-future energy mix, with a lower carbon footprint compared to coal or oil. **Gas is also expected to bring around US$100bn of revenue to Mozambique over its life cycle**.

Mozambique has **a significant competitive advantage in renewable energies with hydropower assets like HCB (2 000MW) and future potential of Mphanda Nkuwa (1 500MW)** enabling regional industry decarbonisation. The country also has a **high solar potential**, with two locations already setup with a total capacity of 80MW, in Mocuba and Metoro.

Household electricity demand is expected to increase with the ambitious Government electrification programme (Energy for All), as well as the increased mandated use of biofuels (introduced by the Mozambique Ministry of Finance as part of the PAE - Programme of Measures for Economic Acceleration).

With effective measures, Mozambique could become an energy hub in Southern Africa.

Mozambique needs to define a strategy to navigate the decarbonisation of global markets and its own economy. Specifically, how to position itself in the various value chain by selling energy & other value-added products & services as opposed to only selling the associated commodities such as gas, coal, and rare minerals (linked to renewables).

Measures such as the country **defining a strategic blueprint** for each energy source; **developing local value chains and industries** linked to renewables and associated commodities; **attracting the private sector**, promoting **economic liberalisation** and **promoting and facilitating sustainable investment** in infrastructure; **managing the national energy portfolio** and improving the **legal framework**.

The report explores what to expect in terms of the country's energy mix, as well as the associated challenges and opportunities for the next 5 to 10 years to realize this vision.

Country outlook

Mozambique

Contents

Socio-economic context

Energy landscape & future energy mix

Risks and opportunities

Final considerations

Brief summary

Context

- Located in Sub-Saharan Africa, Mozambique has the **largest power generation** potential of all Southern African countries, **with the capacity to generate 187GW of power** from coal, hydro, gas, solar, wind and other renewable sources.
- The country has around 32m inhabitants but **just 44% of the population has electricity access**, mainly in urban areas. Approximately 62% of Mozambique's population lives in rural areas. The Government has a national programme ***Energy for All*** to achieve universal access and expand power generation systems by 2030.
- Nevertheless, **energy exports** and **megaprojects** to cover the growing domestic electricity demand, are expected to play an increasingly important role in the years to come, with its **natural gas reserves expected to play an important role in the global energy transition**.

Source: International Trade Administration (ITA), Energypedia, CNBC

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Mozambique's levels of human capital are a constraint to rapid, inclusive and sustainable growth; but this is likely to change in the near future

Socio-economic indicators

Mozambique

Population

Population (2022)
32.9
Million of inhabitants
Ranking within SSA: #10

Population growth (2022)
2.7%
Annual average
Ranking in the world: #13

Urban population (2022)
38%
% of Total Population

Population density (2020)
40
People/km^2
World Ranking: #48

Development

Clean cooking access (2021)
5%
Annual %

Life expectancy (2021)
59
Total Years
Ranking within Africa: #46

Literacy rate (2021)
63%
Adult Total (% of people >= 15 years)
World Ranking: #135

Unemployment rate (2022)
3.9%
% of Total Labour Force

Source: World Bank Group, UNFPA, Worldometers, Energypedia, Statistica, Country Economy

Relevant considerations

There are only 12 countries in the world that have a population growth equal to or faster than Mozambique. According to UNFPA, if the current pace is maintained, **the population of Mozambique will double every 25 years**. By 2033, the population is expected to be 44 million people.

The population density in Mozambique has increased by 1.1 inhabitants per square kilometre (a growth of 2.8%) since 2019, **reaching its peak in 2020** with 40 inhabitants per km^2.

Mozambique's cookstove market is emerging, supported by donor initiatives. Currently 95% of the population uses biomass, firewood or coal for their energy needs, **indicating a significant opportunity for improvement**.

Mozambique's literacy rate has been consistently increasing over the years, with a **notable 3.3 percentage point increase between 2017 and 2021**. This progress can be attributed to the Government's efforts in combating illiteracy through the implementation of various programmes and projects.

The Mozambique economy is recovering from the protracted slowdown in recent years, having experienced a 4.15% GDP growth in 2022

Socio-economic indicators

Mozambique

Economy

GDP (2022)
US$**17.85**bn
GDP per Capita: US$541.50
Ranking within Africa: #26

Inflation rate (2022)
10.3%
Annual %
World Ranking #52

GDP, average growth (2011-2022)
3.5%
2022e: 4.4% 2023f: 5%

Trade balance (2022)
-US$**6.3**bn
Growth: 75%

National currency change between years (MZN%) (2021-2022)
2.5%
Variation of the MZN against the USD

Ease of doing business (2020)
#138
Out of 190 | #20–SSA

FDI (Foreign Direct Investment), net inflows (2022)
14.2%
% of GDP
Average Growth Rate (2018-2022): 29,72%

CO_2 emissions per capita (2020)
0.2 tonnes
Ranked #126 worldwide

Source: World Bank, Energypedia, Wisevoter, African Development Bank

Relevant considerations

Mozambique's **GDP growth rose from 2.3% in 2021 to 4.15% in 2022**. Economic growth is expected to accelerate from 2023, driven by continued recovery in services, increased LNG production, and high commodity prices. In 2028, GDP growth is estimated to reach 14.5%.

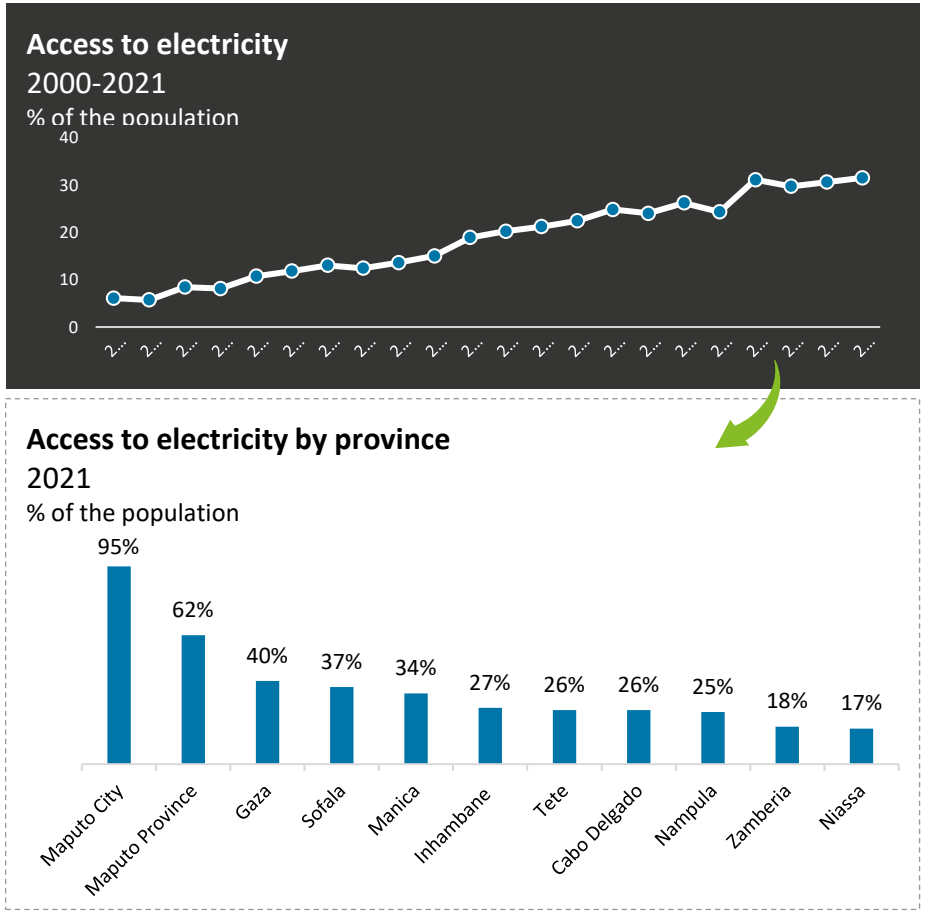
In 2022, the country experienced an **inflation rate of over 10%, which was the highest in the last six years**, as announced by the National Institute of Statistics. The categories of food, non-alcoholic beverages, and transportation showed the most significant increases.

