Climate Action Platform Africa

For further discussion, details, sources and assumptions (available for all quantified statements in this document), please contact:
Carlijn Nouwen, CAP-A co-founder, Carlijn.Nouwen@cap-a.org
Jack Kimani, CAP-A CEO, Jack.Kimani@cap-a.org
Emily Barran, CAP-A Lead Green Industrialisation, Emily.Barran@cap-a.org

Climate Positive Growth – towards sustainable global prosperity

Addressing energy poverty in a future-proof way

Situation: high energy poverty in Africa drives focus on off-grid and mini-grid solutions that are often financially unsustainable

Africa has high energy poverty – nearly 600 million Africans have no energy access, another 150 million have unreliable access, and nearly 1 billion Africans have no access to clean cooking.

Africa also has the world's biggest untapped renewable energy potential, both in absolute and relative terms: Africa's renewables potential is 50x the global anticipated electricity demand in 2040. This includes a mix of baseload and sources with different types of intermittency which can complement each other – including ~1.5 mln TWh of solar potential, nearly 1 mln TWh of onshore wind, and very sizeable untapped geothermal potential.

Despite this abundance of potential, electricity prices in many African countries are not very low – they often are at par or above various upper-middle income countries. Reasons for this vary, from dated inefficient installations in South Africa, to contractual arrangements in which African countries have to purchase all power produced by certain (foreign-funded) generation capacity, with overnight venting of surplus capacity driving up the average electricity price. African utilities often face challenging financial dynamics.

The human and developmental cost of high energy poverty lead to a strong focus on creating energy access as a first priority by many governments and development partners. Given limited grid coverage and interconnectivity and the fact that the biggest energy access challenges are in peri-urban and rural areas, off-grid and mini-grid solutions tend to take priority. Sadly, these often are not financially sustainable and thus need consistent donor or public financing, which in itself is a threat to continued access and tends to limit available capacity sufficient to meet very basic needs (such as lights to do night-time homework). That is insufficient for catalytic entrepreneurial activities (such as on-site agro-processing, cooling, etc.) – missing the opportunity to set in motion a truly virtuous cycle in which energy access drives economic growth and livelihood improvement.

How to meet energy need - fossil fuels or renewable energy?

A substantial part of the discussion on Africa, is about so-called Just Energy Transitions, as pioneered in the JET-P plan for South Africa. The key focus in South Africa, which is one of the most emission-intense economies *globally*, is on *transition* indeed. Yet for the majority of other African countries, who have very low footprints but high energy poverty, the challenge is that of *growth* – and how to avoid a high-emission dependency in that growth path.

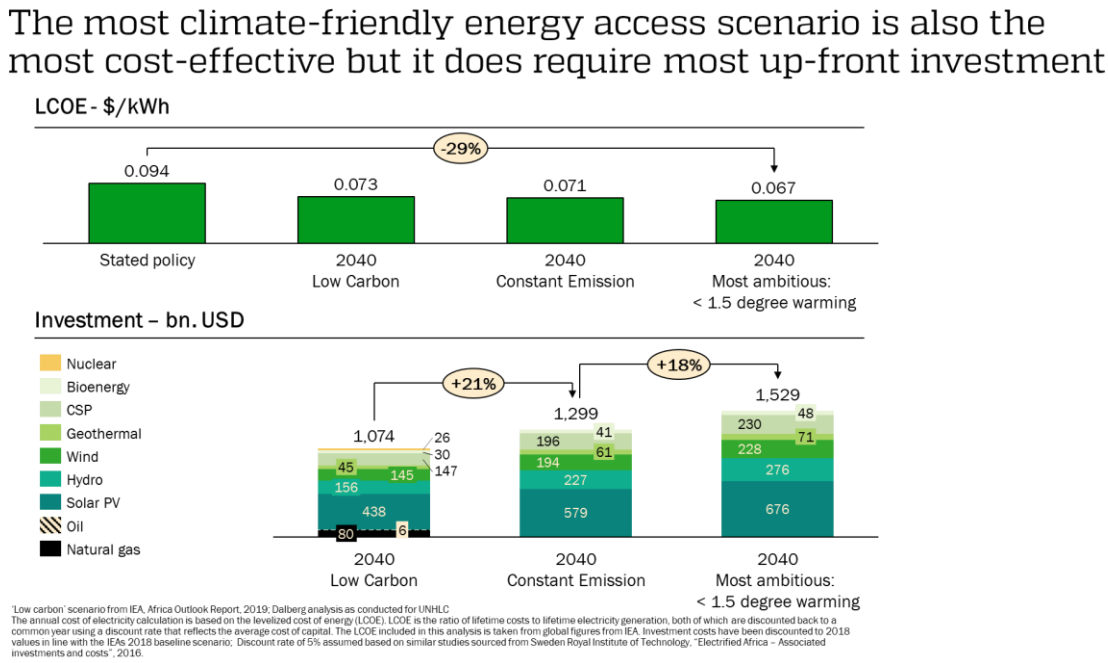
The good news, is that renewables-driven energy pathways are very viable and cost-effective. In fact, Africa can provide energy access for all Africans by 2030,

