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## Nigeria's Energy Transition

### Approaches for An Efficient and Pragmatic Energy Transition and Climate Protection

*Chigozie Nweke-Eze*

- › Nigeria's economy is heavily reliant on oil and gas exports, which account for about 90% of its export earnings and 60% of government revenue. However, the country faces significant energy challenges, including inadequate power generation and widespread energy poverty. Rapid population growth exacerbates these issues, increasing energy demand and putting further pressure on the existing infrastructure.
- › Nigeria has committed to achieving net-zero carbon emissions by 2060 but faces significant obstacles in fulfilling these commitments. The country's heavy reliance on fossil fuels for both energy needs and economic growth presents a considerable challenge to meeting these climate goals.
- › Natural gas plays a vital role in Nigeria's Energy Transition Plan, serving as a key transition fuel. It is regarded as a relatively cleaner energy source due to its low-carbon characteristics and cost-effectiveness compared to other fossil fuels like coal and oil. Consequently, natural gas will continue to be the primary power source in the short term, even as the country gradually shifts towards renewable energy sources.
- › The push for economic diversification and the need to improve energy access have led to increased investment in renewable energy sources like solar, wind, and hydroelectric power. However, challenges such as inadequate grid infrastructure, regulatory bottlenecks, and limited access to finance hinder significant progress.

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### **Current State of Affairs in Nigeria** **Political, Economic and Social Conditions**

Nigeria, the most populous country in Africa, presents a complex landscape of political, economic, and social conditions. Operating under a federal presidential system, with President Bola Ahmed Tinubu serving as the head of state since 2023, Nigeria has experienced peaceful transitions of power through elections since the end of military rule in 1999. The democratic stability, however, is juxtaposed with ongoing government challenges. Despite stable political institutions, effective governance remains elusive, resulting in a cycle of unresolved issues and unmet citizen expectations.<sup>1</sup> A significant challenge is the pervasive corruption that affects various levels of government and public services. Nigeria has been continuously ranked among the most corrupt countries of the world by the Corruption Perceptions Index (CPI) of Transparency International. Corruption has led to numerous political and developmental issues, including state incoherence, institutional inefficiency, poor enforcement of the rule of law, lack of respect for fundamental human rights, and widespread insecurity.

In addition to these governance challenges, Nigeria is also grappling with significant economic issues. After a period of sustained growth from 2000 to 2014 at an average annual rate of over 7%, driven by favourable global conditions as well as macroeconomic and first-stage structural reforms, the economy has faced a significant decline since 2015. Factors such as monetary and exchange rate policy distortions, increased trade protectionism, lower oil production, and external shocks like COVID-19 have contributed to this downturn. By February 2024, inflation had reached a 24-year high of 31.7%, pushing millions into poverty and driving youth unemployment to around 33%.<sup>2</sup> Although significant economic reforms have yielded some positive outcomes – including increased government revenues, higher capital imports and exports as well as an improved credit outlook – they have also introduced challenges such as money devaluation, rising interest rates, and inflation.<sup>3</sup> The result is social unrest and economic instability which directly impacts Nigeria's ability to make the necessary adjustments to meet the country's pressing energy challenges, with

currently 92 million Nigerians lacking access to electricity, and 175 million lacking clean cooking solutions.<sup>4</sup>

Nigeria has the second highest number of people living in poverty globally, in absolute terms, after India, with a poverty rate estimated to be around 38.9% in 2023 and approximately 87 million people living below the poverty line.<sup>5</sup> State capacity in Nigeria is generally low, resulting in limited service delivery and widespread social insecurity and violence. Infrastructure gaps constrain access to electricity and hinder domestic integration, preventing the country from fully leveraging its large market size. Rapid population growth increases energy demand and puts further pressure on existing infrastructure, necessitating policies that not only expand energy access but also ensure sustainability to mitigate environmental impacts. The scarce and unreliable existing energy supply forces many households and businesses to rely on diesel generators, while the lack of access to modern cooking technologies drives deforestation due to the continued use of biomass fuels.<sup>6</sup>

Nigeria's energy supply is mostly made up by fossil fuels, primarily natural gas and oil, which also play central roles in the economy. As Africa's biggest oil producer, fossil fuels account for 60% of Nigerian government revenue and 90% of foreign exchange earnings.<sup>7</sup> Despite the financial importance of fossil fuels for the country, Nigeria has pledged to reach net-zero carbon emissions by 2060. This presents the country with considerable challenges, given the country's heavy reliance on fossil fuels for both its energy needs and economic growth.