The **country's economic development focus** in 2023 will continue along the following priorities: increased productivity, production and employment; economic diversification and inclusive growth; price level stability in order to maintain single-digit inflation; reduction of exchange rate volatility; prioritisation of the efficient allocation of resources; sustainable public debt management; and promoting private sector development.

For more than 20 years, Mozambique has consistently achieved one of the highest economic growth rates in Sub-Saharan Africa. This growth has been driven by substantial investments in the aluminium, coal and hydrocarbons sectors, and supported by effective economic management, leading to **increased foreign direct investment (FDI)** and development assistance.

Mozambique's access to electricity has steadily increased over the past three years, but still represents a gap when considering the 2030 *Energy for All* Government objective

Electricity access



Relevant considerations

1 As per the 2021 SDG7 Tracking Report, **Mozambique ranks within the top 20 countries for a lack of electricity access** between 2010 and 2019. Additionally, it is also among the top 20 countries facing a deficit in accessing clean cooking fuels and technologies from 2015 to 2019.

2 The percentage of Mozambicans with access to grid electricity has seen an improvement, **rising from 34% in 2020 to 40% by July 2022**; with a combination of **off-grid and on-grid access reaching 44% of the population**. However, 17.5m Mozambicans are without electricity in both rural and urban areas.

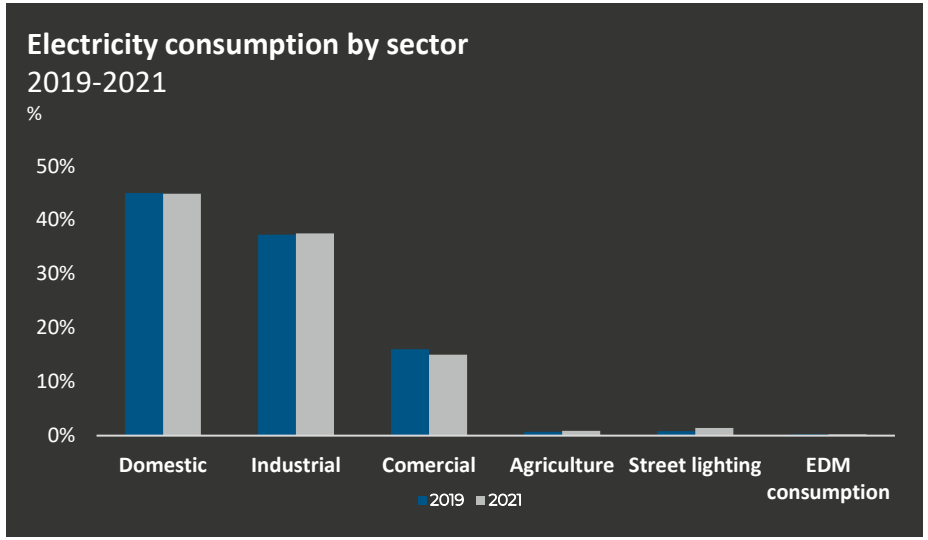
3 Grid access is concentrated in urban areas, leaving a vast majority of the rural population without electricity. In 2020, **only 4.5% of rural residents had access compared to 75%** in urban areas.

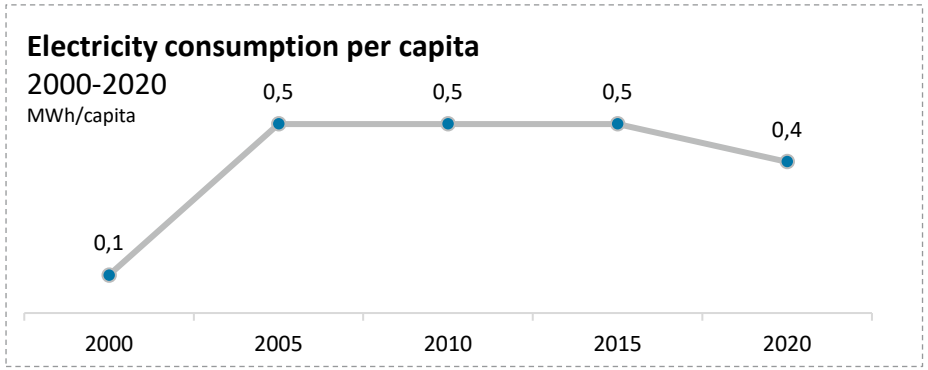
4 Geographically, the provinces near Maputo City, namely Maputo Province (62%), Gaza (40%), Sofala (37%), Manica (34%), and Inhambane (27%), **have a higher electrification rate compared to the central and northern provinces** such as Tete (26%), Cabo Delgado (26%), Nampula (25%), Zambézia (18%), and Niassa (17%).

Source: World Bank, Energypedia, Tracking SDG7: The Energy Progress Report (IRENA)

The domestic and industrial sectors exhibited the largest shares of energy consumption in the country

Clectricity consumption by sector





Relevant considerations

1. Overall, the domestic sector is the largest consumer of energy with 44.9% of the energy consumption share. While coming from a low base, the street lighting and agriculture sectors experienced large increases of 75% and 28.6% respectively between 2019 and 2021

2. The electricity supplied by the grid, however, is predominantly directed towards residential users. Based on EDM's 2019 billing data, the highest demand for electricity on the grid in Mozambique is for domestic use (45%), followed by industrial (37.3%) and commercial (16%) use.

3. Although the percentage of people with access to electricity has increased in recent years, Mozambique's per capita energy consumption, measured in kWh/year, has shown fluctuations over the past 15 years. The trend is for the electricity consumption in Mozambique to increase in the following years, accompanying the universal energy access strategy from the Government..

4. Despite the increase in demand, electricity consumption per household is expected to decline by 2030, resulting from the adoption and implementation of more efficient consumption standards.

Source: IEA, Worldometers, Energypedia, FurtherAfrica

Click back to section home

The energy sector in the country is expanding, encompassing a diverse range of energy sources

Fossil

Oil

Although Mozambique is not an oil producer, the country is focused on leveraging its natural gas resources to manufacture liquid fuels, reducing its reliance on oil product imports.

Coal

Mozambique boasts one of the world's largest coal mines, with 1 975m tonnes of proven reserves compared to the top-ranked, which holds 254 197m tonnes. Its strategic location and abundant reserves also offer substantial export potential.

Natural Gas

Mozambique's oil and gas industry is experiencing growth and is expected to become the third-largest producer in Sub-Saharan Africa by the middle of the next decade (mid-2030s). Mozambique has proven natural gas reserves in excess of 180tcf.

Renewables

Biomass

Biomass energy dominates Mozambique's energy consumption, comprising 66% of the total. It constitutes over two-thirds of the country's energy usage, with a significant concentration in rural areas.

Hydro

Mozambique boasts an impressive hydropower potential of around 12 000MW, one of the largest in Sub-Saharan Africa, with over 80% of it located in the Zambezi Valley, which includes the existing 2 000MW Cahora Bassa project.

