# Energy Geography of Nigeria: Governance, Power and Social Exclusion

**Sani Shehu Matawalle**

**PhD**

**University of York**

**Environment and Geography**

**January 2024**

## ABSTRACT

This study investigates regional disparities in electricity access and supply within Nigeria and proposes evidence-based policy recommendations for equitable and sustainable provision. The research identifies inadequate and unequal electricity distribution as significant obstacles to Nigeria's socioeconomic development. Drawing on Historical Institutionalism, Political Economy, Regional Development and Energy Justice theories, the study explores economic, political, spatial, and socio-cultural factors contributing to these disparities across Nigeria's geopolitical zones. Employing a qualitative approach the data collected from semi-structured interviews with energy stakeholders and community members in the North-West, South-South, and South-West regions reveal that historical neglect, poor governance, and inadequate infrastructure investments are key drivers of unequal electricity distribution.

The findings indicate that the South-West region experiences significantly better access due to strategic infrastructure investments, while the North-West faces persistent shortfalls due to historical underdevelopment and policy neglect. Notably, regional political interests and geographical challenges further exacerbate these disparities, impacting the quality of life and economic opportunities. Based on these insights, the study recommends targeted policy interventions to enhance infrastructure in underserved regions, foster inclusive development, and support sustainable energy futures across Nigeria. The recommendations will guide policymakers, researchers, energy providers, and other stakeholders in developing strategies to enhance more equitable energy access.

## TABLE OF CONTENTS

ABSTRACT ..... i
TABLE OF CONTENTS ..... ii
LIST OF TABLES ..... vii
LIST OF FIGURES ..... ix
DECLARATION ..... x
ACKNOWLEDGEMENTS ..... xi
DEDICATION ..... xiii
ABBREVIATIONS AND ACRONYMS ..... xiv
CHAPTER 1 ..... 1
1.0 Introduction ..... 1
1.1 Analysing the Socio-Spatial Dynamics of Global Energy Access ..... 5
1.2 Why the Focus on Nigeria? ..... 8
1.3 Background on Nigeria ..... 11
1.4 Nature of the Problem ..... 19
1.5 Significance of the Study ..... 23
1.6 Research Aim ..... 23
1.7 Research Objectives ..... 24
1.8 Research Questions ..... 24
CHAPTER 2 ..... 26
2.0 Introduction ..... 26
2.1 Energy Geography and Its Relationship to the Electricity Sector ..... 26
2.2 Geographic Perspective on Regional Disparities ..... 29
2.3 Political Interests and Resource Allocation ..... 32
2.4 Political Economy of Energy: A Global to Regional Perspective ..... 35
2.5 Socioeconomic Consequences of Unequal Electricity Access ..... 38

2.6 Corruption and Mismanagement in the Power Sector: A Global and Regional Perspective ..... 41
2.7 Brief History and Current State of Nigeria's Electricity Sector ..... 43
2.8 Overview of Electricity Access in Nigeria ..... 49
2.9 Factors Influencing Electricity Access in Nigeria ..... 54
2.10 Summary ..... 61
CHAPTER 3 ..... 63
3.0 Introduction ..... 63
3.1 Historical Institutionalism (HI) ..... 63
3.1.1 Colonial Legacies and Regional Disparities ..... 64
3.1.2 Institutional Inertia and Governance Challenges ..... 65
3.1.3 Technological Innovation as a Disruptor of Path Dependency ..... 65
3.1.4 Summary ..... 66
3.2 Regional Development Theory ..... 66
3.2.1 Regional Development Theory and Electricity Infrastructure Development ..... 67
3.2.2 The Role of Centralised and Decentralised Policies in Regional Development ..... 68
3.2.3 Regional Integration and Energy Cooperation ..... 68
3.2.4 Regional Development Theory and Energy Access in Nigeria ..... 69
3.2.5 Summary ..... 70
3.3 Political Economy ..... 70
3.3.1 Political Economy Envisioning a More Inclusive Energy Future for Nigeria ..... 71
3.3.2 Regional Approaches to Energy Diversification and Infrastructure ..... 71
3.3.3 Energy Infrastructure and Governance in Nigeria ..... 72
3.3.4 Summary ..... 73
3.4 Energy Justice ..... 73
3.4.1 Distributive Justice in Energy Access ..... 74
3.4.2 Procedural Justice in Energy Decision-Making ..... 75

3.4.3 Recognition Justice and the Rights of Marginalised Groups ..... 75
3.4.4 Energy and Climate Justice: Intersections and Challenges ..... 76
3.4.5 Technological and Policy Solutions for Energy Justice ..... 77
3.4.6 Summary ..... 77
CHAPTER 4 ..... 79
RESEARCH METHODOLOGY ..... 79
4.0 Introduction ..... 79
4.1 Qualitative Research Methodology ..... 79
4.2 Research Philosophy ..... 80
4.3 Research Paradigm ..... 82
4.4 Justification for Research Methods and Methodological Choice ..... 84
4.5 Case Study Research Design ..... 86
4.5.1 Rationale for Case Study Method ..... 87
4.6 Data Collection Methods ..... 88
4.6.1 Semi-structured interviews ..... 89
4.6.2 Document Analysis ..... 91
4.7 Sampling Framework ..... 93
4.7.1 Positionality of the Researcher ..... 99
4.7.2 Recruiting and Contacting Participants ..... 100
4.8 Design of Interviews ..... 100
4.8.1 Interview Process (Phone Interviews) ..... 101
4.8.2 Challenges During the Data Collection ..... 102
4.9 Data Presentation and Analysis ..... 103
4.9.1 Thematic Data Analysis ..... 104
4.10 Research Evaluation ..... 106
4.10.2 Limitations ..... 108
4.11 Ethical Consideration ..... 109

CHAPTER 5 ..... 110
CASE STUDY REGIONS ..... 110
5.0 Introduction ..... 110
5.1 Identification and Selection of the Case Study Regions ..... 110
5.2 Overview of the Case Study Regions ..... 114
5.3 Overview of the North-West Region ..... 115
5.4 Overview South-West Region ..... 118
5.4.1 Lagos State as a Case Study ..... 119
5.5 Overview South-South Region ..... 120
5.5.1 Rivers State as a Case Study ..... 121
5.1 Comparative Analysis of Case Study States ..... 122
5.1.1 Geographical and Historical Aspects ..... 122
5.1.2 Socio-economic and Demographic Aspects ..... 123
5.1.4 Electricity Infrastructure and Access ..... 124
CHAPTER 6 ..... 126
Rethinking Energy Accessibility in Nigeria: A Historical Analysis ..... 126
6.0 Introduction ..... 126
6.1 Historical Trajectory of Electricity Infrastructure Development ..... 127
6.2 Colonial Legacy in Nigeria's Electricity Infrastructure Development ..... 127
6.3 Examining the Colonial Legacy in Nigeria's Electricity Infrastructure Development ..... 131
6.4 Resistance to Colonial Infrastructure in Northern Nigeria and its Enduring Impact on Regional Disparities ..... 137
6.5 Analysing Development and Distribution of Electricity Infrastructure in post-colonial Nigeria ..... 141
6.6 Disparities in Electricity Access and Supply Amongst Regions ..... 147
6.7 Assessing the Role of Energy Plant Locations in Shaping Electricity Supply in Nigeria ..... 153

6.8 Summary ..... 163
CHAPTER 7 ..... 165
PERCEPTIONS OF THE CURRENT STATE OF ELECTRICITY PROVISION IN NIGERIA ..... 165
7.0 Introduction ..... 165
7.1 Affordability of Grid Electricity ..... 165
7.2 Electricity Needs of Consumers. ..... 169
7.3. Electricity Billing System in Nigeria ..... 176
7.4 Electricity Consumers' Willingness to Pay for Electricity ..... 181
7.5 Analysing the Impact of Energy Theft in Nigeria ..... 185
7.6 Summary ..... 190
CHAPTER 8 ..... 192
ENVISIONING A MORE INCLUSIVE ENERGY FUTURE FOR NIGERIA ..... 192
8.0 Introduction ..... 192
8.1 Strategies for Expanding and Improving Electricity Infrastructure in Nigeria ..... 193
8.2 Perspective on Diversifying Energy Sources to Improve Accessibility in Nigeria ..... 196
8.3 Transitioning Towards an Inclusive Energy Sector: Perspectives on Governance and Policy Reforms ..... 206
8.4 Perceptions on the Efficacy of Cost-Reflective Tariffs in Addressing Electricity Supply Challenges in Nigeria ..... 210
8.5 Promoting Public Participation and Coordinated Decision-Making ..... 215
8.6 Building Trust and Improving Communication in Nigeria's Electricity Sector 219
7.7 Summary ..... 225
CHAPTER 9 ..... 227
CONCLUSION AND RECOMMENDATIONS ..... 227
9.1 Future Research ..... 230
9.2 Recommendations ..... 232

REFERENCES ..... 235
APPENDICES ..... 258

## LIST OF TABLES

Table 1: Source National Bureau of Statistics Nigeria (2021), World Bank (2021)… 20
Table 2: Research Participants Interviewed ..... 97
Table 3: The Community Research Participants ..... 98
Table 4: Major Electricity Undertakings During Colonial Government 1896-1950.. 134
Table 5: Operational Power Plants and their Location (NESI generation Statistics, 2022) ..... 143
Table 6: Power Plants and Under construction and their Location (NESI generation Statistics, 2022)..... 144

## LIST OF FIGURES

Figure 1: Map of Nigeria (The colonial office and Nigeria, 1898-1914 Carland, J.M., 1985). ..... 13
Figure 2: Map of Nigeria showing Geographical regions (FMIC, 2013) ..... 17
Figure 3: Map of Nigeria showing Geographical regions (NERC, 2020) ..... 37
Figure 4: Map of Nigeria showing the transmission network (TCN, 2021) ..... 59
Figure 5: Map of Nigeria showing energy generation plant location (Baseline Report, 2015) ..... 60
Figure 6: Map of Nigeria showing the six regions (FMI 2015) ..... 111
Figure 7: Map of Nigeria showing the six regions (FMI, 2015) ..... 115

## DECLARATION

I, Sani Shehu Matawalle, declare that this thesis, titled Energy Geography of Nigeria Governance Power and Social Exclusion, submitted for the Doctor of Philosophy (PhD) degree at the University of York, is a presentation of my original work. I am the sole author of this thesis, and it has not been previously submitted for any other academic degree or qualification at this or any other institution.

I affirm that all the ideas, theories, methodologies, experimental work, data analysis, and conclusions presented in this thesis are the result of my independent research efforts conducted under the guidance of my supervisors.

I further declare that all sources used in this thesis have been appropriately acknowledged and cited. Any contributions or assistance received from individuals, organizations, or publications have been duly acknowledged in the acknowledgements section of this thesis.

## ACKNOWLEDGEMENTS

I commence this acknowledgement with profound gratitude to Allah, the Almighty, for granting me strength, perseverance, and unwavering guidance throughout my arduous journey to complete this PhD thesis Alhamdulillah.

First and foremost, I owe a debt of gratitude to my dedicated supervisors, Associate Prof Karen Parkhill and Dr Joshua Kirshner. Their unwavering support, mentorship, and expertise have been the guiding lights of this academic journey. In the face of countless emotional and psychological challenges, Karen and Joshua have been steadfast pillars of support, offering invaluable guidance and constructive feedback. Their dedication to reviewing my work and their endless patience have been a wellspring of strength, for which I am genuinely thankful. Their contributions have been immeasurable, and I consider myself profoundly honoured to have had them as my supervisors.

I also extend my deepest gratitude to my external examiner, Prof Roy Maconachie, and my internal examiner, Dr Gideon Baffoe, for their thorough and thoughtful examination of my thesis. Their insightful feedback, constructive critique, and valuable recommendations have significantly enhanced the quality of my research. Their guidance and expertise were instrumental in refining the final thesis, and I am truly grateful for their time and effort in this process.

I must take this opportunity to express my heartfelt appreciation to the Nigerian Defence Academy (NDA) in Kaduna and the Tertiary Education Trust Fund (TETFund) of Nigeria for their nomination and the gracious award of a full scholarship that provided the financial backing for my doctoral studies. I also extend my heartfelt appreciation to the Nigerian Army, particularly the Chief of Army Staff, for their exceptional support in permitting me to pursue my doctoral studies. I will forever hold a deep sense of gratitude towards Major General MI Idris (Rtd) and Major General S. Ibrahim, who were instrumental in nominating me for both my MSc and PhD programs. I am immensely indebted to Major General SS Ibrahim for his unwavering support and invaluable mentorship.

I am profoundly grateful to my parents, and family, my beloved wife, Asiya, and our children, Muhammad, Usman, and Hajar, as well as my friends who are too numerous to mention. Their unwavering encouragement and steadfast belief in my

abilities have been the rock upon which my resilience has been built throughout this challenging journey. Their boundless love, unwavering support, and deep understanding of the demands of my studies have been a constant source of strength.

Furthermore, I extend my thanks to all individuals who have contributed to my research in any capacity whether through insightful discussions, resource provision, or valuable insights. Your contributions have significantly shaped the outcome of this thesis.

Finally, I acknowledge the collective efforts of the faculty members, administrative staff, and fellow students at the University of York. Their conducive academic environment, abundant resources, and collaborative spirit have been pivotal in enriching my research experience.

## DEDICATION

I dedicate this thesis to my family.

## ABBREVIATIONS AND ACRONYMS

**AEDC** Abuja Electricity Distribution Plc

**BEDC** Benin Electricity Distribution Plc

**BPE** Bureau for Public Enterprises

**CBN** Central Bank of Nigeria

**DISCOS** Electricity Distribution Companies

**ECN** Electricity Corporation of Nigeria

**ECN** Energy Commission of Nigeria

**ECOWAS** Economic Community of West African States

**EEDC** Enugu Electricity Distribution Plc

**EKEDC** Eko Electricity Distribution Plc

**EPSR** Electric Power Sector Reform

**GENCOS** Electricity Generation Companies

**GRA** Government Reservation Area

**HDI** Human Development Index

**HDR** Human Development Report

**IAEA** International Atomic Energy Agency

**IBEDC** Ibadan Electricity Distribution Plc

**IEA** International Energy Agency

**IKEDC** Ikeja Electricity Distribution Company

**IMF** International Monetary Fund

**IPP** Independent Power Producers

**JEDC** Jos Electricity Distribution Plc

**KAEDCO** Kaduna Electricity Distribution Plc

**KEDC** Kano Electricity Distribution Plc

**MAN** Manufacturers Association of Nigeria

**MDGs** Millennium Development Goals

**MYTO** Multi-Year Tariff Order

**NBET** Nigerian Bulk Electricity Trading

**NBS** National Bureau of Statistics

**NDA** Niger Dam Authority

**NDHS** Nigeria Demographic and Health Survey

**NDPHC** Niger Delta Power Holding Company

**NEMSA** Nigerian Electricity Management Service Agency

**NEPA** National Electric Power Authority

**NEPP** National Electric Power Policy

**NERC** Nigerian Electricity Regulatory Commission

**NESCO** Nigeria Electricity Supply Company

**NESI** Nigerian Electricity Supply Industry

**NESO** Nigerian Electricity System Operator

**NPC** National Population Commission

**NREMP** Nigeria Renewable Energy Master Plan

**PHEDC** Port Harcourt Electricity Distribution Plc

**REA** Rural Electrification Agency

**TCN** Transmission Company of Nigeria

**YEDC** Yola Electricity Distribution Company Plc

# CHAPTER 1

## 1.0 Introduction

The centrality of energy to human existence and societal advancement cannot be overemphasised. Energy is an indispensable resource integral to maintaining an acceptable standard of living, (IEA, 2019, UNDP, 2020). However, a glaring disparity exists in energy accessibility worldwide, with the Global South, particularly Sub-Saharan Africa (SSA), bearing the brunt of this challenge. The research primarily focuses on electricity, and it is important to note that when referring to energy, it pertains to electricity in this context.

