

Commentary

AFRICA'S EMERGING NUCLEAR ENERGY LANDSCAPE: AN APPRAISAL

Africa's growing interest in nuclear energy is closely linked to one of the continent's most pressing challenges: how to provide reliable and affordable electricity while supporting economic growth. For decades, many African countries have struggled with inadequate electricity generation, weak transmission networks and unequal access to power. At the same time, African economies are expanding, cities are growing rapidly, and governments are seeking to develop industries that require reliable electricity. Climate change has added another dimension to this challenge by increasing pressure to reduce dependence on carbon-intensive energy sources. These developments have encouraged several African countries to reconsider nuclear power as part of their long-term energy strategies.

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Introduction: The Quest for Nuclear Energy

Interest in nuclear energy is not entirely new. South Africa has operated the Koeberg Nuclear Power Station since the 1980s and remains the only African country with an operating commercial nuclear power plan.¹ However, Africa's nuclear energy landscape is beginning to change. Egypt is constructing four reactors at El Dabaa, while countries such as Ghana, Kenya and Nigeria are developing the legal, regulatory and technical foundations for possible nuclear power programmes.² The International Atomic Energy Agency (IAEA) has reported growing interest in nuclear power across more than 20 African countries, although these programmes differ considerably in terms of political commitment, institutional preparedness and technical development.³ This emerging interest needs to be understood in the context of Africa's wider energy problem. According to the International Energy Agency (IEA), over 600 million people across the

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continent still lack access to electricity.⁴ Sub-Saharan Africa continues to account for the largest share of the world's population without electricity access. At the same time, electricity demand is expected to increase as populations grow, urbanization accelerates and economic activity expands. Meeting this demand will require substantial investment in electricity generation and transmission infrastructure.

For a continent endowed with abundant solar and wind resources, nuclear power offers a different set of advantages. It can generate large quantities of electricity continuously while producing relatively low operational carbon emissions. For countries attempting to build energy-intensive industries, this reliability can make nuclear power attractive. The connection between nuclear energy and industrialization is particularly important. Electricity shortages are not simply a social problem; they also limit economic productivity. Manufacturing plants, mines, data centres, transport systems, hospitals and other modern economic activities depend on reliable electricity. Governments therefore increasingly view energy security as a foundation for development. Nuclear power, where economically viable, could provide a stable source of electricity for national grids and support industries that require continuous power.

Country-Level Developments in Nuclear Energy

African states are pursuing nuclear energy to varying degrees, spending on their economic circumstances, climatic vulnerabilities and socio-political priorities. Egypt provides the clearest example of this changing landscape. The country is constructing four Russian-

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designed VVER-1200 reactors at El Dabaa on the Mediterranean coast. With a combined capacity of approximately 4,800 megawatts, the project will represent one of the largest additions to Africa's nuclear electricity capacity.⁵ More importantly, it represents the first new commercial nuclear power programme on the continent since South Africa's Koeberg nuclear power station was developed. Egypt's programme demonstrates both the possibilities and complexities of nuclear development in Africa. The project involves long-term cooperation with Russia in reactor technology, construction, financing, training and other areas. Such partnerships can help countries

overcome the enormous technical and financial barriers associated with nuclear power.⁶ At the same time, they create relationships that may last for many decades. Nuclear cooperation can therefore have implications beyond energy policy, influencing diplomatic relations and wider strategic partnerships.

South Africa occupies a different position. Its decades of experience with Koeberg have provided it with technical expertise, regulatory knowledge and a trained nuclear workforce. The country has also shown renewed interest in nuclear power as part of its long-term power generation strategy. These discussions include additional nuclear capacity and the

deployment of newer reactor technologies. South Africa's experience, however, also highlights the financial and political difficulties involved. Previous plans for a major nuclear expansion were abandoned amid concerns over affordability, financing and governance.⁷ The lesson is important for other African countries: nuclear power cannot be treated simply as a technological project. It requires long-term financial planning, transparent decision-making, strong institutions and political commitment that can survive changes in government.

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Ghana and Kenya represent another stage in Africa's nuclear development, as both countries are still building the institutional foundations for future nuclear programmes. Ghana has developed a national nuclear programme and has examined different reactor technologies and international partnerships. Kenya has established the Nuclear Power and Energy Agency and has worked with the IAEA on issues such as regulatory development, human-resources development, environmental assessment and electricity-grid requirements (Nuclear Power and Energy Agency).⁸ Nigeria has also considered nuclear power for many years. Its large population and persistent electricity shortages make reliable energy a major national priority. The country has worked with the IAEA to develop the regulatory and institutional foundations for nuclear power. Yet Nigeria's experience also demonstrates how difficult it is to move from political commitment to actual construction.⁹ Earlier targets for developing a nuclear power plant were not achieved, reflecting the financial, institutional and technical challenges involved.

