Transforming Nigeria through Climate Positive Growth

Battery Energy Storage Analysis

November 2023

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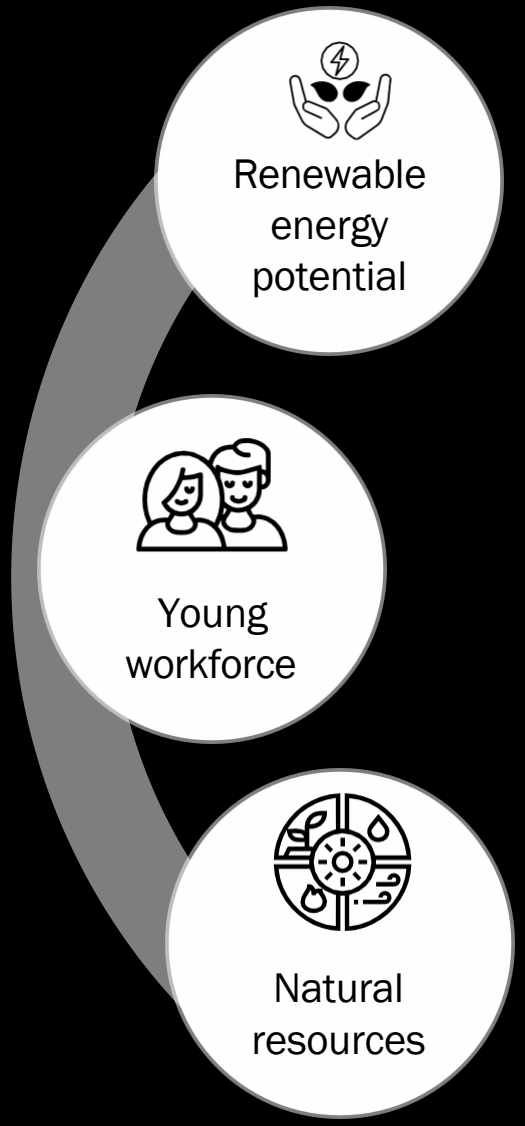
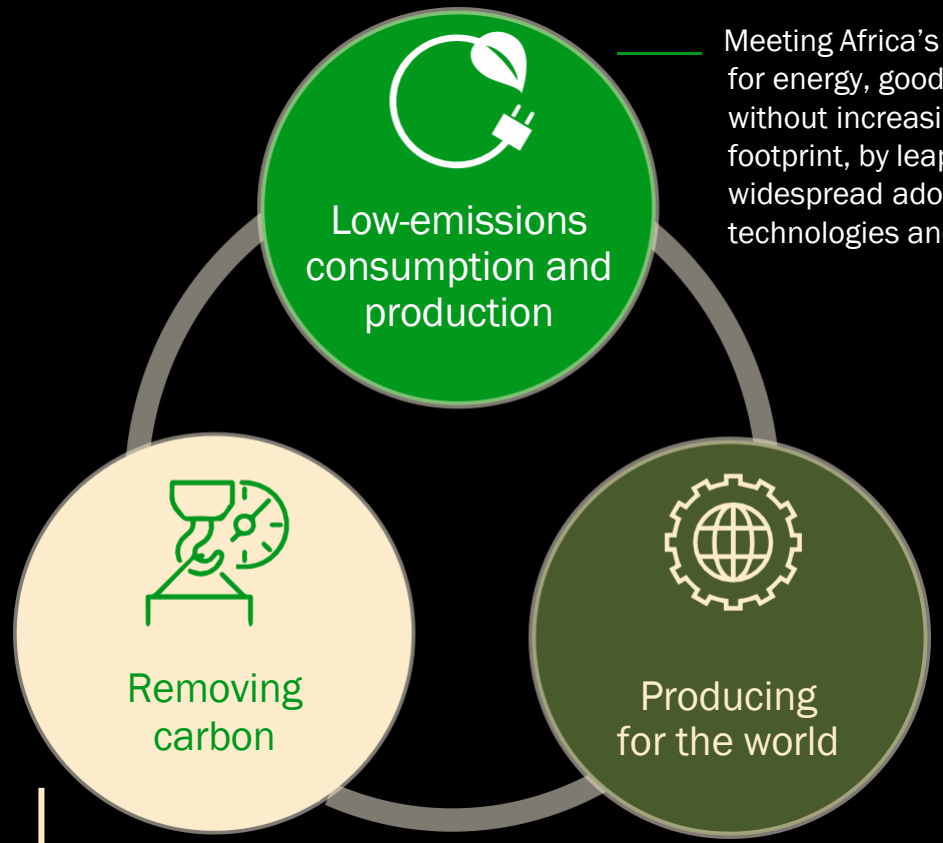
Africa's economic assets give it the potential to tap three pathways to drive Climate Positive Growth

