ISS | AFRICAN FUTURES

Energy

Towards a Viable Africa Energy Policy

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Last updated 05 February 2025 using IFs v8.34

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Briefly

The Climate theme presents the implications for Africa of the current trajectory of carbon emissions and the associated effects such as warming, changes in precipitation and climate volatility. Because of their limited ability to adapt to the effects of climate change, Africans will likely suffer more than any other region despite having contributed little to the cause of this problem. Therefore, the first step towards the development of a viable African Energy Policy scenario must consist of a rapid increase in non-fossil energy production and a decrease in energy from fossil fuels, building upon the analysis presented in the preceding section, which presented the continent's potential in this regard. A second step is to consider the contribution of greater energy efficiency and carbon sequestration before listing the key elements that constitute a viable Africa Energy Policy scenario.

An African energy transition

The UNEP 2023 Production Gap Report "Phasing down or phasing up?" highlights that under the current government plans and projections, a global 'Production Gap' (the gap between planned fossil fuel production and the levels consistent with limiting global warming) is likely to widen to 2050. UNEP's analysis shows that governments plan to produce around 110% more fossil fuels in 2030 than would be consistent with limiting global warming to the ambitious 1.5^{o}C target. This means that fossil fuel production is projected to generate 69% more emissions than would be compatible with limiting warming to 2°C, concluding that the world only had a 14% chance of limiting warming to 1.5^{o}C. To keep the 1.5^{o}C ambition alive at all, fossil fuel use must decline dramatically and other key mitigation and sequestration efforts must increase exponentially. Based on the full implementation of the national commitments would put the world on track to 2.9^{o}C.

There is a large gap, the authors warn, between the fossil fuel production that is being planned and pursued and the Paris Agreement's global warming limits, pointing to the need of drastic change. The 2023 Production Gap report recommends that the world aim for a near-total phase-out of coal production and use by 2040 and reduce oil and gas by three-quarters by 2050 compared to 2020 volumes. UNEP's subsequent Emissions Gap Report 2024 noted that greenhouse gas emissions need to be cut by 42% (2030) and by 57% (2035) to get on track for 1.5^{o}C.

The obvious challenge is that Africa will require significantly more energy in the future and the related energy sector (mining, oil and gas) attracts the bulk of Africa's FDI, implying that pressure to avoid these sectors amongst foreign investors could have a significant detrimental impact on a continent in dire need of capital. We examine the associated trends in the theme on Financial Flows.

According to a 2023 report from the IEA, a tripling of energy production from renewables by 2030 is 'technically and economically feasible', but requires significant policy and investment changes.[1] These ambitions were affirmed at COP28 later that year which agreed to triple renewable energy capacity to at least 11 000 GW by 2030, which is now within reach with more rapid progress in China. African governments have already more than tripled public investment in renewable electricity, up to US$47.0 billion from US$13.4 billion the previous decade. Many African countries have also set ambitious targets for renewable energy development, typically 30% in 2030, although often from a shallow base. Some, such as Kenya and Cabo Verde, aspire to 100%. Others, such as Mozambique, Rwanda and Eswatini, aspire to around 60%.

The reasoning for more rapid decreases in the costs of other renewables follows findings from IRENA that renewable energy costs have steadily fallen for years. Between 2021 and 2022, for example, the global weighted average cost of electricity from new onshore wind projects dropped by 5% and solar PV by 3%. These trends will likely continue, driven by technological advancements, economies of scale and competitive market dynamics. IRENA projects that by 2050, the cost of electricity from utility-scale solar PV could fall by as much as 80% compared to 2020 levels, while onshore wind could see a cost decline of 50%.

The IEA Africa Energy Outlook 2022 report projects that under ambitious policy interventions and significant investments, Africa could see over 80% of new power generation capacity coming from renewables by 2030. In their World Renewables Outlook 2023 report, IRENA estimates that Africa could achieve a renewable energy capacity of 750 GW by 2030, representing a four-fold increase from the current capacity of roughly 180 GW. However, the increase comes from a shallow base since, in 2023, the contribution from renewables only constituted 106 MBOE (or 1.7% of total energy production) and was set to increase to 266 MBOE in 2030, i.e. by a factor of 2.5.

