

NIGERIA'S CLEAN ENERGY REVOLUTION: EXAMINING THE EPISTEMOLOGICAL BARRIERS TO THE NATION'S TRANSITION TO LOW- CARBON ECONOMY

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DOI: 10.13140/RG.2.2.25338.81600

Abstract

Nigeria's clean energy transition is imperative for mitigating climate change and achieving sustainable development. However, the country's transition to a low-carbon economy faces significant epistemological barriers, hindering the adoption of clean energy solutions. Despite growing concerns about climate change, the nation's energy sector remains dominated by fossil fuels. This study critically examines the epistemological barriers to Nigeria's low-carbon economy, exploring the intersections of knowledge systems, power dynamics and energy policy. The research reveals that dominant western epistemologies perpetuate fossil fuel-centric energy policies, overlooking indigenous knowledge and contextualized solutions. Epistemological barriers, including the marginalization of local perspectives and the prioritization of technical expertise over traditional knowledge, hinder the adoption of renewable energy technologies. Furthermore, the study highlights how power dynamics, influenced by international agreements, global economic interests and national politics, reinforce these epistemological barriers. Using a critical discourse analysis and epistemological critique, this study demonstrates the need for epistemological diversity and reflexivity in Nigeria's energy policy. It argues that integrating indigenous knowledge, contextualized solutions and participatory approaches can facilitate a successful transition to a low-carbon economy. This study contributes to the ongoing discourse on low-carbon transitions in developing economies, offering valuable insights for policymakers, industry leaders, and scholars.

Keywords: Clean Energy Revolution, Epistemological Barriers, Low-carbon Economy, Indigenous Knowledge, Energy Policy, Climate Justice.

Introduction

The transition to a low-carbon economy is crucial for mitigating climate change and ensuring sustainable development worldwide (IPCC 2018, 12). Nigeria, Africa's largest economy and most populous nation, faces significant challenges in transitioning from fossil fuels to clean energy (IEA 2020, 123). Despite its rich renewable energy potential, Nigeria's energy policy remains entrenched in fossil fuel-dominated epistemologies. This study examines the epistemological barriers hindering Nigeria's clean energy revolution, focusing on the interplay between knowledge systems, power dynamics, and energy policy.

As Harding (2015, 123) argues, "the dominant knowledge systems of the North" perpetuate energy inequities and marginalize indigenous knowledge. Similarly, Escobar (1995, 12) notes that western-dominated epistemologies reinforce the "coloniality of knowledge," suppressing contextualized solutions. These epistemological barriers militate against the adoption of clean renewable energy technologies and end up exacerbating energy poverty.

This research aims to contribute to the ongoing debates on climate justice, sustainable development, and energy transitions in Africa (Mulugetta et al. 2019, 3). By analyzing the epistemological barriers to Nigeria's clean energy transition, this study seeks to inform policy recommendations for overcoming these barriers and promoting energy democracy. The next

section will explain the meaning of clean energy revolution and why it is essential for several compelling reasons.

Clean Energy Revolution

Clean energy revolution refers to the global transition from fossil fuels to renewable energy sources, driven by technological innovation, policy changes, and shifting societal values (Smil 2017, 12). This revolution aims to reduce greenhouse gas emissions, mitigate climate change, and ensure energy security and sustainability (Jacobson et al. 2017, 56). At its core, the clean energy revolution involves a shift from centralized, fossil fuel-based power generation to decentralized, renewable energy systems (Rifkin 2011, 102). Solar and wind energy have emerged as leading sources of renewable energy, with costs decreasing dramatically over the past decade (IRENA 2020, 15). Energy storage technologies, such as batteries, are also critical to the clean energy revolution, enabling the efficient integration of intermittent renewable energy sources.

The clean energy revolution has far-reaching implications for the global energy landscape. It is projected to create millions of new jobs, stimulate economic growth, and improve public health (IRENA 2020, 20). Moreover, the clean energy revolution is driving innovation in transportation, with electric vehicles becoming increasingly viable (Kammen et al. 2017, 123). However, the clean energy revolution also faces significant challenges like infrastructure barriers, policy and regulatory hurdles, public acceptance and engagement etc.

Compelling Reasons for Clean Energy

Clean energy is essential for mitigating climate change, improving air quality, and conserving water. The Intergovernmental Panel on Climate Change (IPCC) emphasizes that transitioning to clean energy is crucial for limiting global warming to 1.5°C above pre-industrial levels (IPCC 2020, 12). Clean energy also improves air quality, reducing air pollution-related health issues (WHO 2018, 25). Furthermore, clean energy requires significantly less water than traditional fossil fuel-based power generation, conserving this vital resource (DOE 2020, 30). In addition to environmental benefits, clean energy offers economic advantages. The International Renewable Energy Agency (IRENA) reports that clean energy generates millions of new employment opportunities, stimulating local economies and attracting investments (IRENA 2020, 20). Clean energy costs decrease over time, making it competitive with fossil fuels (BNEF 2020, 10). Moreover, clean energy promotes energy independence, enabling communities to generate their own energy and reducing reliance on imported fuels (IEA 2020, 25).