Africa's Assets



Climate Positive Growth Pathways



Meeting Africa's own growing demand for energy, goods and services without increasing the continent's footprint, by leapfrogging to widespread adoption of green technologies and practices

Utilising green manufacturing capacity to provide climate friendly production (expansion) potential for the world, as an increasingly competitive green manufacturing and energy hub that accelerates the greening of global industry

Recognising the anticipated need for carbon removals, ramping up Africa's potential to do this at scale through a combination of land use and ecosystem management, and investment in emerging engineered removal technologies.

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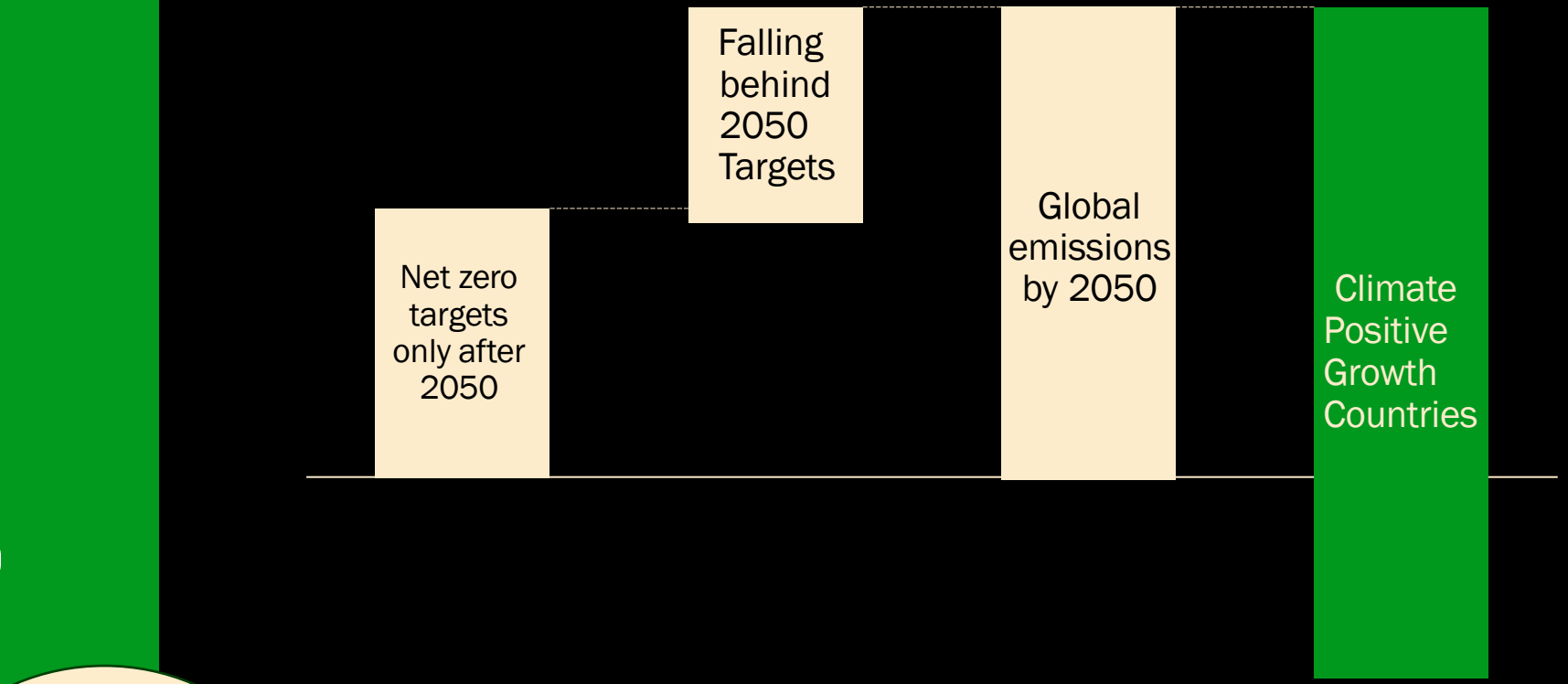
Climate Positive Growth in Africa can meet global demand for green products and carbon removal to reach global net zero by 2050