The International Energy Agency (IEA) indicates that while electricity access has seen some improvement, growing from 48% to 70% between 2010 and 2018, this progress is overshadowed by the rising number of people lacking access to grid and off-grid energy due to demographic growth. This number has increased by 4% between 2019 and 2021 (IEA, 2021). The global energy situation is characterised by significant disparities, which have been exacerbated during the COVID-19 pandemic. This crisis has severely impacted the ability of households in developing nations to afford energy (IEA et al., 2021). Regarding electricity access, Nigeria, the Democratic Republic of Congo, and Ethiopia emerge as the countries facing significant energy challenges. These three have been highlighted due to their combination of substantial population size, rapid growth, and struggling energy infrastructure, creating a unique set of challenges that make their energy access issues particularly acute and representative (ibid).

In Sub-Saharan Africa, the Nigerian political economy offers a compelling case study. Nigeria, African's most populous nation has the highest proportion of its citizens without electricity (World Bank, 2022). The intricate web of demand-supply imbalance, rampant reliance on personal generators, and a woefully inadequate national grid system that powers only 51.2% of the country's electricity needs underscores the complex issues faced by the Nigerian electricity sector (IEA et al., 2020; NBS, 2020).

Moreover, rapid demographic growth and patterns of urbanisation add further strain to the already struggling energy infrastructure. Projections indicate that by 2050, Nigeria will be one of the largest countries worldwide by population, ranking 3rd or

4th, further exacerbating these challenges (UN, 2022). The country's history of unstable governance, marked by military coups and civil war, complicates efforts to implement sustainable solutions which undermine long-term planning and investment in the energy sector (Folola and Heaton, 2008). These factors present a complex and daunting picture for policymakers and energy providers aiming to expand access to reliable and sustainable electricity in Nigeria.

The Nigerian Electricity System Operator (SO) estimates that the country's electricity demand stands at 40,000MW, a far cry from the 4,000-5,000MW generated (SO, 2021). This severe electricity shortfall has a considerable economic cost, with the World Bank (2019) pegging it at around 2% of GDP, equalling $26.2 billion. Unreliable and insufficient electricity supply undeniably throttles economic growth (Ferguson et al., 2000; Ajao et al., 2009; Lionel, 2013; Nwankwo and Njogo, 2013; Itumo, 2017; Nkalo and Agwu, 2019). The adverse ramifications of Nigeria's energy deficit extend beyond mere economic considerations. In the educational sphere, a consistent lack of electricity impedes the efficiency of learning environments. It stifles the deployment of contemporary digital education methodologies, obstructing avenues for equitable and quality educational access (Oyedepo, 2012). Similarly, in the healthcare sector, the unreliability of power supply critically hampers healthcare facilities' abilities to deliver essential services, notably impacting areas such as the preservation of vaccines, the functioning of vital medical apparatus, and the provision of nocturnal healthcare services (Oyedepo, 2012; Abubakar et al., 2018). Consequently, this widespread energy deficit serves as a multifaceted barrier to the nation's comprehensive development, touching upon facets fundamental to the welfare and progress of the Nigerian populace.

Nigeria's energy demand is projected to increase dramatically due to population growth, socio-economic development, and anticipated future lifestyle changes, potentially leaving over 100 million people without access to electricity (World Bank, 2019). Several scholars concur that despite the Nigerian government's significant investment in improving the country's electricity infrastructure, including the generation, transmission, and distribution segments and natural gas supply facilities to power plants, there has not been a corresponding increase in the country's electricity capacity (Hicks, 2015; Akuru et al., 2017; Usman et al., 2017; Olatunji et al., 2018; Nwozor et al., 2021). One reason for this is the years of underinvestment

by the government, which has caused the energy supply infrastructure to lag with population growth (Iwayemi, 2008; Olugbenga et al., 2013).

The transition to private sector ownership in the Nigerian electricity sector occurred following the Electric Power Sector Reform Act of 2005, enacted by the Obasanjo government. This significant shift was designed to improve the efficiency and reliability of the electricity sector by attracting private investment (Sambo, 2008). However, the privatisation process was marred by procedural violations, including a lack of transparency in selling assets to private investors, improper valuation, and inadequate regulatory frameworks that did not align with international best practices (Ogunleye, 2016; Adedeji, 2017, Roy et al., 2020).

These violations have created disparities in who benefitted and who lost out from the reforms. Large corporations and well-connected individuals were often favoured, leading to public criticism and allegations of corruption (Sambo, 2008; Oyedepo, 2012). On the other hand, the general populace, particularly those in underserved regions, did not see the promised improvements in electricity access or affordability, resulting in widespread dissatisfaction (Onochie et al., 2015; Edomah, 2021).

The Nigerian government recognises the significance of addressing these issues and has taken various measures to mitigate the challenges faced by the electricity sector. For instance, efforts have been made to improve the privatisation process, enhance regulatory frameworks, and attract investments to boost electricity generation and transmission (NERC, 2020). To address the procedural violations during privatisation, the government has sought to make the process more transparent and fairer. This includes establishing clearer guidelines for valuation and bidding and conducting thorough audits to ensure these guidelines are followed (NERC, 2020).

The government has also worked on enhancing its regulatory frameworks. For instance, the Nigerian Electricity Regulatory Commission (NERC) has been given greater authority to enforce compliance with regulations and penalise infractions. This has included efforts to ensure that tariffs reflect the cost of providing electricity, promoting more efficient operation of the sector and encouraging private investment (NERC, 2020).

In terms of attracting investments, the government has introduced a variety of incentives. These include tax holidays for investors in the electricity sector, reduced import duties on equipment necessary for electricity generation and transmission and guarantees of minimum returns for investors in some instances (NERC, 2020). Additionally, the government has been promoting energy mix diversification by exploring renewable energy sources such as solar and wind (Federal Ministry of Power, Works, and Housing [FMPWH], 2015). These initiatives aim to reduce the dependence on gas-fired power plants, increase the share of renewable energy, and enhance the resilience and sustainability of the Nigerian energy sector.

The energy framework of Nigeria is deeply entwined with its socio-political landscape, particularly in the Niger Delta region, which is the epicentre of the nation's oil and gas resources. Gas-fired power plants contribute to a significant 80% of Nigeria's energy mix, a dominance attributable to the country's substantial natural gas reserves (Nigeria Electricity Regulatory Commission [NERC], 2020). However, despite this abundance, the allure of exporting natural gas to international markets and the vulnerability of gas infrastructure to frequent sabotage has compromised the steady gas supply to power plants (Iwayemi, 2008). Such disruptions culminate in recurrent electricity shortages, undermining the full operational potential of gas-powered plants.

At the core of the supply interruptions is the Niger Delta's turbulent socio-political arena. Historically, the region has been marked by the rise of militant factions, such as the Movement for the Emancipation of the Niger Delta (MEND), which emerged in response to perceived marginalization, environmental harm from oil activities, and demands for a more equitable distribution of oil-derived wealth. Acts of sabotage on energy infrastructure are common strategies these groups employ to amplify their grievances (Ukeje, 2001; Obi, 2009; Ibaba, 2011). Environmental catastrophes like oil spills and gas flaring have not only despoiled the Delta's ecology but have also ignited resentment and protests against the government and involved oil corporations (Watts, 2007). The overlay of human rights infringements, notably the notorious execution of activist Ken Saro-Wiwa in 1995, only intensifies the region's volatility (Okonta & Douglas, 2001). As such, the frequent disruptions in gas supply

for power generation cannot be detached from the broader political and socio-economic struggles of the Niger Delta.

Nigeria is characterised by its multitude of ethnic groups, with estimates indicating the existence of over 250 distinct ethnicities (Osaghae, 1995). The three dominant groups Hausa, Yoruba, and Igbo are complemented by myriad smaller communities, each contributing to the rich cultural mosaic of the nation. This ethnic diversity is further accentuated by a linguistic landscape comprising over 500 individual languages (Ethnologue, 2019). This considerable socio-cultural diversity can complicate unified policy design and implementation, particularly in infrastructure development and service delivery. Consequently, any exploration of Nigeria's electricity challenge must be approached with a nuanced appreciation of these socio-cultural intricacies, as they invariably influence strategies and solutions in the power sector.

### 1.1 Analysing the Socio-Spatial Dynamics of Global Energy Access

Energy geography has increasingly focused on the socio-spatial dimensions of energy access, addressing how geographic, political, and economic forces interact to shape energy distribution and consumption. Bridge et al., (2013) argue that understanding energy access requires an analysis of the governance systems, infrastructures, and inequalities that shape energy landscapes globally. Developed nations have transitioned to discussions of energy security and sustainability while developing countries still struggle with basic access to electricity.

In Latin America, Brazil’s Luz para Todos program exemplifies efforts to achieve near-universal electrification, yet challenges persist in rural electrification due to the high costs of grid extension (Gomez and Silveira., 2010; Coelho and Goldmeberg, 2013; Da Silva et al., 2024). Pueyo et al., (2018) observe that decentralised solar solutions deployed in these regions to mitigate these issues progress slowly. In South Asia, India’s Pradhan Mantri Saubhagya Yojana has made strides in providing off-grid solar electrification in rural areas. However, as Rao (2013) points out, logistical and infrastructure challenges continue to impede complete coverage in remote regions, revealing the limits of current approaches.

Globally, debates on energy access are dominated by discussions around renewable energy transitions versus fossil-fuel-based strategies. While renewable energy offers a sustainable future, Brazilian et al. (2012) highlight the financial, technological, and policy-related obstacles that hinder its rapid adoption in developing countries. As such, many countries continue to rely on fossil fuels to drive economic growth, often exacerbating environmental concerns while failing to address rural energy poverty.

The global debate on energy access is underpinned by the tension between renewable energy adoption and the continued reliance on fossil fuels, especially in rapidly industrialising nations (Bradshaw., 2013; Pistelli., 2020; Hampton., 2023). In China and India, both major coal producers, economic growth has been fuelled by traditional energy sources. Zhou et al. (2017) argue that despite significant investments in renewables, China's energy access efforts remain uneven, with rural and remote areas still underserved. Similarly, Aklin et al. (2018) examine how South Asian countries, including Nepal and Bangladesh, struggle with the financial and logistical difficulties of integrating decentralised renewable energy systems into their grids.

Renewable energy is often promoted as a solution to energy poverty. However, the reality is more complex, particularly in regions with weak infrastructure., Byrne et al. (2017) argue that although hydropower forms the backbone of the energy mix in Latin America the reliance on centralised grids has left many rural areas without adequate energy access. Brazil's hydroelectric has failed to address the energy needs of rural populations, whose energy consumption remains marginalised but, the company's focus on providing affordable energy to cities. Furthermore, Pueyo et al. (2018) highlight how large-scale projects' social and environmental costs such as displacement due to dam construction, complicate the implementation of renewable energy solutions.

Despite solar home systems making significant inroads In South Asia, the cost of deploying such systems at scale is prohibitive, especially in rural and low-income areas. Sovacool (2014) highlights that while decentralised solar projects have gained momentum in Bangladesh and India, they are often hampered by inadequate financing and governance frameworks, leading to project delays and inefficient implementation.

Governance is a critical factor in energy access, affecting the success or failure of energy projects. Effective governance encompasses policy formulation, regulatory frameworks, political stability, and transparency. Sovacool (2014) emphasises that energy poverty is often a result of governance failures, where corruption and political instability undermine energy investments. This is particularly evident in Venezuela, despite vast oil reserves, the population experiences chronic energy shortages. Mismanagement of the energy sector, combined with political instability, has left millions without reliable access to electricity.

South Asia faces similar governance-related challenges. In countries like Nepal, Kaygusuz (2011) notes that political instability has delayed energy reforms, deterred foreign investments, and stifled rural electrification. Poor governance in energy planning has resulted in unreliable and insufficient power generation, particularly in rural areas. Aklin et al. (2018) argue that governance failures, combined with the prohibitive costs of grid expansion, have left many rural communities without reliable electricity access.

The United States also grapples with governance issues in energy access, though in a different form. Carley and Konisky (2020) examine energy poverty within the context of the U.S. energy transition and find that marginalised communities are often excluded from the benefits of clean energy policies. These governance failures highlight the need for targeted policies that address the needs of underserved populations, even in wealthy nations with advanced energy infrastructure.

Sub-Saharan Africa faces some of the most significant energy access challenges globally, with over 600 million people still lacking electricity. The region’s energy poverty is driven by weak infrastructure, political instability, and a heavy reliance on fossil fuels, even as renewable energy potential remains largely untapped. Eberhard et al. (2011) point to Africa’s energy paradox, where vast energy resources, such as oil and gas, coexist with extreme energy poverty.

Renewable energy presents a significant opportunity for Africa, particularly in solar and wind power. Byrne et al. (2017) discuss Kenya’s Lake Turkana Wind Power Project, Africa’s largest wind farm, as an example of the continent’s potential to harness renewable energy. However, Pueyo et al. (2018) caution that the high

upfront costs of renewable projects and the lack of financing mechanisms have slowed their adoption, particularly in rural areas. The result is an energy structure where centralised grids remain the focus, leaving off-grid and rural populations underserved. Governance challenges further exacerbate the energy access crisis in Africa. Aklin et al. (2018) highlight that weak regulatory frameworks, corruption, and political instability have deterred investment in energy infrastructure across the region.

### 1.2 Why the Focus on Nigeria?

Nigeria, with a population of around 213 million, is the most populous country in Africa, which is expected to rise (World Bank, 2021). This growing population makes it crucial to address the problem of limited electricity access, as more than half of the people don't have reliable power (World Bank, 2021). But the problem is not just about numbers. Nigeria's diversity, with various regions and ethnic groups, makes the power issue even more complex. Added to this is a high % unemployment rate of 33% and security concerns in certain regions. Together, these challenges highlight the need for well-planned solutions to Nigeria's electricity problems.

Moreover, Nigeria's intricate tapestry of regional and ethnic dynamics, a legacy from its colonial past, amplifies the complexity of its electricity access challenge. Historically, the late colonial era under British rule saw a deliberate amalgamation of diverse ethnic and religious groups into one political entity. This "cobbling together," while serving colonial administrative convenience, laid the foundation for post-independence political challenges. The series of military coups and countercoups, culminating in the devastating Biafran civil war (1967-1970), further deepened regional mistrust and imbalances. These historical and political upheavals have contributed to disparities in electricity access across various regions, exacerbating existing socioeconomic inequalities (Onyishi et al., 2020). Such discrepancies can be attributed to an unequal distribution of infrastructure, minimal investments in marginalised areas, and inconsistent government policies, which often resonate with echoes from colonial priorities and post-independence political instabilities (Onyishi et al., 2020).

Given Nigeria's particular set of challenges, examining its electricity access crisis offers instructive insights for Nigeria and other post-colonial African states grappling

with similar issues. Analysing the interplay of Nigeria's population dynamics, diversity, regional disparities, and ethnic tensions can yield a nuanced understanding that holds relevance beyond its borders. As many African nations face rapid demographic growth, urbanisation, and the legacies of colonial-era decision-making, Nigeria's experience can serve as a valuable case study. Through such examinations, more effective strategies can be crafted to enhance electricity access and foster inclusive socio-economic development across the continent.

Despite boasting a wealth of energy resources, Nigeria grapples with delivering consistent electricity to its vast populace. The Niger Delta region, historically the heartland of the country's oil production, holds significant crude oil deposits that have placed Nigeria as one of the top oil producers in Africa (EIA, 2020). Concurrently, Nigeria has natural gas reserves, ranking among the world's top ten in proven reserves. Yet, vast portions remain untapped or are flared rather than being utilised for power generation (ibid).

Beyond fossil fuels, Nigeria also possesses considerable renewable energy potential. The northern regions, for instance, receive abundant sunlight, making solar energy a viable option (IRENA, 2018). The country's extensive river systems and hydrological assets, like the River Niger and River Benue, present prospects for hydropower. Wind energy potential is also present, especially in the coastal and northern regions (IRENA, 2018). Furthermore, Nigeria has biomass resources from various agricultural activities that can be harnessed for energy.

However, despite these abundant resources, the irony lies in the country's per capita energy consumption, which is among Africa's lowest, standing at approximately 151 kWh per year (World Bank, 2021). Addressing Nigeria's electricity access situation requires a comprehensive analysis of factors hindering effective resource utilisation, paving the way for more informed energy strategies.