While the Nigerian government has made commitments under the Paris Agreement, various economic and social conditions affect the extent to which these commitments are being fulfilled. Political stability and effective governance are crucial for the development and enforcement of energy and climate policies. Ongoing security challenges, such as the Boko Haram insurgency and conflicts with bandits, have risked disruption in energy infrastructure and deterred investment in vulnerable regions. Ensuring the security of energy infrastructures significantly influences investment decisions and has therefore become an important energy and climate policy element in Nigeria.

Furthermore, Nigeria's various administrations have shown differing levels of commitment to climate and renewable energy investments. As stated, governance in Nigeria's public sector is often characterized by high levels of endemic corruption and lack of accountability.<sup>8</sup> This trend has also spilled into the governance of climate change funds and has impeded the effective implementation of energy and climate policies. The presence of corruption in the climate finance sector has a detrimental effect on climate change interventions. It weakens attempts to mitigate emissions and lowers the standard of adaptation infrastructure. In both situations, donors and other funders lose out on money or see it misused, thereby reducing the impact of climate change initiatives. Moreover, limited financial resources and high levels of public debt restrict the government's ability to fund large-scale renewable energy projects or comprehensive climate adaptation programs. Fluctuations in global oil prices also significantly affect Nigeria's economic stability and ironically thereby its ability to invest in renewable energy and climate resilience measures.<sup>9</sup>

### The Role of Fossil Fuels and Challenges to Transition

Nigeria faces significant energy challenges, including inadequate power generation and widespread energy poverty. The country draws most of its electricity generation needs from oil and gas, with over 80% of power generation coming from gas and the remaining from oil, making the country the largest consumer of oil-fired backup generators in Africa.<sup>10</sup> While the country does

not rely heavily on coal, recent policies have included plans to revitalize coal mines, which would increase carbon emissions and hinder efforts to transition to a low-carbon economy.<sup>11</sup>

Natural gas will continue to be a key component of Nigeria's energy mix due to its availability and relatively lower carbon footprint, at least in the short term.<sup>12</sup> It is considered a relatively cleaner source of energy, possessing low-carbon features and being more cost-effective compared to other fossil fuels like coal and oil. Nigeria boasts significant natural gas reserves, estimated at 208.83 trillion cubic feet, ranking it the largest in Africa and tenth largest globally.<sup>13</sup> The government has prioritized the expansion of natural gas utilization, aiming to enhance gas production and consumption to power industrial growth and reduce carbon emissions. This initiative is expected to generate substantial economic benefits, including job creation and increased foreign investment.<sup>14</sup> Using natural gas as a transition fuel in a broader plan to an eventual net-zero future has been estimated to potentially foster approximately \$18.3 billion in gross value added to the Nigerian economy.<sup>15</sup> Although this potential can create exponential growth in the nation's domestic value chain, it is important to consider some limiting challenges currently facing the global oil and gas industry. These include high volatile prices and cost pressures as well as the necessary strict adherence to environmental regulations.

The push for economic diversification and the need to improve energy access have generally led to increased investment in renewable energy sources like solar, wind, and hydroelectric power. The volatility of oil prices and the global shift towards greener energy sources make the transition economically viable. With increasing incentives, such as waiving import taxes on renewable energy technologies, the private sector is showing greater interest in investing in the renewable energy sector. However, challenges such as inadequate grid infrastructure, regulatory bottlenecks, and limited access to finance hinder significant progress.<sup>16</sup>

Although public awareness about climate change and the need for renewable energy is growing, it varies significantly across different regions and socioeconomic groups. Urban areas tend to have more exposure to these concepts compared to rural areas. As many Nigerians still lack access to reliable and affordable electricity, the transition to renewable energy is often discussed in the context of improving energy access and security, with solar energy seen as a viable solution for off-grid communities. Equally important is ensuring a socially fair transition by offering opportunities for all and minimizing negative effects on workers and communities dependent on fossil fuels. Efforts must be made to create meaningful employment opportunities, ensure equitable resource distribution, and respect indigenous rights. Social and economic vulnerabilities further necessitate policies focused on climate adaptation and resilience. This includes measures to protect communities from climate impacts such as flooding, droughts, and other extreme weather events. While transitioning to renewable energy can reduce greenhouse gas (GHG) emissions, the fossil fuel industry has left a legacy of environmental degradation, particularly in the Niger Delta. Addressing these issues while shifting to cleaner energy sources is a complex challenge, as well as considering further environmental impacts of renewable energy projects such as land use and water resource management.