Global regulation, like CBAM will **drive demand** for green industrialisation goods and services in Africa, if implemented in an inclusive way

Global greenhouse gas emissions levels by 2050



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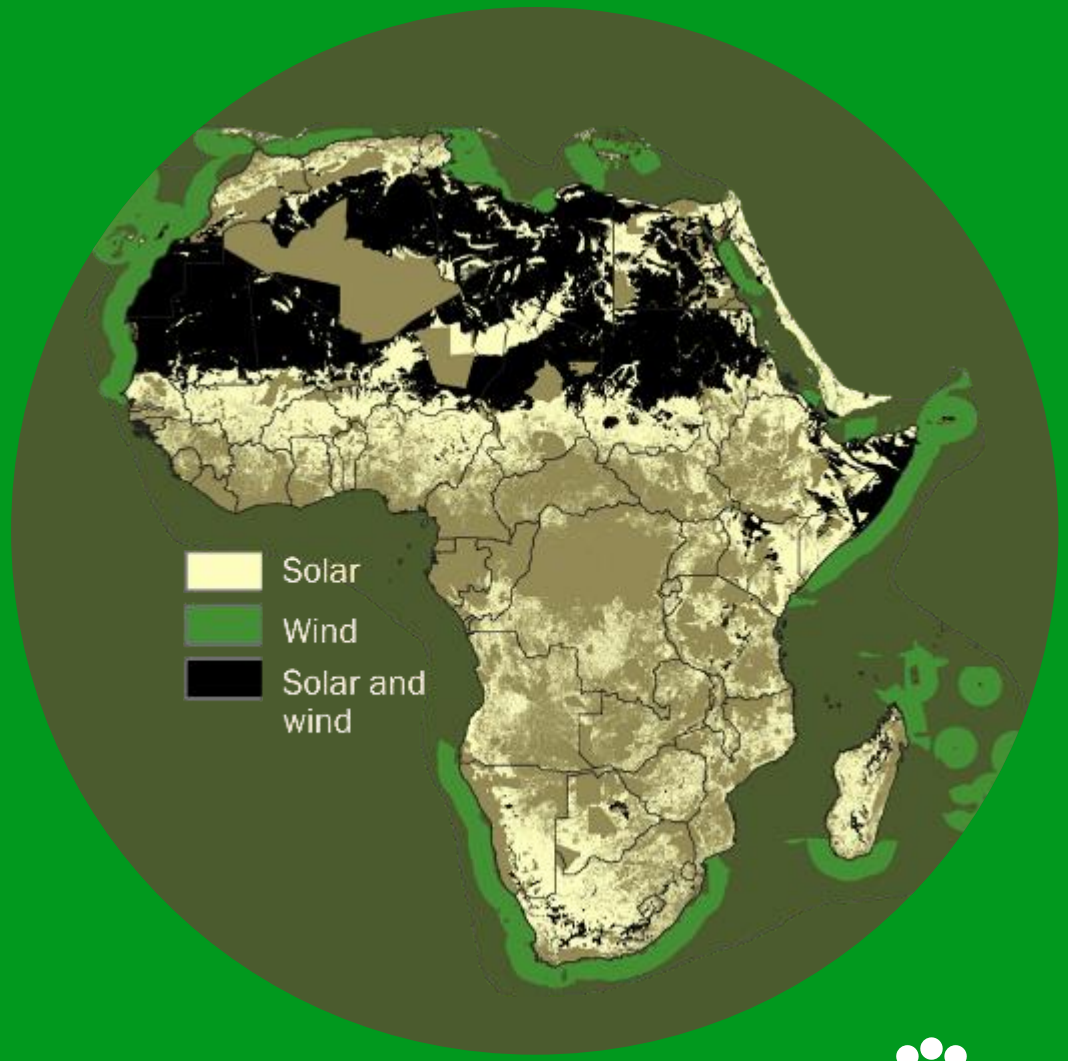
Africa's renewable energy potential can drive green industrialisation

Africa's renewable energy potential is **50 times the world's** estimated electricity demand by 2040

Africa can provide energy access for all Africans by 2030. A renewable-focused path to this, can be **30% cheaper**, reducing emissions by ~80% from generation and **reducing emissions per MWh by more than 90%**. Yet it does need anchor demand to create a bankable investment case for the 40% higher upfront investment required.



