

# LOW-CARBON ENERGY TRANSITION IN AFRICA: INSIGHTS FROM WEST AFRICA

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## EXECUTIVE SUMMARY

A shift towards low-carbon, renewable energy sources is imperative if the worst impacts of climate change are to be avoided. Although Africa has contributed a relatively small proportion of historical carbon emissions, the continent must still play a role in transitioning to a sustainable, green economy. Renewable energy sources could also address weaknesses in the reach and reliability of existing African energy infrastructure, and promote broader innovation and green jobs. This policy briefing explores the key opportunities and constraints related to low-carbon energy transition in Africa, with a particular reference to lessons emerging from Nigeria's experience in this area. To fully benefit from low carbon transition, Africa's energy governance must become more coherent, and steps should be taken to prevent renewable projects from becoming isolated, unsustainable clusters decoupled from national grids and regional plans.

## INTRODUCTION

The evidence that climate change will shape the future global society and economy is overwhelming. Ongoing efforts to decrease carbon emissions – so as to limit the average increase in the global mean temperature to no more than 2°C – demand changes in energy use. Dependence on hydrocarbons is unsustainable for the environment, and action is needed to increase the proportion of renewables in energy mixes by 2050. Yet in African countries many citizens still do not have access to electricity, leading to discussions on renewable energy being

## RECOMMENDATIONS

- 1 Through coordinating renewable projects nationally and regionally, African governments can optimise energy plans and prevent the fragmentation of renewable projects into inefficient clusters that are decoupled from national and regional electricity grids.
- 2 African governments should accelerate low-carbon investments while pursuing energy plans more explicitly, as part of building resilience.
- 3 Governance structures in African states need to evolve proactively to take advantage of economic dynamics and technological innovations, which can drive diversification in the energy mix and help optimise competitive advantages.
- 4 Importantly, Africa should prioritise renewable energy technologies that are both robust and adapted to its conditions.

overshadowed by the immediate concerns of affordability and accessibility. Africa has abundant renewable energy potential and could benefit from the economic efficiencies generated by renewables. In addition, renewable energy technologies are likely to become progressively more competitive than conventional alternatives.

It is essential that developing countries become active in the efforts to decarbonise the world's energy systems. Renewables can help reduce greenhouse gas emissions and lower demand for fossil fuels. However, a successful shift to renewable energy sources in developing nations demands accelerated efforts on social, economic and environmental sustainability targets. These include [Sustainable Development Goal 7](#) on affordable and sustainable energy. Globally, rapid technological advances have underscored the possibility of lowering the high dependence on fossil fuels through reshaping the nature of production, societies and consumption patterns. In Africa, governments need to focus on proven approaches, as well as the mobilisation of resources, to tap carbon-neutral energy sources. This is essential to mitigate climate change, relieve pressures on planetary boundaries, and even enhance national competitiveness and the overall quality of life.

## ACCELERATING AFRICA'S GREEN TRANSITION

Renewable energy sources include biomass, wind, hydropower, geothermal and solar radiation. Unlike conventional energy sources, they do not produce carbon and generally do not pollute. In terms of final energy consumed, the real contribution of low-carbon sources is also slightly higher than that of conventional energy, owing to the large proportion of fossil fuel energy that is wasted during the energy conversion process. By 2015 the contribution of renewables to global final energy consumption stood at 19.3%, with continuing growth in capacity and production in 2016.<sup>2</sup>

Debates have been proliferating about the central issues that need to be taken into account in this clean energy pursuit. One crucial question is whether African countries can sustain increased investments in low-carbon energy sources. Linked to this is the question of how low-carbon technologies can support an efficient and effective energy sector in Africa. The critical step is for Africa to create a more enabling environment to optimally harness its myriad low-carbon energy sources in response to climate change and broader sustainable development. Renewable technologies are rapidly growing in technical proficiency and provide a viable alternative for Africa.