Nuclear will likely also play an important role in Africa's energy future. For the first time since the annual climate summits commenced in 1995, the 198 signatory countries to the UN Framework Convention on Climate Change (UNFCCC) officially included nuclear energy to help achieve deep and rapid decarbonisation at the COP28 meeting in Dubai in December 2023. The inclusion of nuclear and a separate declaration by more than 22 countries to advance the aspirational goal of tripling nuclear power capacity by 2050, on top of statements by the IAEA and the nuclear industry, underscored a new momentum for this sector and its potential contribution to clean energy.

In addition to nuclear, Africa also has to invest in more energy from hydropower—although the associated projects are often capital intensive and require significant lead-in times. In a meeting of the International Hydropower Association in Abuja in May 2024, participants called for the refurbishment of Africa's ageing hydro facilities and for African governments to 'recognise and champion sustainable hydropower as a clean, green, modern and affordable solution to provision of secure electricity supply...' That said, the increased variations in seasonal rainfall that are associated with climate change are making hydropower less reliable with each passing year. Thus, in February 2024, Zambia extended its national disaster to include a provision to import and ration electricity as a devastating drought affected hydropower generation from the Kariba Dam, its main source of energy. The effect is being felt globally. According to the IEA, droughts were an important contributing factor to higher world energy demand in 2023, worsened by the El Nino weather pattern that warms the Pacific Ocean. To compensate, fossil fuel power plants were used instead, releasing about 170 million tons of additional CO_2.

Africa will undoubtedly require significantly more energy in the future and it is also important to recognize the opportunity that fossil fuel exploration projects offer to a continent that otherwise attracts limited foreign direct investment. Although trends are changing, the resource extraction sector (mining, oil and gas), attracts the bulk of Africa's FDI, implying that pressure to avoid these sectors amongst foreign investors could have a significant detrimental impact on a continent in dire need of capital.

In addition to the use of different renewable sources of energy, fossil fuel dependence can also be reduced by improving the efficiency with which the fuel is used. Currently, Africa requires 70% more energy per unit of GDP than the global average, reflecting the potential for rapid improvement, particularly through investment in grid capacity as discussed previously, and reflected in Chart 2.

In the Africa Energy Outlook 2022, the IEA projects that with vital policy interventions and significant investments, Africa could achieve a 30% reduction in electricity demand through energy and material efficiency measures by 2030. However, in 2023, the electricity share of energy use in Africa averaged only 13% and is forecast to decline to 11% in 2050, meaning the reductions in electricity demand would have little impact on total energy demand, particularly given energy poverty.

Additional savings could come from implementing stricter building codes and energy standards, greater industrial efficiencies such as in cement, steel and chemicals (the ADB estimates this could save up to 10% of the continent's total energy consumption by 2030), and efficiencies in existing vehicles and promoting fuel-efficient modes of transport, which the IEA estimates could contribute a 5-10% reduction in total energy demand by 2030.

Because it relies upon fossil fuels (mostly diesel) that are transported by road (and not by rail or pipeline), often for use in numerous small generators, the potential for greater energy efficiencies in Africa with fossil fuel use is significant.

Modelling Africa's energy transition: the Energy Policy scenario

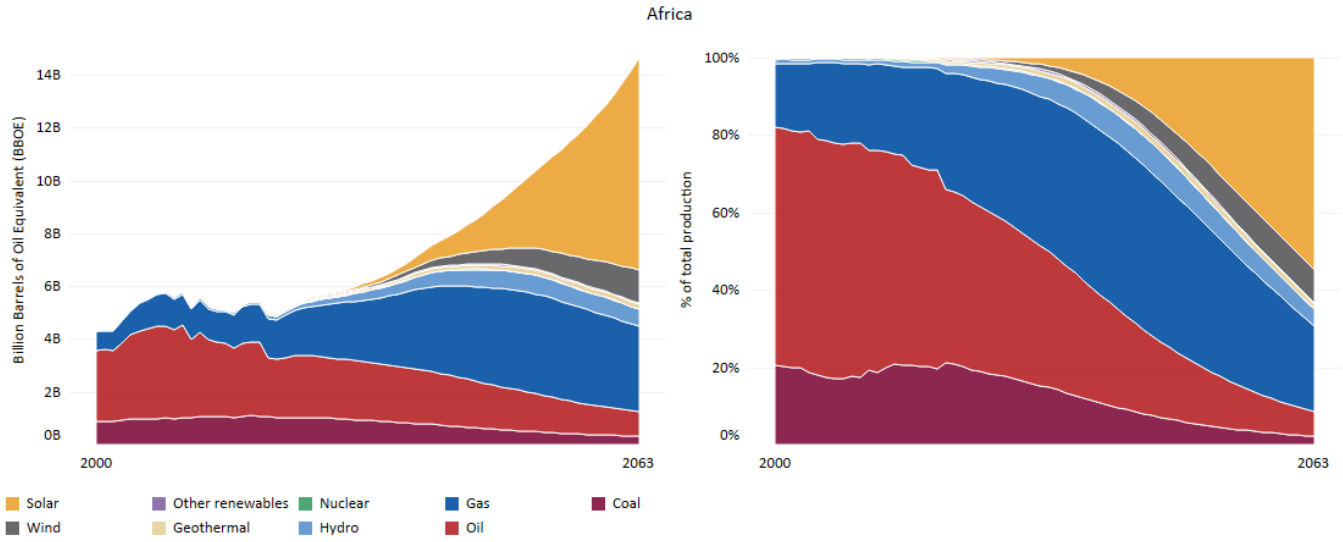
The Current Path that is presented in Chart 1 is already aggressive in ramping up renewable energy production in Africa. Our further interventions for an Energy Policy scenario on energy production, exports, transmission loss and electricity access that stem from the preceding sections mean that Africa will produce 12.5% more energy in 2050 than in the Current Path consisting of the following (reflected in Chart 5):