Given the pressing nature of these challenges, a personal connection to this issue can provide nuanced insights and perspectives. Regarding my point of view and position as a researcher, studying Nigeria's electricity access situation is significant, driven by my background and experiences. I have witnessed communities' hardships due to inadequate electricity, which profoundly impacts daily life, socio-economic opportunities, and overall development. Being a Nigerian from Kano, the most

populous state in the nation (NPC, 2006) and situated in the poorest northwest region, with poverty rates above 50 per cent (NBS, 2022). My objective is to shed light on the challenges faced by underserved regions and contribute to identifying tailored solutions that address the specific needs and circumstances of underserved communities. I firmly believe that by amplifying the voices of those directly affected this research can advocate for equitable access to reliable electricity. Moreover, it can pave the way for positive change and foster inclusive socio-economic development in Nigeria.

Research has been conducted on Nigeria's energy sector, particularly its infrastructural inadequacies, governance challenges, and policy reforms. Most existing literature tends to focus on national-level challenges, offering broad overviews of power shortages and inefficiencies without delving into the significant geographical differences within Nigeria. For instance, Emodi and Yusuf (2015) and Adenikinju (2013) highlight systemic issues such as underinvestment, outdated infrastructure, and poor management within the energy sector. However, these studies largely overlook the spatial dimension of electricity distribution and how access differs drastically between Nigeria’s regions. Thus, these studies fail to account for how specific regions, such as the North-West and South-South, face unique challenges related to their historical development, geography, and political dynamics.

However, some scholars acknowledge the existence of regional energy inequalities, but these are often treated as secondary concerns rather than primary areas of investigation. For example, Sanusi and Owoyele (2016) and Olaniyan et al. (2018) briefly discuss how the northern regions of Nigeria, particularly the North-East and North-West, experience lower access rates compared to the more developed South-West. However, these studies do not fully explore the root causes of these disparities, such as the historical neglect of infrastructure development in the North, differences in governance priorities, or the role of energy geography in exacerbating these inequities. Furthermore, these analyses are often quantitative in nature, focusing on statistical disparities rather than exploring the qualitative experiences of communities affected by poor energy access.

The broader literature on energy poverty in Sub-Saharan Africa also tends to focus on national or continental-level analyses, often neglecting the internal regional inequalities within countries like Nigeria. Scholars such as Newell and Phillips (2016) and Bouzarovski (2014) have examined the governance and policy failures that contribute to energy poverty across Africa, but their analyses typically address these issues on a macro scale, without adequately considering how intra-national disparities in energy access shape broader patterns of inequality. This approach overlooks the fact that countries like Nigeria are not even in their energy challenges; rather, they are marked by significant regional disparities that require region-specific solutions. By failing to engage deeply with the socio-spatial dimensions of energy access, the existing literature has not fully captured the complexity of Nigeria's energy structure.

This study, therefore, fills the gap in the literature by providing a comprehensive, regionally focused analysis of electricity access in Nigeria. Through multi-sited analysis, the research goes beyond mere statistical comparisons to offer in-depth insights into the lived experiences of those affected by energy inequality, while also contributing to the global discourse on energy justice and regional development. This study provides an original contribution by positioning regional disparities at the forefront of the energy access debate, thus offering new perspectives on how to address energy inequities within countries as diverse and complex as Nigeria.

### 1.3 Background on Nigeria

Nigeria was a significant British colony primarily due to its abundant natural resources, vast population, and strategic location in West Africa (Mamdani, 1996). The British established their presence in Nigeria in the late 19th century and eventually consolidated their control over the area through treaties, military conquests, and establishing protectorates (Falola, 2004). British governed Nigeria as a colony under an indirect rule system, which relied on local leaders to maintain order and administer British policies (Lugard, 1922). This approach allowed the British to exercise control over the Nigerian people with minimal direct involvement, reducing the administrative burden and costs associated with colonial governance (Mamdani, 1996).

The British colonial administration divided Nigeria into the Northern and Southern Protectorates, each with its distinct systems of governance see fig 1 (Falola, 2004). These divisions resulted from the diverse socio-political landscape of the regions. The Northern Protectorate, inhabited by Muslim populations, was governed through the existing emirate system, with local emirs maintaining control over their territories and people (Havinden and Meredith, 2002). This approach allowed the British to preserve the political and social structure in the north while indirectly controlling the region through the emirs (Lugard, 1922).

In contrast, the Southern Protectorate was characterised by a more diverse and decentralised political structure, with numerous ethnic groups and chiefdoms. Therefore, the British administration opted for a more direct approach to governance in the south, with British-appointed officials taking on administrative roles in the various regions (Havinden and Meredith, 2002).

The British colonial officials in Nigeria were appointed through a centralized system managed by the British government (Crowder, 1962). These officials often held positions within the British colonial administration due to their expertise in various fields, such as engineering, law, or education and were selected based on their qualifications and experience (Falola, 2004). In some cases, officials were directly appointed by the British Crown or the Colonial Office, while in others, they were chosen by senior colonial administrators already serving in Nigeria (Crowder, 1962).


*Figure 1: Map of Nigeria (The colonial office and Nigeria, 1898-1914 Carland, J.M., 1985).*

Once appointed, these officials were responsible for implementing and overseeing the policies and priorities of the British colonial administration within their respective regions. The officials held conflicting views on the most appropriate governance of the regions, which contributed to the heterogeneous approach to decision-making and infrastructure development across Nigeria (Killingray, 1989; Falola, 2004). The British-appointed officials in Nigeria played a significant role in administering policies within their respective regions. However, the amalgamation of Nigeria in 1914 brought forth new challenges and tensions (Crowder, 1962).

The British amalgamation of Nigeria was primarily driven by their interests rather than considering the ethnic and cultural diversities of the region. The act sparked inter-ethnic conflicts and struggles for political supremacy among diverse groups within Nigeria (Tamuno, 1970; Momah, 2013; Ajaebili, 2015). The amalgamation did not lead to a unified colonial policy or a centralised government in Nigeria. The regions maintained different legal and land tenure systems, further highlighting the

administrative and political divisions within the country (Oyovbaire, 1983; Afigbo, 1991; Ajaebili, 2015).

The complexities of Nigeria's post-independence era were underscored by the series of military coups, the most consequential of which culminated in the Biafran Civil War in 1967. The first military coup in 1966, predominantly led by Igbo military officers, led to the assassination of key Northern and Western political leaders (Siollun, 2009). This coup was perceived by many in the North as an Igbo conspiracy, further deepening existing ethno-regional suspicions (ibid). The subsequent counter-coup later that year, predominantly orchestrated by Northern officers, was aimed at reasserting Northern dominance within the national military and political architecture, and it saw the brutal killing of Igbo military officers and civilians, especially in the North (Siollun, 2009). This cycle of violence spurred retaliatory killings of Northerners in the East. It culminated in the Eastern Region's declaration of the independent Republic of Biafra under Colonel Ojukwu, igniting the civil war in 1967 (Achebe, 2012).

Central to these events were underlying grievances stemming from the amalgamation's legacy. Having been governed indirectly by the British, the North retained a distinct political and administrative structure wary of Southern domination, especially Igbo. The first coup inadvertently intensified these fears, which the counter-coup sought to address. The subsequent war was, in many ways, a tragic manifestation of these accumulated tensions as regions vied for control, influence, and resource distribution in the young nation (Falola & Heaton, 2008).

In the context of energy, the significance of the Niger Delta in these dynamics cannot be overstated. The region's oil resources were crucial in the war, as control over them determined economic power and, by extension, political influence (Watts, 2004). The contestation over this vital resource, combined with historical ethno-regional rivalries, has indelibly shaped Nigeria's energy and political landscape. The discovery of oil in the Niger Delta in the late 1950s added a layer of complexity to Nigeria's already intricate socio-political tapestry. The Oloibiri Oilfield in present-day Bayelsa State heralded the dawn of oil exploration in 1956, and by the 1970s, Nigeria was on its way to becoming a major global oil exporter (Frynas, 2000). This

newfound resource represented significant economic potential and a focal point of regional and national contention.

The Niger Delta, traditionally marginalised and faced with environmental degradation due to oil activities, started to demand a fair share of the nation's oil wealth and adequate compensation for the environmental toll on their land and waters (Okonta & Douglas, 2001). As oil revenues began to pour into national coffers, they amplified regional disparities, deepening divisions among Nigeria's ethnic groups, particularly as it became apparent that oil wealth was not evenly or fairly distributed (Obi, 2010).

During the Biafran War, the Niger Delta and its vast oil resources became a strategic point of interest. Control of these resources was vital for financing the war and solidifying the economic foundations of a united Nigeria or an independent Biafra. The Federal Military Government sought to retain these territories due to the significant revenue the oil could bring, thus ensuring the continued flow of resources for its war effort (Nwajiaku, 1995). For Biafra, capturing and retaining these oil fields was essential not just for financial reasons but as a statement of their sovereign and economic viability.

The war saw both sides attempting to control or sabotage the oil infrastructure. International oil companies operating in the region were also affected, with some suspending operations, while others negotiated their continuance under intricate circumstances (Uche, 2008). The post-war era saw the centralisation of oil revenues in the federal government, further marginalising the Delta communities. This centralisation, coupled with environmental degradation, would later catalyse the emergence of militancy in the region in the 1990s and 2000s, as local communities demanded resource control and environmental justice (Ikelegbe, 2005). The legacies of the Biafran War and Nigeria's oil politics continue to influence the nation's energy policies and the Niger Delta's role in the national discourse. These historical circumstances have had a profound influence on Nigeria's socio-political landscape, contributing to the complexities and challenges the country faces today.

The demographic and historical foundations of Nigeria have shaped a tripolar ethnic structure that forms the basis for ethnic agitation and contestation within the country (Falola & Heaton, 2008; Paden, 2015). Each region is home to ethnic and religious minorities who harbour grievances against the ethnic and religious majorities they

perceive as dominating oppressors. These frustrations find expression through passionate political complaints, fiery media discourse, and occasional outbreaks of violence (Tamuno, 1970; Afigbo, 1991; Paden, 2015).

Within the multi-dimensional socio-political milieu of Nigeria, several underlying complexities contribute to the nation's ongoing challenges. A nuanced exploration into Nigeria's ethnic and religious diversity reveals not just simmering tensions between groups but the strategic manipulation of these divisions by dominant political-economic elites (Okonta and Douglas, 2001). While many regions indeed harbour ethnic and religious minorities with long-standing grievances against perceived majorities, it's essential to understand the role of elites in amplifying these divisions. These elites, equipped with considerable resources and influence, often exploit ethnic tensions, diverting attention from systemic issues, solidifying their power bases, or ensuring they maintain control over Nigeria's vast resources (Osaghae and Suberu, 2005). In this context, ethnic divisions serve dual purposes: they act as a smokescreen and a tool for power consolidation.

Nigeria's recent history further attests to its socio-political intricacy, with diverse crises and agitations stretching across its vast landscape. The Boko Haram insurgency has significantly destabilised the northeast, a group with origins in 2002, which has targeted the secular establishment in its quest to create a strict Islamic state (Zenn, 2014). This insurgency has caused widespread havoc within Nigeria and spilling into parts of Niger, Chad, and Cameroon.

The Middle Belt region, especially central Nigeria, has seen escalating tensions between Fulani herders and local farmers, a conflict rooted in competition for land and resources but intensified by climate change, population growth, and religious differences (Higazi, 2016). Additionally, the northwest has experienced a surge in banditry, with armed groups engaging in kidnappings, cattle rustling, and other criminalities due to economic deprivation, inadequate state presence, and weapon proliferation (Ibrahim, 2018).

To the south, the echoes of the Biafran War still resonate. Particularly in the southeast, groups such as the Indigenous People of Biafra (IPOB) advocate for the region's secession (Nwankpa, 2017). The southwest, primarily the Yoruba region, has had political agitations, with growing calls for regional autonomy and federal

restructuring (Adebanwi and Obadare, 2010). However, with the ascension of Bola Tinubu, a formidable figure from the southwest, to the presidency in June 2023, Nigeria's political narrative might be witnessing a significant transformation. Tinubu's rise could symbolise a potential mitigation of some regional agitations, especially within the southwest (Vaaseh, 2021).

The dissatisfaction of numerous minority ethnic groups and the persistent instability of the democratic system led to the collapse of the First Republic in January 1966 and the subsequent establishment of military regimes. These military regimes attempted to foster national unity by dismantling the regional framework that underpinned ethnic political conflicts. Additionally, efforts were made to address the concerns of minority groups. Consequently, Nigeria embarked on a protracted process of state formation, starting with the four regions in 1963, expanding to 12 states in 1967, 19 states in 1976, 21 states in 1987, 30 states in 1991, and ultimately reaching 36 states in 1996 as shown in fig 2 (Depository, 2011).

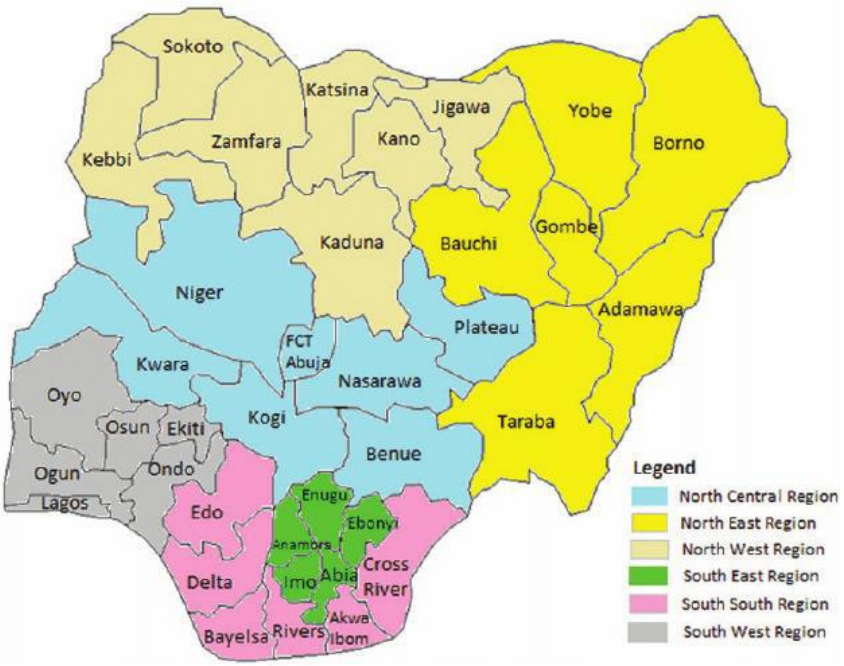


*Figure 2: Map of Nigeria showing Geographical regions (FMIC, 2013)*

Nigeria is divided into six geopolitical zones, which group the states based on shared ethnic groups and interconnected political histories (Alapiki, 2005; Vande, 2013).

While the geopolitical zones are not strictly demarcated geographically, they represent clusters of states with commonalities in terms of ethnic composition and historical experiences. However, it is important to note that the state-creation process primarily reconfigured ethnic-regionalism rather than eradicating it (ibid). Instead of eliminating regional differences, it merely reshaped them. For instance, the Northwest, predominantly Hausa-Fulani, continues to wield significant political influence due to its demographic weight, a legacy from the first republic when the Northern Region dominated the political space (Falola, 1998). Conversely, the Southeast, a hub of Igbo ethnicity, has its narrative interwoven with the tumultuous Biafran War, influencing its socio-political stance and quests for autonomy (Achebe, 2012).

Similarly, the oil-rich South-South zone, home to many ethnic minorities like the Ijaws and Ogonis, has its struggles for resource control rooted in its historical marginalisation, despite contributing significantly to the national treasury (Watts, 2004). These zones, with their regional disparities, have birthed dominant political and economic elites who capitalise on the divisions for their gain. In the North Central, a region marked by religious and ethnic diversity, the Fulani herders crisis underscores the complex intersection of ethnic, religious, and resource conflicts (Higazi, 2016).

Such disparities, reconfigured by the state-creation process, can create a skewed distribution of power and resources, leading to inter-zone and intra-zone conflicts. For instance, while zones like the Northwest enjoy political dominance, the South-South grapples with environmental degradation due to oil exploitation, despite its economic contribution (Obi, 2010).

Thus, understanding the intricate layering of these geopolitical zones is paramount in grasping Nigeria's socio-political structure. As entities birthed from historical imperatives, the zones are emblematic of the nation's efforts to manage its diversity. However, they also serve as a reminder that mere administrative reshuffling cannot wish away deeply entrenched ethnic and regional sentiments. The challenge lies in harnessing these diversities towards a more cohesive and inclusive national identity while simultaneously addressing the genuine grievances stemming from historical injustices and disparities.