### **Climate Change Policy Goals, Measures, and Instruments**

While the oil sector remains a dominant economic force, there is a growing recognition of the need to diversify Nigeria's economy away from oil.<sup>17</sup> Nigeria is committed to adopting sustainable energy sources, promoting energy security, and addressing energy poverty as part of its strategy to reach net-zero carbon emissions by 2060. The government has enacted multiple policies and expressed commitments to reducing greenhouse gas emissions and transitioning towards

renewable energy. The key policies, laws, and frameworks outlining Nigeria's climate goals and actions are described below:

- › **Nationally Determined Contributions (NDCs):** Nigeria submitted an updated version of their NDC in 2021, following the initial submission in 2015. In this updated NDC, Nigeria has increased its conditional commitment to a 47% reduction in emissions by 2030 and reaffirmed its unconditional commitment to a 20% reduction below the business-as-usual scenario by the same year. Nigeria has raised its goals in the amended NDC by adding additional sectors such as waste and water, and new gases like hydrofluorocarbons (HFCs) and short-lived climate pollutants (SLCPs). The scope of Nigeria's climate obligations now broadly covers energy and efficiency, agriculture, electricity, oil and gas, infrastructure, and housing.
- › **Climate Change Act 2021:** Enacted in November 2021, this Act provides Nigeria with a legislative framework to achieve resilience, long-term social and economic sustainability, and its climate goals. A key component of the law is the establishment of the National Council on Climate Change (NCCC) and the provision of an operational framework for climate action. The Act focuses on both adaptation and mitigation, integrating climate considerations into national planning and development. It outlines specific measures to reduce GHG emissions, promote renewable energy adoption, and support sustainable growth to reach the net-zero target by 2060.
- › **Climate Change Policy (2021-2030):** This policy aims to significantly lower GHG emissions and mitigate the negative socioeconomic impacts of climate change. It serves as a vehicle for organizing the nation's finance, development planning, and oversight of climate-related projects and programs. The policy outlines the goals and objectives of Nigeria's climate change management program, as well as the principles and strategies guiding the implementation of initiatives to mitigate the potential negative effects of climate change on the country's development. It is divided into seven sections, each covering policies to accelerate climate action and outlining prerequisites for achieving sustainable growth in a climate-resilient economy.
- › **National Climate Change Action Plan (NCCAP):** The NCCAP is a policy under the NCCC which sets goals for reducing GHG emissions and enhancing climate resilience across various sectors. The NCCAP aims to improve energy and resource efficiency in the manufacturing sector, encourage the adoption of renewable energies, promote clean cooking, and develop sustainable transport systems. It also seeks to enhance the resilience of the blue economy, increase forest cover, and reduce risks from climate-related disasters.
- › **National Adaptation Strategy and Plan of Action on Climate Change (NASPA-CC):** This strategy outlines Nigeria's approach to preparing for and responding effectively to the impacts of climate change, focusing on enhancing resilience in vulnerable sectors such as agriculture, water resources, and coastal areas. It aims to reduce risks, enhance national and local adaptive capacity and resilience, seize new opportunities, and promote cooperation with the international community to lessen Nigeria's vulnerability to the adverse effects of climate change. The strategy was developed by a multi-stakeholder group, including the Government of Nigeria and various civil society organizations, to create a comprehensive framework that recognizes the diverse needs and vulnerabilities of all sections of the society.
- › **Nigeria Energy Transition Plan (ETP):** Enacted in 2022, the ETP, along with the Energy Transition Implementation Working Group (ETWG) and the Energy Transition Office (ETO), provides guidelines and structures for achieving the net-zero targets set in the Climate Change Act. The

plan outlines a timeline and framework for reducing emissions and achieving net-zero across five key sectors, which account for about 65% of Nigeria's emissions: power, cooking, oil and gas, transport, and industry. The plan envisions contributing to economic growth through job creation and poverty alleviation, claiming that renewable energy in Nigeria will lift 100 million people out of poverty and create up to 340,000 jobs by 2030 and 840,000 jobs by 2060. The plan relies mostly on action after 2030, although it also includes targets for long-term gas expansion in the 2020s, referred to as the "Decade of Gas".

