

# Commentary

## Decarbonization of Africa: Metamorphosing the continent for sustainable trajectories

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### Introduction

In Africa, the well-being of individuals has been considerably enhanced over the years due to significant economic growth as a result of speedy digitalization, industrialization, urbanization, and technological advancements and innovations (Shoo et al., 2022). Low-income countries in sub-Saharan Africa have emitted fewer greenhouse gases than high-income countries. However, it is crucial to take immediate action toward identifying sustainable approaches for decarbonizing Africa (Collett and Hirmer, 2021). Currently, Africa's land and oceans are experiencing a faster rate of warming than the global average. The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report indicates that critical levels of global warming are likely to be attained earlier than mid-century in Africa due to the continent's high susceptibility to climate variability and change. Africa is at risk of the adverse impacts of climate change that can affect the health and well-being of millions of people (Ayugi et al., 2023).

Human activities have had a growing impact on the temperature and climate of the earth since the time of the Industrial Revolution. Activities such as deforestation, expansion of livestock cultivation, and combustion of fossil fuels are generating significant quantities of gases that are released into the atmosphere. The continual emission of gases from these activities leads to an increase in the greenhouse effect, causing global warming. Despite the benefits of economic growth, it has also caused a significant rise in CO<sub>2</sub> emissions, environmental degradation, and loss of biodiversity, with some of these negative impacts taking several decades to undo, while others may be irreversible (Omotoso and Omotayo, 2024).

The African Union developed the African Agenda 2063 in 2013, outlining 17 Sustainable Development Goals (SDGs)

for the continent with an emphasis on partnerships, environmental preservation, and human well-being. The 2063 Agenda acknowledges the link between inequality, poverty, unemployment, and energy poverty, and seeks to investigate the relationships among these objectives while comprehending global development norms and practices (Garfias Royo et al., 2022). To resolve this issue, strategic approaches would be implemented to create an inclusive and sustainable energy supply system with minimal environmental impact. The approach of decarbonization is a major means of achieving this goal, especially in light of the outcomes of the UNFCCC at the 26th Conference of Parties (COP26) (Momodu et al., 2022). The shift to a low-carbon future in Africa requires the decarbonization of energy and other systems. There is an imperative need to decarbonize Africa to reduce the adverse impacts of GHG emissions on the environment as well as on human lives and well-being (Miralles-Quirós and Miralles-Quirós, 2022). Therefore, this commentary seeks to briefly address the challenges and pragmatic approaches to achieving the decarbonization of Africa.

### Challenges to the decarbonization of Africa

The decarbonization of Africa encompasses many challenges, of which difficulties in the incorporation of highly renewable energy are major challenges, which are often grouped into economic, social, and technological challenges. The key priority in addressing this challenge is to guarantee that technological solutions will be made accessible on a large enough scale and at a reasonable cost, particularly for industries that are harder to transition to lower carbon emissions (Fay et al., 2015). There is inadequate consideration given to these

system integrations and the social and non-financial aspects when addressing decarbonization in Africa. Also, the primary economic challenge is seen as the requirement for significant investments in low-carbon technologies within the energy sector, in both developed and developing nations (Papadis and Tsatsaronis, 2020). There is an absence of pledges at each national level to pursue decarbonization pathways, coupled with little to no policies and financing options that support both decarbonization and economic growth in the long term (Moreno et al., 2024). This is no longer surprising in Africa, as both domestic and global political efforts have fallen short of meeting the set target for decarbonization. A contributing factor to this lack of significant action on climate change globally and in Africa is the need for upfront investments in transitioning to zero-carbon electricity and transportation, and this is a major barrier for almost all African countries. Another obstacle is the significant distributional effects on employment that will ensue, both within countries and across the continent, with millions of jobs lost in the process (Strauss and Derviş, 2021).

The challenge of technical issues will pose a barrier to the decarbonization of Africa, and less developed nations may also encounter various technological issues in the practice of the technologies to reduce GHG. These issues may even persist more in less developed countries in the proper disposal of waste and the sustained functioning of different specific renewable energy technologies after the departure of foreign experts. The establishment and expansion of renewable energy sources will be impeded in many developing countries in Africa due to a lack of well-defined energy policies and insufficient legal and organizational capabilities (Manda, 2020; Okoh and Okpanachi, 2023; Santos et al., 2022). Decarbonization also poses various challenges encompassing financial, technical, economic, and social factors to a company's growth and development in Africa, which, in the long run, weaken the already weak economies of many African countries.