## 1.4 Nature of the Problem

The nature of the problem in Nigeria's energy sector is multifaceted, complex and deeply rooted. The electricity access challenge in Nigeria is a significant barrier to wider sustainable development, especially in the Northern region, where access rates are as low as 39% (NBS, 2019). The continued electricity supply and access challenges have had profound economic and social implications, resulting in decreased productivity and increased poverty levels for households (Onyeji et al., 2012). These issues have far-reaching implications for the country's ambition of becoming a top 20 world economy by 2025 (RPR, 2010).

The country's electricity infrastructure faces myriad problems, including low efficiency and performance, an ageing transmission and distribution network, weak grid structure, regulatory barriers, insufficient data, inadequate financial investment, and a lack of policy and project continuity (Emodi and Yusuf, 2015; Sambo et al., 2012). These challenges have been exacerbated by corruption, political instability, terrorism, and the absence of long-term planning for the energy sector. While deregulation might solve some of these challenges, it also poses potential pitfalls. Specifically, deregulation can lead to price volatility, reduced access for underserved populations, and the possibility of monopolistic practices if not managed effectively. Furthermore, the success of deregulation hinges on technical expertise in policy-making and practical implementation. Given the historical underinvestment in capacity building within Nigeria's energy sector, there's a risk that the country might lack the technical acumen to manage and optimize a deregulated environment (Okafor and Uzodinma, 2010). This deficit can mean even well-intentioned reforms might yield unintended consequences or not meet their intended goals.

Moreover, the quality of supply in the Northern region is markedly poorer, with frequent outages and reduced voltage levels (Olaniyan et al., 2018). The disparities have been persistent over the years, and although there have been efforts to bridge the gap, the difference between the regions has been widening rather than converging. Between 2015 and 2019, while the Southern region saw a 5% improvement in access rates, the Northern region witnessed only a 2% increase, further emphasizing the growing chasm (NBS Annual Reports, 2015-2019). Such trends underscore the urgency to address the root causes of these disparities and

foster regional development to ensure equitable energy access and supply across the country.

To better understand the regional disparities Table 1 provides insights into Nigeria's Northern and Southern regions' demographic, geographic, and socio-economic differences.

*Table 1: Source National Bureau of Statistics Nigeria (2021), World Bank (2021).*

| **Indicators** | **North-West** | **North-Central** | **North-East** | **South-West** | **South-South** | **South-East** |
|---|---|---|---|---|---|---|
| **Population (2021, estimate) * (millions)** | 43.9 | 25.3 | 22.1 | 33.6 | 25.1 million | 19.6 million |
| **Landmass per sq. km** | 216,065 | 242,425 | 272,451 | 79,665 | 84,587 | 29,525 |
| **Population density (000/km2)** | 2.0 | 1.0 | 0.8 | 4.2 | 3.0 | 3.7 |
| **Electricity access (%)** | 39 | 45 | 26 | 82 | 75 | 71 |
| **Poverty rate (%)** | 75 | 66 | 76 | 50 | 53 | 57 |
| **Literacy rate (%)** | 56 | 58 | 51 | 85 | 82 | 81 |

* Derived from World Bank's World Development Indicators (population growth rate applied to 2021)

Several empirical studies have been conducted on the issue of poor electricity access in Nigeria. Emodi and Yusuf (2015) identified low efficiency, ageing transmission and distribution networks, weak grid structure, regulatory barriers, insufficient data, inadequate financial investment, and a lack of policy and project continuity as significant obstacles to improving power access. Similarly, Sambo et al.

(2012) highlighted inadequate funding, insufficient generation, gas shortage, obsolete infrastructure, and poor maintenance as key barriers to enhancing the electricity supply.

Several scholars observed disparities in energy access these studies rely primarily on general quantitative data rather than providing a qualitative, region-specific analysis (Sanusi and Owoyele, 2016; Archibong, 2018; and Ogunro and Afolabi, 2021). The authors identified significant regional disparities in energy access, with Southern regions outperforming their Northern counterparts. Factors such as income inequality, literacy level, state-generated revenues, and household size correlate strongly with energy poverty levels. Interestingly, though more energy-impoverished, the North possesses greater renewable energy potential.

Olaniyan et al. (2018) further emphasised that distinct topographical, demographic, and socio-economic factors influence electricity access disparities between the northern and southern regions. Their study identifies varied terrains, from waterlogged south to expansive northern plains, pose distinct challenges for energy infrastructure development. While the south benefits from abundant natural gas, making power generation more feasible, the north's arid conditions are ideal for solar energy. However, transportation challenges, especially in rugged central terrains, and varying population densities further complicate electricity distribution.

Regional energy inequalities are prevalent across African countries, particularly in Sub-Saharan nations like Tanzania and Kenya, where rural areas face significantly lower electrification rates compared to urban centres. These disparities are often driven by centralised policies that prioritise economically productive urban areas while neglecting the specific needs of rural regions. Winther et al. (2018) and Kirubi et al. (2009), highlight how such policies exacerbate socio-economic divides, leaving rural communities with limited access to energy. In both countries, decentralised renewable energy solutions, such as mini-grids and solar home systems, offer a potential path forward but have yet to be fully implemented. These cases demonstrate the need for region-specific strategies that cater to the unique geographical and socio-economic conditions of underserved regions.

In contrast, developed nations like Germany and Spain have successfully addressed regional energy disparities through decentralised energy systems and community-led

renewable energy projects. Germany’s Energiewende and Spain's solar energy initiatives have improved access in rural areas by promoting local ownership and engagement in energy governance (Moss et al., 2020). These approaches are informed by the concept of energy justice, which emphasises equitable access, participatory decision-making, and fair resource distribution. Lessons from these European contexts illustrate that addressing regional energy disparities requires comprehensive policy frameworks that not only improve infrastructure but also prioritise community involvement.

Although the existing literature acknowledges the presence of regional disparities in electricity access, there is a lack of in-depth understanding regarding the origins, underlying causes, and implications of these disparities. Consequently, this research addresses this gap by adopting an integrative and multidimensional approach. Additionally, a conspicuous gap persists in the literature in terms of the methods used to collect data and therefore the insight provided in these studies. While these studies have yielded valuable insights, they have primarily employed quantitative methodologies and failed to consider the complexity of factors contributing to regional disparities in electricity access. This methodological limitation has resulted in a lack of comprehensive and integrative analysis of these disparities' origins and underlying causes, and their implications for Nigeria’s broader energy transitions. Moreover, the existing research has paid little attention to the experiential aspects of these disparities, such as how they are perceived and experienced by community members and stakeholders.

This research adopts an integrative and multidimensional approach to address this gap, combining Historical Institutionalism, Energy geography, and Regional Development theories. Unlike existing studies that primarily rely on quantitative methodologies, this approach incorporates qualitative data from semi-structured interviews with stakeholders and community members. Doing so aims to provide a more comprehensive and nuanced understanding of the factors influencing electricity access and the experiences of different actors involved.

Drawing on these diverse data sources regional disparities in electricity access in Nigeria result from a complex interplay of historical, topographical, demographic, and socio-economic factors rather than infrastructural or economic challenges. These

multifaceted determinants have shaped the contemporary framework of energy access and entrenched systemic inequities across regions. By offering a comprehensive and nuanced exploration of the underlying causes, this study underscores the necessity for an integrated, equity-driven approach in policy formulation and implementation to address and rectify these entrenched disparities.

### 1.5 Significance of the Study

This study holds considerable significance as it seeks to provide a nuanced understanding of regional disparities in electricity access in Nigeria, which is crucial for informing policy and fostering equitable development. The research integrated qualitative data from interviews with stakeholders such as government officials, policymakers, energy providers, and community leaders which enriches the analysis by providing context-specific insights. These insights help illuminate the decision-making processes, policy directions, and infrastructure investments that contribute to the uneven distribution of electricity resources. Engaging directly with individuals and communities affected by electricity access challenges adds another layer of significance, as it ensures that the study reflects the lived experiences and perspectives of those most impacted. This human-centered approach amplifies the voices of marginalised groups and provides a fuller picture of how electricity access influences socio-economic development, health, education, and overall quality of life.

Furthermore, the study's significance lies in its potential to influence policy and practice by highlighting the complex and interconnected causes of electricity disparities, including governance failures, socio-political dynamics, and systemic inequalities. The findings are intended to inform more inclusive, equitable, and sustainable energy policies that consider regional needs and priorities. By offering a holistic view of the issue, the study aims to contribute to the formulation of targeted interventions that not only improve electricity access but also address the socio-economic challenges tied to these disparities, ultimately promoting national development.

### 1.6 Research Aim

This study aims to analyse Nigeria's regional disparities in electricity access and supply and identify the underlying causes and consequences.

## 1.7 Research Objectives

These research objectives will be addressed through a series of research questions that delve into the factors influencing electricity access, the spatial distribution of infrastructure, the role of key actors, and potential strategies for promoting equitable access.

- To investigate the factors influencing access to electricity across the Nigeria's regions and to determine the extent to which these factors contribute to the existing disparities between the north and south and between Kano, Lagos and Rivers States.
- To assess the spatial distribution of electricity infrastructure and its impact on accessibility within and between regions.
- To examine the role of key actors in the electricity sector in promoting or hindering regional access to electricity and to identify any patterns of regional exclusion or inclusion.
- To propose recommendations for expanding and improving the region's electricity infrastructure and promoting a more equitable distribution of energy resources.

## 1.8 Research Questions

- What are the main factors contributing to regional disparities in electricity access between the different regions in Nigeria?
- How does the spatial distribution of electricity infrastructure affect the accessibility of electricity within and between regions?
- How do regional politics and policies shape electricity infrastructure investment in Nigeria and contribute to disparities in access?
- What are the prospects for expanding and improving electricity infrastructure in the regions, and what are the implications for promoting equity in energy access and supply?

This thesis will argue that the historical development, political economy, and colonial legacies have played a critical role in shaping Nigeria's current electricity infrastructure, consequently leading to regional disparities in electricity access.

In Chapter 2, I review relevant literature on energy access and accessibility diving deep into Nigeria's electricity sector's history and current state.

Chapter 3 Presents the theoretical framework of Historical Institutionalism, Political Economy, Regional Development and Energy Justice.

Chapter 4 delves into the methodology, exploring the qualitative research method employed, the philosophical underpinnings of the research, the data collection methods, and the intricacies of the interview process.

Chapter 5 presents a comprehensive overview of the selected case study regions, highlighting the peculiarities of the North-West, South-West, and South-South regions.

Chapter 6 aptly titled "Rethinking Energy Accessibility in Nigeria: A Historical Analysis", offers a deep dive into the historical trajectory of electricity infrastructure development, evaluating the colonial legacies and their enduring impact on regional disparities. This chapter critically analyses the development and distribution of electricity infrastructure in post-colonial Nigeria and assesses the role of energy plant locations in shaping electricity supply.

Chapter 7 gauges perceptions of the current state of electricity provision in Nigeria. It evaluates affordability, consumer needs, and the billing system and tackles Nigeria's complex issue of energy theft.

Chapter 8 envisions a more inclusive energy future for Nigeria by discussing potential strategies for expansion, diversification, governance reforms, and fostering trust and communication in the electricity sector.

The final chapter, Chapter 9, offers conclusions from the study's findings and provides actionable recommendations for policymakers and other stakeholders in Nigeria's energy sector.

With a keen focus on examining the intricate web of historical, political, and economic factors, this research contributes to an enriched understanding of Nigeria's electricity challenges. It offers pathways to a more equitable energy future.

# CHAPTER 2

# LITERATURE REVIEW

## 2.0 Introduction

The complexities of energy access, especially in developing countries, have drawn considerable attention from researchers and policymakers. Energy geography, a growing field, provides critical insights into how geographical, political, and socio-economic factors affect energy production, distribution, and consumption. In this chapter, an extensive review of existing literature informs a deep dive into the intricacies of electricity access. The review explores various dimensions of the electricity sector, including the influence of geographical disparities, political interests, and resource allocation. It highlights the role of renewable energy in addressing energy gaps, particularly in regions where traditional grid extensions are economically unfeasible.

By examining global and regional case studies, this review delves into the socio-political factors shaping energy access and the socio-economic consequences of unequal electricity distribution. It also discusses corruption, mismanagement, and other institutional challenges that hinder the development of sustainable energy infrastructures. A detailed investigation of Nigeria's electricity sector offers insight into how these global themes manifest in a local context, revealing both historical trajectories and current challenges in achieving universal electricity access. Thus, this chapter builds a comprehensive understanding of the multifaceted challenges and determinants that influence electricity access in Nigeria and sets the tone for the subsequent chapters.

## 2.1 Energy Geography and Its Relationship to the Electricity Sector

In recent years, energy geography has flourished as a pivotal theoretical framework, granting researchers the tools to unravel the spatial intricacies of energy systems. This method spans the comprehensive range of energy production, consumption, and distribution, highlighting the crucial influence that geographical settings have in shaping and deciding the characteristics of our global energy structure.

At the heart of energy geography lies the critical understanding of how physical and human geographical contexts shape the distribution and accessibility of energy resources. Solomon (1986) seminal work laid the cornerstone for this. He illustrated

the intertwined relationship between regions' geographical endowments and their prospective energy and economic trajectories. Solomon's keen insights, rooted in the spatial distribution of energy resources and their infrastructural bedrock, form the foundation of many contemporary discussions in the field. However, while his comprehensive analysis of physical resources is ground-breaking, it prioritised the geographical over the socio-political. Such an approach, while comprehensive, leaves some nuances of the energy structures, particularly the socio-political intricacies relatively less explored.

The era of renewable energy has brought a seismic shift in our energy discourse and, in tandem, in the realm of energy geography. Boyle, (1996) opened new avenues by shedding light on how topographical nuances and climatic variations often serve as determining factors in the feasibility and success of renewable energy projects. While Boyle's framework ingeniously moved the spotlight from mere resource availability to its effective utilisation, there remains an avenue for even deeper exploration: understanding the technological adaptations and innovations regions undertake in response to their unique renewable energy potentials. This intersection of technology and geography could provide valuable insights into regional resilience and innovative capacities.

In the context of energy structures, a diverse range of societal perspectives contributes to the intricate fabric of these environments, transcending theoretical concepts and delving into the tangible realities experienced by many populations. Pasqualetti, (2011) unearthed the dynamic relationship between energy infrastructures and their sociocultural environments, producing deep into the heart of how local histories, aesthetic sensibilities, and embedded cultural values either facilitate or hinder energy projects. Wind farms, for instance, are not mere infrastructural projects; they become symbols, either of progress or intrusion, based on the societal lens they are viewed.

Huber, (2015) added another layer to this discourse by introducing the urban dimension. The rapid expansion of cities worldwide has led to a significant increase in energy demands, and the resulting consumption patterns cannot be overlooked. Huber's analysis explores the core of the urban-energy relationship, clearly understanding how urban structures and complex transportation networks impact

energy dynamics. Huber noted the interconnectedness between contemporary urban environments and the development of energy systems is a significant aspect to consider. Therefore, it is evident to future urban planners and politicians that urban and energy futures are closely interconnected.

However, as energy geography evolves, it faces its share of academic scrutiny and constructive critiques. Calvert, (2016) discourse, for instance, highlights a potential pitfall overshadowing temporal considerations due to an overwhelming emphasis on the spatial. This, Calvert argues, risks ignoring the historical legacies and potential future trajectories integral to fully understanding energy structures. Similarly, while researchers like Pasqualetti offer deep sociocultural dives, others might inadvertently overlook the broader political and economic matrices that govern energy dynamics. Bridge's (2009) critique reminds scholars to consistently use a broad perspective, ensuring that macro-level political and economic narratives are not overlooked in favour of micro-level geographical analysis. The discourse surrounding the ideal scale of analysis, as emphasised by Zimmerer in 2011, contributes more depth to this discussion. Energy geography is a field that navigates the tension between global and local perspectives, seeking to achieve a balance between comprehensive analysis and detailed observations. Heffron and McCauley (2017) highlight an additional problem that arises from the interdisciplinary structure of the field: the inherent friction in integrating multiple approaches and theories. Though arduous, the pursuit of methodological coherence may be a pivotal factor in accessing more profound ideas. Solomon (1986), focuses primarily on the spatial distribution of resources, leaving the political interests and governance structures that influence energy access underexplored. This is particularly relevant in developing countries like Nigeria, where power dynamics significantly affect resource distribution.