Solar & Wind

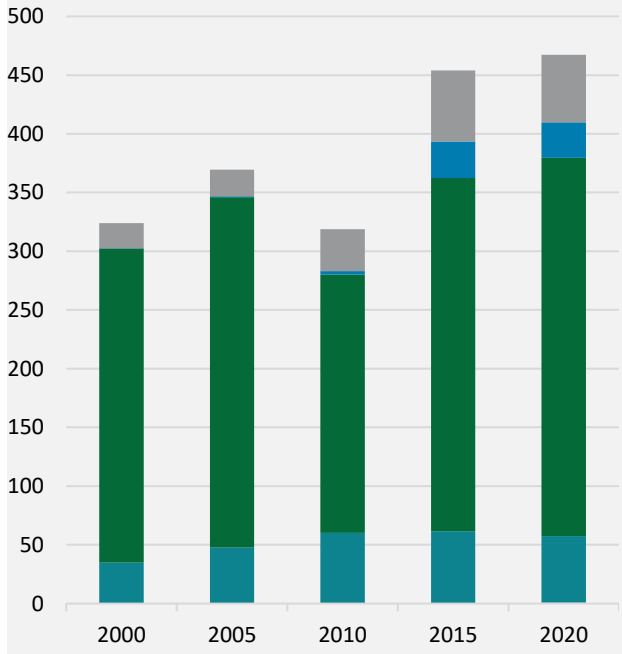
Mozambique has vast untapped solar potential. By 2022, 125MW of solar power plants had been established through public-private partnerships, with 80MW already connected to the grid. Additionally, the country is the among the world's top three graphite producers, a resource used in renewable energy technologies.

Click to go to specific energy source insights

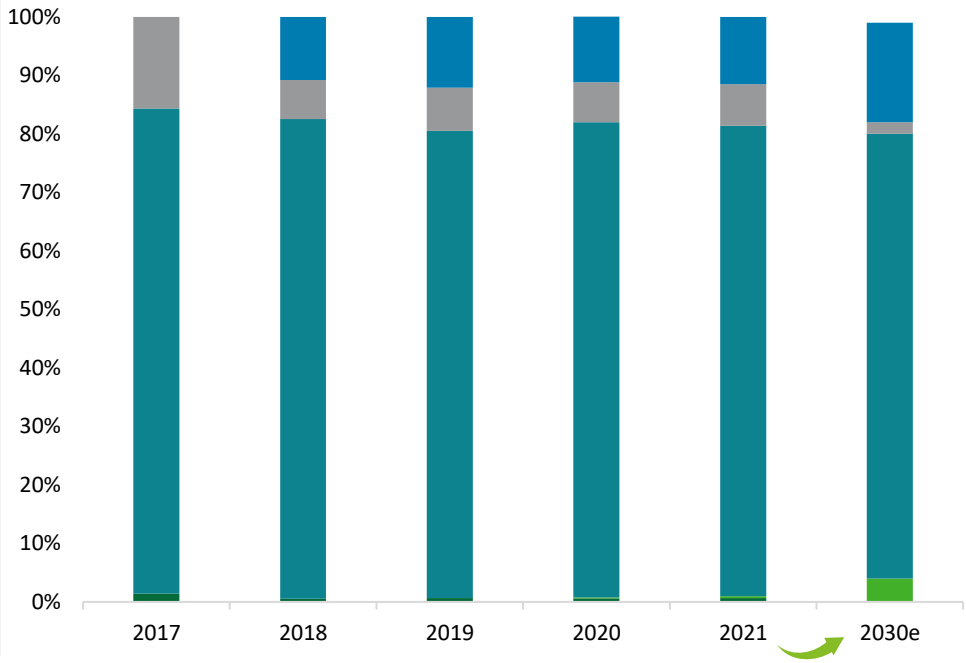
Mozambique's actual energy mix – consumption and production

From 2000 to 2020, biomass accounted for the largest share of energy supply and consumption, followed by hydroelectricity.

Mozambique energy consumption by source
2000-2020
TJ per 1 000



Mozambique energy production by source
2017-2030f
TWh in %



Despite its large and diverse energy potential, the country's energy strategy focuses on large hydro projects in the Zambezi Basin (e.g., Cahora Bassa and Mphanda Nkuwa), with its main target market being South Africa, and with a small portion allocated for domestic consumption. This trend is expected to remain unchanged in the following years.

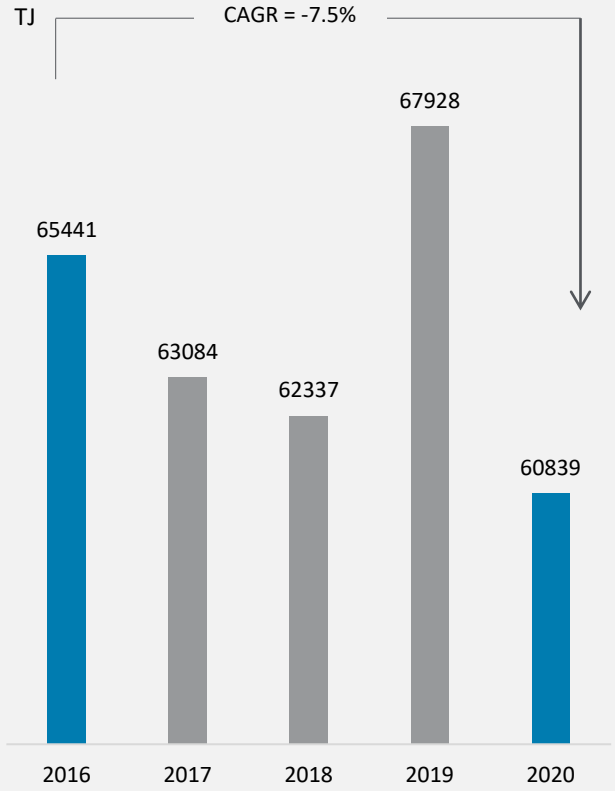
Source: IEA, World Bank, Aler (Energy Mix Overview), Our World In Data

Mozambique intends to use its abundant natural gas resources to generate liquid fuels

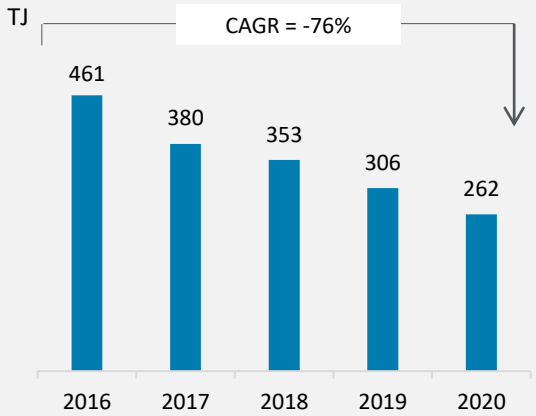
Oil | Coal | Natural Gas | Biomass | Hydro | Solar & Wind

Click to check energy sources

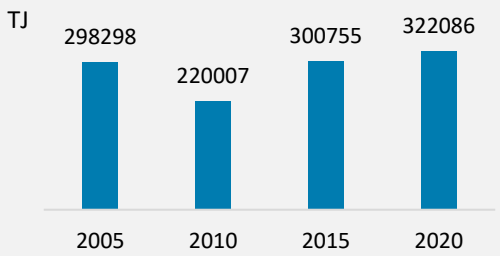
Oil products consumption
2016-2020



Condensate production
2016-2020



Biofuel energy supply
2005-2020



Source: IEA, Energy Capital Power, Nemus, FurtherAfrica

Relevant considerations

- Mozambique is not a petroleum producer, although it produces condensate from the Pande and Temane natural gas fields, which is fully exported.
- The country heavily relies on oil and petroleum derivative imports, making it a major fuel used in end-use sectors, such as transportation, industry or residential.

