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Energy

Energy demand and production in the Combined scenario

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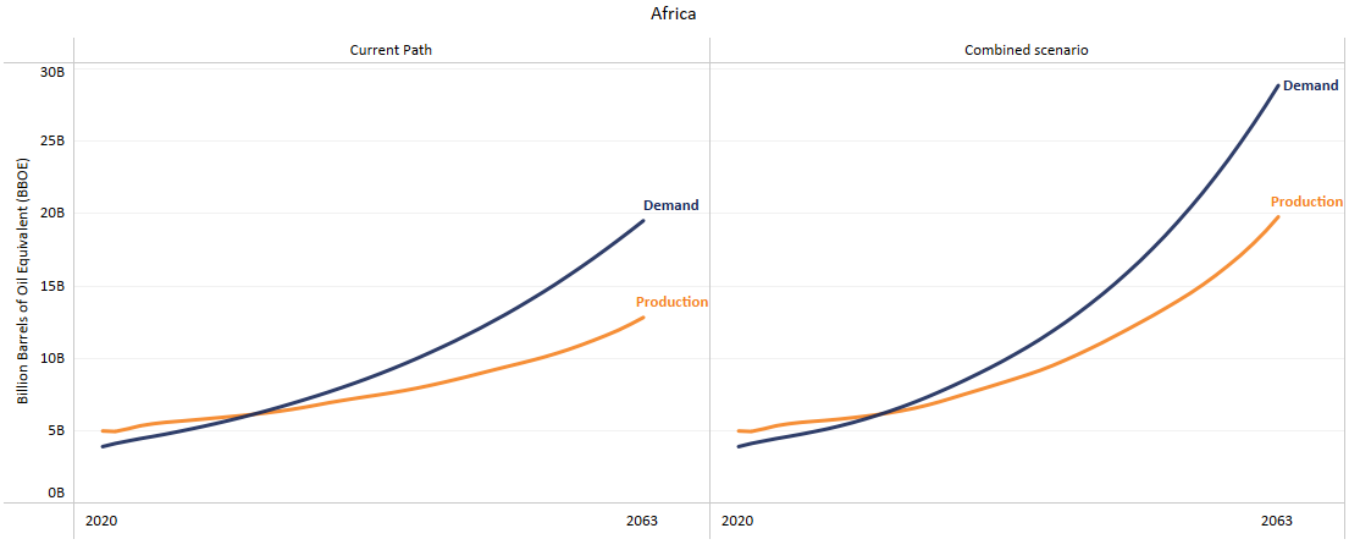
With more rapid economic growth in the Combined scenario compared to the Current Path, African countries' total energy demand will increase. Energy demand for 2050 in the Combined scenario is 26% above the 2050 Current Path (Chart 6) and 48% higher in 2063. Despite a 29% increase in energy production above the 2050 Current Path, energy imports will increase.

The increase in demand is partly offset by the 29% increase in production by 2050 when comparing the Combined scenario with the Current Path. Production in the Combined scenario is 11.55 BBOE in 2050 compared to the Current Path of 8.95 BBOE in 2050.

Because we intervene in the Combined scenario to constrain energy exports as a policy initiative to improve domestic energy security, exports decline compared to the Current Path. Instead of energy exports of US$104.6 billion in 2050, African countries would only earn US$100.7 billion. In 2023 (a record year for energy exports from Africa due to Europe's energy crisis with the war in Ukraine), African countries earned US$83.7 billion.