In sum, the complex and diverse nature of energy geography makes it a powerful instrument for elucidating the spatial dynamics of energy systems. The field's broad collection of seminal works and its ongoing and adaptive critical analyses ensure its continued prominence in academic research. The significance of energy transitions in shaping global futures necessitates the inclusion of energy geography as an essential and invaluable resource due to its diverse range of perspectives.

## 2.2 Geographic Perspective on Regional Disparities

David Harvey's exploration of geographical disparities in "The Limits to Capital" (1982) postulates that the continuous mobility of capital in search of profitable landscapes perpetuates uneven spatial development. This creates regions that become fluctuating economic activity centres, which can thrive in one era and diminish in the next as capital relocates. Building on this foundational argument, Doreen Massey (1984) delves into the spatial divisions of labour. By highlighting how the historical and social placement of industries and labour markets magnifies regional disparities, Massey underscores that it's not just the inherent geography but its complex interplay with socio-economic structures that shape regional outcomes.

Neil Smith (1984) emphasises the strategic devaluation of specific geographies through processes such as urbanisation in this evolving discourse. He suggests a cyclical pattern where capital devalues certain regions to profitably reinvest later, driving regional growth and decline waves. Contrastingly, scholars like Paul Krugman in (1991) present a different perspective by introducing the concept of new economic geography. Krugman posits that economies of scale, transportation costs, and labour movements can naturally concentrate wealth, leading to the emergence of robust economic 'hubs' and sidelined peripheral regions.

However, it is essential to juxtapose these theoretical perspectives with empirical analyses of the causes of regional disparities. Historically, geographical determinism was touted as the primary culprit (Bloom et al., 1998; Gallup et al., 2003; Bao et al., 2002; Bryceson, 2006). However, Kanbur and Venables (2005) shift the narrative, emphasising that factors exceeding geography's innate conditions, especially policy-driven elements and the spatial distribution of infrastructure, significantly shape these disparities. For instance, when analyses consider geographical and infrastructural variables, the overpowering influence of geography wanes, implying that human interventions play a pivotal role in fostering disparities. A clear manifestation of this complex interrelation is seen in Peru's regional development, which offers a case study where natural geography and man-made infrastructures come into play, driving developmental outcomes.

Critically, the cases of Northeast Thailand and the Cerrado region of Brazil provide strong evidence against geography being the sole determiner of development.

Despite challenging geographical and ecological conditions, both regions transformed into competitive agrarian regions due to advancements in agricultural technology and public infrastructure (Morris et al., 2009). This transformation demonstrates that geographical limitations can indeed be overcome with appropriate policy interventions and infrastructural investments.

However, the World Development Report (2009) cautions against spatially targeted policies, arguing that spatial economic development is an interplay of density, distance, and division. The report contends that attempts to distribute economic activities spatially may hinder overall national economic development. Critics, such as Rigg et al. (2009), contest this assertion, arguing that it overlooks complex dynamics of power relationships, potentially perpetuating regional disparities.

The case of Nigeria illuminates the intricate interplay between geography and regional development. Despite its resource wealth, the Niger Delta region faces significant poverty due to factors extending beyond geography, including resource mismanagement, insufficient infrastructure, and ineffective policies (Ako, 2018). In contrast, despite significant geographic challenges, Lagos State, specifically the city of Lagos, has become Nigeria's economic hub due to its strategic location and concentration of economic activities (Fourchard, 2011). However, this concentration has led to unbalanced development, reinforcing the World Development Report's (2009) caution against uneven spatial economic growth.

Mitigating regional disparities and promoting inclusive development requires strategies that consider both inherent geographic conditions and policy-influenced variables. Consequently, while geographical determinism has been debunked in many cycles, it remains a significant consideration, especially in rural and remote regions. policy-makers can formulate more effective and inclusive development policies by acknowledging the complexities of regional disparities.

Electricity access is pivotal to socio-economic development, and disparities in this access, particularly between urban and rural regions, pose significant challenges to inclusive and sustainable development. Nonetheless, some countries have successfully strategised to surmount these hurdles.

Bangladesh, for instance, has made commendable strides in addressing disparities in electricity access. A strategy pivot toward decentralised solar home systems

allowed the country to extend electricity to remote, off-grid areas. The Infrastructure Development Company Limited (IDCOL) program, established in 2003, was instrumental in this effort. Through collaborations with local NGOs and microfinance institutions, the program facilitated the installation of over four million solar home systems, thereby extending electricity to over 20 million people (Khandker et al., 2014).

Similarly, Kenya has adopted a comprehensive approach combining on-grid and off-grid solutions. Its Last Mile Connectivity Project, initiated in 2015, aimed to broaden grid connections to households within proximity of transformers, thus substantially reducing connection costs. The government advocated off-grid solar home systems for remote areas, partnering with private entities such as M-KOPA to ensure inclusivity (Lee et al., 2020).

Brazil's Luz para Todos ("Light for All") program, initiated in the 2000s, further exemplifies effective strategies focusing on free electricity connections for rural and low-income urban households. The program utilized off-grid solutions like solar and micro-hydro systems for remote regions, like the Amazon, where geographic challenges were prominent (Silva et al., 2018).

China also stands out in its achievements in addressing electricity access disparities. Early in the 2000s, China exhibited significant rural-urban disparities in electricity access. However, by 2015, the country had attained near-universal access due to consistent investments in rural electrification and a context-specific mix of solutions, including grid extensions and decentralized renewable energy systems (Zhang et al., 2017).

The investigation of these case studies reveals the need for strategies sensitive to local geographical and socio-economic contexts to address electricity access disparities effectively. As demonstrated by the above examples, successful strategies adeptly incorporate both grid extensions and off-grid renewable energy solutions, partnerships between public entities, the private sector, and local communities, and innovative financing mechanisms. These case studies underscore that achieving universal electricity access is not solely an infrastructural challenge but a complex endeavour requiring multi-stakeholder collaboration, innovative policy, and social inclusion.

## 2.3 Political Interests and Resource Allocation

The relationship between political interests and resource allocation in the electricity sector is a global phenomenon, affecting both developed and developing nations. Globally, political actors often use resource distribution as a tool for consolidating power, leading to unequal access to essential services like electricity (Newell, 2021). In many cases, resource allocation is shaped not by technical requirements or population needs, but by political motivations, particularly in countries with weak democratic institutions (Kashwan et al., 2019; Newell, 2021). For instance, in India, Golden and Min (2012) found that electoral politics heavily influence the provision of electricity, with regions that support the ruling party receiving preferential treatment (Bussell, 2019). This politically motivated allocation of resources is also evident in Brazil, where regions with stronger political representation tend to receive more significant investments in infrastructure, regardless of actual demand (Montero, 2016). These cases highlight how political agendas can distort resource allocation, deepening regional inequalities and exacerbating socio-economic disparities.

The Global North, although more transparent in its resource allocation processes, is not entirely free from political influence. In Germany, the government's Energiewende policy, which seeks to transition the country to renewable energy, has faced criticism for unevenly distributing subsidies and infrastructural support (Fischer et al., 2016). Hanke et al., (2023) noted that while the policy has promoted decentralised renewable energy projects, such as wind and solar farms, these investments are often concentrated in wealthier, urban regions, while rural areas with less political clout have struggled to attract funding. Similarly, in the United States, the allocation of federal energy subsidies and infrastructural investments often reflects political considerations. Aklin et al., (2018) found that states with greater political representation in Congress are more likely to receive federal funding for energy projects.

In many developing nations, the influence of political interests on resource allocation is particularly pronounced, as governments often lack the institutional capacity to implement transparent and equitable systems of governance. For example, in Yemen, the ongoing civil war has led to the destruction of much of the country's electricity infrastructure, with political instability further preventing the rebuilding of power systems (Al-Saidi et al., 2020). Here, political actors divert resources away

from energy infrastructure to focus on military spending, leaving vast regions without access to electricity. Similarly, in South Sudan, decades of conflict have resulted in the near-total collapse of the country's power infrastructure, with prioritisation of military and political interests over essential services like electricity (World Bank, 2020). In these contexts, political instability exacerbates existing regional inequalities, as regions with less political influence or those affected by conflict often face long-term neglect in infrastructure development.

Regionally, Sub-Saharan Africa provides numerous examples of how political dynamics shape electricity access. In Kenya, Kirubi et al., (2009) reveal how the centralisation of electricity distribution has led to substantial regional disparities, with urban areas like Nairobi receiving over 90% electrification, while rural regions lag significantly behind. These disparities are not solely driven by economic factors but are deeply embedded in political considerations, as regions that are economically productive or politically aligned with the ruling government tend to receive prioritised infrastructure development. Similarly, in Tanzania, Winther et al., (2018) argue that the government’s focus on expanding the national grid to politically influential regions has further marginalised rural areas, which are better suited for decentralised renewable energy solutions such as mini-grids and solar home systems. As a result, regions with weaker political representation continue to suffer from inadequate electricity access.

In Nigeria, the influence of political interests on resource allocation is evident in the skewed distribution of electricity infrastructure, particularly in the location of power generation facilities. Adenikinju (2003) highlights how political elites often use infrastructure investments to reward regions with strong political representation, leading to uneven access to electricity. The Mambilla Hydroelectric Power Project in Taraba State is a prime example of how political interests can delay critical infrastructure development. Despite its potential to produce 3,050 MW of electricity, making it one of Africa’s largest hydroelectric projects, the project has been repeatedly delayed due to political competition and controversies over control (Economist, 2020). As Oyedepo (2017) notes, regions with greater political influence tend to benefit from more reliable and stable electricity, while less politically connected areas, such as Taraba State, experience long-term underdevelopment and neglect.

Furthermore, political interests extend beyond power generation facilities to influence the development of transmission and distribution networks. In Nigeria, regions with closer ties to political elites often receive preferential treatment in infrastructure investments, exacerbating existing regional disparities. Adegbulugbe et al., (2007) observe that regions located closer to political and economic centres are more likely to benefit from consistent and reliable electricity, while more peripheral regions experience frequent outages and lower electrification rates. This trend is similar to findings in India, where Golden and Min (2012) demonstrate how politically aligned regions receive better access to electricity, further perpetuating socio-economic inequalities.

Conflict and political instability in Nigeria have also intensified the unequal distribution of resources in the electricity sector. In the North East, where the conflict with Boko Haram has devastated infrastructure, power lines and facilities have been systematically targeted, resulting in widespread electricity shortages (Akorede et al., 2017). Similarly, the North West has been plagued by intercommunal clashes and banditry, which have destroyed power infrastructure and further limited access to electricity (NERC, 2020). As Williams and Ghanem (2018) argue, resources in conflict-affected regions are often diverted to address immediate security concerns, leaving infrastructure development underfunded and deprioritised. This has resulted in the prolonged neglect of these regions, perpetuating socio-economic disparities and undermining efforts to improve electricity access.

To address these issues, scholars argue for the depoliticisation of resource allocation in the electricity sector. Calderón et al., (2017) stress the importance of implementing transparent, objective criteria for infrastructure investments, ensuring that decisions are based on energy demand and population needs rather than political interests. In Nigeria, strengthening governance frameworks and regulatory mechanisms could mitigate the influence of political actors on resource allocation. Additionally, promoting citizen participation in decision-making processes would ensure that marginalised and underrepresented groups have a voice in determining how resources are distributed, fostering a more inclusive and equitable electricity sector (Heffron & McCauley, 2017).

## 2.4 Political Economy of Energy: A Global to Regional Perspective

Globally, the political economy of energy is deeply intertwined with both economic growth and geopolitics. Scholars have long recognised the influence of energy on national security, economic stability, and international relations (Umbach, 2010; Cherp and Jewell; Sovacool and Mukherjee, 2011; Yang et al., 2023). Mitchell (2011) explores how the shift from coal to oil transformed the political and economic structures of the 20th century, fostering centralised control over global energy resources. The political economy of energy became a tool for both colonial powers and emerging nations to assert influence, as oil-producing countries gained geopolitical leverage. This shift also altered market structures, leading to the rise of multinational corporations and the establishment of cartels such as OPEC, which dramatically shaped the global energy market (Fattouh & Mahadeva, 2013).

With the global energy transition underway, the shift towards renewables introduces a new dimension to the political economy. Sovacool et al. (2017), highlights how the decentralisation of renewable energy disrupts the established hierarchies that define fossil fuel markets. Countries that had historically relied on centralised fossil fuel production are now grappling with the economic and political ramifications of transitioning to decentralised energy systems, such as solar and wind. This shift underscores the importance of governance structures, where countries with strong institutional frameworks, such as Germany and Denmark, have excelled in managing their energy transitions by integrating both market and state-led initiatives (Johnstone et al., 2021).

The political economy of energy in Sub-Saharan Africa presents a different case due to the intersection of underdeveloped infrastructure, resource wealth, and governance challenges. Africa's vast energy resources both fossil fuels and renewables remain underutilised despite significant demand for energy access. For instance, Nigeria, Angola, and South Africa are among the continent's leading energy producers, yet access to electricity across the region remains limited (Eberhard et al., 2016).

In examining the African energy structures, Ahlborg and Hammar (2014) emphasise the governance challenges that hinder energy access and investment. Political instability, regulatory uncertainty, and the lack of institutional capacity have impeded

efforts to build robust energy infrastructures. These governance issues are compounded by economic factors, such as dependency on external financing and fluctuating commodity prices. Moreover, corruption, particularly in energy-rich countries, has led to inefficiencies in resource management, limiting the benefits of energy wealth for broader socio-economic development.

However, renewable energy presents both opportunities and challenges for the region. Newell and Phillips (2016) examine how renewable energy technologies could offer solutions to Africa's energy access challenges, particularly in rural areas where centralised grid expansion is economically unfeasible. Though, the integration of renewables also requires substantial policy reforms and capacity-building to attract investment and ensure long-term sustainability (Cantarero, 2020).

In Nigeria the energy structure is characterised by an intricate web of regulatory bodies, institutional actors, and complex market dynamics. As Africa's largest economy and one of the world's leading oil producers, Nigeria has long relied on fossil fuels to drive its economy. However, the country's energy sector is plagued by inefficiencies, governance challenges, and underinvestment, particularly in its electricity sector (Adenikinju, 2008; Edoma and Lemaire; 2021). Despite the country's vast fossil fuel resources, energy access remains a significant challenge for millions of Nigerians (ibid).

The reform of Nigeria's energy sector, particularly the unbundling of the Power Holding Company of Nigeria (PHCN) in 2005, was a critical turning point in the country's energy political economy. The privatisation of Generation Companies (GENCOs) and Distribution Companies (DISCOs) was intended to improve efficiency and attract private investment. Eleven Distribution Companies (DISCOs), established as part of the unbundling of the Power Holding Company of Nigeria (PHCN), play a crucial role in the delivery of electricity to consumers in Nigeria. These privatised entities distribute electricity to various regions and customer segments. However, despite being a part of the reform measures, DISCOs face persistent challenges related to revenue collection, electricity theft, and inadequate infrastructure investment (Akinlo, 2012). As shown in Fig 3, each DISCO is responsible for distributing electricity within its designated franchise area, which includes specific

states or regions of the country. The DISCOs operate within specific geographic regions and have defined coverage areas across Nigeria.