Deloitte point of view

- Oil is expected to **remain among the most used energy sources**, supporting various end-use sectors.
- Nevertheless, the national production of liquid gas through its Gas to Liquids (GTL) projects, based on the Rovuma Basin natural gas, is expected to allow Mozambique to **reduce its high reliance on imported oil and petroleum**, while also bolstering its capacity to export energy. The Government intends to invest US$20.3m for the construction of the first production unit of Liquefied Petroleum Gas (LPG).
- Additionally, the Government is promoting biofuel production and use through internal regulations, that require a mixture of the imported products with local biofuels. This strategy aims to stimulate the biofuel industry and aligns with the National Poverty Alleviation Agenda.
- Efforts have also been made to reduce the country's annual imports of 1.6m metric tonnes of liquid fuels by **increasing the number of gas-powered cars**. Currently, there are around 3 000 gas-powered cars and four compressed natural gas pumps available, operated by Autogas.

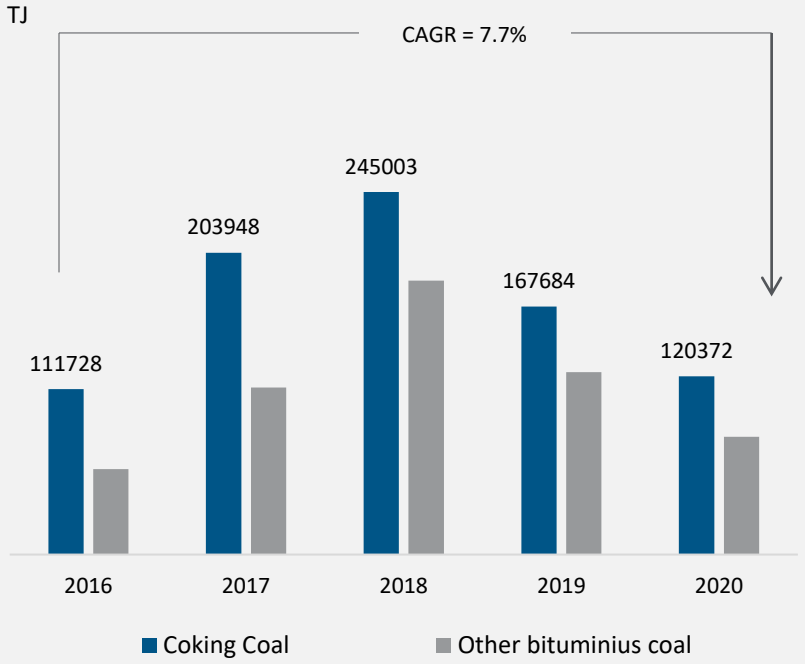
Mozambique has one of the biggest coal reserves in the world

Oil | Coal | Natural Gas | Biomass | Hydro | Solar & Wind

Click to check energy sources

Mozambique coal production per coal type

2016-2020



Yearly energy production **2042** 2TWh

Coal-fired capacity **2042** 1.7GW

Source: Worldometers, IEA, African Development Bank Group

Relevant considerations

- As of December 2019, the Moatize coal mine was estimated to hold an impressive **1 975m tonnes** of proven coal reserves.
- Despite the growth in Mozambique's coal production and exports, the domestic consumption of coal currently remains remarkably insignificant, **accounting for well under 1%.**
- While coal is being gradually replaced in most countries for power generation, it will continue to play a crucial role in Mozambique as a by-product for the private sector until newer technologies are available.
- At a global level, coal remains an important energy source for reliability reasons.

Deloitte point of view

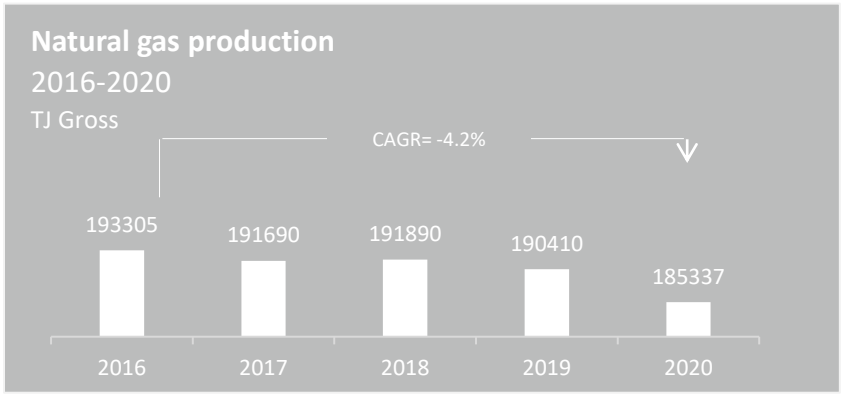
- Mozambique’s current Master Plan envisions a significant 1.7GW coal-fired capacity, ensuring a substantial electricity supply of nearly 2TWh per year until 2042. The potential construction of the **Moatize coal-fired power plant**, could lead to an increased share of coal-based energy in the country.
- Additionally, with the ban on Russian coal exports, Mozambique benefits economically as it results in higher coal prices and creates export opportunities. **Prices per tonne increased to US$400 (Feb 2022) compared to US$50-100 over the last decade,** but since then the value has **fallen, standing at US$147 by mid-August 2023.**
- However, it is important to strategically allocate coal production to **customers with a consistent demand** in the medium to long term, as the **iron and steel production segment**, and industries for which firm and guaranteed energy is essential.
- To have a place as a cleaner energy source in the decades to come, governments and the coal industry need to develop and deploy less polluting and more efficient technologies, including but not limited to carbon capture, utilisation and storage (CCUS).

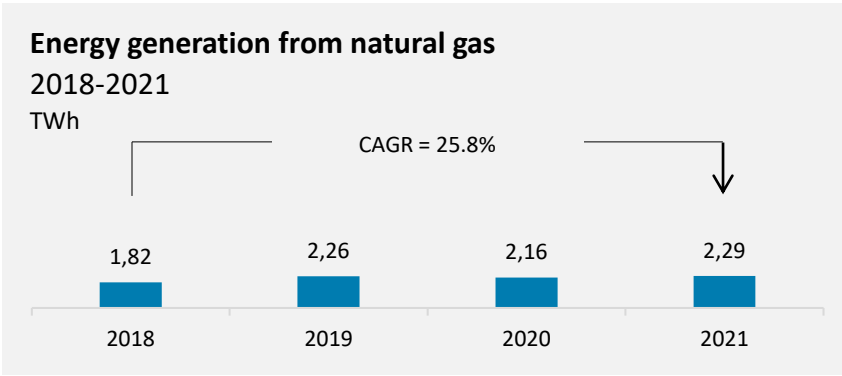
Natural gas is expected to be one of the main natural resources driving the Mozambican economy

Oil | Coal | **Natural Gas** | Biomass | Hydro | Solar & Wind

Click to check energy sources

Production





Installed capacity

2030
1 048MW

2030
17%

Source: IEA, Energypedia, Our World in Data, O País, Aler

Relevant considerations

- Mozambique has the largest natural gas reserves in Sub-Saharan Africa, with over 180tcf of natural gas. With projects such as Coral South and North (FLNG), Mozambique LNG, and the PSA project, the country's gas production is anticipated to double by 2030, and the combined output of the two areas currently under concession will yield **30m tonnes of LNG per annum**, with up to a quarter of the gas allocated for domestic use in Mozambique.