Clean energy also drives technological innovation, advancing efficiency and reducing costs. The National Renewable Energy Laboratory highlights the significant improvements in renewable energy technology, increasing efficiency and reducing costs (NREL 2020, 10). Clean energy creates new industries and opportunities, fostering economic growth and development (Cleantech 2020, 15). The social benefits of clean energy are substantial. Clean energy expands energy access to underserved communities, improving public health and quality of life (SEforALL 2020, 15). Community-led clean energy initiatives foster engagement and economic development, promoting self-sufficiency (ICLEI 2020, 20). In conclusion, clean energy is vital for environmental sustainability, economic growth, energy security, social benefits, and technological innovation.

Background to Nigeria's Clean Energy Revolution

Nigeria, Africa's largest economy and most populous nation, is richly endowed with renewable energy resources, including solar, wind, hydro, and biomass (IEA 2020, 123). The country's geographical location provides optimal conditions for harnessing solar energy, with an estimated 2,400-3,000 hours of sunshine per annum. Additionally, Nigeria's vast wind

resources, particularly in the northern regions, offer significant potential for wind energy generation (NEC 2020, 56).

Despite these advantages, Nigeria's energy sector remains dominated by fossil fuels, accounting for approximately 65% of its electricity generation (NEC 2020, 45). This reliance on fossil fuels has significant implications for the environment, economy, and human health. For instance, Nigeria's oil spills and gas flaring have devastated effect on the ecosystems, resulting in estimated annual losses of \$5.5 billion 2019 United Nations Environment Programme report (UNEP 2019, 56). In recent years, Nigeria has made efforts to transition to clean energy. *The National Renewable Energy Policy (2015)* aims to increase renewable energy's share in the energy mix to 10% by 2025 (FMENV 2015, 10). Furthermore, the *Nigerian Energy Transition Plan (2020)* outlines strategies for achieving a low-carbon economy by 2050 (NEC 2020, 20). However, these efforts face significant challenges, including epistemological barriers (Harding 2015, 123), institutional constraints and financial hurdles (IEA 2020, 130).

The energy poverty prevalent in Nigeria underscores the urgency of transitioning to clean energy. According to the 2020 World Bank report, over 80 million Nigerians lack access to electricity (12), while fossil fuel subsidies drain the nation's resources, with estimated annual expenditures of \$3.5 billion (IMF 2020, 34). To understanding Nigeria's clean energy position, it is important to take a critical look at *the National Renewable Energy Policy (2015)* and *the Nigerian Energy Transition Plan (2020)*.

Examining Nigeria's National Renewable Energy Policy (2015)

The *Nigeria's National Renewable Energy Policy (2015)* aims at increasing the country's renewable energy share in the energy mix to 10% by 2025 (FMENV 2015, 10). The policy recognizes the importance of renewable energy in reducing Nigeria's dependence on fossil fuels, mitigating climate change, and promoting sustainable development (FMENV 2015, 5). The policy outlines several objectives, including increasing renewable energy's share in the energy mix, promoting energy security, reducing greenhouse gas emissions, and enhancing energy access. The policy sets specific targets for various renewable energy sources, including solar, wind, hydro, and biomass. For instance, Nigeria aims at generating 500 MW of solar energy by 2025 (FMENV 2015, 12). Similarly, the policy targets 200 MW of wind energy and 1,500 MW of hydro energy by 2025 (FMENV 2015, 13-14). Biomass energy is also targeted to contribute 100 MW to the energy mix by 2025 (FMENV 2015, 15).

To achieve these targets, the policy provides incentives for renewable energy development. These incentives include tax exemptions for renewable energy equipment (FMENV 2015, 16), feed-in tariffs for renewable energy generation (FMENV 2015, 17) and grants for research and development in renewable energy (FMENV 2015, 18). Additionally, the policy establishes an institutional framework for implementing renewable energy policies, including the Renewable Energy Agency (REA) and the National Renewable Energy Committee (NREC) (FMENV 2015, 20-21).

Despite the policy's ambitions, Nigeria faces challenges in implementing renewable energy projects. Funding constraints, infrastructure deficits, and regulatory barriers hinder the development of renewable energy in Nigeria (NEC 2020, 60). The policy falls short in providing a clear roadmap for implementation. Its lacks specific targets, timelines, and funding commitments, making it challenging to track progress.