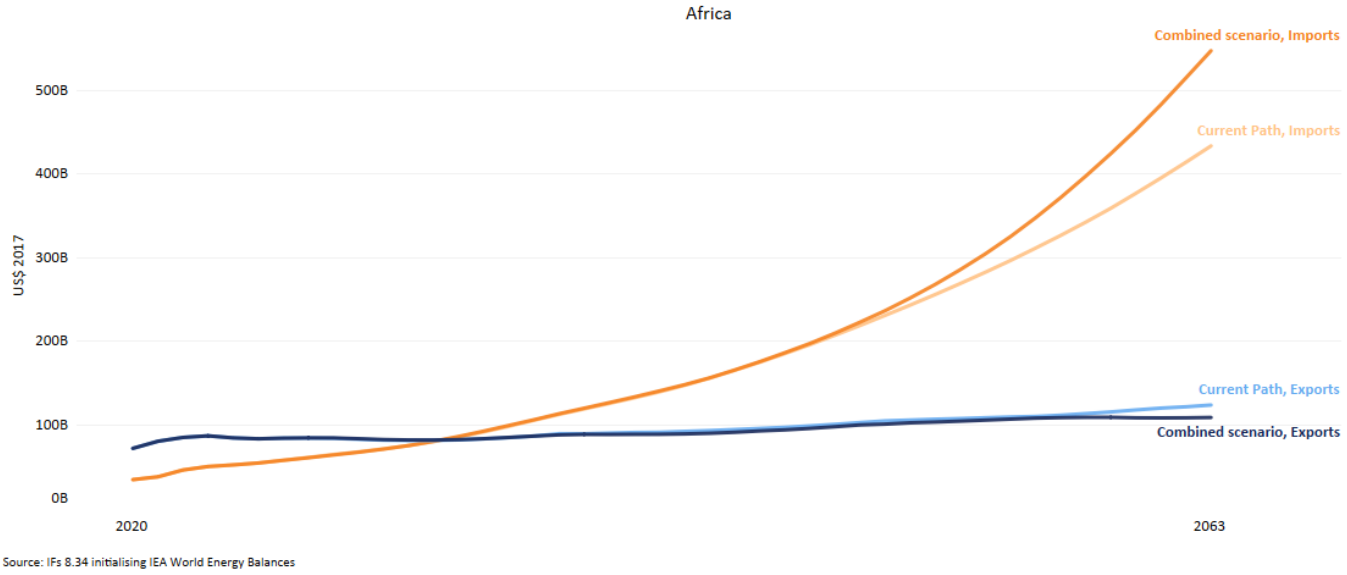
Chart 6: Energy demand and production: Current Path vs Combined scenario, 2020-2063
Measured in billion barrels of oil equivalent (BBOE)



Source: IFs 8.34 initialising IEA World Energy Balances

In 2023, African countries imported energy products to the value of US$50 billion. Because of the constraint on exports in the Combined scenario, import value is largely similar in the Current Path and Combined scenario in 2050 despite the fact that total energy production in the Combined scenario is 29% above the Current Path. Generally, Africa's import dependence slightly improves (i.e. energy import minus exports relative to demand is lower in the Combined scenario compared to the Current Path).

Chart 7: Energy exports and imports: Current Path vs Combined scenario, 2020-2063
Measured in billion barrels of oil equivalent (BBOE) and US$ 2017



Source: IFs 8.34 initialising IEA World Energy Balances

Population growth and welfare improvements are the reasons for the increase in Africa's future energy demand. In 2023, Africa's population surpassed that of India and China. By 2063, Africa (at 3.1 billion people) will have almost double the population of India (at 1.67 billion). India will, in turn, have a much larger population than China (then at 1.1 billion). GDP per capita, a good general indicator of improvements in well-being, will increase by 48% above the 2050 Current Path in the Combined scenario.

