

## Research Briefing | Africa

# Understanding Africa's climate risks

- We have expanded our climate transmission channels on the Global Economic Model to include more sub-Saharan African economies. Through scenario analysis, we can better understand the climate risks faced by Botswana, Ghana, Kenya, Mauritius, Mozambique, Nigeria, Tanzania, Uganda, and Zambia.
- Africa faces disproportionately large physical risks from climate change, despite emitting less than 3% of cumulative global emissions. Most African countries are well above the estimated optimal temperature of 15°C, according to our analysis; any further warming means those countries will experience poorer productivity performance.
- A green energy transition holds out hope for the region's economic and social development. Our analysis shows it will bring investment to the region, boost mineral and metal exports, and improve access to clean energy, in addition to slowing global warming.

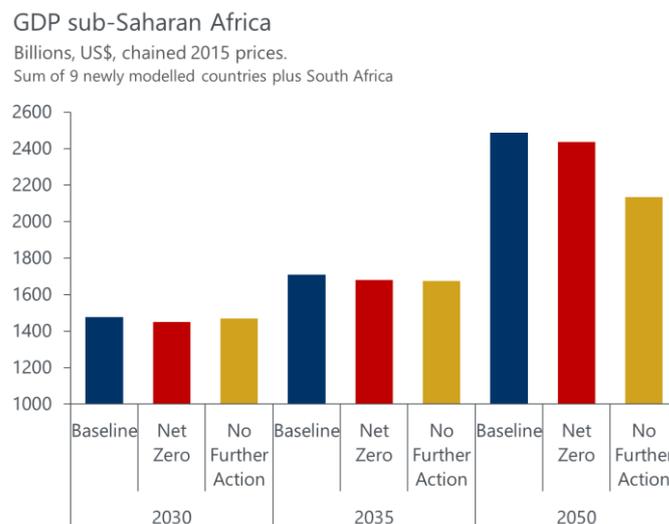
Oxford Economics' [Global Climate Service](#) (GCS) quantifies the macroeconomic impacts of various climate scenarios against a stated policies baseline. These scenarios help businesses understand the trade-offs and implications of climate mitigation. In this note, we review the results of two contrasting and extreme GCS scenarios – Net Zero and No Further Action – on the newly modelled African countries. In doing so, we find that a green energy transition offers hope to the region in terms of both economic and social development (**Chart 1** and **Chart 6**).

### Africa will suffer if temperatures continue to rise – No Further Action

The World Bank notes that [natural disasters \(namely droughts\) have increased](#) in Africa at a faster pace than rest of the world. Indeed, between 2010 and 2019 the frequency of droughts in sub-Saharan Africa nearly tripled relative to 1970-1979. This trend will only worsen as global temperatures rise, resulting in increased water and food scarcity, health problems, more endemic diseases, and climate migration.

To capture some of these risks, we use a [non-linear damage function](#) in our scenario analysis. This relationship finds that "warm countries" in Africa, with annual temperatures above 15°C, experience an exponential deterioration in productivity growth with higher temperatures (**Chart 2**).

#### Chart 1: Africa's GDP Levels



Source: Oxford Economics/Haver Analytics

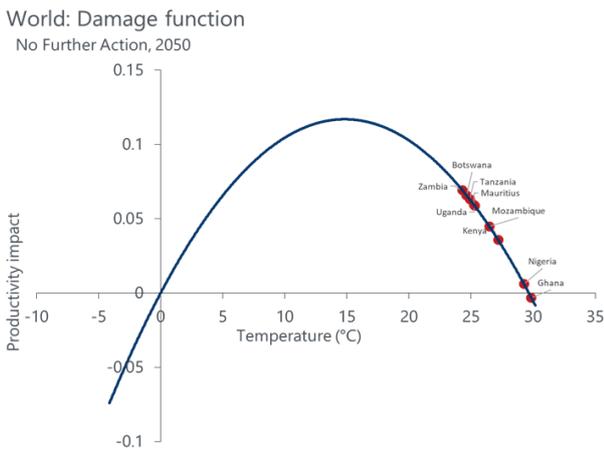
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# Understanding the climate risks faced by Africa

Our No Further Action scenario sees global temperatures warming to 2.2°C by 2050 relative to pre-industrial levels. In this scenario, governments fail to meet their policy pledges, and carbon emissions in the atmosphere continue to intensify. This results in slower economic growth relative to our stated policies baseline, particularly across Africa, as the region experiences warming of approximately 120% of the global change.