One major criticism is the policy's over-reliance on centralized grid-connected renewable energy projects, neglecting the potential of decentralized, community-based initiatives. This approach may exacerbate existing energy access disparities, particularly in rural areas.

Furthermore, the policy's regulatory framework is inadequate, failing to address critical issues such as land acquisition, transmission infrastructure, and grid connectivity. The absence of a clear regulatory framework may deter investors and hinder project development. The policy also overlooks the importance of public engagement, education, and awareness-raising. Raising public awareness about renewable energy benefits and involving local communities in decision-making processes are crucial for successful policy implementation.

Additionally, the policy's financing mechanisms are unclear, and the proposed funding sources are insufficient to support the scale of renewable energy deployment envisioned. The policy needs to explore innovative financing options, such as green bonds, crowdfunding, or public-private partnerships. Again, the policy's monitoring and evaluation framework is also inadequate. Establishing a robust monitoring system is essential to track progress, identify challenges, and make adjustments to policy implementation.

Lastly, the policy lacks alignment with Nigeria's international climate commitments, such as the Paris Agreement. Integrating climate change mitigation and adaptation strategies into the policy would strengthen its impact. Overall, while the Nigerian National Renewable Energy Policy (2015) represents a step in the right direction, its limitations and gaps must be addressed to ensure effective implementation and achievement of Nigeria's renewable energy goals.

Synopsis of the Nigerian Energy Transition Plan (2020)

Nigeria's Energy Transition Plan (2020) outlines the country's strategy for transitioning to a low-carbon economy by 2050 (NEC 2020, 10). The plan aims to reduce Nigeria's greenhouse gas emissions by 40% by 2030 and achieve net-zero emissions by 2050 (NEC 2020, 12). The plan identifies five key sectors for energy transition: power, oil and gas, transportation, industry, and buildings (NEC 2020, 15). In the power sector, Nigeria aims to increase renewable energy's share to 30% by 2030 and 60% by 2050 (NEC 2020, 18). The plan also promotes energy efficiency, with targets to reduce energy consumption by 30% by 2030 (NEC 2020, 20). To achieve these targets, the plan outlines several strategies, including:

- i. Developing renewable energy resources, such as solar, wind, and hydro,
- ii. Promoting energy efficiency through building codes and appliance standards,
- iii. Encouraging electric vehicles and public transportation and
- iv. Enhancing energy access through mini-grids and off-grid solutions (NEC 2020, 30).

The plan also addresses financing and policy frameworks, including:

- i. Establishing a green finance facility to support renewable energy projects,
- ii. Developing a carbon pricing mechanism to incentivize low-carbon investments and
- iii. Strengthening regulatory frameworks to support energy transition.

Implementation of the plan will require coordination among government agencies, private sector stakeholders, and civil society organizations (NEC 2020, 45).

It is important to note that the Nigerian Energy Transition Plan (2020) builds upon the 2015 policy, expanding its scope and ambition. The 2020 plan sets more aggressive targets, aiming to reduce greenhouse gas emissions by 40% by 2030 and achieve net-zero emissions by 2050 (NEC 2020, 12). The plan integrates renewable energy development with energy efficiency, transportation, industry, and buildings, creating a comprehensive framework for Nigeria's energy transition. The 2020 plan also addresses financing and policy frameworks, establishing a green finance facility and carbon pricing mechanism to support low-carbon investments (NEC 2020, 35-38). This builds on the 2015 policy's incentives for renewable energy development, such as tax exemptions and feed-in tariffs.

Assessing Nigeria Transitioning to Low-Carbon Economy

Nigeria's commitment to transitioning to a low-carbon economy is questionable, despite its policy documents and international commitments. The National Renewable Energy Policy (2015) and the Nigerian Energy Transition Plan (2020) outline ambitious targets for renewable energy development and greenhouse gas emissions reduction (FMENV 2015, 10; NEC 2020, 12). However, implementation has been slow, and the country's energy sector remains dominated by fossil fuels as earlier submitted.

Nigeria's reliance on oil and gas revenues poses a significant challenge to its transition to a low-carbon economy. The country's economic growth is closely tied to the oil and gas sector, making it difficult to diversify and invest in renewable energy. Furthermore, Nigeria's regulatory framework is inadequate, lacking clear policies and incentives to support renewable energy development. The International Energy Agency (IEA) notes that Nigeria's energy sector requires significant investment and reform to achieve its renewable energy targets (IEA 2020, 130). Nigeria's energy transition requires a fundamental shift in its economic and political structures.