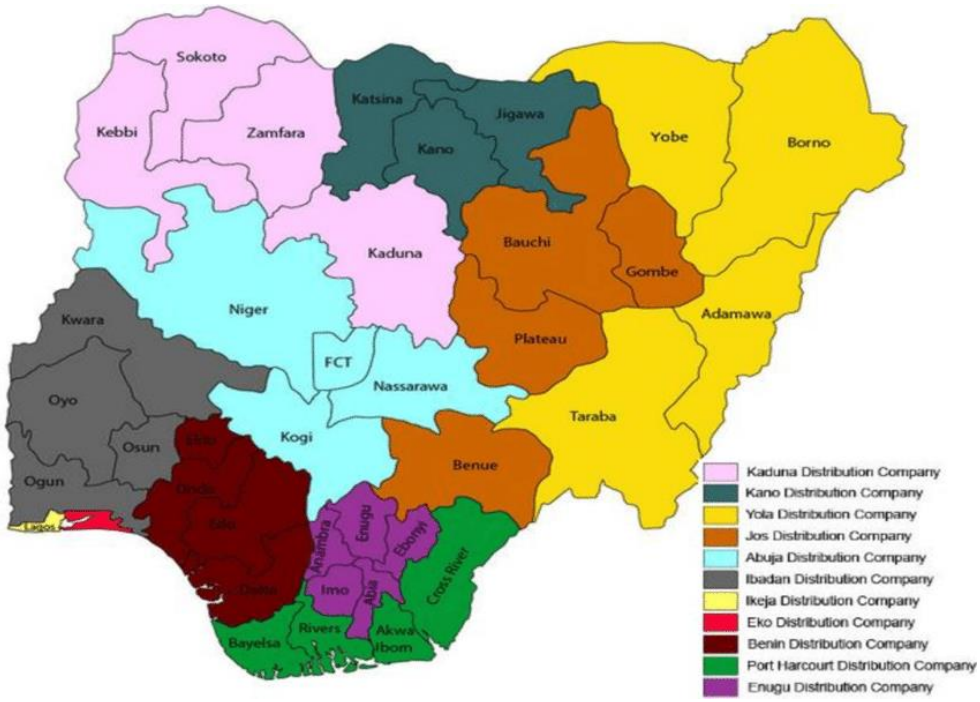


*Figure 3: Map of Nigeria showing Geographical regions (NERC, 2020)*

The Nigerian Bulk Electricity Trading Company (NBET) operates as an intermediary under the Ministry of Power, facilitating the purchase and resale of electricity between Generation Companies (GENCOs) and Distribution Companies (DISCOs). NBET is crucial in ensuring a reliable off-taker guarantee for the GENCOs, ensuring their generated electricity will be purchased and paid for. By offering this financial security, NBET aims to enhance the financial viability of the power sector and encourage investments in electricity generation infrastructure. This role of NBET as a reliable off-taker contributes to the overall stability and sustainability of the electricity supply chain in Nigeria (Eberhard & Godinho, 2017).

NBET and its power purchase agreement framework establish a structured and transparent system for electricity transactions. These agreements define the terms and conditions for the sale and purchase of electricity between the GENCOs and NBET, including pricing mechanisms, payment terms, and dispute resolution processes. By providing a regulated platform for electricity trading, NBET ensures a

smooth and efficient flow of electricity from generation to Distribution, supporting the stability and functionality of the Nigerian electricity market (NERC, 2015).

Overall, Nigeria's energy context, with its multitude of actors performing distinct roles, is shaped by historical policy decisions, regulatory frameworks, and market dynamics. While recent reforms aimed at improving the performance and efficiency of these entities have been implemented, the persisting challenges underline the need for comprehensive policy solutions, institutional improvements, increased private sector involvement, and collaborative international efforts. This will ensure that the country's rich energy potential can be effectively harnessed to meet its growing domestic needs and foster sustainable development.

### 2.5 Socioeconomic Consequences of Unequal Electricity Access

Globally, electricity access is a fundamental driver of socio-economic progress, but the lack of equitable distribution continues to exacerbate inequality (Sarkodie and Adams, 2020; Sinha et al., 2022). About 759 million people globally still lacked access to electricity with the vast majority living in Sub-Saharan Africa and South Asia (IEA, 2019). This global challenge reveals that unequal electricity access is both a symptom and cause of broader developmental disparities. One notable example of the transformative potential of electricity access is India, where the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) initiative brought electricity to over 26 million households, leading to improvements in local economies, educational attainment, and healthcare delivery (Palit et al., 2020). In contrast, countries like Haiti continue to struggle with unreliable electricity supply, where 75% of rural households remain without power. This has stunted economic growth, exacerbated poverty, and impeded healthcare services (Brinkman et al., 2019).

The critical role of electricity in healthcare was demonstrated during the COVID-19 pandemic. In countries with reliable power, health systems were better equipped to handle the pandemic's strain due to their ability to power essential life-saving equipment and store vaccines (Aemro et al., 2023). For example, in Kenya, frequent power cuts severely disrupted healthcare delivery, complicating vaccine storage and contributing to higher mortality rates in rural areas (Nkosi, 2021). Similarly, in parts of South Asia, healthcare facilities faced challenges maintaining cold chains for vaccine

distribution due to power shortages, leading to significant public health risks (WHO, 2020).

Education is another area profoundly impacted by electricity access. Globally, access to reliable power enhances educational outcomes by providing lighting for studying, powering schools, and supporting digital learning tools (UNESCO, 2020). A stark contrast is seen in sub-Saharan Africa, where the lack of electricity limits the effectiveness of digital education programs and contributes to significant learning gaps between urban and rural students. In rural areas of Ethiopia, for instance, power outages are a significant barrier to the implementation of e-learning programs, further disadvantaging already marginalized communities (Dereje et al., 2020).

In Nigeria, unequal access to electricity is particularly problematic, contributing to deepening socio-economic disparities across sectors. Despite being Africa's largest economy, Nigeria's electricity supply remains unreliable, disproportionately affecting rural and conflict-affected regions.

Economic growth in Nigeria is closely tied to electricity access. Adegbulugbe et al. (2018) argue that SMEs, which form the backbone of Nigeria's economy, are particularly vulnerable to unreliable power supply. A case in point is the Niger Delta region, where frequent blackouts and power rationing have stifled industrial productivity and business development, thus perpetuating income inequality (Nwachukwu & Onuoha, 2019). This contrast is evident when comparing regions like Lagos, where better electricity infrastructure supports robust economic activity, to more rural areas where businesses often rely on expensive diesel generators, significantly raising operational costs and reducing competitiveness (Adoghe et al., 2023).

The education sector in Nigeria is similarly affected by electricity inequality. Onuoha (2020) observes that schools in regions like the Northeast suffer from frequent power outages, severely limiting access to digital learning tools and impeding the implementation of technology-driven educational reforms. This has led to significant disparities in academic performance between students in well-powered urban centers and those in poorly electrified rural areas (ibid). For instance, in the Northeast, where electricity access is sporadic, students are unable to benefit from

online resources and are less competitive in national examinations (Tayo et al., 2016; Adubi et al., 2021).

Healthcare in Nigeria is also critically dependent on reliable electricity access (Monyei et al., 2018; Lazo et al., 2023). The healthcare facilities in Northern Nigeria, particularly in rural areas, struggle to maintain essential services due to power shortages (Monyei et al., 2018). Hospitals are often unable to operate critical medical devices, and vaccines are at risk due to the lack of refrigeration. This leads to poorer health outcomes and higher mortality rates compared to regions like Abuja, where electricity infrastructure is more stable. For instance, in rural Northern Nigeria, inadequate electricity has been linked to higher infant mortality rates due to the failure of hospitals to power incubators and other life-saving equipment (Balogun, 2023).

While the Nigerian government has introduced policies aimed at improving electricity access, these efforts have been insufficient in bridging the gap between urban and rural areas. The National Electric Power Policy (2001) and the more recent Power Sector Recovery Program (2017) have made strides in addressing urban power supply issues, but the focus has largely been on privatization and infrastructure development in cities, neglecting rural electrification (Babatunde et al., 2023). As a result, rural areas continue to suffer from energy poverty, limiting their socio-economic development. The inadequate implementation of rural electrification programs, compounded by corruption and mismanagement in the power sector, has perpetuated a vicious cycle of inequality (ibid).

The socioeconomic consequences of unequal electricity access are stark, reinforcing regional disparities in education, healthcare, and income levels. Uzoma et al. (2020) highlight that rural electrification initiatives such as the Rural Electrification Fund (REF) have been underfunded and poorly managed, limiting their impact on reducing energy poverty in Nigeria's underserved areas. Moreover, political instability and insecurity in the Northeast and Niger Delta regions have further complicated efforts to provide equitable electricity access, contributing to persistent underdevelopment in these areas (Jatto., 2024).

## 2.6 Corruption and Mismanagement in the Power Sector: A Global and Regional Perspective

Corruption and mismanagement in the power sector are significant obstacles to development. In many countries, these issues contribute to inefficient allocation of resources, inflated costs, and the delay of critical infrastructure projects (Foster, 2021; Asantewaa, 2023). In the Global South, where governance institutions are often weak and transparency is lacking, corruption severely undermines the power sector's ability to deliver electricity to underserved populations (Foster, 2021). For example, in Brazil, political corruption has been linked to large-scale mismanagement in the awarding of energy sector contracts, leading to financial losses and delayed projects (Montero, 2016). Similarly, India's power sector has struggled with corruption in procurement processes, resulting in suboptimal project delivery and further perpetuating inequalities in electricity access (Seitz, 2018). These examples highlight a common pattern across the Global South: systemic corruption in energy infrastructure undermines equitable access and entrenches socio-economic disparities.

In contrast, the Global North experiences corruption and mismanagement in more subtle but equally damaging ways. In Italy, corrupt practices within public administration have impacted the efficiency of energy infrastructure projects, resulting in delays and financial losses (Locatelli, 2017). In Germany, the government's Energiewende policy, while hailed for its innovation in renewable energy, has faced accusations of financial mismanagement and overspending on certain projects, raising concerns about resource allocation (Fischer et al., 2016; Hanke et al., 2023). Though the scale and visibility of corruption may differ between the Global North and South, its impact on resource allocation and infrastructure development remains a common challenge across both regions.

Regionally, across Africa, corruption has profoundly impacted the power sector, leading to a severe underdevelopment of critical infrastructure. In South Africa, the state-owned utility Eskom has been mired in corruption scandals that have siphoned off billions of dollars through inflated contracts and fraudulent tenders, severely compromising electricity generation and service delivery (De Ruyter, 2023). Similarly, in Kenya, corruption within Kenya Power has led to procurement fraud, inflating costs and stalling energy projects intended to expand access to electricity

(Atela et al., 2017). These cases exemplify how corruption in Africa's power sector not only delays infrastructural development but also contributes to persistent electricity access inequalities, particularly in rural and marginalised areas.

In Nigeria, corruption and mismanagement in the power sector are particularly pervasive, severely undermining efforts to improve electricity access and service delivery. The National Integrated Power Project (NIPP), initiated in 2004 to increase power generation capacity, was significantly hampered by corruption. High-ranking government officials and private individuals were involved in fraudulent activities, including the misappropriation of funds and the awarding of inflated contracts (Olanrewaju, 2016). This not only resulted in substantial financial losses but also hindered the project's progress, leaving many regions without the electricity improvements the NIPP was meant to deliver. Smith (2010) further highlights how bribery and favouritism in contract allocation distort resource allocation, with contracts frequently awarded to politically connected individuals rather than those best equipped to complete the projects efficiently.

Another major instance of corruption in Nigeria's power sector involves the Rural Electrification Agency (REA). In 2017, the former Managing Director of the REA was implicated in the embezzlement of funds meant for rural electrification projects (Premium Times, 2017). This case is emblematic of how corruption at high levels undermines efforts to improve electricity access for some of Nigeria's most underserved populations. Oluwaseun (2016) also notes how corruption has plagued the procurement processes in Nigeria's power sector, with bribery and the lack of competitive bidding often leading to poor-quality infrastructure development and inflated costs. This perpetuates inefficiency and leaves regions, especially those with weaker political influence, with inadequate electricity infrastructure.

Electricity theft is another manifestation of corruption in Nigeria's power sector, contributing to significant revenue losses for power distribution companies. Olumide and Ifedolapo (2016) identify illegal connections, meter tampering, and non-payment of bills as key issues in the sector, exacerbated by a lack of enforcement and regulatory oversight. The culture of impunity that surrounds electricity theft, enabled by weak governance structures, further undermines the financial sustainability of the power sector and contributes to the erratic supply of electricity to consumers. This

type of corruption is less visible but equally damaging, as it creates a vicious cycle of financial instability that prevents the sector from investing in necessary infrastructure upgrades and expansions.

Mismanagement of financial resources also poses a significant challenge in Nigeria's power sector. Adenikinju (2003) argues that inadequate funding and inefficient use of allocated resources have contributed to delays in power sector projects and the failure to maintain and upgrade existing infrastructure. The Niger Delta region provides a clear example of this issue. Despite its wealth in oil and gas resources, the region suffers from chronic power shortages and frequent outages due to poor planning, resource misallocation, and underinvestment in power infrastructure (Okolie et al., 2017). This is indicative of a broader trend in Nigeria, where mismanagement, compounded by corruption, prevents the country from fully harnessing its resource potential to improve electricity access for its citizens.

Addressing these issues requires comprehensive governance reforms that enhance transparency, accountability, and regulatory oversight. The World Bank (2019) advocates for the implementation of robust anti-corruption measures, including stronger financial governance mechanisms and independent audits of power sector projects. Strengthening the capacity of regulatory bodies such as the Nigerian Electricity Regulatory Commission (NERC) to investigate and penalise corrupt practices is also crucial. Additionally, encouraging greater public participation and oversight can help to mitigate corruption. Heffron and McCauley (2017) emphasise the importance of involving civil society and local communities in the monitoring of power sector activities, which can act as a check on corrupt practices and ensure that resources are used efficiently.

### 2.7 Brief History and Current State of Nigeria's Electricity Sector

The history of Nigeria's electricity sector encompasses various milestones, policy reforms, and challenges. The establishment of the first public electricity supply company by the British colonial government in Lagos in 1896 marked the early beginnings of the power sector (Baker, 1974). However, the fundamental transformation and consolidation of the electricity sector occurred with the formation of the Electric Corporation of Nigeria (ECN) in 1950 by the colonial government. The government recognised the strategic importance of a centralised electricity system

for the country's economic development and administrative efficiency, which was instrumental in creating ECN.

1972 marked conjunctures in Nigeria's electricity sector, epitomised by the merger of the Electricity Corporation of Nigeria (ECN) and the Niger Dams Authority. This consolidation gave rise to the National Electric Power Authority (NEPA), which undertook the mantle as the primary electricity provider across Nigeria, charged with responsibilities spanning from generation to transmission and distribution (Eberhard et al., 2017).

However, NEPA was encumbered by many obstacles that significantly thwarted its performance. A major hindrance involved substantial shortfalls in the investment in infrastructure, limiting NEPA's capacity to furnish a consistent and reliable power supply (Adewuyi & Oyejide, 2012). Such limitations represented the constrained financial resources earmarked for the augmentation of generation capacity, upgrading outdated infrastructure, and maintenance of the existing grid system.

Technical inefficiencies, compounded by these infrastructural challenges, further undermined NEPA's effectiveness. These issues could be attributed to various factors, including obsolete technology, sub-optimal operation and maintenance practices, and a deficit of technical expertise (Sambo, 2008). These problems manifested in substantial technical losses, regular power interruptions, and an overall deterioration in service quality.

Furthermore, NEPA contended with formidable challenges associated with revenue collection. The scope of these problems extended from rampant electricity theft to widespread non-payment of electricity bills, exacerbated by lax enforcement mechanisms and metering challenges (Ayodele, 2001; Okoro and Chikuni, 2007; Iwayemi, 2008; Onochie, 2015). These issues depleted NEPA's revenue and fed into a vicious cycle of underinvestment and declining service quality (Ayodele, 2001; Okoro and Chikuni, 2007; Iwayemi, 2008).

The Nigerian government initiated a significant policy reform in 2005 to address the electricity crisis, resulting in the unbundling of the National Electric Power Authority (NEPA) into several successor companies under the umbrella of the Power Holding Company of Nigeria (PHCN) (EPSR, 2005; Okafor, 2007). This unbundling was primarily aimed at establishing separate entities for the generation, transmission, and

distribution in a bid to improve the operational efficiency of these distinct facets of power supply (Amadi and Eke, 2013). Furthermore, it aimed to foster participation from the private sector and attract much-needed investments into the beleaguered sector (Adenikinju, 2008).

