



Energy

Africa's Energy Landscape

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Africa is experiencing facing a growing addiction to gas and oil. Yet, in 2023, Africa produced only 6.6% of world energy, which would increase to 8.1% in 2050 - a portion vastly out of balance with its large and growing population and development needs.

Energy demand, however, in Africa is less than 5% of the world. The difference between production and demand reflects that the continent has abundant energy resources but exports a significant portion. According to the [Climate Action Tracker](#), around 40% of Africa's gas production is exported, primarily to Europe, China and India whilst again importing refined products.

Chart 2: Africa's energy mix in the Current Path, 2023 and 2050



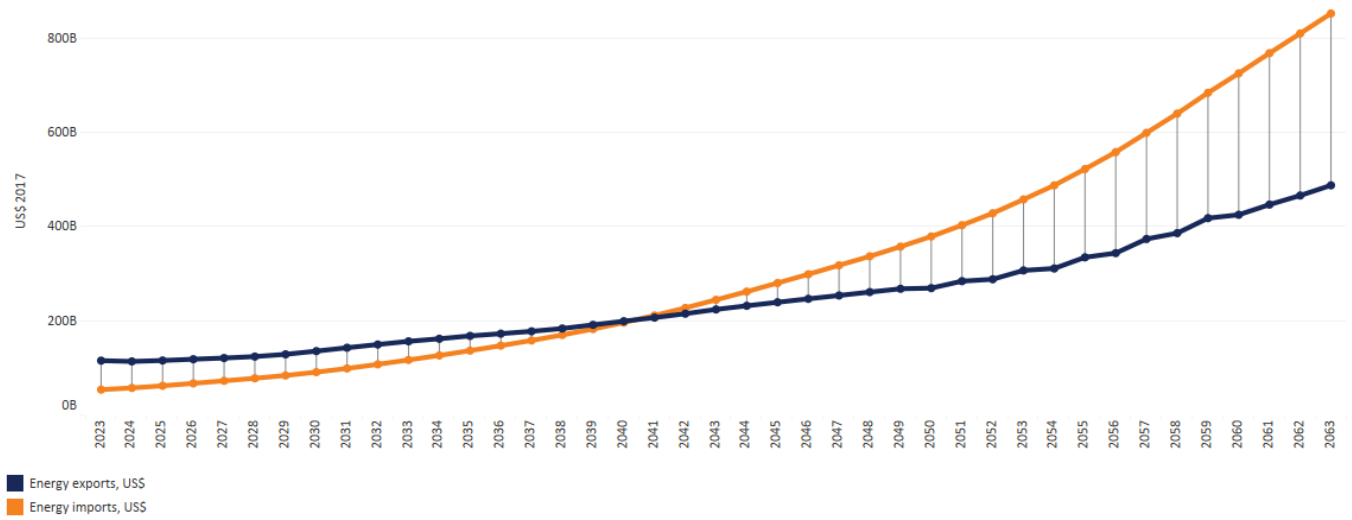
■ Gas ■ Other renewables ■ Hydro
■ Oil ■ Coal ■ Nuclear

Source: IFS 8.17 initialising from IEA World Energy Balances

In 2023 (Chart 3), African countries exported more energy to other African countries and the rest of the world than they imported. That year, African countries exported energy equivalent to 67.9% of their domestic energy demand. Rapid population and income growth mean the continent's energy demand will increase rapidly. From 2041, African countries will collectively import more energy than they import, with large country-to-country differences.

Chart 3: Energy exports vs imports, 2023-2063

Toggle between US\$ and BBOE



Source: IFS 8.17 initialising from IEA World Energy Balances

Several African countries are dependent upon energy imports[1] for more than 50% of their domestic demand, ranging from Morocco (for 93% of its demand), Senegal, Benin, Tunisia, Mauritania, Mauritius, Eritrea, Mali, Uganda Togo, Mozambique, Burkina Faso and Namibia (at 50%). By 2050, 29 African countries will import more than 50% of their demand. Being dependent on energy imports makes these countries vulnerable to price fluctuations (such as the effect on gas prices that followed Russia’s invasion of Ukraine) and supply disruptions in international markets (such as the attacks on commercial vehicles in the Red Sea early in 2024). It also points to the large potential with the development of Africa’s five electricity trading entities or pools[2] where demand in one country can be offset by production in another.

Together with its low levels of development, the result of these exports is that Africa’s people are energy-poor. Only 57% of Africa’s population has electricity, meaning 596 million people lack access to the most basic household resource for heating, cooling, cooking, reading and home education. The data highlights the stark contrast between the continent’s energy potential and widespread energy poverty.

In addition to limited access to electricity, a fundamental requirement for a decent quality of life, Africans generally lack energy for transportation, industry, agriculture, construction and services to enable economic growth. This energy paradox is particularly evident in countries such as the Central African Republic, Chad and South Sudan, where abundant energy resources do not translate to electricity access.

Yet Africa has roughly 7.3% of the world’s proven oil reserves[3], approximately 7.7% of the gas reserves[4] and 4.8% of coal, most of the latter in South Africa, which uses coal for much of its electricity and exports large amounts.

Coal production is the third largest energy source produced on the continent (oil and gas are first and second, respectively), but this is narrowly exploited in only a few countries. South Africa hosts 86% of Africa’s entire coal-fired generation capacity. Smaller coal-fire plants are operational in Namibia, Botswana, Zimbabwe, Morocco, Madagascar, Mauritius, Nigeria, Zambia and Senegal.