Nigeria faces additional challenges in transitioning to a low-carbon economy and one major challenge is the lack of infrastructure, including transmission and distribution networks, to support renewable energy development (IEA 2020, 140). Nigeria's energy infrastructure is aging and inefficient, leading to significant energy losses and hindering the integration of renewable energy sources (NEC 2020, 60). Another challenge is the high cost of renewable energy technologies, making them less competitive with fossil fuels. Nigeria's economy is heavily reliant on fossil fuels, and the transition to renewable energy requires significant investment in new technologies and infrastructure.

Corruption and governance issues also hinder Nigeria's energy transition. The country's oil and gas sector is plagued by corruption, and the lack of transparency and accountability hinders the effective implementation of energy policies. Furthermore, the country's regulatory framework is inadequate, lacking clear policies and incentives to support renewable energy development.

Security concerns also pose a significant challenge to Nigeria's energy transition. The country's Niger Delta region, where much of its oil and gas reserves are located, is plagued by militant activity and vandalism, disrupting energy production and transportation. Additionally, Nigeria faces social and environmental challenges in transitioning to a low-carbon economy. The country's energy transition must balance economic development with environmental protection and social justice (FMENV 2015, 15). The transition also requires significant workforce retraining and upskilling to adapt to new energy technologies (NEC 2020, 45). Again, Nigeria's energy transition is also influenced by global factors, such as the volatility of international oil prices and the impact of climate change (IEA 2020, 150). The country must navigate these external factors while addressing its domestic challenges to achieve a successful energy transition.

Despite these challenges, some progress has been made. Nigeria has increased its renewable energy capacity, with solar and wind energy contributing to the energy mix (NEC 2020, 20). Additionally, the country has established institutions, such as the Nigerian Renewable Energy Agency, to support renewable energy development (FMENV 2015, 20). While Nigeria has made efforts to transition to a low-carbon economy, its progress is slow, and challenges persist. Addressing these challenges requires a concerted effort from the government, private sector, and civil society to create an enabling environment for renewable energy development.

Epistemological Barriers to Nigeria's Clean Energy Transition

Nigeria's transition to a low-carbon economy faces significant epistemological barriers, hindering the adoption of clean energy technologies. In Nigeria's context, epistemological barriers refer to the dominant western knowledge systems that prioritize fossil fuels over renewable energy, perpetuating energy insecurity and environmental degradation. The epistemological barriers to Nigeria's clean energy transition are multifaceted:

a. Technocratic Expertise

Technocratic expertise poses a significant epistemological barrier to Nigeria's clean energy transition. This barrier refers to the dominance of western-trained technical experts in shaping Nigeria's energy policy, often at the expense of local perspectives and knowledge (Escobar 1995, 12). Technocratic expertise prioritizes technical efficiency and economic viability over social and environmental considerations, perpetuating the notion that clean energy is too expensive or inefficient for Nigeria's energy needs. This expertise is often embedded in international organizations and western consulting firms, which impose standardized solutions on Nigeria without considering its unique context. For instance, the International Energy Agency's (IEA) energy projections for Nigeria are often based on western assumptions about energy demand and economic growth, neglecting local factors such as energy poverty and economic inequality (IEA 2020, 140).

Nigerian scholars argue that technocratic expertise marginalizes local knowledge and expertise, undermining the country's capacity to develop context-specific clean energy solutions. This expertise also perpetuates the notion that clean energy is a western innovation, ignoring Nigeria's indigenous knowledge and innovation in renewable energy. The dominance of technocratic expertise has serious consequences for Nigeria's clean energy transition. It:

- i. Limits local ownership and participation in clean energy projects,
- ii. Fosters dependence on external expertise and funding,
- iii. Ignores social and environmental impacts of clean energy technologies (Harding 2015, 123).

To overcome this barrier, Nigeria must promote local expertise and knowledge, encourage participatory policy-making and recognize the value of indigenous innovation in clean energy.

b. Neoliberal Market Fundamentalism

Neoliberal market fundamentalism poses a significant epistemological barrier to Nigeria's clean energy transition. This ideology prioritizes market forces and private sector interests over social and environmental considerations, hindering the development of a sustainable energy sector (Harvey 2005, 2). Neoliberalism promotes the notion that clean energy can be achieved through market-driven solutions, ignoring the need for state intervention and regulation. In Nigeria, neoliberal market fundamentalism has led to the privatization of the energy sector, favoring foreign investors and multinational corporations over local communities and small-scale renewable energy entrepreneurs. This has resulted in the concentration of energy resources in the hands of a few corporations, undermining energy democracy and community-led initiatives.