These examples demonstrate that Africa is not moving towards nuclear energy along a single, common path. Countries are at different stages. Some are operating reactors, some are constructing them, some are developing regulations and others are still examining whether nuclear power is economically and technically appropriate. The decision to pursue nuclear energy will depend on the size of each country's electricity grid, projected demand, access to finance, institutional capacity and availability of skilled personnel.

Challenges to Africa's Nuclear Energy Ambitions

Conventional nuclear reactors require significant upfront capital investments and require strong, stable electricity grids capable of absorbing immense gigawatt-scale outputs – conditions that present major obstacles for many smaller African economies. Small Modular Reactors (SMRs) offer a potentially more because of their smaller generating capacity, lower initial capital requirements and suitability for smaller power grids, enabling phased deployment for both electricity and non-electric applications such as industrial heat or water desalination.¹⁰

However, SMRs cannot provide an immediate solution. Most designs are still progressing toward widespread commercial deployment, and they continue to require robust national frameworks for nuclear safety, physical security, emergency response, and radioactive waste disposal.

Africa possesses roughly 20% of global uranium reserves, led by key producing nations such as Namibia and Niger (International Atomic Energy Agency, 2024).¹¹ However, a stark structural disconnect exists between the continent's role as a major supplier of uranium and its limited domestic capabilities across the nuclear fuel cycle. Because most African countries lack domestic enrichment, fuel fabrication and other fuel-cycle facilities, their nuclear power programmes remain dependent on foreign suppliers and processing capabilities.

Nuclear energy requires massive upfront capital investment before a plant can generate revenues. To bridge this financing gap, countries often rely heavily on international vendor partnerships, notably from state-backed entities in Russia, China, France, South Korea, and

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the United States. The multi-decade contracts with these external partners can create long-term geopolitical and technological dependencies on foreign entities, reinforcing the need for African governments to balance external assistance with national human capital development.

Finally, institutional capacity and governance issues are among the most pressing challenges facing Africa. Building a competent, independent nuclear regulator takes years of sustained investment. Beyond granting permits, regulatory

bodies must enforce standards relating to radiation safety, environmental protection and radioactive waste management. Addressing spent-fuel management from the outset is essential; postponing this issue can undermine both regulatory credibility and public trust. To ease this burden, regional bodies like the African Union and the African Commission on Nuclear Energy (AFCONE) help align safety standards across borders, share technical expertise, and pool capacity-building costs (AFCONE, 2022).¹²

Conclusion

Africa's nuclear future stands at a critical juncture, shaped by financial, institutional and strategic considerations. The continent's ability to harness nuclear power will ultimately depend on three interlinked conditions. First, sustainable financing will be essential. Nuclear energy projects are capital-intensive, requiring billions of dollars in upfront investment for construction, regulatory compliance, and safety infrastructure. African nations will need to secure long-term funding through a combination of government budgets, private investment, and international financial mechanisms. Without reliable financing sources, even well-formulated nuclear plans may never progress beyond the drawing board. Second, strong and accountable institutions will be essential. Nuclear programmes demand highly specialised regulatory bodies, robust safety protocols, and transparent governance to ensure that both domestic and international standards are met. Countries must train skilled personnel, establish independent oversight agencies, and create legal frameworks that prevent corruption or political influence from compromising safety and efficiency. Without such institutional capacity, the risks of accidents, misuse, or project delays increase

significantly. Third, managing international partnerships effectively will be critical. Many African nations will rely on collaboration with experienced global nuclear powers to access technology, expertise, and equipment. However, such cooperation must be structured to minimize long-term technological dependence. Strategic partnerships that incorporate technology transfer, local workforce training and the development of domestic supply chains will be essential if nuclear energy is to contribute to broader economic and industrial growth.

If African countries can successfully address these three pillars – securing financing, building institutions, and managing partnerships – nuclear energy could become a cornerstone of the continent’s long-term energy and industrial strategy. It could help diversify energy portfolios, reduce reliance on fossil fuels and provide reliable electricity for growing industries. However, failure to meet these conditions would likely leave nuclear ambitions stalled, confined to policy documents, feasibility studies, and aspirational roadmaps rather than operational reactors.

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 - ³ International Atomic Energy Agency. (2025). Outlook for nuclear energy in Africa. IAEA Publications. <https://www.iaea.org/publications/15896/outlook-for-nuclear-energy-in-africa> (Accessed on 26 May 2026)
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 - ⁶ ROSATOM. “Rosatom installs key safety equipment at Unit 4 of El Dabaa NPP in Egypt”. State Atomic Energy Corporation ROSATOM. 20 November 2024 <https://ase-ec.ru/en/for-journalists/news/2024/nov/installation-of-the-core-catcher-has-started-at-el-dabaa-npp-unit-4/> (Accessed on 30 May 2026)
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