While the MENA region, including North Africa, holds around 60% of the world’s proven oil reserves, most countries in Sub-Saharan Africa (SSA) import most of their refined fuel requirements from elsewhere. SSA only has 2 to 3% of the

world's [refining capacity](#) and is thus vulnerable to oil price shocks and regional fuel shortages. The region relies heavily on liquid fuels for primary energy consumption, particularly diesel, which accounts for most of transportation fuel consumption, baseload, and backup electricity generation. For example, up to 90% of [Senegal's](#) electricity is generated via diesel and heavy fuel oil.

Improving local liquid fuel production is particularly challenging in the region due to underdeveloped infrastructure and unreliable transportation networks. Apart from Kenya and South Africa, which have pipelines to transport liquid fuels, petroleum products are generally transported by road and truck.

Several African countries have expressed interest in building nuclear power stations. Currently, only South Africa has a commercial nuclear power plant, the Koeberg station near Cape Town, that accounts for around 6% of its electricity production, with a capacity of 1 940 MW. The first unit was synchronised to the grid in 1984 and scheduled for decommissioning in 2024, but its lifespan is currently being extended to 2044. In 2021, the [National Energy Regulator](#) of South Africa approved plans for South Africa to procure an additional 2 500 MW of nuclear [power](#).

Egypt has embarked upon a nuclear build program and awarded a US\$25 billion contract to Russia's Rosatom company for a 4.8 GW power plant at El-Dabaa along the Mediterranean coast. The first unit should enter service in 2028; all four will be operational by 2030. Other African countries that are exploring [nuclear power](#) options include Ghana, Morocco, Uganda, Burkina Faso, [Kenya](#) and [Rwanda](#), but none have started construction.

Data on clean energy differs, but Africa boasts 60% of the world's best solar resources, utilising only 1% of its installed solar PV capacity. It sits on top of numerous active hot spots, offering vast potential for geothermal energy generation.

Large parts of Africa also have excellent wind resources, particularly in coastal areas and the Great Rift Valley.

It is therefore concerning that, in 2023, only 1.7% of Africa's energy production came from 'other renewables' (essentially wind and solar), which is equivalent to 0.1 BBOE. Its energy production landscape is heavily fossil-fuel dependent and is primarily composed of oil at 46.6%, gas at 31.2% and coal at 17.6%.

In addition to its abundant renewable energy resources, Africa has the most significant untapped hydropower potential of any region globally, but hydro only constituted 2.6% of total energy production in 2023[5]. The continent has many rivers and waterfalls, making it a prime candidate for hydropower generation. For example, Ethiopia recently completed the US\$5 billion Grand Ethiopian Renaissance Dam (GERD) on the upper reaches of the Blue Nile close to its border with Sudan, the third-largest hydroelectric facility in the world in terms of installed capacity, capable of generating almost 6.5 GW in peak operating conditions. With the completion of GERD, Ethiopia is now the largest source of hydroelectric power in Africa, having overtaken the Democratic Republic of the Congo (DR Congo).

Other hydroelectric projects include the [Julius Nyerere Hydropower Plant](#) and Dam in the Rufiji River basin in [Tanzania](#), which would deliver 2.1 GW. In the DR Congo, the first two dams of the Grand Inga scheme, Inga I and II, are built, and Inga III is imminent. But the larger [Grand Inga](#) (of which Inga III would only be a first phase) has been in planning since the 1950s, held back by poor planning, inefficiencies, corruption – and the need to lay transmission lines over several thousand kilometres to the large South African and Nigerian markets.

Endnotes

1. The price per barrel is US\$46.65 in 2023, US\$73.81 in 2050 and US\$101.20 in 2063.
2. They are the Southern African Power Pool (SAPP), Eastern Africa Power Pool (EAPP), Central African Power Pool (CAPP), West African Power Pool (WAPP) and North African Power Pool (NAPP).
3. The top five African countries with 80% of Africa's proven oil reserves are Libya, Nigeria, Algeria, Egypt and Angola.
4. Nigeria, Egypt, Libya, and Algeria account for almost 80% of Africa's gas reserves.
5. Africa has only 37GW of installed hydro-electric capacity – roughly 11% of its potential

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About the authors

Dr Jakkie Cilliers is the ISS's founder and former executive director. He currently serves as chair of the ISS Board of Trustees and head of the African Futures and Innovation (AFI) programme at the Pretoria office of the Institute. His 2017 best-seller *Fate of the Nation* addresses South Africa's futures from political, economic and social perspectives. His three most recent books, *Africa First! Igniting a Growth Revolution* (March 2020), *The Future of Africa: Challenges and Opportunities* (April 2021), and *Africa Tomorrow: Pathways to Prosperity* (June 2022) take a rigorous look at the continent as a whole.

Ms Alize le Roux joined the AFI in May 2021 as a senior researcher. Before joining the ISS, she worked as a principal geo-informatics researcher at the CSIR, supporting various local and national policy- and decision-makers with long-term planning support. Alize has 14 years of experience in spatial data analysis, disaster risk reduction and urban and regional modelling. She has a master's degree in geographical sciences from the University of Utrecht, specialising in multi-hazard risk assessments and spatial decision support systems.

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