Deloitte point of view

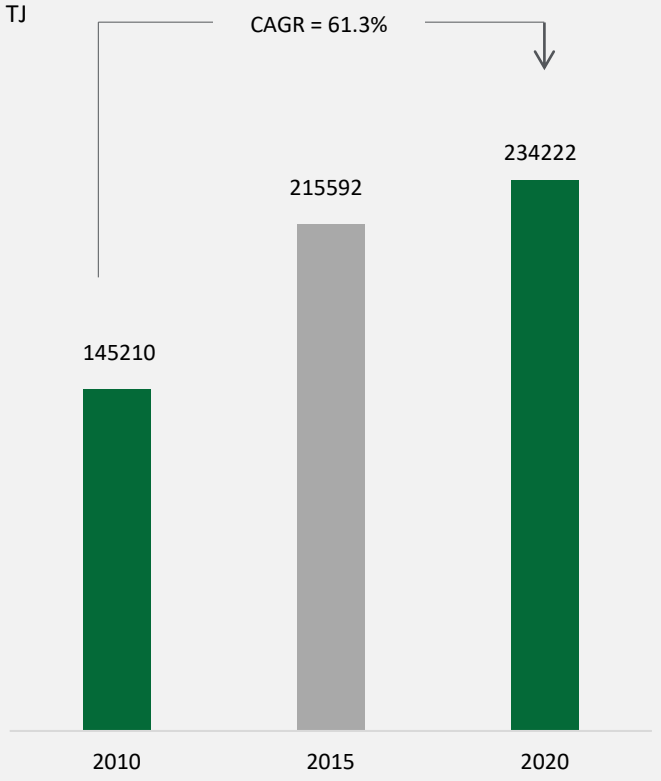
- Mozambique is **poised to become a gas powerhouse,** with the world committed to using cleaner energy sources. Natural gas is expected to play an essential role in this transition and in building that future, making Mozambique an important player in the energy sector due to its reserves.
- On the other hand, the war in Ukraine has impacted energy prices. The price of gas in Europe reached around €340 per MWh, 10 times more than before the war. Despite prices having normalised, **European countries continue to worry about ensuring energy independence from Russia**, **positioning African resources as an alternative**. This change in global focus presents a great opportunity, for Mozambique natural gas, in terms of economics and employment generation, within the existing window of opportunities.
- Additionally, the consumption of natural gas is expected to significantly increase in Mozambique, with natural gas-fired power plants projected to **provide around 44% of total electricity generation** by 2030.
- This context represents a substantial shift in the country's energy mix, underscoring the growing **importance of natural gas as a primary energy source**, an energy source that produces less **than 50% of carbon than coal or oil**.
- Also, with South Africa being one of Mozambique's main energy importers, there is an opportunity for the country to assist **in South Africa's decarbonisation efforts**. Nevertheless, ensuring economic viability of gas transportation poses a challenge (pipeline, FSRU, or both).

Firewood and charcoal are still essential to meet the energy needs of households in Mozambique

Oil | Coal | Natural Gas | **Biomass** | Hydro | Solar & Wind

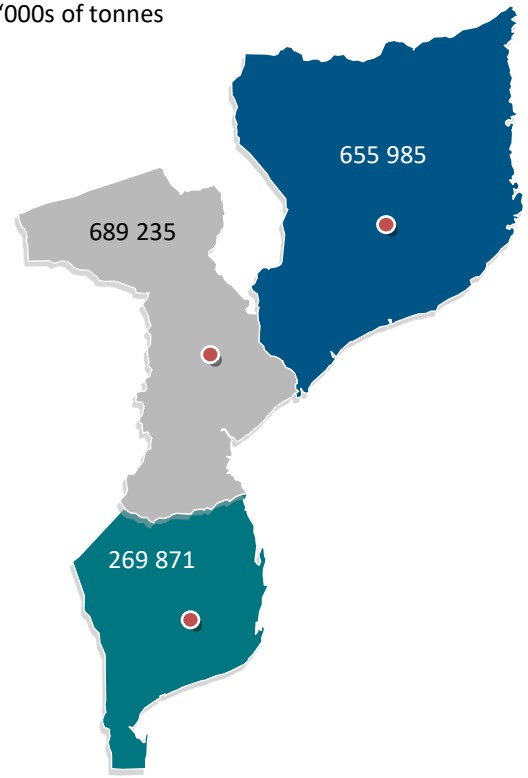
Click to check energy sources

Biomass, biofuels and waste consumption 2010-2020



Woody biomass resources available in the country

'000s of tonnes



Relevant considerations

- As one of the top ten producers of charcoal in the world, Mozambique possesses a substantial biomass potential, **surpassing 2GW**.
- It is estimated that the residues from forestry activities at the national level could generate 750GWh of energy.
- Wood biomass accounts for **80% of the total energy consumption** in Mozambique.
- The utilisation of charcoal and firewood as essential cooking fuels extends not only to Mozambique but also to other nations in Southern Africa.

Deloitte point of view

- As of today, 80% of Mozambican households still rely on biomass. Although the government is making efforts to increase access to cleaner sources of energy, the number of Mozambicans who still rely on biomass is not expected to reduce significantly in the next few years.
- Therefore, the country needs to prioritise domestic energy needs, ensuring sustainable solutions for the use of wood biomass, such as improved cook stoves (which reduce biomass consumption by around 70-80%) and promote the cultivation of fast-growing trees for energy purposes (such as bamboo), which can be processed between two to four years after being planted, serving as a sustainable alternative to clearing indigenous forests.

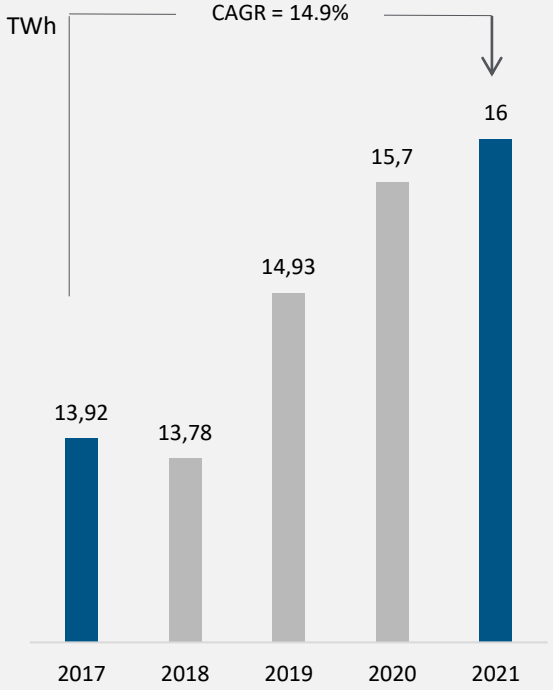
Source: International Energy Agency, INE, UNESC

Estimated at around 12 500MW, Mozambique's hydropower potential is among the largest in Africa

Oil Coal Natural Gas Biomass **Hydro** Solar & Wind

Click to check energy sources

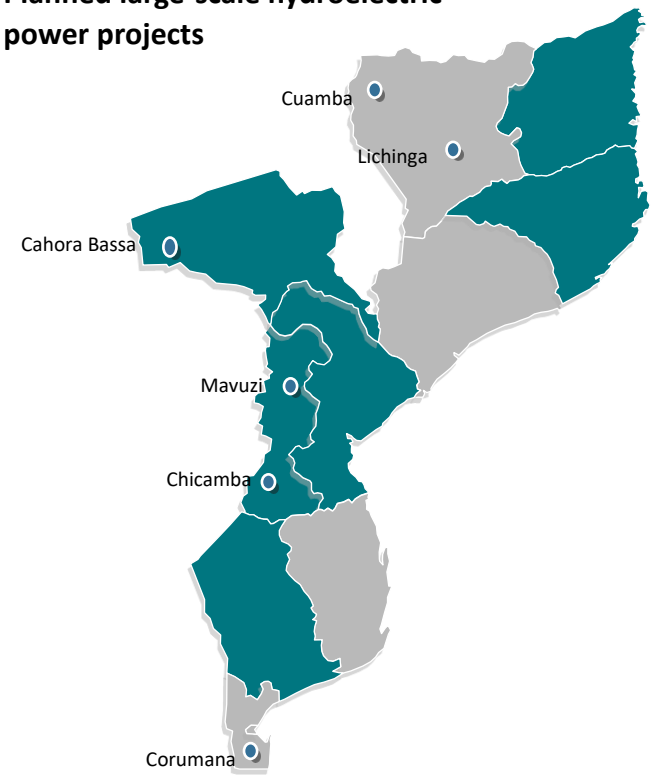
Hydropower generation
2017-2021



Installed capacity **2030** 4 539MW

Source: Our World in Data, Energypedia, Aler (Energy Mix Overview)