- A 7.1% reduction in energy exports (US$7.65 billion lower export earnings from energy exports),
- An increase of 175 million tons of carbon sequestration (through forest protection and regeneration),
- A 19% increase in nuclear energy production,
- A 42% increase in solar energy production,
- A 36% increase in wind energy investment and production,
- A 29% increase in hydro energy production,
- A 25% increase in geothermal energy production,
- A 3% increase in energy production from gas,
- A 28% increase in energy production from other renewables,
- A 5% reduction in energy production from oil,
- A 12% decrease in energy production from coal.

The interventions reduce the number of Africans without electricity access by 184 million of which 69 million are in urban areas and 112 million in rural areas. Also, instead of losing 12% of electricity production, Africa will only lose 10.8% due to grid extension and efficiency improvements.

With respect to carbon sequestration, our Agriculture scenario includes a reasonable forest protection multiplier to constrain the expansion of cropland. This multiplier is included in the Energy Policy scenario over a 40-year period in 17 African countries.[2] However, the positive increase in production needs to be placed in context because, in the high-growth Combined scenario, Africa's energy demand is 26% higher (15.2 instead of 12.1 BBOE) in 2050 than in the Current Path (Chart 5).

Chart 5: Energy production by type: Current Path vs Energy Policy scenario, 2000-2063
Measured in billion barrels of oil equivalent (BBOE)



Source: IFs 8.34 initialising IEA World Energy Balances

The interventions listed above are included in the Combined scenario, to which we turn below.

Endnotes

1. In 2022 (the base year from which the IEA forecast), renewables accounted 4.2% of Africa's energy production, equivalent to 232 million BOE. For Africa to triple its renewables could mean 11.2% or 696 million BOE from renewables. On the Current Path, the portion of Africa's energy from other renewables will more than double to 7.8% (579 million BOE) in 2030. In the Current Path forecast, renewable energy production would increase to 20.9% or 2.38 BBOE in 2050.
2. Congo, Zambia, Angola, CAR, Nigeria, São Tomé, Senegal, Sierra Leone, Ghana, Benin, Eswatini, Gambia, Guinea, Malawi, Burkina Faso, Togo, Madagascar.

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Jakkie Cilliers and Alize le Roux (2025) Energy. Published online at futures.issafrica.org. Retrieved from https://futures.issafrica.org/thematic/15-energy/ [Online Resource] Updated 05 February 2025.

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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 oce 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.

About African Futures & Innovation

Scenarios and forecasting can help Africa identify and respond to opportunities and threats. The work of the African Futures & Innovation (AFI) program at the Institute for Security Studies aims to understand and address a widening gap between indices of wellbeing in Africa and elsewhere in the world. The AFI helps stakeholders understand likely future developments. Research findings and their policy implications are widely disseminated, often in collaboration with in-country partners. Forecasting tools inspire debate and provide insights into possible trajectories that inform planning, prioritisation and effective resource allocation. Africa's future depends on today's choices and actions by governments and their non-governmental and international partners. The AFI provides empirical data that informs short- and medium-term decisions with long-term implications. The AFI enhances Africa's capacity to prepare for and respond to future challenges. The program is headed by Dr Jakkie Cilliers.