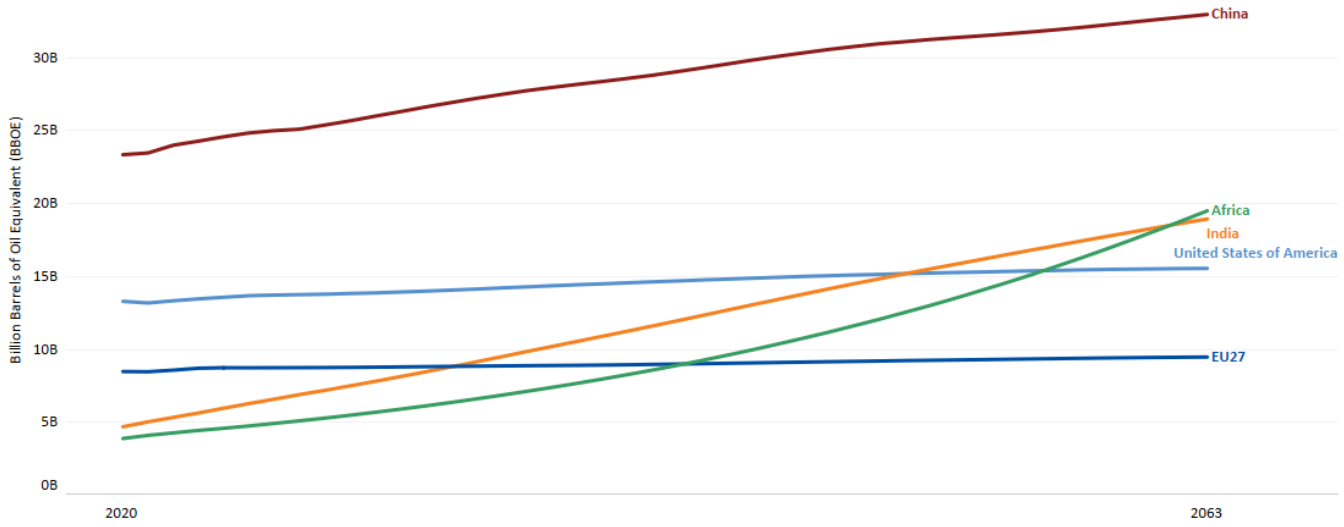
Contrary to the situation with India and China, Africa's population will continue to increase beyond the end of the century. As prosperity increases, so will Africa's energy demand and associated carbon emissions unless the continent embarks upon a different energy future than its current trajectory, which imitates the fossil-dependent pathway of richer regions and countries.

It is evident that Africa has an energy mountain to climb. Only seven African countries (South Africa, Algeria, Mauritius, Libya, Seychelles, Botswana and Equatorial Guinea) had per capita demand above the threshold of 8.62 BOE in 2023, the minimum level required for rapid human development gains. The average energy demand per person in Africa in 2023 was much lower, at only 3 BOE, and will only modestly increase to 4.6 BOE in 2050 on the Current Path. Even the Combined scenario only increases energy demand to 6.2 BOE per person in 2050 at which point 16 countries would meet or exceed the 8.62 BOE development requirement. That is in spite of the fact that in the high growth Combined scenario, Africa's energy demand is 26% above the 2050 Current Path.

It is therefore no surprise to find that Africa's energy demand per person is lower than South America and South Asia, the two other developing regions against which we typically benchmark Africa. The Current Path is that Africa's relative energy poverty (demand per person compared to these two regions) will increase over time as energy production in South America and South Asia ramps up more rapidly than in Africa although the gap stabilises in the Combined scenario.

Chart 7 compares Africa's total energy demand in 2023, 2050 and 2063 with that in India, China, the European Union and the US. The data is in BBOE and the user can also select to show the forecast for South America and South Asia, as well as the impact of the Combined scenario on Africa's energy demand.

Chart 8: Energy demand: Current Path vs Combined scenairo, 2020-2063
Measured in billion barrels of oil equivalent (BBOE)