Neoliberal market fundamentalism also perpetuates the notion that clean energy is a commodity to be traded, rather than a public good essential for human well-being (Klein 2014, 150). This ideology ignores the social and environmental externalities associated with fossil fuel extraction and consumption, prioritizing profit over people and the planet (Harding 2015, 125). The consequences of neoliberal market fundamentalism for Nigeria's clean energy transition are limited access to energy for marginalized communities, increased energy costs due to privatization and undermining of local innovation and entrepreneurship. To overcome this barrier, Nigeria must adopt a more inclusive and sustainable approach to energy development, prioritizing social and environmental justice over market fundamentalism.

c. Coloniality of Knowledge

Coloniality of knowledge is a pervasive epistemological barrier to Nigeria's clean energy transition. This concept refers to the historical and ongoing dominance of western knowledge systems over non-western epistemologies, perpetuating the marginalization of indigenous knowledge and perspectives (Quijano 2000, 542). Coloniality of knowledge positions western science and technology as universal and superior, dismissing traditional knowledge and practices as inferior or irrelevant (Mignolo 2011, 155). In the context of clean energy, coloniality of knowledge manifests in the imposition of western-derived solutions, ignoring Nigeria's unique cultural, social and environmental contexts. This has resulted in the neglect of indigenous energy sources, such as biomass and solar, in favor of imported technologies. Furthermore, western-dominated knowledge production has silenced local voices and perspectives, undermining community-led initiatives and energy democracy (Harding 2015, 128).

Coloniality of knowledge also perpetuates the notion of "development" as a western-imposed concept, ignoring Nigeria's own development trajectories and priorities (Escobar 1995, 12). This has led to the prioritization of economic growth over social and environmental concerns, exacerbating energy poverty and environmental degradation (Klein 2014, 152). The consequences of coloniality of knowledge for Nigeria's clean energy transition are far-reaching and the local communities in Nigeria today and to overcome this barrier, Nigeria must decolonize its knowledge systems, recognizing the value of indigenous knowledge and perspectives in clean energy development.

d. Lack of Contextualized Knowledge

The imposition of generic solutions by international organizations and western experts has been a persistent challenge in Nigeria's development. This lack of contextualized knowledge neglects the country's unique historical, cultural, and socio-political context. As a result, externally-driven initiatives often fail to address the specific needs and complexities of Nigeria's energy sector. Similarly, western experts' recommendations for renewable energy development in Nigeria often overlook the country's existing infrastructure and institutional capacities. This "one-size-fits-all" approach ignores the unique opportunities and challenges presented by Nigeria's energy landscape (Ake 1996, 12).

Furthermore, the dominance of western knowledge systems marginalizes indigenous perspectives and local expertise. This perpetuates a cycle of dependency on external expertise, undermining Nigeria's capacity for self-directed development. To address this challenge, Nigeria must prioritize contextualized knowledge and local expertise. This requires:

- i. Inclusive policy-making processes that incorporate local perspectives and expertise.
- ii. Context-specific research and development initiatives.
- iii. Capacity building for Nigerian institutions and experts.
- iv. South-South cooperation and knowledge sharing.

By embracing contextualized knowledge, Nigeria can develop tailored solutions that address its unique energy challenges and promote sustainable development.

e. Limited Local Research and Development:

Nigeria's research institutions today face huge funding constraints, hindering local innovation and knowledge production in clean energy. This limitation undermines the country's ability to develop context-specific solutions to its energy challenges. Local research and development (R&D) are essential for understanding Nigeria's unique energy landscape and challenges, developing tailored clean energy technologies and policies and building local capacity and expertise in clean energy. However, Nigeria's R&D landscape is often characterized by

inadequate funding: Insufficient government allocation and private sector investment in R&D, limited infrastructure: Outdated research facilities and equipment and brain drain- emigration of skilled researchers to developed countries (National Bureau of Statistics, 2020)

Consequences of limited local R&D include dependence on foreign technology and expertise, lack of contextualized knowledge and solutions and missed opportunities for local innovation and entrepreneurship. To address these challenges, Nigeria should increase government funding for R&D in clean energy, encourage private sector investment in R&D, develop public-private partnerships for R&D collaboration, strengthen research institutions and infrastructure and implement policies to retain local talent and expertise. Examples of successful local R&D initiatives include: the Nigerian Renewable Energy Research Center, the Energy Commission of Nigeria's Research and Development Department and the University of Lagos's Renewable Energy Research Group (University of Lagos Renewable Energy Research Group Report, 2020, 2). By prioritizing local research and development, Nigeria can unlock its potential for clean energy innovation and sustainable development.

f. Dominance of Fossil Fuel-based Education

Nigeria's educational system has been criticized for prioritizing fossil fuel-based knowledge, neglecting renewable energy and sustainability. This dominance of fossil fuel-based education perpetuates the country's reliance on non-renewable energy sources, hindering the transition to a sustainable energy mix. This narrow focus has severe consequences, including a lack of skilled professionals in renewable energy and sustainability. As a result, Nigeria struggles to develop and implement effective policies and technologies to address climate change and energy security challenges. Furthermore, the education system's emphasis on fossil fuels reinforces the status quo, limiting innovation and entrepreneurship in the renewable energy sector according to some scholars.