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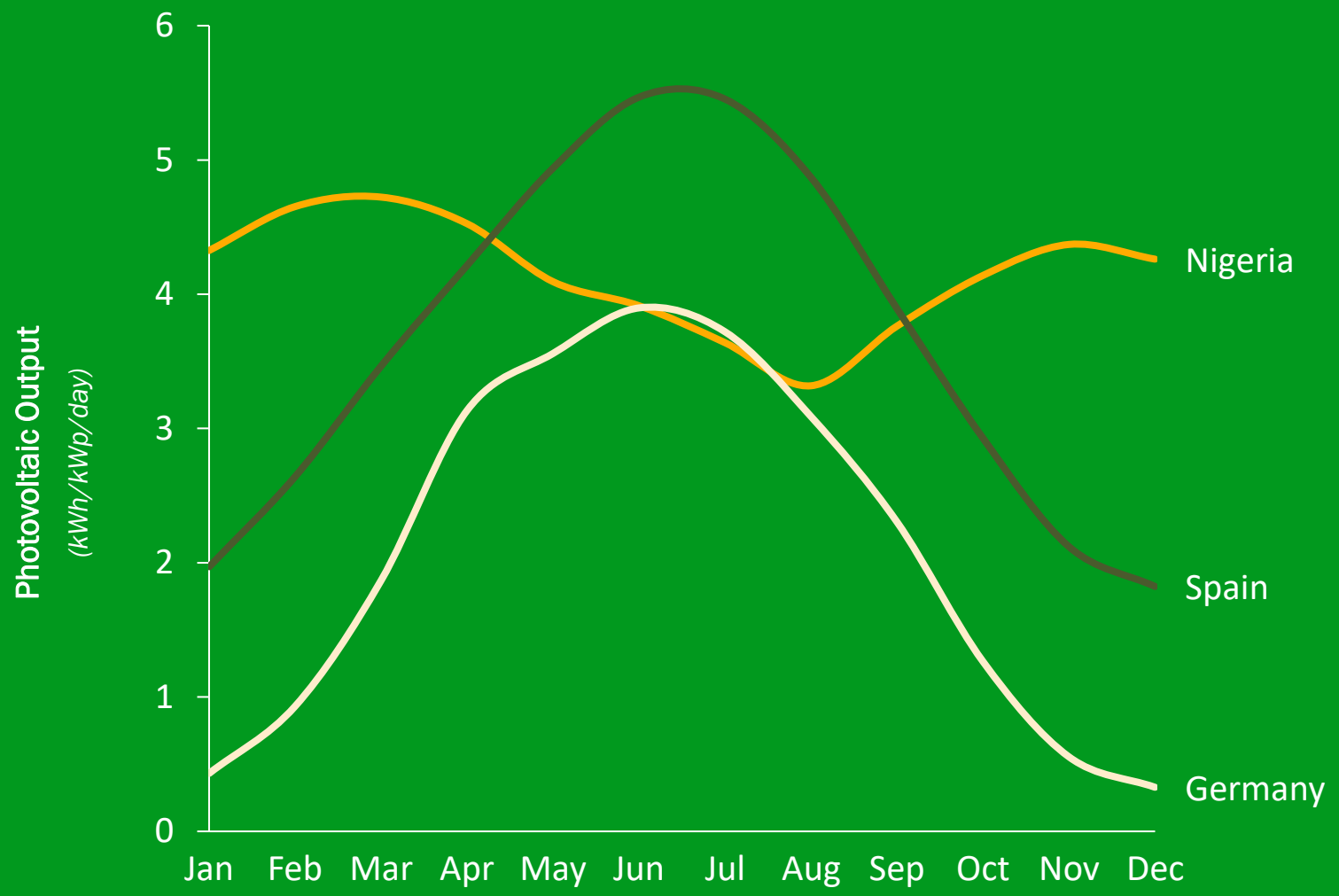
Africa's low seasonal variation can create renewable baseload

Long-term Average Solar Energy Output

Top performing Germany, Nigeria, and Spain locations [kWh/kWp/day]



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Solar PV in Nigeria vastly outperforms Europe's industry centre – and even Europe's top PV spot

The same battery-supported PV system in Nigeria will enable a baseload that is **~8 times as big** as Germany

Similarly, the same PV system can support a baseload that is **1.8 times as big** in Nigeria as in Spain

Performance data of the same PV system at a baseload that would have a 98% reliability in Nigeria