Planned large-scale hydroelectric power projects



Legend:
- Existing large-scale power plants
- Planned hydroelectric power projects

Relevant considerations

- Mozambique has a significant hydroelectric potential estimated at over **12 500MW,** particularly in the province of Tete, along the Zambezi River, with a feasible hydropower potential of about 37 647GWh/year, equivalent to around 6 600MW of installed capacity.

Deloitte point of view

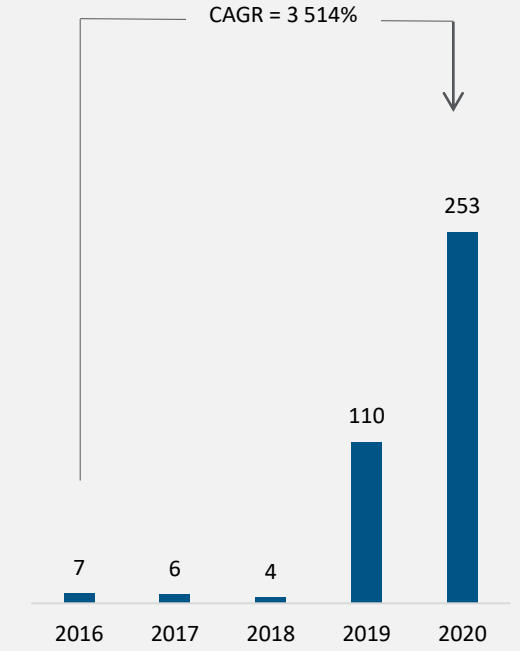
- With **more than US$6bn being invested** in significant projects like Mphanda Nkuwa (2 000MW) and other future ones like Cahora Bassa North (850MW), Mozambique's energy generation is poised for remarkable expansion, offering substantial benefits to the domestic market and neighbouring countries in the region.
- These ambitious projects are designed to deliver sustainable, "green", and dependable baseload power, in line with the projected energy demands at both the national and regional levels. **Consequently, Mozambique is anticipated to retain its crucial role as a key electricity supplier to neighbouring countries,** thereby generating substantial foreign exchange income and contributing to the country's economic growth.
- In terms of domestic energy consumption, the primary driving factors for **small-scale hydro power projects** include the rise in the industrial sector and the potential to cater to off-grid population centres. The Government's continued promotion of these projects through legislative reforms further reinforces this trend.

Large-scale renewable projects are becoming a point of interest for investment in Mozambique

Oil Coal Natural Gas Biomass Hydro **Solar & Wind**

Click to check energy sources

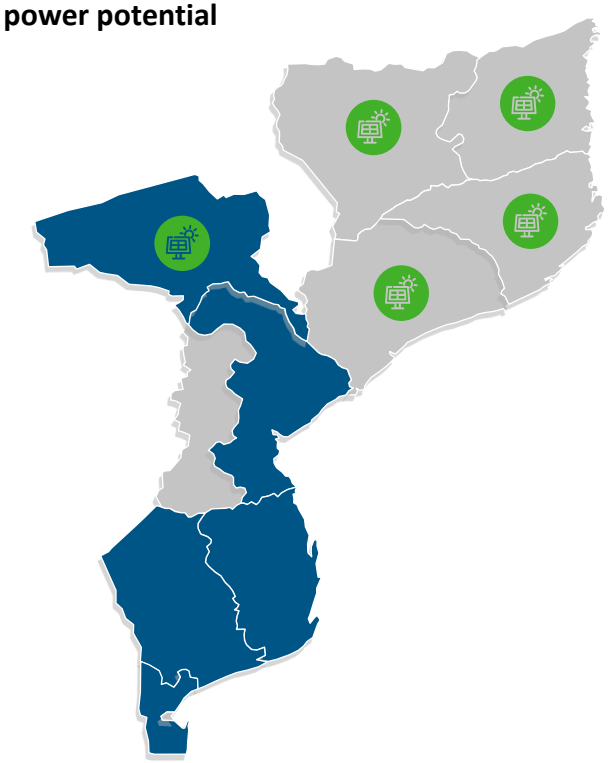
Solar and wind total energy supply
2016-2020
TJ



Installed capacity **2030** 266MW **2030** 40MW

Source: Energypedia, IEA, Aler (Energy Mix Overview), Proler

Regions with the highest solar and wind power potential



Legend:
- Regions with the highest wind power potential
- Regions with the highest solar power potential

Relevant considerations

- As per the World Bank's PV power potential map, Mozambique exhibits the capacity for PV power projects, with a yearly total specific PV power output ranging from 1 534KWh to 1 753KWh.
- Moreover, the county has a potential wind capacity of 4.5GW, of which about 25% has potential for immediate connection to the existing grid.

Deloitte point of view

- Renewable energy is poised to experience significant growth in the country, as Mozambique aims to have **20% of its generation mix coming from solar and wind sources by 2040.** This transformation will be achieved through investments in projects like the construction of the Cuamba II solar power plant (20MW), or wind projects in Inhambane and Namaacha (south region) accounting for a combined capacity of 170MW.
- **Internal consumption is likely to rise** as off-grid technologies (mini-grids and solar home systems) are the best solution for the majority of off-grid households as opposed to expensive grid extensions, between 2020 and 2030, considering the Energy for All programme launched by the Government in 2018.
- On the other hand, the **energy transition depends** on a transformation of the global energy from fossil-based **to zero-carbon sources**, where solar and wind energies play a relevant role. Although there are still multiple challenges related to its reliability, Mozambique is well positioned to respond to a ne- zero approach due to vast solar and wind resources.

Mozambique's journey and aspiration reflects the global ambition for sustainability, accessibility, and affordability

Sustainability

Mozambique possesses significant untapped renewable energy potential, yet the country still experiences low rates of energy access, with **only 44% Mozambicans with access to electricity in rural and urban areas**.

Through the ***Mozambique Energy Strategy***, the country seeks to enhance accessibility to various sustainable energy sources, thereby fostering the well-being of its population and promoting socio-economic growth throughout the country. This ambition involves bolstering the state's institutional capabilities to effectively execute the required initiatives and develop energy infrastructure.

By 2030, the country aims to achieve the universal access, with **30% based on off-grid sources**, which is set to improve the energy access in the country.

Accessibility

The universal energy access by 2030 is one of the primary goals of the Mozambican government.

Moreover, programs such as ***Energia Para Todos***, led by EDM and FUNAE, are underway to ensure energy access for all Mozambicans by 2030, aligned with the ***National Electrification Strategy*** (ENS). **On-grid** (EDM), interventions include the construction of 1 50km of medium voltage lines, 1 200 transformers, 3 500km of low voltage lines, and **11 000 user connections**. **Off-grid** (FUNAE) panned initiatives include, **13 mini-grids** plants and distribution networks.