To address these challenges, there is a need for a paradigm shift in Nigeria's education system, incorporating renewable energy and sustainability into the curriculum. This can be achieved through revised educational policies, teacher training programs, and increased investment in renewable energy research and development.

g. Language Barriers:

Language barriers significantly hinder the adoption of clean energy technologies in local communities. Technical information on clean energy is often inaccessible due to language constraints, excluding marginalized communities from the transition to sustainable energy. In Nigeria, for instance, English is the primary language used in clean energy documentation, yet many rural communities speak indigenous languages. This language gap results to:

- i. Lack of awareness about clean energy benefits and opportunities
- ii. Misunderstandings about installation, operation, and maintenance
- iii. Inability to troubleshoot issues or report problems
- iv. Limited participation in decision-making processes
- v. To bridge this gap, clean energy stakeholders must prioritize language inclusivity:
- vi. Translate technical materials into local languages
- vii. Provide interpreter services for community engagements
- viii. Develop visual aids and simplified materials
- ix. Collaborate with local influencers and community leaders

By addressing language barriers, Nigeria can increase clean energy adoption, enhance community engagement, and promote sustainable development.

h. Cognitive Biases:

Cognitive biases significantly influence decision-makers' perceptions of clean energy, often

driven by misinformation or a lack of understanding. These biases can lead to misguided decisions, hindering Nigeria's transition to sustainable energy. Common cognitive biases against clean energy include:

- i. Confirmation bias: Seeking information that confirms pre-existing doubts about clean energy.
- ii. Anchoring bias: Overemphasizing initial costs while downplaying long-term benefits.
- iii. Availability heuristic: Overestimating the importance of fossil fuels due to familiarity.
- iv. Loss aversion: Fear of losing investments in traditional energy sources.

To overcome these biases: provide accurate, unbiased information on clean energy benefits and potential, engage decision-makers in experiential learning and site visits, foster collaborative discussions with experts and peers and develop inclusive, evidence-based policies. By addressing cognitive biases, Nigeria can promote informed decision-making, unlocking clean energy's potential for sustainable development.

Addressing the Epistemological Barriers and Power Dynamics Hindering Nigeria's Clean Energy Transition

Nigeria's energy transition is hindered by epistemological barriers rooted in dominant western knowledge systems. To overcome these barriers, this section examines strategies for decolonizing energy knowledge, promoting indigenous perspectives, and fostering inclusive participatory approaches. By challenging prevailing epistemological frameworks, we can uncover new pathways for sustainable energy development that prioritize local contexts, values, and needs. Addressing these epistemological barriers requires:

a. Contextualizing Knowledge Production

Contextualizing knowledge production involves generating knowledge tailored to Nigeria's unique context. This approach recognizes western-dominated epistemologies may not totally apply in African settings. By contextualizing knowledge, researchers and practitioners will develop solutions accounting for local nuances. Contextualized knowledge production encourages collaboration between local stakeholders, researchers, and policymakers. This ensures knowledge is co-created, relevant, and effective in addressing Nigeria's energy challenges. By prioritizing contextualized knowledge production, Nigeria reduces reliance on imported solutions and fosters innovative approaches.

b. Local Research and Development

Local research and development (R&D) drive the creation of context-specific technologies. Domestic R&D enables knowledge sharing and capacity building among Nigerian researchers, policymakers, and industry experts. Local R&D facilitates innovation hubs and research institutions driving adapted technologies. For example, Nigerian researchers develop affordable solar panels suitable for rural environments. By investing in local R&D, Nigeria will cultivate a vibrant innovation ecosystem.

c. Inclusive Education and Training

It is important for Nigeria to build inclusive education that will integrate renewable energy and sustainability into school curriculum. This ensures diverse stakeholders access clean energy knowledge and skills. Inclusive education empowers local communities to participate in sustainable energy development. Training programs focus on solar installation, maintenance, and entrepreneurship.

d. Cultural Sensitivity and Community Engagement

Cultural sensitivity involves recognizing local customs, values, and beliefs. Community-led initiatives will ensure clean energy solutions align with local needs. Effective community

engagement fosters trust, ownership, and participation. This involves community-based renewable energy cooperatives and energy literacy programs.