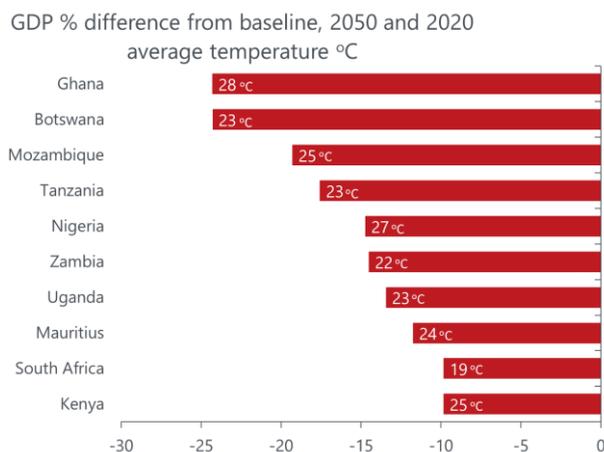
**Chart 2: Africa's position on the damage curve**



Source: Oxford Economics

In the No Further Action scenario, Ghana, already one of the hottest countries, suffers a bigger hit to economic growth than others as temperatures rise: It can expect GDP levels to be 24.3% below baseline levels by 2050. Meanwhile, Nigeria, currently facing similar average temperatures to Ghana, sees economic growth fall to only 14.7% below baseline. The reason for that is Nigeria's larger oil producing output (as compared to Ghana): As a result, increased oil demand in the scenario bestows greater benefits to Nigeria.

**Chart 3: GDP % differences from baseline, 2050**



Source: Oxford Economics

## Energy transition offers hope – Net Zero

Along with slowing global warming, the energy transition could also improve living standards, through investment and diversification.

Our scenario analysis shows that many African countries would be better off under a Net Zero transition scenario, as compared to our baseline. In the Net Zero scenario, global warming is limited to around 1.5°C through early policy action, technological advances, and global coordination.

## Green investment supports growth

Transitioning away from fossil fuels and carbon-intensive modes of production requires significant investment to fund energy efficiencies, clean electricity, and low-emission fuels. This green investment drive can support productivity, particularly if action is taken early to take advantage of the natural investment cycle and limit the scrapping of carbon-intensive capital.

In the Net Zero scenario we take the IEA's assumption that \$2.7tn of global annual investment is needed in the energy sector by 2030. We assume 50% of global energy investment initially comes from the private sector. The other 50% from governments is funded through carbon tax revenues, meaning the transition is not debt financed. Over time, this share of private investment increases to more than 70%.

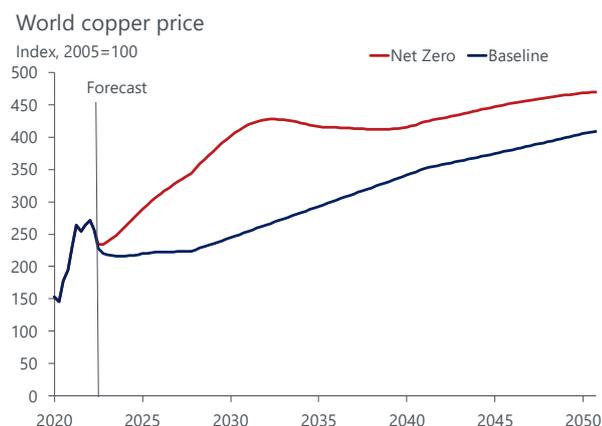
Africa is particularly attractive for green investment because it is rich in renewables – with huge solar, wind, hydroelectric, and geothermal potential – and home to plentiful reserves of key transition metals and minerals used in the production of batteries, solar panels, and hydrogen technologies.