Overall, Nigeria is actively working to increase its use of renewable energy sources to reduce dependence on fossil fuels and lower emissions. These policies aim to achieve net-zero emissions, foster a low carbon and high growth path, ensure environmental protection, build climate resilience, integrate climate change mitigation, and more. However, the country still faces significant challenges. Most of these policies have not been fully implemented because they failed to build on previous initiatives. The primary barrier to implementing these policies has consistently been identified as the lack of available funds. Additionally, Nigeria's climate change budget has focused on raising awareness rather than allocating funds for mitigation and adaptation projects.<sup>18</sup>

As a significant portion of the country's income stems from oil revenue, the government has taken a cautious approach towards transitioning away from fossil fuels due to concerns about the economic impact and job losses in the oil sector. The Petroleum Industry Act of 2021 envisions an even greater role for oil and gas in Nigeria's economy.<sup>19</sup> Given Nigeria's international net-zero commitments, however, the Nigerian leadership is under pressure to transition quickly to renewable energy sources, even as the country focuses on solving its energy deficiencies and remains open to explore fossil fuel options in the short and medium term. Balancing the global goals to reduce carbon emissions with national development and economic growth can be challenging and often results in inconsistent policies and regulatory frameworks. Such inconsistent policies and a lack of clear long-term strategies for energy transition create uncertainty for investors, potentially impeding the development of renewable energy infrastructure. Encouraging investment in renewable energy through policies like tax incentives, subsidies, and feed-in tariffs, while also setting clear regulations and standards for renewable energy projects and grid integration, is hence crucial for scaling up renewable energy.

## How to Transition Away from Fossil Fuels

### Relevance and Priorities for Energy Transition and Decarbonization

Nigeria has abundant conventional energy resources for energy supply. The latest figures on Nigeria's crude oil and gas reserves as released by the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) show that the combined reserves of crude oil and condensate reached 37.50 billion barrels, while the reserves of associated gas and non-associated gas stood at 209.26 trillion cubic feet, as of January 1, 2024.<sup>20</sup> Similarly, coal and lignite has risen to 3 billion tonnes of indicated reserves in 17 identified coal fields and over 600 million tonnes of proven reserves, and tar sands to 41 billion barrels.<sup>21</sup> Although the country is known for its significant contribution to global fossil-based energy consumption, the production of energy for local use remains disappointingly low.<sup>22</sup> The current energy mix is dominated by conventional sources, which are expensive and often inaccessible to the poor population, particularly in rural areas.<sup>23</sup>

In addition to its wealth in conventional energy resources, Nigeria boasts abundant renewable energy resources that are widely distributed across the country, with the potential to generate significant amounts of energy. Nigeria's transition away from fossil fuels hinges on developing its renewable energy resources as alternative sources. The country boasts significant solar power potential, which can be harnessed for both small-scale and large-scale solar power projects.

Additionally, Nigeria has numerous rivers and existing dams suitable for hydropower generation. The northern regions of the country, in particular, offer enormous potential for wind farm development.<sup>24</sup> Similarly, a substantial amount of biomass is produced that can be converted into bio-energy.<sup>25</sup> The expansion of renewable energies is crucial for meeting rising energy demands. Increasing the share of renewables in the energy mix by 2050 is also seen as a source for sustainable economic growth.<sup>26</sup> However, regional interests may conflict over the allocation of resources for energy projects.<sup>27</sup>

As much of Nigeria's existing energy infrastructure is designed for fossil fuels,<sup>28</sup> transitioning to renewable energy requires significant investment in new infrastructure, which can be costly and time-consuming. It is crucial to expand the energy grid, especially in rural areas, through decentralized renewable energy solutions like solar mini grids. Upgrading and expanding the electricity grid to accommodate variable renewable energy sources will ensure a stable supply. Furthermore, developing energy storage solutions is necessary to manage intermittency issues associated with renewable energy. The adoption of these new technologies, however, may face resistance due to lack of expertise, resources, and infrastructure.