However, as salutary as the intentions behind the unbundling of PHCN were, the process did not proceed without criticism or challenges. One of the principal points of contention pertained to the transparency of the privatization process or the perceived lack thereof. Critics like Ogunleye (2016) contended that the process was shrouded in opacity and riddled with numerous procedural violations. This lack of transparency was seen as an affront to the principles of good governance and is believed to have undermined the credibility of the reform initiative (ibid). Harris (2003) expressed concerns about the subsequent rise in tariffs post-privatisation. They emphasised that the reforms led to increased financial burdens on consumers without a corresponding improvement in service quality. This rises in cost, without visible benefits to the consumers, raised questions about the efficacy of the unbundling.

Ikeme and Ebohon (2005) delved into another dimension of the challenge, questioning the readiness of the private sector to manage such a pivotal role in the nation's electricity supply. He pointed to potential pitfalls, including the sector's inexperience and the risk of mismanagement. The expectation that privatisation would necessarily lead to efficiency and improved service delivery was thus brought into sharp focus. Regional disparities in electricity access further compounded the criticisms. Okoje (2009) argued that the unbundling exacerbated these disparities, with urban areas reaping more benefits than their rural counterparts. This critique underscored the need for a more holistic approach that ensured equitable electricity distribution across the country.

The concern over effective regulatory oversight post-unbundling added to the complex challenges. Oyedapo (2012) pointed to the absence of a robust regulatory mechanism that left gaps for potential exploitation and abuse. Coupled with Aminu and Peterside (2014) emphasis on the role of political interference, it became evident that the reform, while well-intentioned, was riddled with multifaceted challenges that needed urgent redress.

The post-unbundling period in 2005, despite initial optimism, did not yield the expected positive outcomes. One of the most persistent issues encountered was related to revenue collection (Sambo 2008; Oyedapo, 2012). In particular, the newly formed distribution companies (DISCOs) faced considerable difficulties collecting customer tariffs (Sambo, 2008). Economic hardships and frequent power outages have diminished consumer willingness to pay for inconsistent services. Further compounding the issue is the historical mistrust of the electricity sector, marked by allegations of corruption and perceived inefficiencies (Okafor, 2007). This scepticism, combined with a prevalent cultural view of electricity as a basic right and inadequate regulatory oversight, has made revenue collection particularly challenging in informal urban settlements known for illegal electricity taps (Adenikinju, 2008; Joseph, 2018). This presented significant operational challenges and exacerbated their financial woes (Oyedepo, 2012; Joseph, 2018).

After the unbundling process, several government narratives emerged to defend and justify the reforms. Central to the government's position was the belief that the unbundling would pave the way for a more efficient and sustainable electricity sector (Federal Ministry of Power, 2006). The breaking down of NEPA was described as a strategic move designed to pinpoint challenges, streamline operations, and bolster accountability across the electricity value chain. The government emphasised the dire need for the involvement of the private sector, citing constraints in public funding and the pressing need to revamp the country's dated electrical infrastructure (NERC, 2007). The push for private sector engagement was not merely about funds but also about harnessing private sector efficiency, expertise, and innovation to rejuvenate Nigeria's power landscape. Reinforcing its stance, the government often drew parallels with international best practices, asserting that Nigeria's reform approach was in alignment with global trends that had successfully transformed power sectors elsewhere (Federal Ministry of Power, 2006).

Furthermore, infrastructure investment was markedly insufficient within the DISCOs post-unbundling (Akinlo, 2012). Without adequate investment, the infrastructure needed to generate, transmit, and distribute electricity remained substandard, severely limiting the effectiveness of the unbundling process, and contributing to the continued instability of the Nigerian power sector.

Despite its abundant natural resources, including oil and gas and Africa’s largest oil producer (OPEC, 2023) Nigeria continues to grapple with a substantial deficiency in generation capacity within its electricity sector. This shortcoming is strikingly evident in the persistence of chronic power shortages and recurrent electricity outages that plague the populace (Awosope, 2014; Aremu, 2019; NERC, 2020; Otobo et al., 2023). While the country's installed electricity capacity theoretically stands at approximately 12,522 MW, the actual operational capacity often falls short of this figure due to persistent maintenance issues, an insufficient fuel supply, and technical constraints (NERC, 2020). The insufficient supply of fuel, particularly natural gas, which powers many of Nigeria's plants, arises from disruptions caused by pipeline vandalism, contractual and pricing disputes, and inadequate infrastructure for gas transportation (ibid). This gap between supply capacity and demand has, in turn, exacerbated access to electricity for many Nigerians (Iwayemi, 2008).

Compounding the inadequacy of generation capacity are the inefficiencies within Nigeria's transmission and distribution networks. This infrastructure, crucial to disseminating electricity, is marred by outdated equipment, poor maintenance, and inadequate investment (Ogueri & Muogilim, 2019). The high technical and commercial losses during electricity transmission and distribution further burden the already strained electricity supply chain and stymie the sector's capacity to meet burgeoning demand (Okafor, 2007; Idowu et al., 2019; Komoafe and Udofia 2020; Dodo et al., 2020).

Adding to the litany of challenges confronting the electricity sector are the issues of tariff inadequacies and financial constraints. The existing tariff structure, which fails to adequately encapsulate the costs associated with electricity generation, transmission, and distribution, threatens the sector's financial viability. This flawed structure leads to revenue shortfalls for power companies, limiting their ability to invest in crucial infrastructure upgrades and maintenance (Iwayemi, 2014). Insufficient funding and investment compound these challenges, hindering electricity infrastructure's requisite expansion and upkeep.

The spectrum of challenges plaguing Nigeria's electricity sector has precipitated a reality where many Nigerians have found it necessary to resort to the self-generation of electricity. According to World Bank 43% of Nigerian lack grid access to electricity

(Word Bank 2021). The most common means of achieving this is using petrol or diesel-powered generators (Ikpe & Osueke, 2017). This dependency on alternative sources of power is not without significant implications and indeed contributes to various socio-economic and environmental issues (Akinlo, 2009; Smith and Sagar, 2014; Brown et al., 2015; WHO, 2016: Ikpe and Osueke, 2018).

From an environmental perspective, the widespread use of petrol or diesel generators introduces several deleterious effects. The emissions from these generators are a significant source of air pollution, contributing to the deterioration of air quality in many urban and peri-urban areas (Akinyanju, 2011). Besides the environmental harm, this also poses serious health risks to the population, including an increased prevalence of respiratory ailments and other pollution-induced health issues (Ezejiofor et al., 2014; Kelly and Julia, 2015; Asubiojo, 2016; WHO, 2016; Al-Kindi et al., 2020).

Moreover, the proliferation of these generators and the accompanying fuel storage exacerbates the risk of fire accidents, leading to significant property damage and loss of lives (Adeyemo, 2016). This is particularly prevalent in densely populated areas where safety regulations and guidelines for generator usage are often neglected (Ezejiofor et al., 2014)

From an economic viewpoint, the high costs of running and maintaining these generators impose a significant financial burden on households and businesses (Ikpe & Osueke, 2017). These costs are not limited to the procurement of the generators themselves but also encompass the recurrent expenditure on fuel, which can be exorbitant but also unpredictable given the frequent fluctuations in fuel prices resulting from global shifts in oil prices (Sambo, 2008; Smith, 2012; Kilian, 2014). The cost of maintenance and repairs also contributes to the financial burden, given that these generators are often used beyond their intended capacity and lifetime due to the unreliable public power supply.

Furthermore, for businesses, these additional costs cut into their operating budgets, thereby reducing their competitiveness and profitability. They also constitute a major entry barrier for small and medium-sized enterprises (SMEs) that cannot afford these overhead costs (Oyedepo, 2012).

While self-generation of electricity offers a temporary solution to Nigeria's power supply challenges, it simultaneously introduces additional problems. These factors underscore the urgency for comprehensive and effective reforms in the electricity sector to provide a reliable, sustainable, and cost-effective power supply for the Nigerian population.

The diversification of Nigeria's energy mix, to include renewable resources such as solar, wind, and hydropower, has been identified as a critical step towards achieving a sustainable and resilient energy sector (Iwayemi, 2008; ECN, 2016, NERC, 2020). However, integrating these renewable sources into the grid has been slow, necessitating a more concerted focus on policy, investment, and technological advancements.

### 2.8 Overview of Electricity Access in Nigeria

The stratified scenario of electricity access in Nigeria paints a multifaceted picture, punctuated by marked geographical disparities between regions and urban-rural areas. Urban sectors, often the focal points of infrastructure development and technological advancements (NERC, 2019; Ohiare, 2015; Khavari, et al., 2021) are commonly better equipped to harness electricity, resulting in an urban electrification rate of approximately 85% (REA, 2019).

The primary factor to consider is the socio-economic implications that underpin the higher electrification rates in urban locales. The clustering of economic activities and population in urban areas increases the economic viability of infrastructure investments, which, in turn, fosters a more robust power supply (Maduekwe & Odume, 2018). Furthermore, the concentration of political power and administrative control in urban centres can lead to policy biases favouring urban electrification (Okoro, Chikuni, & Kholopane, 2006). Therefore, the intricate nexus between infrastructural development, socio-economic forces, and policy dynamics manifests itself in Nigeria's urban areas relatively elevated electrification rates.

The nature of urban spaces themselves, characterised by denser populations and smaller geographical spreads, reduces per capita costs of infrastructure deployment, contributing to more extensive and efficient electricity provision (Odarno, et al., 2017). Moreover, urban consumers typically have higher incomes and are better positioned to afford the costs associated with electricity access and consumption,

further perpetuating the urban-rural divide (Blimpo & Cosgrove-Davies, 2019). In sum the enhanced electrification rates in urban regions are the cumulative result of these favourable geographical, infrastructural, economic, and policy conditions (ibid).

The understanding of Nigeria's urban electrification – thus - requires an appreciation of the intricate interplay between geography, infrastructure, provision and siting socio-economic dynamics, and policy frameworks. Furthermore, the acknowledgement of the persisting challenges within urban electrification underlines the imperative of sweeping reforms to truly actualise the goal of universal, reliable, and affordable electricity access in Nigeria.

In stark contrast to the urban domains, rural regions in Nigeria are characterised by a dearth of electricity access. These areas endure an electrification rate of 39%, leaving a sizeable segment of the rural populace with insufficient access to electricity (IEA, 2020). This scarcity of electricity is detrimental to the quality of life and economic development in these areas.

On a wider regional scale, the narrative of electricity access within Nigeria's six geopolitical zones shows substantial differentiation. Geographical factors, levels of urbanisation, and proximity to the national grid collectively contribute to this uneven distribution. Regions such as the Southwest and South-South showcase a more favourable electrification profile. These regions, distinguished by greater urbanisation and closer geographical proximity to the national grid, demonstrate comparatively higher electrification rates (REA, 2019).

In these areas, the urbanisation processes and infrastructural development have catalysed the integration into the national grid, translating into improved access to electricity for the populace. Moreover, the geographical proximity to the grid has made it economically viable to extend grid connections to these regions, contributing to their higher electrification rates.

In juxtaposition, the Northeast and Northwest regions, characterised by their predominantly rural demography and geographic distance from the grid, exhibit the most deplorable electrification rates (REA, 2019). The combination of large rural populations, challenging geographical terrain, and a lack of proximity to the national grid complicates the grid extension. These hurdles culminate in lower electrification

rates, indicative of the inadequate infrastructure and challenges in extending grid-based electricity to these remote areas.

This regional dichotomy underscores the necessity of a differential approach in addressing the issues of electricity access across Nigeria. Strategies to extend electricity access need to factor in these unique regional characteristics and challenges, formulating tailored solutions to bridge the gap between urban and rural electrification rates. The lessons gleaned from the success in the Southwest and South-South regions can be instrumental in guiding such interventions, highlighting the role of urbanisation, infrastructure development, and grid proximity in enhancing electrification rates. Concurrently, the case of the Northeast and Northwest regions necessitates innovative and adaptable solutions, such as off-grid and mini-grid systems, to cater to the specific challenges of these predominantly rural and remote areas.

The implications of these disparities extend far beyond electricity access, posing significant hurdles to sustainable development and further widening the socio-economic gap between urban and rural areas. The dearth of electricity in rural areas impedes economic activities, restricts educational opportunities, compromises healthcare services, and constrains overall development prospects (IEA, 2020). These effects underscore the urgent need for targeted interventions and concerted efforts to extend electricity infrastructure to underserved areas, with particular attention to remote rural communities.

The complexities underpinning the disparities in electricity access within Nigeria can be traced back to many intertwined causes, forming a multifaceted matrix of challenges. Chief among these is the inadequacy of investment funnelled into power infrastructure, which has consistently undermined the country's capacity to meet the burgeoning electricity demand (Eberhard & Gratwick, 2011).

This investment deficiency is discernible in developing, maintaining, and upgrading critical power infrastructure. The knock-on effects of this shortfall are particularly evident in the insufficient expansion of the electricity grid, whose reach is constrained in rural locales. Consequently, this has impeded the grid's ability to penetrate these underserviced regions, deepening the electricity access chasm between urban and rural areas (Eberhard & Gratwick, 2011).

Alongside the inadequate investment, weakened institutional capacity forms another layer of the complex challenge. Institutional constraints arising from insufficient capacity, inadequate governance, and ineffective regulatory enforcement have curtailed the sector's efficiency and effectiveness (Okoro & Chikuni, 2007). These shortcomings at the institutional level have engendered a lack of coordinated planning and policy implementation, resulting in sub-optimal performance across the electricity value chain (Eberhard & Gratwick, 2011).

Regulatory barriers further compound the issue. In an environment where the regulatory framework is perceived as uncertain or inconsistent, potential investors may be discouraged, limiting the inflow of much-needed private capital into the sector (Okoro & Chikuni, 2007). Additionally, the lack of a robust regulatory framework has implications for tariff setting, a crucial element in ensuring the financial sustainability of the electricity sector. Power companies are financially strained without cost-reflective tariffs, inhibiting their ability to invest in infrastructure and affecting electricity access (Onyeji, Bazilian, & Bronk, 2012).

These factors collectively combine with an ageing and insufficient power infrastructure continually threatened by frequent power outages and significant losses due to poor maintenance and inefficiencies (Eberhard & Gratwick, 2011). This, in turn, results in an unreliable power supply that falls short of consumer demand, further fuelling the cycle of inadequate access, particularly in rural areas.

The diversity in Nigeria's household energy mix, particularly in off-grid rural areas, further complicates the scenario. In many households, traditional energy sources such as firewood and kerosene remain the primary means for cooking and lighting, reflective of the limited access to modern energy services (Oyedepo, 2012). While the adoption of off-grid solar solutions is on the rise, it remains relatively limited, thus underscoring the need for a broader deployment of renewable energy technologies.

Comprehensive and multifaceted strategies are required to address these pressing challenges. These strategies must encompass grid extension and rehabilitation to enhance the reliability and coverage of the electricity grid. Alongside this, adopting off-grid solutions, such as mini-grids and standalone solar systems, can markedly extend electricity access to remote and underserved areas (Adedoyin & Bekun, 2020). Furthermore, policy and regulatory reforms are critical to attracting necessary

investments, improving governance, and fostering an enabling environment for the electricity sector (Adedoyin & Bekun, 2020).

Despite concerted efforts towards mitigating electricity access challenges, the ongoing initiatives, such as the Nigerian government's National Electrification Project, represent the promising stages of a long journey towards universal electricity access (World Bank, 2019). This project signifies an important step where the government seeks to leverage private sector investments to construct solar mini-grids and standalone solar systems, promoting renewable energy and enhancing the decentralisation of power distribution.

Yet, it is crucial to recognise that these steps, while essential, only mark the beginning of the journey. Achieving universal electricity access in Nigeria is an extensive endeavour that requires much more than sporadic project-based interventions. It mandates a sustained commitment from the government, private stakeholders, and the international community, particularly considering the scope and scale of Nigeria's energy challenges.

Further, comprehensive policy and operational reforms constitute another critical aspect of this process. Policymakers must create a conducive environment that encourages private sector participation and foreign direct investment in the power sector (Olugbenga & Adejumo, 2021). This can be achieved by ensuring regulatory transparency, protecting investor rights, and offering attractive incentives for investment in renewable energy and off-grid solutions.

Moreover, operational reforms should enhance efficiency across the power value chain. This encompasses areas such as technical loss reduction, theft prevention, billing accuracy, and revenue collection. For instance, implementing advanced metering infrastructure could substantially improve billing accuracy and customer satisfaction, thereby boosting revenue collection and financial sustainability of power utilities (Oyedepo et al., 2020).