It is important to note, however, that the proportion of total energy that comes from low-carbon sources in the coming years and decades will depend not just on the roll-out of renewables and nuclear but also on total energy consumption. Without effective regulation in Africa, energy intensity could continue to grow, cancelling out the overall emission reductions from low-carbon sources. It is therefore essential that key issues are prioritised in Africa's transition to cleaner energy. For the continent, the emerging evidence on so-called 'stranded' hydrocarbon assets holds specific lessons. Several African economies remain dependent on conventional energy assets. Global reserves of fossil fuels are estimated to contain about 11 000 gigatonnes (Gt) of carbon dioxide (CO<sub>2</sub>).<sup>3</sup> Yet, limiting CO<sub>2</sub> emissions to 2°C requires that less than 870 to 1 240Gt of these reserves are released between 2011 and 2050.<sup>4</sup> It is currently estimated that roughly 30%, 50% and 80% respectively of oil, gas and coal may become stranded assets as a result of efforts to limit carbon emissions.<sup>5</sup> This suggests that there may be a limited window for both African and global conventional energy producers to leverage revenues from fossil fuels to drive renewable investments.

## THE CASE FOR BROADER RESILIENCE

African economies have been undergoing a slow process of structural transformation. The buoyant regional growth of recent years has given way to a less certain economic outlook amid a sharp fall in global commodity prices. Few local innovations to boost growth and job creation are attracting the large-scale funding that is required. With economies battling recession and unemployment on the rise, investment in renewables is challenging. At the same time, there is growing evidence of extreme weather patterns in Africa. Weather-related disasters such as storms, drought and wildfires are more frequent. Developments such as the announcement that the US would withdraw from the [Paris Agreement](#) present challenges to collective action on climate threats. In this context, African countries need to take greater ownership of their own development trajectories, evolve holistic climate responses and devise energy plans that take proactive advantage of technologies and market dynamics.

Responsive governance is a prerequisite for achieving a cleaner energy future. African governments have yet to build comprehensive linkages between energy policies, resources and the individual programmes designed to improve the energy profile across regions. This impedes synergies between energy policies and economic sustainability

plans, and undercuts the benefits of scale offered by region-wide energy visions. For Africa to actualise its green transition it is necessary to transcend the extant practice of formulating ambitious green plans and programmes with little investment in integrated implementation.

## ENERGY GOVERNANCE WITH REGIONALISM

Efficient governance structures and processes are needed to ensure accountability in the management of energy resources, and frame engagement with stakeholders in business, communities and other sectors of society. Benefits from sustainable energy investments need to be more inclusively defined and better articulated. Only in this way can stakeholders align behind effective implementation efforts that harness the capacities of citizens and optimise available resources. It is important that concerted efforts are made to harmonise niche low-carbon projects with more holistic and coherent national and regional plans that can transform energy profiles and overall sustainability.

West Africa provides a graphic illustration of the regionalisation challenge. Of the 300.7 million citizens of ECOWAS, only 126.2 million enjoy access to electricity.<sup>6</sup> This leaves more than 57% of the region's inhabitants unable to access modern energy.<sup>7</sup> The six most advanced ECOWAS countries provide about half of their population with electricity while the rest average only about 16%. Yet ECOWAS possesses abundant renewable energy. The advantages of an increased adoption of renewables in the region include expanded access to clean energy, declining reliance on traditional biomass, greater energy affordability and reliability, and accelerated climate progress.

However, the region's creaking electricity grids suffer in the face of fast growth in energy demand and dwindling electricity output. In Nigeria, for instance, the national grid is locked in a vicious cycle where power distribution companies are unable to collect tariffs efficiently and power-generating companies are starved of investable funds. Hydropower's potential in West Africa is estimated at 25 000 megawatts (MW), but only 16% of this is being harnessed. In-country waterways also hold significant promise for renewable power generation, but West Africa has only 214 of Africa's total of 1 282 dams.<sup>8</sup> Better use of rivers such as the Volta and Niger can boost electricity supplies across the region. Solar power is seeing a steady rollout across West Africa, such as the 155MW Nzema plant in Ghana, which is one of Africa's largest. The immense, yet untapped, solar potential throughout the region is evident, with sunny Mali and Niger the standout

examples. Cape Verde, The Gambia and Senegal boast similar wind potential.