- While reducing total emissions related to energy generation by ~80%, and emissions per MWh by well over 90% (compared to 2040 stated policy)
- With 30% lower costs for generation than 2040 stated policy

For further discussion, details, sources and assumptions (available for all quantified statements in this document), please contact:
Carlijn Nouwen, CAP-A co-founder, Carlijn.Nouwen@cap-a.org
Jack Kimani, CAP-A CEO, Jack.Kimani@cap-a.org
Emily Barran, CAP-A Lead Green Industrialisation, Emily.Barran@cap-a.org

- This does require a 40% higher upfront investment than current stated policy pathway[1]

Figure 1: Energy pathways for Africa to achieve universal energy access



African countries face pressures to exploit their fossil fuel resources. Although the intrinsics of a fossil-fuel driven business case increasingly are weaker than those of renewable, the push for their development remains strong – and has increased with Western countries seeking to diversify supply. For those African countries with untapped fossil resources, it is key to avoid building an economy that is fossil-fuel dependent (e.g., any exploration contracts should not have the country sit with the stranded asset risk; and domestic fossil fuel use should be limited to avoid opportunity cost dynamics). More importantly, though, the investment case for renewable energy needs to be made and executed in a **coherent manner** – and both **market access** and **appropriate and affordable capital availability** are key to that.

The missed opportunity: green industrial development to drive affordable energy access and inclusive economic growth

At first glance, the lack of financial viability of rural solutions in a situation of abundant renewable energy potential, confuses. Yet it is important to realise that, globally, universal energy access tends to be achieved through cross-subsidies – these work out differently in different settings, but one approach is to fund grid expansion (or cover the marginal costs of off-grid solutions) to serve more remote customers through profits on serving urban and industrial demand. Energy-poor consumers in many African countries represent a real *need* for energy – but not a *bankable demand:* they are both insufficiently aggregated and often will not be able to afford the fully loaded costs of their energy.

Given high capex for investments in energy generation and economies of scale in many projects, investors in these projects need to see secure offtake. The most predictable and most financially viable approach to this, is to secure *anchor industrial demand,* from newly established energy-hungry industrial activity.

[1] See https://dalberg.com/our-ideas/pathways-to-a-renewable-energy-future-in-africa/ for details and reports. Given the focus on LCOE in this analysis, this does not include costs for transmission and distribution and load levelling – which may be higher in fully renewable scenarios. Conversely, these scenarios only include a conservative price decrease for renewables.

For further discussion, details, sources and assumptions (available for all quantified statements in this document), please contact:
Carlijn Nouwen, CAP-A co-founder, Carlijn.Nouwen@cap-a.org
Jack Kimani, CAP-A CEO, Jack.Kimani@cap-a.org
Emily Barran, CAP-A Lead Green Industrialisation, Emily.Barran@cap-a.org

As the world needs to green everything it consumes and remove carbon at a very large scale, energy-hungry industries are looking for large-scale renewable energy access, ideally in proximity to relevant primary materials, markets, and other relevant production factors (such as labour and land). Africa offers a unique opportunity to meet its own growing demand, help the rest of the world decarbonise its industrial activity, and remove carbon at a very large scale: it can deploy its abundant availability of untapped renewable energy potential, labour, and relevant land and natural assets and resources to do so. Importantly, most African countries have very low emissions related to industrial activity and energy generation (for example, Kenya's grid is 92% green already) limiting the 'moral hazard': unlike most highly industrialised locations, there is limited industrial and energy infrastructure that needs to be decarbonised, so new renewable energy can be deployed directly towards energy-intense processes. In fact, it is *exactly* those energy-intense processes that will make investment in renewable energy, bankable – which in turn can drive increased energy access (either through larger scale generation on the backbone of industrial demand, or through cross-subsidising dedicated off-grid and mini-grid solutions).