e. Cognitive Bias Awareness

Cognitive bias awareness is crucial for effective decision-making in Nigeria's energy sector. Biases like confirmation bias and anchoring bias can lead to misguided decisions (Kahneman, 2011, p. 125). Recognizing these biases enables policymakers to consider alternative perspectives. Cognitive bias awareness training programs can enhance critical thinking and objective decision-making (Tversky & Kahneman 1974, 1127). Effective cognitive bias awareness strategies include workshops, training sessions, and peer review processes. These initiatives promote self-reflection and critical evaluation of assumptions (Kahneman 2011, 130). By integrating cognitive bias awareness into decision-making processes, Nigeria can reduce the influence of biases and improve energy policy outcomes.

f. Institutional Capacity Building

Institutional capacity building is vital for Nigeria's energy sector development. Strengthening institutions enables effective policy implementation and regulation. Capacity building initiatives should focus on human resources, infrastructure, and organizational processes. Institutional capacity building enhances the effectiveness of energy agencies and ministries. Training programs, workshops, and collaborations with international organizations can build capacity. Effective institutional capacity building requires a needs assessment, strategic planning, and performance monitoring. This ensures targeted interventions and measurable outcomes. By investing in institutional capacity building, Nigeria can enhance its energy sector governance and even attract investors in the sector.

g. Data Collection and Analysis

Data collection and analysis are critical for informed decision-making in Nigeria's energy sector. Accurate data enables policymakers to track progress, identify trends, and make evidence-based decisions. Effective data collection involves surveys, energy audits, and monitoring systems. Data collection and analysis inform policy development, energy planning, and resource allocation. If data collection and analysis is prioritized, Nigeria can optimize energy sector performance, identify areas for improvement, and drive sustainable development.

h. Power Dynamics and Energy Policy

Power dynamics play a crucial role in shaping energy policy, particularly in Nigeria's transition to clean energy. Power dynamics refer to the relationships and interactions among various stakeholders, including governments, corporations, civil society, and local communities, that influence energy policy decisions. In Nigeria, power dynamics have historically favored fossil fuel interests, hindering the development of renewable energy (Newell & Mulvaney 2013, 56). The Nigerian government's energy policy has been criticized for prioritizing the interests of international oil companies (IOCs) over local communities and the environment (Obi 2016, 102). Furthermore, Nigeria's energy policy has been influenced by western powers, who have historically promoted fossil fuel interests (Klare 2012, 123).

Civil society organizations (CSOs) and local communities have challenged these power dynamics, advocating for a transition to clean energy and greater community involvement in energy decision-making. However, CSOs face significant barriers, including limited access to funding, information, and policy-making processes. To address the epistemological barriers and power dynamics hindering Nigeria's clean energy transition, a multifaceted approach is necessary. Firstly, Nigeria should prioritize decolonizing its knowledge systems by establishing indigenous knowledge centers to document and promote traditional energy practices (Mignolo 2011, 160). This should be complemented by integrating local perspectives into energy policy-

making through participatory research and community engagement (Harding 2015, 128). Promoting energy democracy is also crucial to addressing power dynamics. Nigeria should implement community-led energy initiatives, enabling local communities to own and manage renewable energy projects. Inclusive energy policy-making processes should be established, involving civil society organizations and local communities (Newell & Mulvaney 2013, 60). Regulatory frameworks should be strengthened to ensure accountability and transparency in energy decision-making. Fostering local innovation is vital to Nigeria's clean energy transition. There is a urgent need for research and development funding mechanisms to be established for local energy entrepreneurs. Technology transfer programs should also be developed to enhance local capacity in renewable energy. Business incubators and hubs should be created to support local energy start-ups.

Addressing energy poverty requires targeted interventions. Nigeria should implement energy access programs for marginalized communities. Affordable energy financing mechanisms should be developed for low-income households (Obi 2016, 102). Energy efficiency measures should be promoted in buildings and industries.

Ultimately, a coordinated approach is necessary to overcome these complex barriers hindering Nigeria's clean energy transition. By prioritizing decolonization, energy democracy, local innovation, energy access, and international cooperation, Nigeria can create a sustainable and equitable energy future.

Conclusion

Nigeria's clean energy transition is hindered by complex epistemological barriers and power dynamics. The dominance of western knowledge systems, technocratic expertise, and neoliberal market fundamentalism has marginalized local perspectives, indigenous knowledge, and community-led initiatives. These barriers perpetuate energy poverty, environmental degradation, and social injustice. However, by recognizing and addressing these challenges, Nigeria can create a more inclusive and sustainable energy future. Decolonizing knowledge systems, promoting energy democracy, fostering local innovation, addressing energy poverty, and leveraging international cooperation are crucial strategies for overcoming these barriers.