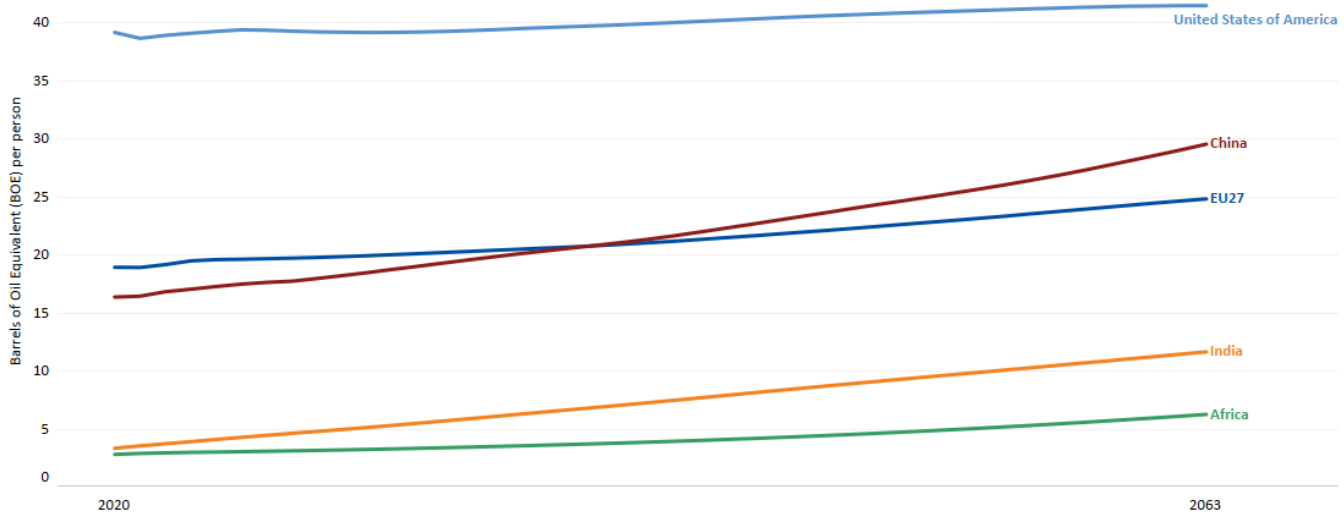


Source: IFs 8.34 initialising IEA World Energy Balances

Total energy demand from China (with its large population and rapid economic growth) is the largest, although demand growth starts to taper off towards the end of the forecast period. On the Current Path, total energy demand from Africa overtakes that of India in 2062. Demand in the EU and the US increases marginally.

Chart 9 compares demand per person and shows the extent to which the energy demand from the average American was much higher than any other: 39.1 BOE equivalent in 2023, compared to 3 BOE in Africa and 3.9 BOE in India. Looking to the future, China's per capita demand will overtake the EU in 2040.

Chart 9: Energy demand per capita: Current Path vs Combined scenario, 2020-2063
Measured in billion barrels of oil equivalent (BBOE)



Source: IFs 8.34 initialising IEA World Energy Balances

By 2050, the average US demand will be at 40.7 BOE per person, reflecting the extent to which the demands from AI,

bitcoin and other services require more energy in advanced economies. This overturns the expectation that the energy intensity of high-income countries could eventually decline. By 2063, almost four decades into the future, Africa's average energy demand per person will be a quarter of the demand in the US in the Combined scenario compared to only 15% of US demand in the Current Path.

Despite its slow per capita energy demand growth, Africa's growing population, expanding economy and low energy efficiencies imply that the continent's portion of the world's energy demand will increase from 4.7% in 2023 to 12.9% by 2063 (Current Path) and to 18.1% in the Combined scenario, pointing to the need for additional efforts to unlock a less carbon-intensive future in its own, and global, interest.

With rapid population growth, urbanisation and economic expansion driving a surge in energy demand, the continent must navigate a complex path to secure its energy future. The Combined scenario demonstrates that while energy production can significantly increase—particularly through renewables like solar, wind, and hydro—demand will still outpace supply, reinforcing Africa's dependence on energy imports.

The shift away from fossil fuels in favour of cleaner energy sources is evident, with oil, coal and nuclear power declining as a share of total production, while solar, wind and hydro expand significantly. However, the transition is happening against a backdrop of persistent energy poverty. By 2050, even under the high-growth Combined scenario, Africa's average per capita energy demand will remain far below global benchmarks, underscoring the urgency of scaling up investment in energy infrastructure, grid expansion and renewable capacity.

In the Current Path (Chart 1), fossil fuels would still account for 61% of world energy production in 2050, consisting of 21% from coal,16% from oil and 23% from gas. The preceding analysis has already presented the 2050 percentages of total energy production for fossil fuels in Africa (see Chart 5) which are as follows:

- Oil: 17.45% in the Current Path and 13.8% in the Combined scenario,
- Gas: 40.7% in the Current Path and 36% in the Combined scenario,
- Coal: 6.9% in the Current Path and 4.7% in the Combined scenario.

Africa cannot develop without adequate energy and it is inevitable that its development will be accompanied by increased energy demand. Appropriate action is required to ensure that carbon emissions are as low as possible.