The existing energy infrastructure is also outdated and poorly maintained, leading to inefficiencies in power generation and distribution. Generally, improving energy efficiency across various sectors, including buildings, transportation, and industry, to reduce overall energy demand is of crucial importance, although the matter has not received as much attention as renewable energy adoption.<sup>29</sup>

By implementing measures to reduce emissions from the oil and gas sector through better management of flaring and venting systems, Nigeria is working towards its decarbonization goals.<sup>30</sup> The Nigerian government aims to raise approximately USD 23 billion in initial investment opportunities to develop infrastructure in renewable energy, clean cooking, e-mobility, and healthcare.<sup>31</sup> Although these investments can spur economic growth by attracting both domestic and foreign investment, the initial cost can be challenging, particularly given the country's financial and budget constraints. Furthermore, since these investments are capital-intensive, there may be short-term increases in energy costs, creating an affordability burden to the populace, many of whom already face energy poverty as it is. Additionally, the country heavily subsidizes fossil fuels, making them cheaper and more appealing compared to renewable alternatives.<sup>32</sup>

## Recommendations

### Measures and Instruments for Enabling a Just and Efficient Transition to Sustainable Energy Systems

Achieving a just and efficient transition to a sustainable energy system requires a combination of political, technological, and financial measures. The goal is to shift from fossil fuels to renewable energy sources while ensuring fairness, inclusivity, and alignment with national priorities of achieving full energy access and sustainable economic growth.

#### Efficient and Inclusive Policy Frameworks and Regulations

To promote the adoption of renewable energy and reduce emissions in the country, practical policy frameworks and regulations are needed. To ensure these policies are efficient and inclusive, extensive stakeholder consultation and involvement is essential. This will ensure that all stakeholders, including marginalized communities, are represented in decision-making processes and feel integrated into the country's transition journey.

In the long run, as Nigeria progresses towards its net zero targets, it may become necessary to implement taxes on carbon emissions to provide a financial disincentive for emitting GHG and generate revenue for clean energy projects. Additionally, establishing a market for carbon allowances, where companies can buy and sell emissions permits, would further incentivize emissions reductions.

### **Investment in Renewable Energy and Energy Efficiency**

A diverse mix of renewable energy sources, including solar, wind, hydro, and geothermal, should be developed where suitable. Robust investment in research and development is essential to improve technical adaptability and reduce the costs of renewable energy deployment in the country. Similarly, stringent energy efficiency standards for buildings, appliances, and industrial processes should be implemented if an efficient transition is to be achieved. Implementing energy efficiency measures, such as widespread net-metering<sup>33</sup>, will ensure that energy use is cost-reflective, while also making unused energy available for other unserved areas of the country. Consumers with more frequent access to energy should be sensitized and encouraged to use energy efficient appliances and to use available energy efficiently.

### **Adapted and Innovative Clean Technology and Infrastructure Solutions**

The development of smart grid technologies to optimize energy distribution and integrate renewable sources, along with investments in energy storage technology such as batteries and pumped hydro, is crucial for managing the intermittency of renewables and achieving a just transition. Promoting decentralized energy systems, including microgrids and off-grid solutions, will provide reliable energy access in remote areas, accelerating the transition process and coverage, especially in rural areas. Furthermore, investing in new energy transition fuels, storage mechanisms, and vectors, such as green hydrogen, along with the development and deployment of Carbon Capture and Storage (CCS) technologies to capture and store CO<sub>2</sub> emissions from industrial processes and power plants, could advance energy transition and decarbonization efforts as well as offer a competitive and pioneering edge, particularly in the manufacturing of exportable products.

### **Monitoring, Accountability and Transparency**

Specific systems should be established to monitor the progress of energy transition initiatives and their social impacts. This is crucial for achieving a viable transition and ensuring transparency in reporting progress towards targets and the allocation of funds. Furthermore, the public should be educated on the benefits of renewable energy and the importance of reducing carbon emissions. Relevant stakeholders, including businesses, NGOs, and civil society, should be engaged in the energy transition process.

### **Government Incentives, Grants and Subsidies**

Although the Nigerian government has a limited public budget, providing direct financial support for renewable energy and energy efficiency projects and programs, as well as for research and development, could attract further funding from international and private sources. Incentives to stimulate investment in the energy transition include tax credits, deductions, and exemptions for investments in renewable energy, energy-efficient technologies, and infrastructure improvements. Blended financing, combining public and private funding, can reduce the risk for private investors and attract more capital to renewable energy and sustainable infrastructure projects. This can be complemented by offering loans at below-market interest rates to support projects with high social and environmental benefits. The effective removal of fuel subsidies can create a level playing field for price competition between fossil fuels and renewable energy sources, while also freeing up funds for investment in cleaner energy system options.