The *Energia para Todos* programme will broaden energy reach to peri-urban and rural zones, leveraging the national grid, introducing solar mini-grids and solar home systems (driven by private sector) for areas where the grid does not reach.

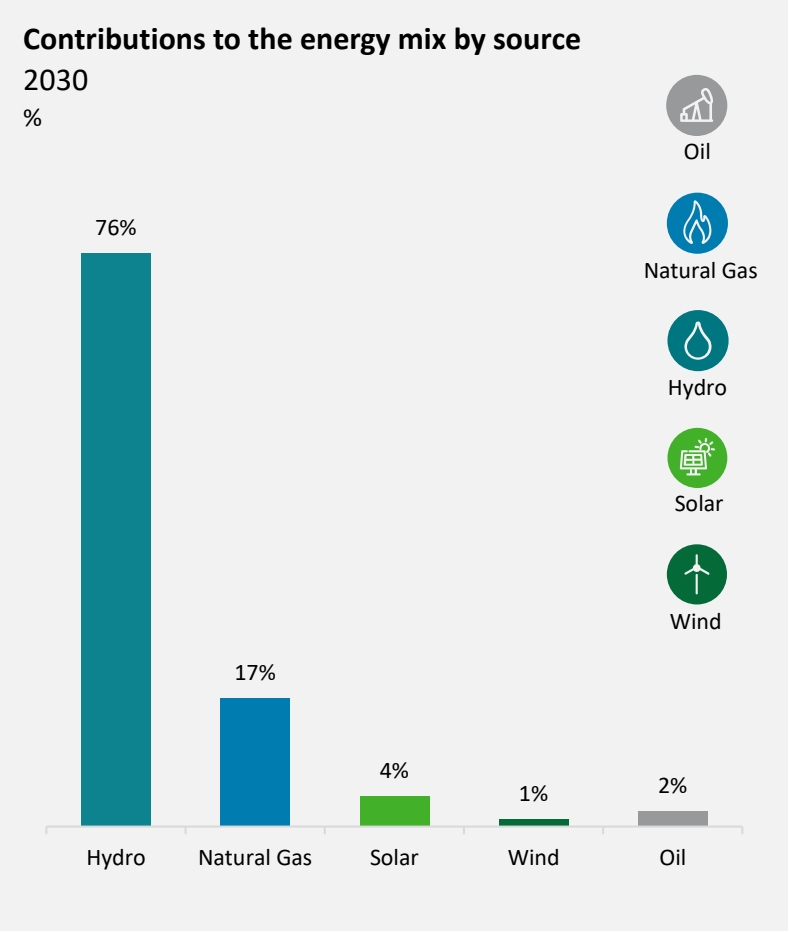
Affordability

In Mozambique electricity tariffs commonly exceed household budgets. Therefore, various initiatives have been implemented in the recent years by **different stakeholders**.

This joint effort involves zero costs to the consumer for a new installation (meter and new subscription, or **donor & multilateral programmes** with significant grants aimed at financing the CAPEX associated with new connections and new generation. This commitment is helping increase the affordability as these costs do not have be be recovered through the tariff. Additionally, these funds are being directed towards making renewables more affordable for Mozambican customers.

Source: Energypedia, Energia para todos, African Development Bank, Gesto Energy, USAID

A consolidated strategy, focused on the existing opportunities and energy portfolio, will ensure that Mozambique takes advantage of its full potential



Source: Aler (Energy Mix Overview)

Strategic opportunities

Electrification potential: Mozambique has made a significant effort to increase electrification, reaching 44%, but access remains mainly urban-focused, presenting an opportunity to leverage abundant energy resources for urban and rural electrification.

Off-grid policies: Nearly two-thirds of the country's population, living in dispersed off-grid communities, do not have access to electricity. The new Regulation for Energy Access in Off-Grid Areas, is expected to help reach the electrification goals for 2030 (*Energy for All*) and attract private investments through mini-grids.

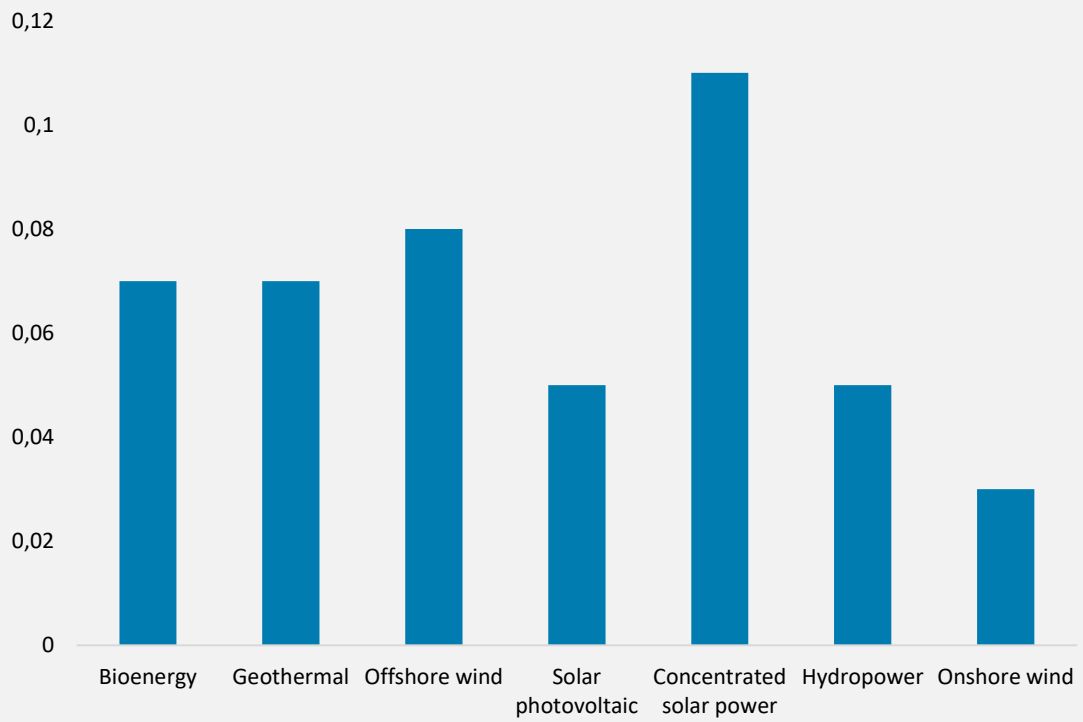
Natural gas exploration: Given that gas has been classified as green by the European Commission, Mozambique's gas has the potential to become one of the most in-demand and valuable energy resources internationally, which can help boost the country's economy. Additionally reducing its carbon footprint with carbon compensation projects will make it even more attractive.

Hydropower exploration: With upcoming projects, such as Mphanda Nkuwa and potentially Hidroeléctrica de Cahora Bassa North, and the exploration of other hubs like Boroma and Lurio Power Plants, hydropower-generated energy is expected to significantly boost energy availability, help ensure a competitive overall portfolio tariff on the back of cheap HCB power thereby making the country more attractive to investment and industry.

Industrialisation and commercial opportunities: Universal electrification represents an opportunity for Mozambique to become a relevant consumer market, where benefits do not only come from selling energy, but also from selling products (especially electrical appliances), attracting manufacturing to serve African local markets and accelerate industrialisation.

Mozambique possesses a wealth of energy resources, providing ample opportunities to lower its Levelized Cost of Energy (LCOE)

Global Levelised Cost of Energy by Technology[1]
2021
US$/KWh



Source: Our World In Data

Hydropower

Hydropower in Mozambique, leveraging in its ample water resources such as the Zambezi River, offers a compelling opportunity to establish a consistent and cost-effective energy source, **reducing dependence on expensive fossil fuels** and advancing sustainable development goals.