Renewables can generate 50% of Africa's energy needs until 2030.<sup>9</sup> Actualising this potential requires clearly defined, regionally aligned policies framed within a broader regional vision. For instance, efforts need to be accelerated to actualise and expand projects within the [West African Power Pool](#), which currently attains peak-load of approximately 25 000MW of its 32 000MW.<sup>10</sup> This is a fraction of the unmet West African energy needs, where Nigeria – the regional anchor – generates less than 5 900MW. South Africa, with a population one-third of Nigeria's, produces over 44 000 MW.<sup>11</sup>

## ENABLING APPROPRIATE TECHNOLOGIES

Scaling up sustainable energy projects is the best spur to low-carbon energy development. Beyond Africa's urban spaces, renewable energy technologies present viable options for rural communities, where infrastructure remains grossly inadequate. Historically, political elites in Africa, including in the oil-rich Gulf of Guinea region, benefitted from vast energy revenues but rarely re-invested these to drive a clean energy transition. Public policies contributed to worsening inequality, with energy subsidy schemes corruption-ridden and geared to unsustainable energy use.

Successive governments have undermined the potential to diversify their hydrocarbon-based economies. Looking forward, it is imperative for Africa to prioritise the introduction of renewable technologies that are not only robust but also adapted to specific African conditions. Encouragingly, evidence is emerging of a sustained uptake of cleaner energy in many countries, although this needs to be upscaled. Some countries are cooperating with international partners to leverage opportunities.<sup>12</sup>

Nigeria stands out here as an example of both the challenges and the exciting prospects of a greener energy transition. Under the [Nigeria–Germany Energy Partnership Project](#), signed in 2016, about 40 federal universities in Nigeria will soon abandon the national grid in favour of solar projects.<sup>13</sup> Already, universities such as Benin and Port Harcourt have transitioned 100% to self-generated power based on clean energy. Banks, universities and even residential estates are leveraging solar and gas-fired projects. Since 2015 manufacturing businesses in the central Ikeja hub in Lagos have launched six embedded power projects of between 30 and 50MW. This will effectively aid a transition from costly, diesel-fired

electricity to renewable sources. Crucially, the greener sources are becoming more cost competitive.

In 2017 the first phase of a solar project to cover 20 000 homes will be completed in partnership between the government and the private sector firm Azuri Technologies. About 500 petrol stations across Nigeria have leveraged solar to ensure stable electricity. Technology transitions are aiding this shift. Battery-pack costs were down to less than \$230 per kilowatt hour (kWh) in 2016, compared with almost \$1,000 per kWh in 2010. Regulatory changes, such as the unveiling of the Mini Grid Regulation by the Nigerian Energy Regulatory Commission, also incentivise renewables. This facilitated approval to private companies to supply up to 1MW power to paying customers without the need to obtain a power generation licence. Similarly, the Association of Alternative Power Suppliers of Nigeria is marshalling resources behind a 10 000MW project to be pooled from 10 000 Nigerian individual investors, each expected to generate 1MW electricity.<sup>14</sup> However, Nigerian energy planners urgently need to prevent a damaging fragmentation, as evolving renewable energy projects remain poorly coordinated with the conventional energy-focused national grid.

## CONCLUSION

Africa's clean energy revolution and efforts to manage climate change should be tackled jointly, and holistically. This sustainability challenge requires African countries to build more resilient societies. Although clean energy uptake has been rapid, Africa's policy fragmentation and the dearth of adequate investments are major stumbling blocks. Channelling resources and expertise into Africa's green transition requires changes in priorities and governance on many levels.

A key solution is for African states to position themselves more strategically while increasing their readiness to benefit from green and climate funds. Building wider partnerships will bolster progress towards sustainable energy, with scaled-up investments and up-to-date know-how that can drive local innovations. Crucially, this also depends on an ability to engage in grainier analysis of the type that African governments are slow to invest in. This includes mapping renewable energy needs along the rural–urban divide and among large-scale versus small users; disaggregating data on the geographic distribution of wind, solar, hydro and other resources; and profiling frequency and reliability.

While Africa's structural, coordination and governance issues

remain unaddressed, the lack of coherence will continue to hobble its potential to harness low-carbon energy. It is crucial that country-level actions and region-wide interventions become more aligned, with strategic political coordination by subregional and continental bodies such as the AU and the African Development Bank. These can serve as repositories of political and technical capacity for greening, which is deficient in many national contexts.

## ENDNOTES

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