PV system specifications

Peak Capacity: *10MWp* *Reliability:* *98%*

Battery capacity: *50MWh*

PV system specifications

Peak Capacity: *10MWp* *Baseload:* *1.5MW*

Battery capacity: *50MWh*

Analysis conducted using hourly energy output from specified PV system specifications

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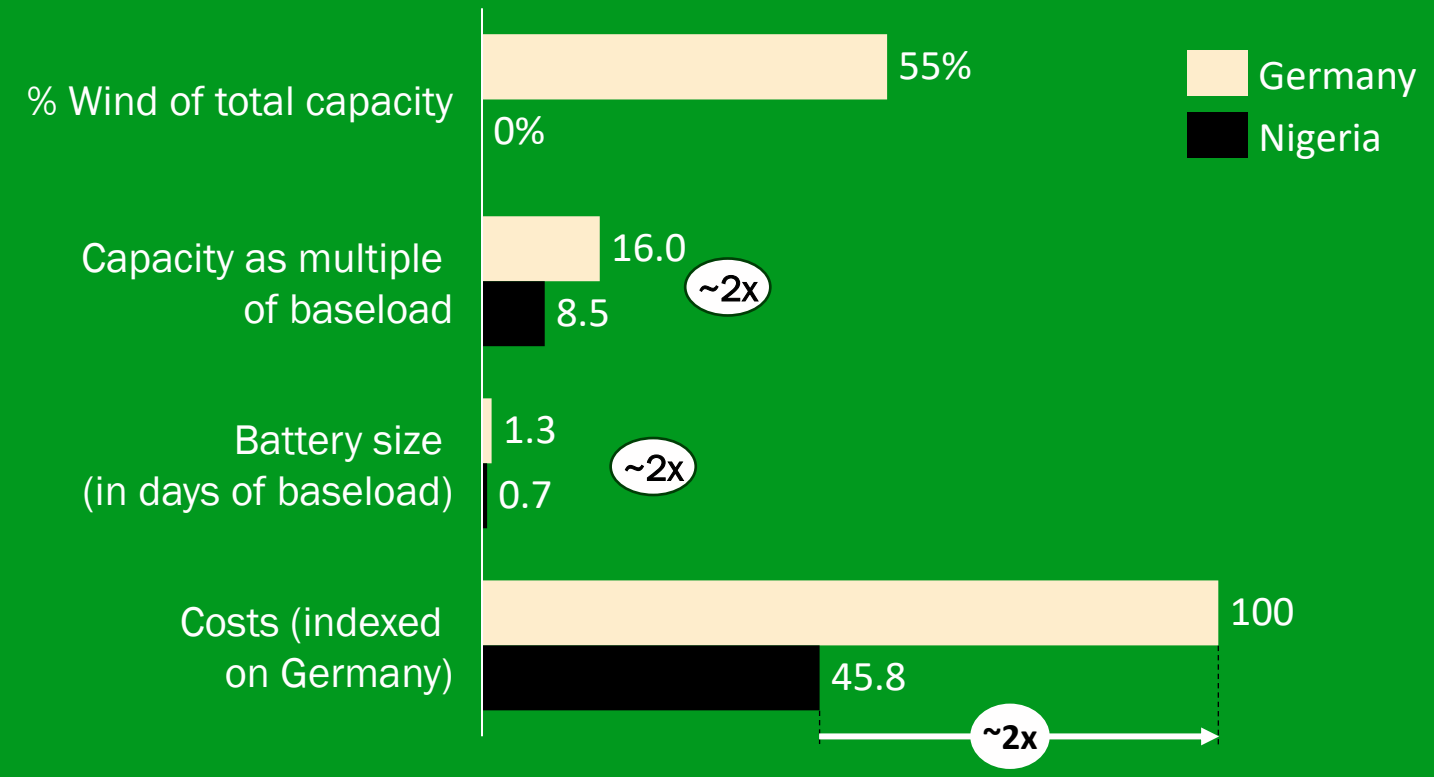
The optimal RE + storage system needed for reliable baseload, is nearly twice the capacity, twice the battery size, and 2 times the costs in Germany when compared to Nigeria

System parameters for the cheapest total system (combining wind, solar, and battery storage), to deliver a continuous baseload, at 98% reliability



Analysis based on 16 years of geolocated hourly energy data for both wind and solar (good locations for each in each country)

Key cost assumptions based on most recently available installation cost data of $ 1,274 per kW onshore wind capacity, $ 867 per kW solar capacity, and $ 400 per kWh battery capacity

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