Effective policy interventions, such as community-led energy initiatives, inclusive energy policy-making, and targeted energy access programs, can ensure that Nigeria's clean energy transition benefits all citizens. Moreover, prioritizing local innovation, research, and development will enable Nigeria to develop context-specific solutions to its energy challenges. As a matter of fact, Nigeria's clean energy transition requires a paradigm shift from fossil fuel dominance to renewable energy, from technocratic expertise to community-led initiatives, and from neoliberalism to social and environmental justice. By embracing this transition, Nigeria can ensure energy security, economic development, and environmental sustainability for generations to come.

References

- Ake, C. (1996). *Democracy and Development in Africa*. Brookings Institution Press.
- Cleantech. (2020). *Cleantech Innovation Report*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://tech2.cleantech.com/2020-global-cleantech-100-report-download>
- Escobar, Arturo. (1995). *Encountering Development: The Making and Unmaking of the Third World*. Princeton University Press.
- Federal Ministry of Environment (2015). *National Renewable Energy Policy*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://cleantech.hnologyhub.com/wp-content/uploads/2022/07/NATIONAL-RENEWABLE-ENERGY-AND->

[ENERGY-EFFICIENCY-POLICY-NREEEP.pdf](#)

- Federal Ministry of Environment (2020). Nigerian Energy Transition Plan. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.energytransition.gov.ng/>
- Harding, Sandra. (2015). *Objectivity and Diversity: Another Logic of Scientific Inquiry*. University of Chicago Press.
- Harvey, David. (2005). *A Brief history of Neoliberalism*. Oxford University Press.
- International Council for Local Environmental Initiatives. (2020). *Community-led Clean Energy*.
- International Energy Agency. (2020). *Energy Policies and Technologies for a Low-Carbon Economy*. OECD Publishing.
- International Energy Agency. (2020). *Energy Security*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.iea.org/reports/world-energy-outlook-2020>
- International Monetary Fund. (2020). *Nigeria: Staff Report for the 2020 Article IV Consultation*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.imf.org/en/News/Articles/2020/02/17/pr2053-IMF-Staff-Concludes-Article-IV-Consultation-to-Nigeria>
- Intergovernmental Panel on Climate Change. (2020). *Climate Change 2020*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.ipcc.ch/2020/>
- Intergovernmental Panel on Climate Change. (2018). *Global Warming of 1.5°C*. Cambridge University Press.
- International Renewable Energy Agency. (2020). *Global Renewables Outlook: Transforming the Energy System*.
- Jacobson, Mark Z., et al. (2017). 100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-sector Energy Roadmaps for 139 Countries of the World. *Energy & Environmental Science*, 10(8), 2186-2203.
- Kahneman, Daniel. (2011). *Thinking, Fast and Slow*. Farrar, Straus and Giroux.
- Kammen, Daniel M., et al. (2017). Economic benefits of Grid Modernization. *IEEE Power and Energy Magazine*, 15(4), 122–131.
- Klare, Michael T. (2012). *The Race for What's Left: The Global Scramble for the World's Last Resources*. Metropolitan Books.
- Klein, Naomi. (2014). *This Changes Everything: Capitalism vs. the Climate*. Simon and Schuster.
- Mignolo, Walter D. (2011). *The Darker Side of Western Modernity: Global futures, Decolonial Options*. Duke University Press.
- Mulugetta, Yasuhiro, et al. (2019). *Africa's Energy Transition: Opportunities and Challenges*. Springer Nature.
- Nigerian Electricity Commission. (2020). *Nigerian Energy Transition Plan*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.energytransition.gov.ng/>
- Newell, Peter, & Mulvaney, David. (2013). The Political Economy of the Just Transition. *Journal of International Development*, 25(6), 761–774.
- National Bureau of Statistics (NBS). (2020). *Migration and Remittances in Nigeria*.
- National Renewable Energy Laboratory. (2020). *Renewable Energy Technology Advancements*.
- Obi, Cyril. (2016). Oil and Insurgency in the Niger Delta. *Journal of Contemporary African*

Studies, 34(1), 97–113.

Quijano, Aníbal. (2000). Coloniality of Power and Eurocentrism in Latin America. *International Sociology*, 15(2), 533–555.

Rifkin, Jeremy. (2011). *The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and the World*. Palgrave Macmillan.

Sustainable Energy for All. (2020). *Energizing Universal Access*.

Smil, Vaclav. (2017). *Energy and Civilization: A History*. MIT Press.

Tversky, Amos, & Kahneman, Daniel. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124–1131.

United Nations Environment Programme. (2019). *Environmental Assessment of Ogoniland*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.unep.org/topics/disasters-and-conflicts/country-presence/nigeria/environmental-assessment-ogoniland-report>

World Health Organization. (2018). *Air pollution*. Retrieved November 20, 2024 from <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.who.int/health-topics/air-pollution>

World Bank. (2020). *Nigeria: Energy Sector Review*.