Natural gas for electricity production

Mozambique's natural gas resources, when harnessed efficiently, **can lead to lower energy production costs**, reducing electricity prices and enhancing the country's economic competitiveness by attracting industries and investment.

Solar Power

Solar power in Mozambique, harnessing its abundant sunshine**, presents a strategic opportunity to establish a sustainable and economically viable** energy source. This can also reduce reliance on fossil fuels and advance the country's energy.

Mozambique is advancing a series of energy-related projects, some of them with significantly reduced LCOE, which poses as an opportunity to increase both accessibility and affordability in the coming years.

Note: 1. It presents the average cost per unit of energy generated across the lifetime of a new power plant.

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The country needs to define a strategy to navigate the decarbonisation of its economy and to better position itself in the value chain by selling energy instead of merely selling associated commodities such as gas, coal, and rare minerals.

With effective measures, Mozambique could become Southern Africa's energy hub

Define strategic blueprints for each energy source

Define coherent and innovative blueprints for the exploration of each hydrocarbon energy source, by complementing these with the development of the country's renewable potential and through carbon compensation mechanisms.

Develop local value chains and industries linked to renewable energies

Develop relevant value chains, associated with the energy portfolio, such as the aluminium, cobalt, graphite, lithium, nickel, platinum and rare earth metals, and renewable energy sources to ensure maximum benefit.

Attract the private sector and promote economic liberalisation

Private sector investment will introduce efficiency, reduce costs, attract talent and develop skilled local labour. The Government must put in place a framework that incentives cost reflective tariffs that could attract new investments while guaranteeing the standards for infrastructure and services from energy suppliers.

Promote and facilitate sustainable investment in infrastructure

Extend the network and secure the plug-in of renewables in the transmission networks, to meet universal access targets by 2030.

Management of the national energy portfolio

Gas will be extremely important as a transition energy in the coming decades, as such the country must ensure it does not lose the window of opportunity by developing a strategic vision and an effective portfolio management strategy for its hydrocarbon and renewable resources. Thus, when eventually gas or coal are no longer priorities for international markets, the country will have made the most of that opportunity and will have taken the necessary development steps. It will also have the flexibility and vision to focus on new priorities such as rare ores critical for renewables such as aluminium, cobalt, graphite, lithium, nickel, platinum and rare earth metals, and renewable energy sources itself.

Improve legal framework

Improve legal instruments in order to improve the access and quality of new off-grid technologies (e.g., solar home systems) and impose ESG requirements to the private sector. Additionally, promote a greater improvement of local companies and talents, considering the expected skill needs and investments in renewables, storage (energy storage), smart grids (intelligent networks), hydrogen, biofuels, circular economy, digital transformation and its proper application in the respective energy value chains, and corresponding adaptation in management and administrative functions.

Source: Deloitte research

A number of bottlenecks will need to be overcome to increase energy access

Underdeveloped transmission and distribution network, combined with the fact that the average Mozambican domestic consumer cannot afford the electricity tariffs, despite heavy subsidies by the government of Mozambique. This context also impacts **the involvement of the private sector** in the sector. To address the latter, the creation of an enabling environment is crucial (laws and regulations reviews, cost reflective tariffs, definition and promotion of technical standards, incentives and grants on small-scale related products, etc).

About 64% of the population lives on less than US$2 a day, most of them living in rural areas, where the access to electricity decreases significantly. This income constraint **impacts the affordability of electricity supplies, including solar home systems and other off-grid sources.** The *National Electrification Strategy* (NES) targets 30% of the universal access to be based on off-grid sources by 2030, but in most cases these technologies are not accessible for individuals or households. Given rapid population growth, **electricity affordability barriers will likely persist, or worsen.**

Dispersed settlement patterns of rural communities (low population density and high dispersal), represents additional costs to the national public electricity utility in extending the national grid, posing a challenge in reaching the underserved and geographically remote rural communities, where grid connections are limited or non-existent. The off-grid solutions are then key to increase energy access in rural areas, but **both hydro and PV technologies and services are still in an early stage.**

Although a significant effort is being made regarding **off-grid laws and regulation**, there are still more reforms needed. The high import duty and VAT on PV and ICS is one of the examples. As compared to other Sub-Saharan African countries such as Ethiopia, Ghana or Tanzania, these duties have a significant impact on the affordability of households and consequently also on private sector development in this segment in Mozambique. USAID SAEP estimates that **a price drop of US$2.50 a month (in VAT and duties) could double the households who can afford solar home systems.**

Source: Deloitte research

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Final considerations

Opportunity

- Mozambique's vast gas reserves could make the country a **top 10 global producer, responsible for 20% of Africa's output by 2040.**
- Natural gas is expected to play a pivotal role in the energy mix, with a lower carbon footprint compared to coal or oil. **Gas is also expected to bring around US$100bn of revenue to Mozambique over its life cycle**.
- Mozambique has **a significant competitive advantage in renewable energies with hydropower assets like HCB (2 000MW)** and Mphanda Nkuwa (1 500MW) enabling regional industry decarbonisation.
- The country also has a **high solar potential**, with two locations already set up with a total capacity of 80MW, in Mocuba and Metoro.
- The transition to renewables presents an opportunity to create a local industry that will attract new players, create national ecosystems and develop different skills in the country.
- The government approved a new Electricity Law that simplifies permitting and concession processes for power generation projects, particularly for off-grid projects up to 10MW. This new law should **boost private sector participation in power generation**, which shall actively contribute to an increase in national energy access, and improve **operational efficiencies through private sector competition and participation** in the sector.

Mozambique has the opportunity to position itself to contribute to the world's energy needs, either during the transition period or by establishing a strong presence in renewables.

Trends shaping the country's energy mix over the next decade

Increased demand for electricity from the household segment

In residential consumption, an increase in the sale of new products that accompany universal access to energy is expected, mainly household appliances. It is estimated that changes in consumption patterns in Africa will lead to increased demand for electricity in the household segment.

Use of biofuels

The use of biofuels, which result from transforming biomass and organic waste into liquid fuels or gas, is equivalent to fossil-based fuel with a net-zero impact when considering the life cycle. The great advantage is that using this product does not require changes to existing industrial processes, making it a very viable option for the aviation sector, for example.

Accelerated adoption of electricity from renewable sources

Traditionally, the technological barrier to the electrification of industrial processes has focused on the need to reach high temperatures, for which fossil-based sources are considered ideal. However, technological advancements now enable the concept of thermal storage, allowing electricity from renewable sources to reach temperatures of 1 500°C, necessary for certain industrial processes. Additionally, in industries like data centres, operators are increasingly demanding connection to renewable energy sources to reduce their ecological footprint and meet the growing quality requirements expected by their customers.

Mozambique has an opportunity to be an active player in decarbonisation. The local gas will be decisive in deactivating coal-fired power stations in Southern Africa, with the goal of reducing carbon dioxide emissions.

New skills to meet the industry needs

The energy transition will require different skills and six times more people working in the energy sector to meet the needs of emerging industries, including renewables, energy storage, smart grids, hydrogen, biofuels, circular economy, digital transformation, and their proper application in the respective energy value chains, along with corresponding adaptations in management and administrative functions.

Green hydrogen as a potential advantage post 2030

Energy-intensive processes that require high temperatures will transition to green hydrogen, whose process output is effectively water. This energy will be subject to lower price volatility, as it depends on more abundant raw materials. With a price of €1.5/kg, half of global energy consumption based on fossil fuels could be replaced by 2030. In Mozambique, the gas infrastructure can be repurposed in the future to transport green hydrogen.

Source: Deloitte research

List of references

List of references – Mozambique

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