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Exploring the dynamics of stakeholders' perspectives towards planning low-carbon energy transitions: a case of the Nigerian power sector

Babajide Epe Shari^a, Saidou Madougou^a, Olayinka S. Ohunakin^{b,c}, Philipp Blechinger^d,
Yacouba Moumouni^e, Abdulwaheed Ahmed^f and Yunusa Tukur^f

^aWest African Science Service Centre on Climate Change and Adapted Land Uses (WASCAL), Doctoral Research Program in Climate Change and Energy (DRP-CCE), Abdou Moumouni University, Niamey, Niger; ^bMechanical Engineering Department, The Energy and Environment Research Group (TEERG), Covenant University, Nigeria; ^cVisiting professor, Faculty of Engineering & the Built Environment, University of Johannesburg, South Africa; ^dReiner Lemoine Institut, Berlin, Germany; ^eElectrical and Computer Engineering, Higher Colleges of Technology, Ras Al-Khaimah, United Arab Emirates; ^fEnergy Commission of Nigeria, Abuja, Nigeria

ABSTRACT

This study uses a multi-stakeholder analysis approach to consolidate low-carbon energy planning and facilitate energy transition (ET). To do this, we assess factors that influence ET strategies in the Nigerian power sector. Here we employ both quantitative and qualitative data obtained via well-structured, and concise questionnaires and semi-structured interviews. While our study brings to light a sustainable approach to achieving a low-carbon future, it identified technology, motivation and finance as variables that are significant in accelerating the country's transition to clean energy. It revealed that prioritising low-interest rate and tax holiday for investors' of solar energy and consistence expansion in energy efficiency (EE) is pertinent to achieving a sustainable low-carbon future in Nigeria. We conclude that robust policy frameworks that prioritise investment in solar energy and EE through incentivising energy management solutions with appropriate financial tools and fostering active verbal support through advocacy are essential to ET in Nigeria.

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Clean energy planning; energy transitions; multi-stakeholder energy analysis; Nigerian power sector; energy efficient technology; solar energy

1. Introduction

Global warming (GW) is threatening our existence on earth. To date, every region has experienced diverse challenges due to global warming caused by increasing anthropogenic carbon dioxide emissions (NASA 2021). Globally, about 65% of carbon dioxide (CO₂) emissions are due to fossil fuels use, a dynamic shift to clean energy sources is pertinent to curb the continues emissions of CO₂ (IPCC 2014). Transitioning from fossil fuel to a cleaner energy paradigm requires reliable and ambitious measures by nations to cut greenhouse gas (GHG) emissions and enhance the security of their respective energy systems. As such, several governments have pledged their commitments to limit their emissions (Parry 2015). While most developed economies are committed to cutting down their GHG emissions, some developing countries are concerned about ensuring the security

CONTACT Babajide Epe Shari  babajide.s@edu.wascal.org

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of the energy supply (IRENA 2017). Meanwhile, a three- to five-fold increase in electricity demand is projected in developing countries over the next 30 years (Ahuja and Tatsutani 2009). This increasing energy demand will be met by fossil fuel resources if a deliberate clean energy future driven by decarbonisation of the power sector is not prioritised (Fankhauser and Jotzo 2017). Therefore, it is opined that emerging economies fully harness the economic prosperity that comes with low-carbon development.

It is worth noting that planning a low-carbon energy future is one of the prerequisites to limiting GHG emissions that may have the potential to cause a rise in global average temperature. Such planning is pertinent in the energy sector because fossil-led economies are depleting (OPEC 2016) and constitute critical environmental and health challenges through indoor and outdoor air pollution (Manisalidis et al. 2020). Furthermore, large hydropower plants are increasingly threatened by shrinking rivers, thereby shaking the security of electricity supplies in countries dependent on hydropower (Kaunda, Kimambo, and Nielsen 2012).

Several studies have explored thematic area of energy transition, including perspectives of energy transitions (Khalilpour 2018; Schreurs 2020), including international reports (OECD/IEA and IRENA, “Executive Summary/Chapter 1” 2017; IEA 2017; IEA 2023). For example, Doran et al. (2022) examine how people perceived societal low carbon transition and its possible pathways, with respect to energy production and use. Solar, wind and hydro were perceived to be more effective for mitigating impact on climate change, whereas, energy production from nuclear was perceived to have no mitigating impact. Also, Sorman et al. (2020) examine expert stakeholders that guide future energy insights on low-carbon transitions in Spain.

Emerging economies have committed to cutting down emissions in their Nationally Determined Contributions (NDCs). However, these nations struggle to meet low-carbon commitments made in their respective NDCs (UNDP 2016). In the case of Nigeria, the government has pledged in her NDCs to reduce its emissions by 20% by 2030, when compared to business-as-usual levels (NDC 2021). The GHG emissions have been consistently rising with about 271% increase since 1990 (shown in Figure 1), and was the 17th biggest (2nd in Africa) after South Africa (Hansen 2021). There is indeed need to abate GHG emissions in Nigeria for both economic prosperity and social wellbeing.

In addition, a silent crisis is unfolding in developing countries like Nigeria, where about 85 million of its population live without access to electricity (World Bank 2021). This shortage makes the residents heavily dependent on wood, which has remained scarce and over-exploited, thus making more vulnerable the poor and endangering efforts to reduce poverty, thereby making Nigeria the country with the largest energy access deficit in the world (World Bank 2021). Transitioning to clean energy tends to improve and bridge the country’s existing energy gap and deficit (World Bank 2021). This transiting to a low-carbon energy system is not simply a matter of

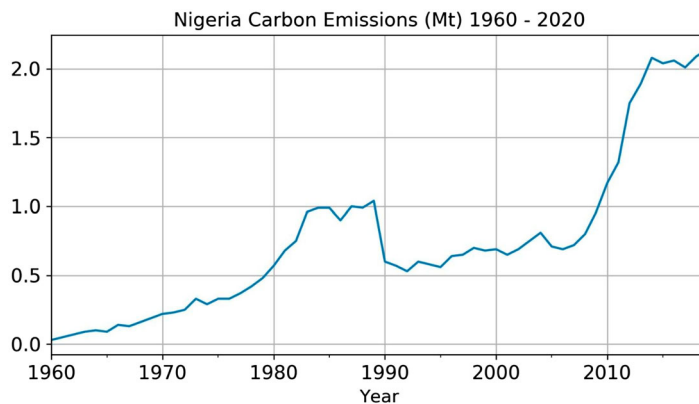


Figure 1. Carbon emissions in Nigeria from 1960 to 2020. Data source: (TealTool 2021).