Examples of this opportunity abound[2]:

- Africa is recognised as a sizeable production location for *green hydrogen*, including by reputable sources like IRENA. Less recognised is Africa's potential for green hydrogen production *using seawater*: Without material increase in energy need, seawater can be used for green hydrogen production, eliminating concern about water stress (with <5% additional energy need, over 1 million km^2 of coastal areas in Africa are suitable for green hydrogen production without competing for land with built-up environments and agriculture activity). Green hydrogen is a highly versatile industrial product suitable for direct export, green energy carrier/ industrial feedstock, fuel synthesis (including sustainable aviation and maritime fuels), and precursor for green industrial production – green fertiliser, green steel, green chemical, and green plastics production
- Africa's bauxite production, ~90 million tonnes per year, (almost 25% of the world's bauxite production) is almost exclusively exported unprocessed. Processing this bauxite in Africa using renewable energy, would have substantial local, regional, and global benefits:
    - Save **335 mln tonnes of CO_2e every year** – close to 1% of all global GHG emissions
    - Generate **60,000 new direct jobs**, nearly **280,000** new jobs in total
    - Generate **$ 37 bn** in additional African revenue
    - Help global off-takers **diversify and shorten their supply chains,** whilst **accelerating their decarbonisation**
    - Create suitable anchor demand for investment for **44 GW of additional renewable electrical capacity**
- Similarly, Africa's iron ore production is also largely exported as ore. Processing this in Africa using renewable energy, would again have substantial local, regional, and global benefits:
    - Save up **to 110 million tonnes CO2e/ year**
    - Create **24,000 direct jobs and 215,000 total jobs**
    - Drive up to **$ 20 bn in additional revenue** for Africa, and
    - Create **20 GW** of anchor demand for RE development

  For green steel, the demand is not limited by 'green premium' thanks to green steel commitments by global car manufacturers
- Relatively energy-hungry carbon removal solutions, such as Direct Air Capture (DAC) and the production and distribution of biochar not only represent great industrial anchor demand for electricity and heat – but also may offer various socio-economic benefits
- Crucially, unlike most highly industrialised zones – which are largely based in temperate climates – Africa's solar energy potential has much lower seasonal variation, making solar energy a suitable energy source for industrial deployment with today's battery technology. Given this, and given the favourable cost differential between solar and wind energy, the

[2] See original analysis by CAP-A with details on green steel and aluminium on https://remakingtradeproject.org/white-papers

For further discussion, details, sources and assumptions (available for all quantified statements in this document), please contact:
Carlijn Nouwen, CAP-A co-founder, Carlijn.Nouwen@cap-a.org
Jack Kimani, CAP-A CEO, Jack.Kimani@cap-a.org
Emily Barran, CAP-A Lead Green Industrialisation, Emily.Barran@cap-a.org

lowest-cost captive energy system (generation + storage, using only wind and solar) that can provide 98% reliable industrial baseload power in Kenya, costs 1/3 of what the same system would cost in industrial heartland Germany – and half of what it would cost in RE-powerhouse Spain.[3]

Key challenges and critical enablers

African green industrialisation will be driven, at least partially, by the opportunity to sell products internationally: both carbon credits, and low-embedded-emission products and services. Yet access to those international markets is not unrestricted. As a leading innovator in this space, the European Union has the world's first Carbon Border Adjustment Mechanism (CBAM) and the largest compliance carbon market. If CBAM is operationalised in a fair and equitable way, African products should be very competitive as they can be produced green-from-the-start and relatively close to the end market. Yet the exact metrics and compliance processes, as well as acceptance (or lack thereof) of African reporting and systems, could also lead to prohibitive entry barriers to these markets. Similarly, the EU compliance carbon market (the EU ETS) does not allow international credits to be traded[4], driven by a mix of both real and perceived issues.

Often, when market access is discussed, developing market supporters advocate for exemptions or preferential access. At CAP-A, we are convinced that African countries can be competitive in many sectors if the market access is fair, equitable, and driven by high standards around climate rules and benefits. Such trade rules will also ensure globally efficient solutions: activities will be undertaken where they realise the most cost-effective climate and economic impact, which will allow humanity collectively to most efficiently fight the existential threat of climate change.

Market access is necessary, but insufficient. Renewable energy needs more upfront investment than fossil-fuel energy generation. At present, just 0.6% of renewable energy investment goes to Africa. If Africa is to be the green industrial powerhouse of the world, much more is needed – and it needs to be available on more suitable terms. Africa is seen as a 'risky' investment destination – and thus attracts high cost-of-capital. Some of those drivers are real, yet some are perceived, or highly overestimated.[5] Deconstructing risk drivers, debunking myths, and applying appropriate risk mitigation (through focused FX instruments, guarantees, future purchase commitments, and concessional finance, amongst others) should help avail the right amount and type of capital.

[3] Analyses available on request; based on location-specific data of hourly irradiation and wind speeds over a 16 year period. Costs and complexities of transmission, distribution and load levelling, and differences in cost-of-capital between locations impact the bottom line business case of entire energy system investments.
[4] These constraints do not apply in the Voluntary Carbon Market (VCM). Yet demand for authorised credits, key to compliance instruments and growing in VCM, is growing and comes with eligibility criteria – this also attracts higher prices ($ 70 – 100 per tonne vs ~$2 – 20).
[5] See https://www.climatepolicyinitiative.org/wp-content/uploads/2023/06/An-FX-Guarantee-Mechanism-for-the-Green-Transformation-in-Developing-Countries.pdf