## Export revenues will flourish

Furthermore, the price of key metals and minerals will rise, boosting export revenues for African economies. For example, the copper price would peak 65% above baseline levels in 2030, with global demand outstripping supply. Our modelling shows Zambia's terms of trade increasing by 27ppts in 2030, compared to our baseline.

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**Chart 4: World copper price**



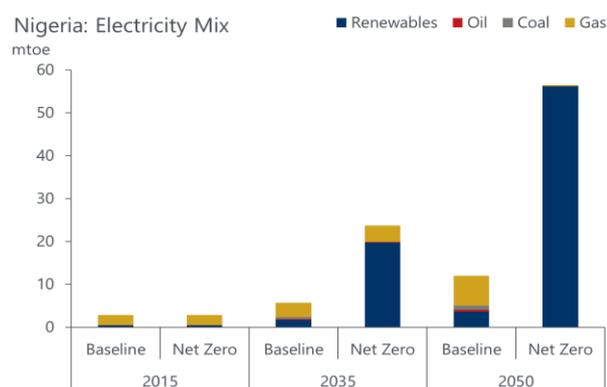
Source: Oxford Economics/Haver analytics

## Improved access to clean energy

Policymakers induce a transition to low-carbon energy by increasing the price of carbon. Carbon pricing drives energy efficiencies and a change in the energy mix – taxed fossil fuels and biofuels drop out of the mix over time and renewable capacity increases.

Coal and biofuels completely drop out of the long-run energy mix for all African countries, even those who are heavily reliant on fossil fuels. New gas reserve finds in the region – notably in Nigeria and Mozambique – are not exploited, as domestic and global mitigation policies mean production is no longer cost effective. This would be necessary to achieve net-zero emissions but also very challenging.

**Chart 5: Electricity demand increases**



Source: Oxford Economics/IEA

As electricity supply becomes less carbon intensive, it also becomes more affordable. This is critical for Africa where much of the population of Africa [lacked access to affordable and reliable electricity](#) in 2020. For example, total electricity output in Nigeria increases almost five times by 2050, as access to electricity improves and demand increases (**Chart 5**).

## Africa's economic outlook would improve

With the introduction of carbon pricing, we see inflationary pressures build across the region, eroding real incomes and reducing GDP.

Regionally, impacts are mixed. Fossil-fuel intensive economies like Nigeria experience significant near-term inflation. In contrast, economies with large renewable capacity, like Kenya and Uganda, experience less inflation pass-through, with electricity prices better protected from carbon taxes.

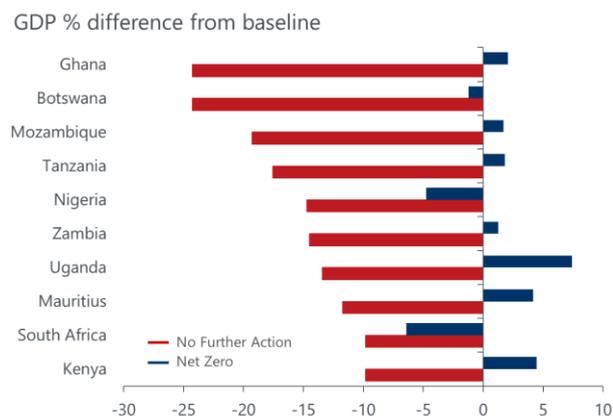
But this inflation fades as economies transition away from taxed products. Meanwhile, incomes in several economies, such as Zambia and Mozambique, are supported by metals exports.

By 2050, all African countries fair better in our Net Zero scenario when compared to the No Further Action counterfactual (**Chart 6**). Nigeria and South Africa would be worse off than our baseline as demand for their fuel exports collapses. But if we were to extend these results out to 2100, they too would be better off than our baseline as higher temperatures are avoided.

There are further benefits, which we haven't modelled, from phasing out biofuel, including reducing deforestation and saving natural carbon sinks.

COP27 held in Egypt later this year, presents a critical platform for Africa to set out its strategies and highlight the international support it needs. Given the electricity access problem the continent faces, without a strong global initiative, a near-term increase in fossil-fuel consumption is likely. The onus therefore is on the advanced economies to meet their climate objectives.

**Chart 6: Net Zero GDP impacts**



Source: Oxford Economics