### Special Transition Funds

As Nigeria transitions to cleaner energy sources over the medium and long term, it is necessary to implement programs that retrain workers from industries affected by the transition, preparing them for new roles in the clean energy sector. Additionally, funds should be allocated to support communities that are disproportionately impacted by the transition, ensuring they have access to economic opportunities and social services. Providing financial assistance to low-income households is also crucial to ensure they can afford clean energy solutions.

### Areas of Priority for Regional and International Cooperation Agreement

Given the country's need to balance energy access, economic development, and climate goals, regional and international cooperation agreements play a crucial role in supporting Nigeria's energy transition. Cooperation can foster the development and integration of regional power grids, thereby enhancing energy security and providing access to a wider range of energy resources. For instance, the West African Power Pool (WAPP) aims to connect national grids and facilitate energy trade across West Africa, including Nigeria. Cross-border joint projects on renewable energy sources like solar, wind, and hydroelectric power offer mutual benefits. Countries have the opportunity to collaborate by sharing technical expertise, financial resources, and market access while benefiting from capital de-risking and economies of scale. Harmonizing energy policies, standards, and regulatory frameworks can further facilitate cross-border investments and energy trade. This includes setting common standards for renewable energy, energy efficiency, and emissions reduction.

Especially international technical cooperation could be leveraged to offer support in the formulation of policies and frameworks promoting the energy transition and decarbonization agenda in Nigeria. In addition, through international partnerships, Nigerian stakeholders would benefit from technical training and capacity building necessary to improve the efficiency of transition technologies and projects deployment. This includes knowledge transfer on the latest trends and applications of renewable energy technologies, energy efficiency measures, and grid management. By cooperating with international development financial institutions, Nigeria could also continue to benefit from concessional loans and grants, which are crucial for supporting the country's renewable energy projects, grid modernization, and other infrastructural projects and programs.

Furthermore, regional and international collaboration on research and development (R&D) might accelerate the adoption and scale-up of new clean technologies. This includes research on energy storage, smart grids, and sustainable energy systems. Sharing data on climate impacts, energy usage, and resource availability could help in making informed national and regional policies, adapted strategies and plans for a sustainable energy future in Nigeria and its cooperating regions.

Regional and international cooperation, through shared resources and strategies, enhances the delivery of sustainable, clean, and affordable energy for all. Addressing the social and economic impacts of the transition, particularly for workers in traditional energy sectors, through re-skilling and retraining programs for job transition into new, clean, and sustainable energy sectors, is also vital. Ensuring that energy transition plans consider the needs of vulnerable populations, including rural communities, is crucial for multi-stakeholder buy-in and support in Nigeria.

In conclusion, Nigeria's transition to renewable energy is a necessary but challenging endeavour. While international cooperation and effective policies are crucial, the country must address significant obstacles, including corruption, inadequate infrastructure, and financial constraints. Reducing reliance on fossil fuels will require substantial investment and political will, and the success of

this transition is far from guaranteed. Nonetheless, it remains a critical step towards a more sustainable and resilient energy future.

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- <sup>33</sup> Net metering allows consumers who generate their own electricity, typically from renewable sources like solar or wind, to feed excess energy back into the grid and receive credits. This system helps balance their energy costs by offsetting the electricity they consume from the grid.

## Imprint

### The Author

**Chigozie Nweke-Eze** is an economist and geographer specializing in the international finance, economics, politics, geographies, and sustainability of large-scale and cross-border projects in the energy and mining sectors. He is the CEO of Integrated Africa Power (IAP), serves on the board of the Hydrogen-Africa conference and EXPO, and convenes the African Hydrogen Hub. He is also a visiting fellow with the Africa programme at the European Council on Foreign Relations, focusing on the financing, governance, and geopolitics of energy and mining projects in Africa.

#### *Coordination of the publication series:*

##### **Lina Rühl**

Policy Advisor Climate, Agriculture and Environment  
Analysis and Consulting Division  
T/p +49 30 / 26 996-3502  
[lina.ruehl@kas.de](mailto:lina.ruehl@kas.de)

##### **Gisela Elsner**

Global Sustainability Officer  
Analysis and Consulting Division  
T/p +49 30 / 26 996-3759  
[gisela.elsner@kas.de](mailto:gisela.elsner@kas.de)

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