## Pragmatic approaches to decarbonization of Africa

It is imperative for the government and concerned agencies in Africa to scale up their efforts to drive the development and deployment of renewable energy technologies through the implementation of financial incentives and strategic partnerships. This includes prioritizing investment in large-scale renewable energy projects and distributed energy systems like rooftop solar panels (Masson et al., 2014). Public awareness campaigns should be implemented to educate people about the benefits of renewable energy and the urgency of transitioning away from fossil fuels. By taking these actions, Africa can make significant progress toward building a more sustainable future and reducing dependence on fossil fuels (Masson et al., 2014). In the quest for decarbonization, enhancing energy efficiency is vital to reduce energy consumption and mitigate climate change's negative impacts. The International Renewable Energy Agency (IRENA) must play a leading role in developing policies

that promote energy efficiency across various sectors, establish standards, and provide financial incentives for energy-efficient upgrades. Increased research and public awareness campaigns are crucial in this regard, leading to substantial cost savings and environmental benefits (Oyedepo, 2012).

To advance sustainable transport and reduce greenhouse gas emissions, African governments should invest in public transportation systems like buses and light rail to encourage people to use public transport instead of private vehicles (Okesanya et al., 2024a). Also, promoting electric vehicles (EVs) through charging infrastructure and alluring benefits in the form of tax credits, rebates, and subsidies will not only reduce emissions but also improve air quality (Manda, 2020). Enhancing energy efficiency and sustainability in buildings also requires African governments and relevant authorities to offer incentives for builders, implement green building standards and certifications, raise public awareness, and establish regulations for new constructions to meet energy efficiency criteria. These actions encourage the adoption of cost-effective and environmentally friendly practices and technologies (Gai et al., 2020; Røstvik, 2013). African countries can foster sustainable agriculture and forest conservation by supporting sustainable farming practices, encouraging afforestation and reforestation efforts, funding research and development, and raising public awareness. These actions can reduce emissions, promote soil health, increase productivity, and sequester carbon (Liu et al., 2021). Providing aid, technical assistance, training to farmers, public engagement, research development and funding, and implementing policies for environmental conservation can all contribute to creating a more sustainable future (Liu et al., 2021). Furthermore, to improve access to clean cooking solutions, there is an urgent need to develop policies that promote eco-friendly and efficient cooking technologies, provide access to clean cooking fuels, and launch public awareness campaigns. Offering subsidies and tax incentives can make clean fuels more affordable and accessible to low-income households (Welle, 2023). Promoting public education on the benefits of clean cooking solutions and the negative impacts of traditional methods can encourage households to switch, which is crucial for public health, greenhouse gas emissions reduction, and climate change mitigation.

The governments, policymakers, and relevant authorities in Africa can promote international cooperation and financing for clean energy projects and decarbonization initiatives by strengthening partnerships, mobilizing climate finance, and prioritizing supportive regulatory frameworks. Africans must seek collaborations with international organizations, multilateral development banks, and the private sector to mobilize funding for clean energy projects and decarbonization. Lastly, they should create supportive regulatory frameworks that incentivize private sector investment in clean energy and decarbonization (African Development Bank, 2021).

The African Assessment is a crucial tool in guiding actions towards mitigating climate change across Africa. It uses

modeling approaches like SEI's Low Emission Analysis Platform and NASA's global composition and climate model to provide detailed insights into the impact of short-lived climate pollutants (SLCPs) on African climate and air quality (United Nations Environment Programme [UNEP], 2022). The Assessment identifies feasible pathways for implementing nationally appropriate measures, which have been rigorously assessed and validated by stakeholders. Many African countries are already developing integrated emission inventories and impact assessments based on the assessment's findings to inform their nationally determined contributions. The Assessment's aim is to enhance capacity for short-term and long-term national planning for integrated air pollution and climate change strategies. The development of scenarios, such as the baseline scenario, the SLCP scenario, and the Agenda 2063 scenario, provides valuable insights into future emission trajectories and potential mitigation measures (UNEP, 2022; Okesanya et al., 2024b; Malley et al., 2021).

## Conclusion

The decarbonization of Africa presents numerous challenges, including economic, social, technological, and political barriers. However, the implementation of pragmatic approaches such as expanding renewable energy sources, enhancing energy efficiency, promoting sustainable transport and buildings, supporting sustainable agriculture and forest conservation, improving access to clean cooking services, and fostering international cooperation will be significant in creating sustainable, low-carbon development and a prosperous future for the continent and its people. To this end, it is imperative that immediate action be taken to mitigate the adverse effects of climate change on the African continent.

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## Author contributions

All authors have contributed equally to the writing of this article. We have all read and approved the final draft.

## Declarations

Conflict of interest: The authors declare no competing interests.

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