



Energy

Introduction: Energy and Sustainable Development

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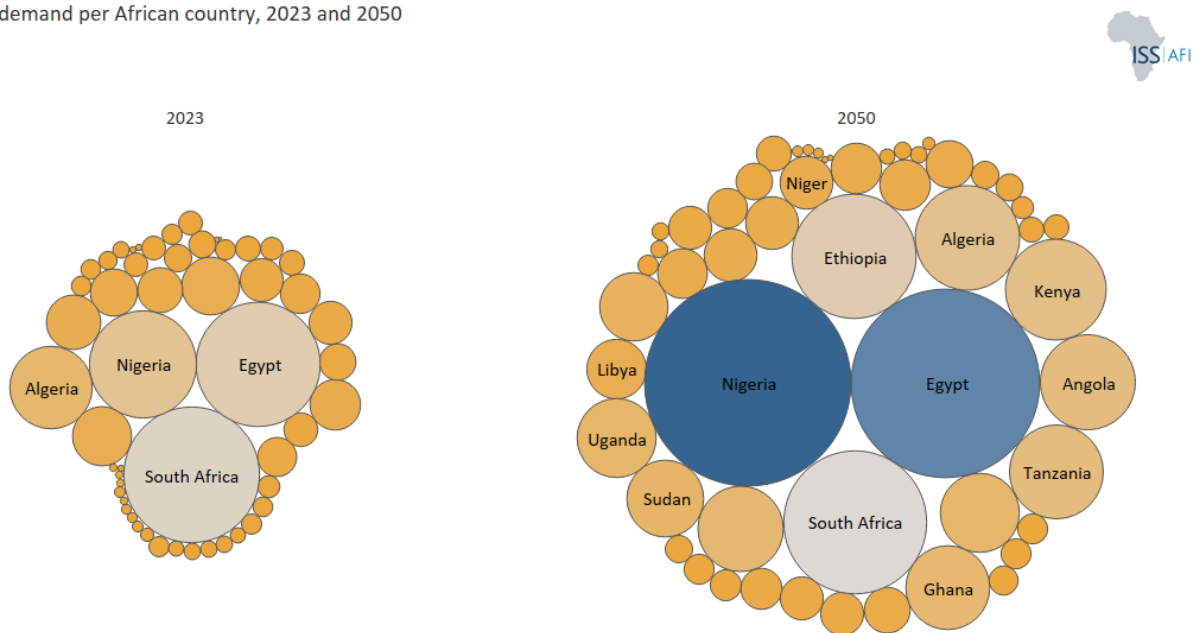
Introduction: Energy and Sustainable Development

Energy is essential for economic growth and human progress. The relationship between per capita energy consumption and various development indicators such as access to food, wealth, health, nutrition, clean water, infrastructure, education, infant mortality and life expectancy is powerful, particularly at low levels of development. Thus, low scores on the [Human Development Index \(HDI\)](#) correlate with low per capita energy use.

The HDI finds that with sufficient energy, development can be rapid, especially at low-income levels and posits a requirement of 8.62 barrels of oil equivalent (BOE, equivalent to 100 gigajoule) per person to allow for rapid development. At this level small increment of energy use corresponds with a relatively large increase in HDI. Diminishing returns become evident at higher levels of use and, above 16.34 BOE, there is no statistical significant relationship as a saturation effect sets in.

In light of this, Africa has an energy mountain to climb. Only six African countries (Libya, Mauritius, South Africa, Seychelles, Botswana and Namibia) have per capita demand above the threshold of 8.62 BOE in 2023, which is required for rapid human development gains. The average energy demand per person in Africa in 2023 is much lower at 3.2 BOE and will only modestly increase to 6.4 BOE by 2063 on the Current Path forecast. Thus it is no surprise that in a high growth scenario (the [Combined Agenda 2063 scenario](#)) modelled elsewhere on this site, Africa's energy demand is almost 40% above the 2050 Current Path forecast and energy demand per capita is significantly higher. Chart 1 presents current and future energy demand per African country, and Chart 6 presents energy demand per person.

Chart 1: Energy demand per African country, 2023 and 2050



Source: IFS 8.17 initialising from IEA World Energy Balances

Rapid development in Africa will be associated with large increases in energy demand and associated carbon emissions should the continent proceed on the same fossil fuel development pathway as today's developed economies.

At higher levels of development, technology can allow energy use per person to decline even as incomes increase. The energy required for [human development](#) in high-income countries has therefore decreased over time. In 1975, high human development characterised by a long and healthy life, a well-educated population, stability, and a decent standard of living, needed 16.3 BOE per person. This had almost halved to 9.8 BOE by 2005. Yet, total energy demand continues to

grow globally due to population growth and the development demands in low and middle-income countries. Looking long-term, the energy demand from data centres, artificial intelligence, and cryptocurrency may slow energy reductions in many high-income countries and is expected to **double** from 2% of global demand in 2022 by 2026.

The trend of increased energy demand associated with development is evident when considering the Current Path forecast. For a world population that will increase from 8 billion in 2023 to 9.8 billion in 2050 (i.e. by 21%), energy demand[1] will increase from 94.2 billion barrels of oil equivalent (BBOE) to 134.8 BBOE. This represents more than double the rise in population at 43%, reaffirming the strong relationship between energy and development.

The relationship between energy and development at higher consumption levels is complex because other factors, such as the economy's structure (including, for example, the size of the manufacturing sector), institutional quality and social capital, become more important to improve human development. The result is large differences in energy consumption amongst high-income countries at roughly the same levels of development, such as the US, which uses significantly more energy per person compared to Norway or Sweden.

Endnotes

1. Excluding biomass

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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.

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.