Africa's energy transition is rapid even as emissions grow. In 2023, 95% of Africa's energy came from coal, oil and gas. On the 2050 Current Path, it would be 65%, and only 54% in the Combined scenario—a difference of eleven percentage points.

When considering these differences, it is important to remember that the size of the African economy in the Combined scenario is much larger than in the Current Path, meaning that the actual transition away from fossil fuels is more rapid than reflected in the eleven percentage point difference.

Another way of presenting this is to consider Africa's CO_2-equivalent emissions from fossil fuels in global terms (see Chart 7):

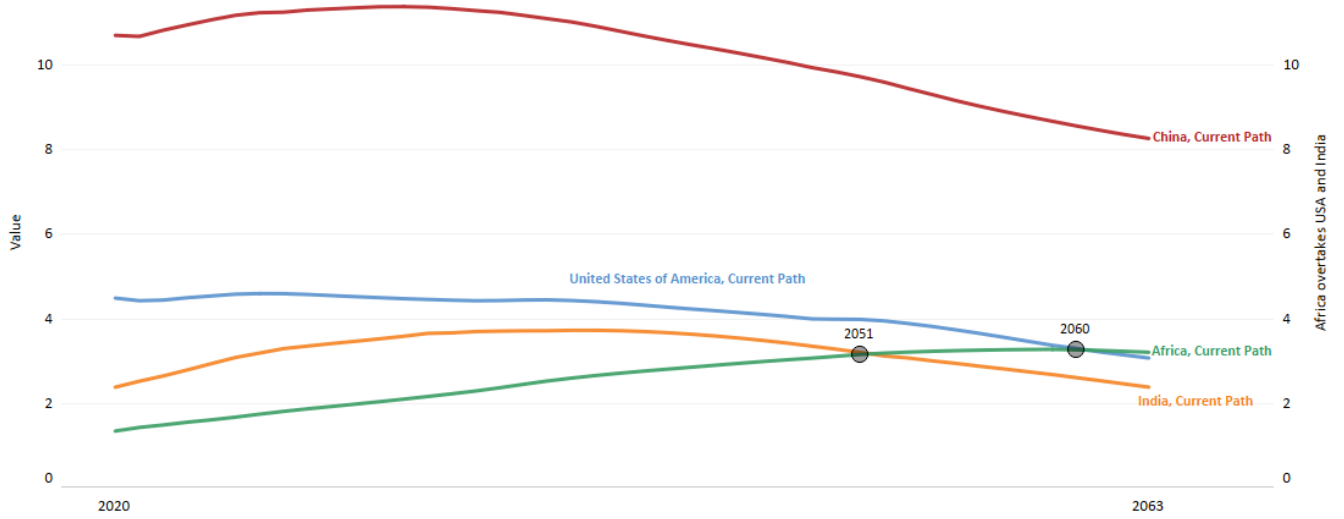
- In 2023, CO_2 equivalent emissions from fossil fuels in Africa constituted 4.5% of the world total.

- However, global CO_2 emissions from fossil fuels will peak around 2037/8, after which they start to decline. By 2050, global CO_2-equivalent emissions from fossil fuels will be 5% below their 2023 emissions (a difference of 1.69 billion tons of CO_2 equivalent).

- According to the Current Path, by 2050, Africa will emit 9.4% of the world's CO_2-equivalent emissions from fossil fuel use.

- In the Combined scenario, by 2050, Africa will emit 10.4% of the world's carbon emissions from fossil fuel use. The difference is equivalent to 342 million tons of CO_2.

Chart 10: CO_2 equivalent emissions: Current Path vs Combined scenario, 2020-2063
Measured as emissions from fossil fuels



Source: IFs 8.34 initialising from Appalachian State University data

On the one hand Africa's need for more energy and associated growth in carbon emissions from fossil fuel will be offset by the forecast of a decline in global emissions from fossil fuel use. But since the latter is incompatible with the lower emissions required to keep the Paris goals alive, more is required globally, and from Africa.

However, the remarkable transition to renewables that has been modelled thus far does not reduce Africa's carbon emissions, pointing to the need for additional interventions.

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Cite this research

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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 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.

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