Furthermore, an effective, transparent, and participatory governance structure is crucial for overseeing the sector's operations and reforms. The governance structure should involve relevant stakeholders, including policymakers, regulatory authorities, private sector representatives, and civil society, to ensure that decision-making is

inclusive, balanced, and cognisant of diverse perspectives and needs (Eberhard & Gratwick, 2011).

Overall, Nigeria's journey to achieving universal electricity access is intricate and multifaceted. It requires robust initiatives such as the National Electrification Project and a host of complementary efforts, including sustained commitment, continued investments, comprehensive policy and operational reforms, and effective governance structures. The cooperation of these elements could pave the way for a future where every Nigerian has reliable and sustainable access to electricity.

### 2.9 Factors Influencing Electricity Access in Nigeria

Understanding the factors influencing electricity access in Nigeria requires a detailed exploration of its multi-dimensional aspects. This process necessitates a comprehensive look at various interlocking elements, including the economic dynamics, the policy environment, and social factors.

**Economic Dynamics:** The economic dynamics within a country influence the level of electricity access its citizens can enjoy. In Nigeria, factors such as tariff levels, cost recovery mechanisms, and the financial health of utilities significantly impact the availability, reliability, and quality of electricity services (Iwayemi, 2014). The underpricing of electricity services, while seemingly making power more affordable in the short term, creates long-term sustainability challenges for utilities. In rural and lower-income urban areas, where affordable electricity is crucial, this tariff misalignment can lead to inconsistent power supply or even complete disconnections when utilities grapple with financial insufficiencies (Oyedepo, 2017). Consequently, while the immediate cost may seem lower, the unpredictability and unreliability of access exacerbate energy poverty, especially for economically marginalized communities (Smith, 2018).

The issue of underpricing electricity services in Nigeria can be illustrated by several instances, highlighting its profound implications for the financial sustainability of the power sector and the goal of expanding electricity access.

One such example is the Multi-Year Tariff Order (MYTO) framework implemented by the Nigerian Electricity Regulatory Commission (NERC). The MYTO was designed to ensure cost-reflective tariffs. However, it has often been unable to keep pace with

the rising costs of electricity generation due to issues such as inflation and foreign exchange fluctuations (NERC, 2020). The failure to adjust tariffs in line with these costs has resulted in significant financial shortfalls for utilities, limiting their ability to invest in network expansion and improvement (Eberhard & Gratwick, 2011).

Furthermore, in 2020, the Nigerian government introduced a new service-based tariff structure to ensure that tariffs reflect the cost of electricity and improve service quality. However, the government had to backtrack on this policy due to widespread protests against increased tariffs, further demonstrating the challenges of achieving cost-reflective pricing in the country (Adedoyin & Bekun, 2020).

Even when tariffs are adjusted upwards, as in 2016, the impact on utilities' financial health is often offset by high collection losses and electricity theft. For instance, in 2019, the Association of Nigerian Electricity Distributors reported that its members could only collect about 70% of the billed revenue, substantially affecting their financial sustainability (ANED, 2019).

The dilemma of balancing cost-reflective tariffs with affordability and consumer acceptability, as evident in Nigeria, illustrates the broader challenges many developing nations face. This balancing act is often situated within socio-economic realities and the political economy of energy reforms (Jenkins et al., 2017). As scholars such as Dubash and Morgan (2013) have argued, there exists a tension between economic sustainability for utility providers and the socio-political implications of energy pricing, especially in settings where energy is both a basic necessity and a politically sensitive commodity. Within this nexus, the concept of "just transitions," proposed by scholars like Heffron and McCauley (2017), emphasises that while moving towards cost-reflective tariffs, policymakers must ensure that vulnerable populations are not disproportionately affected. Overcoming these challenges will require innovative approaches, such as graduated tariff structures and targeted subsidies, as well as improvements in metering and revenue collection (Adedoyin & Bekun, 2020). These issues must be effectively addressed to enhance the financial viability of utilities and facilitate the expansion of electricity access.

The prevalence of electricity theft and inefficiencies in revenue collection has amplified the dire financial status of utilities. Electricity theft, including illegal connections and meter tampering, deprives utilities of much-needed revenue, further compounding their financial woes (Akinlo, 2012). Meanwhile, the inability of utilities to effectively collect revenue from consumers, attributable in part to the weak enforcement of payment obligations and the absence of effective metering systems, inhibits their financial stability and service expansion capabilities (Akinlo, 2012). To ameliorate these economic challenges, Nigeria must consider a series of reforms.

**The Influence of Policy Environment:** The policy environment has been fraught with inconsistencies, which have undermined the effectiveness of these measures. For instance, in 2016, the Multi-Year Tariff Order, a policy that reflects the actual cost of electricity generation and delivery, witnessed intermittent enforcement due to societal backlash and political pressures. This inconsistent implementation created uncertainty and discouraged potential investment in the sector (Onochie, Ukoha & Ikpe, 2017).

Similarly, the privatisation process of the electricity sector, despite being an integral part of the Electric Power Sector Reform Act of 2005, was marred by policy inconsistency. Changes in privatisation terms have resulted in disputes between the government and new owners of power assets, further exacerbating the sector's challenges and obstructing improvements in service delivery and capacity expansion (Adedoyin & Bekun, 2020).

A salient example can be seen in the Yola Electricity Distribution Company (YEDC) case. Following privatisation in 2013, the company was sold to Integrated Energy Distribution and Marketing Company. However, the new owners declared a force majeure in 2015, citing an insurgency in the North-East region as rendering them unable to operate (Eberhard et al., 2017). This led to a protracted dispute and eventually to the Nigerian government reclaiming ownership of the YEDC.

Another example is the disagreement between the government and the new Enugu Electricity Distribution Company owners. After the privatisation, the government, through the Nigerian Electricity Regulatory Commission (NERC), accused the company of failing to meet the agreed performance targets (Eberhard et al., 2017).

The owners contested this accusation, arguing that the challenges in the sector, including gas supply issues and tariff shortfalls, were beyond their control.

These examples underscore the difficulties faced in implementing privatisation in the power sector in Nigeria. They reveal the need for clear and stable policy and regulatory frameworks, adequate preparation for the transition, and robust mechanisms for addressing disputes and enforcing agreements (Adedoyin & Bekun, 2020). Addressing these issues will be crucial in attracting and retaining private sector participation, which is vital for enhancing service delivery and expanding electricity access.

Moreover, the inconsistent implementation of Nigeria's Renewable Energy Policy has thwarted its attempt to enhance its renewable energy profile. Despite launching in 2006, the lack of enforcement of the policy's provisions and insufficient incentives for renewable energy investment has limited the effectiveness of this policy (Oyedepo, 2014). Further compounding the sector's issues, inconsistency in gas pricing policies has led to an unstable gas supply to power plants, thereby affecting electricity generation, given that a large portion of Nigeria's electricity is generated from gas-fired power plants (Ogueri & Muogilim, 2019).

Finally, rural electrification projects, which were supposed to expand electricity access to rural areas, have been undermined by policy inconsistencies. Many projects initiated under the mandate of the Rural Electrification Agency have been delayed due to changes in implementation strategies and insufficient funding (Okafor & Uzodinma, 2010).

**Socio-economic Factors and Consumer Behaviour**: Socio-economic factors and consumer behaviour play a significant role in shaping electricity access. Factors like population density, income levels, and consumer attitudes and practices are particularly influential. Population density is a substantial determinant of grid extension feasibility. In regions with lower population densities, such as rural and remote areas, grid extension may be economically unviable due to the high per-capita infrastructure costs (IEA, 2020). This economic challenge leads to lower electrification rates in such regions, exacerbating the urban-rural divide in electricity access (Akorede et al., 2017).

Income levels significantly influence households' ability to access and afford electricity services. Low-income households, particularly those in rural areas, often face economic constraints limiting their ability to pay connection fees or ongoing electricity costs (Ogueri & Muogilim, 2019). For instance, despite the drive for rural electrification, studies have shown that up to 95% of rural households in some parts of Nigeria cannot afford the cost of a grid connection (Maduekwe & Rowlands, 2013). This financial barrier further exacerbates disparities in electricity access and underscores the need for targeted subsidies and innovative financing solutions to enhance affordability for low-income households (Adedoyin & Bekun, 2020).

Moreover, socio-cultural and behavioural factors significantly influence the acceptance and adoption of electricity services and renewable energy technologies. Consumer perceptions of reliability, familiarity with traditional energy sources, and resistance to change can affect the adoption of new technologies such as solar home systems (Lewis & Pattanayak, 2012; Schuitema et al., 2017; Boudet, 2019; Gordon et al., 2022). For example, research in rural Nigeria has shown that the perceived high cost and unfamiliarity with solar technology are significant barriers to adopting solar home systems (Urmee & Gyamfi, 2014).

To overcome these socio-cultural and behavioural barriers, awareness campaigns, community engagement, and capacity-building are crucial. These initiatives can help dispel misconceptions, enhance understanding of the benefits of modern energy services, and facilitate the transition from traditional energy sources to sustainable alternatives (Nwankwo & Nwankwo, 2020).

**Geographical factors:** Geographical disparities play a substantial role in shaping the landscape of electricity access across Nigeria, with uneven electricity distribution manifesting both in urban-rural dichotomies and among the diverse geopolitical zones within the country. By virtue of their high population densities and proximity to infrastructural facilities, urban areas generally enjoy better access to the national power grid. The electrification rate in urban regions has been estimated to be around 85%, demonstrating the advantage of more robust infrastructure and connectivity to the national grid (IEA, 2020). For example, cities like Lagos and Abuja enjoy comparatively better electricity access with their high population densities and significant economic activities (NERC, 2020).

On the contrary, rural areas, particularly remotely located ones, grapple with significantly lower electrification rates. The lower population densities, geographical remoteness, and perceived high costs of grid extension contribute to the neglect of these regions in grid extension efforts, resulting in an electrification rate as low as 39% in some areas (IEA, 2020; REA, 2019). For instance, in rural states like Yobe and Zamfara, electricity access remains a persistent challenge, with many communities relying on traditional and unsustainable energy sources due to a lack of grid connectivity (Oyedepo, 2012).

Moreover, there are significant disparities in electricity access among Nigeria's six geopolitical zones see Fig 4 and 5. The stark geographical disparities in electricity access present significant challenges for equitable and sustainable development in Nigeria. They underscore the need for a geographically inclusive approach to grid extension and electrification efforts, considering the unique challenges and needs of different regions and communities. Such an approach could involve deploying off-grid renewable energy solutions, such as solar mini-grids and standalone solar systems, which are particularly suitable for remote and underserved areas (World Bank, 2019; Adedoyin & Bekun, 2020).


*Figure 4: Map of Nigeria showing the transmission network (TCN, 2021)*

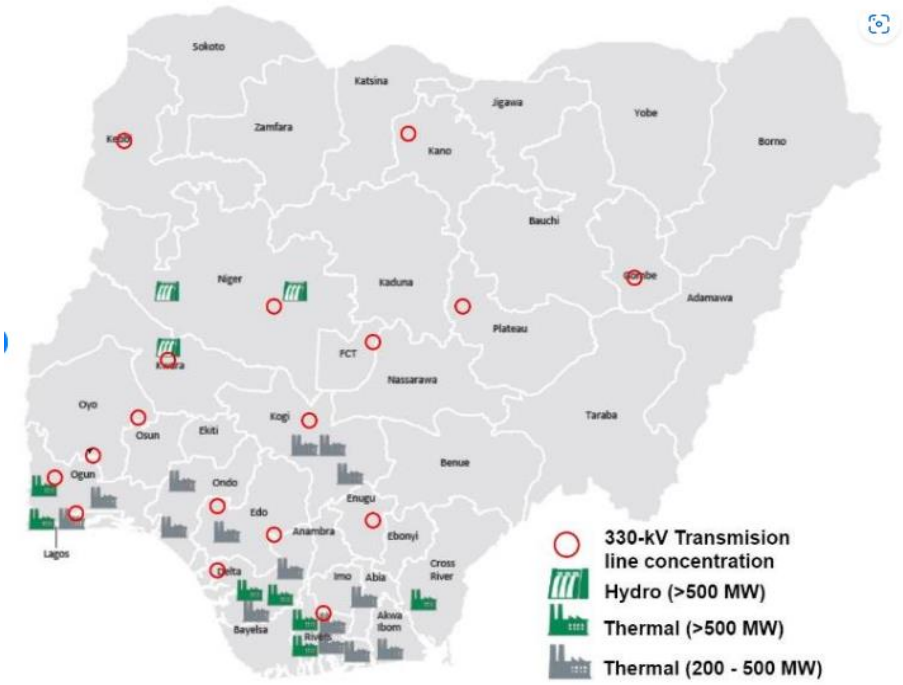


Figure 5: Map of Nigeria showing energy generation plant location (Baseline Report, 2015)

**The Role of Renewable Energy in Enhancing Electricity Access:** The potential for renewable energy to play a transformative role in improving electricity access in Nigeria cannot be overstated. Solar energy, in holds great promise for Nigeria, considering its location within the tropics, which affords it substantial solar irradiation levels throughout the year. Implementing solar home systems (SHS) and solar mini-grids can provide a sustainable and environmentally friendly solution to the electrification challenges rural communities face. For instance, projects like the 'Light up Rural Nigeria' initiative launched by the Federal Government have used solar energy to power rural communities, such as the village of Shape (Nwofe, 2015).

Similarly, the potential for small-scale hydropower systems in Nigeria is immense, especially given the country's abundant water resources. Small-scale hydropower systems are relatively inexpensive to set up, environmentally benign and can provide a reliable electricity source for rural communities near rivers and streams. A noteworthy example is implementing a small-scale hydropower system in the village of Kurdula in Gumi Local Government Area of Sokoto State, which has improved electricity access and stimulated local economic activities (Sambo, 2008).

Moreover, wind energy could also be harnessed, particularly in the wind-rich regions of the country. The Katsina Wind Farm, the largest wind power project in West Africa, demonstrates the potential of wind power in Nigeria, contributing towards diversifying the country's energy mix and enhancing electricity access (Nnaji et al., 2019).

However, despite renewable energy's immense potential and benefits, its integration into Nigeria's energy mix has been relatively slow. Several factors contribute to this lag, including the high upfront costs associated with renewable energy projects, lack of consumer awareness about the potential benefits, and technical and regulatory challenges related to renewable energy adoption (Iwayemi, 2008).

For instance, while solar home systems and mini-grids are becoming increasingly cost-competitive, the initial setup cost can be a significant barrier for many households and communities. Similarly, the absence of comprehensive and favourable regulatory policies can dissuade potential investors from investing in renewable energy projects (Nnaji et al., 2019).

In summary, renewable energy represents a viable avenue for improving electricity access in Nigeria, particularly in rural and remote areas. However, to fully harness the potential of renewable energy, it is essential to address the existing barriers through comprehensive policy reforms, capacity building, awareness campaigns, and innovative financing mechanisms. With the right measures, renewable energy can contribute significantly towards achieving universal electricity access in Nigeria.

### 2.10 Summary

The literature review has explored the multifaceted challenges and opportunities within the electricity sector from a geographical, socio-economic, and political perspective. It outlined how energy geography provides a theoretical framework to understand the spatial distribution of energy resources and the socio-political dynamics affecting energy systems globally. Key discussions emphasised the impact of regional disparities on energy access, the influence of political interests in resource allocation, and the need for effective governance to mitigate these challenges.

By investigating case studies from countries like Bangladesh, Kenya, Brazil, and China, the review highlighted successful strategies in addressing electricity access disparities through renewable energy and decentralised systems. In the Nigerian context, the review revealed that political interests, corruption, and mismanagement are significant obstacles to achieving equitable electricity distribution. It concluded by discussing the critical role renewable energy could play in enhancing electricity access, especially in rural and remote areas, if existing barriers like financial, technical, and regulatory challenges are addressed effectively.

# CHAPTER 3

# THEORETICAL FRAMEWORK

## 3.0 Introduction

This chapter presents the analysis of the four key theoretical frameworks. Historical Institutionalism (HI), Regional Development Theory (RDT), Political Economy, and Energy Justice. These frameworks are employed to analyse the structural and ethical dimensions of the energy landscape. Historical Institutionalism (HI) explains how historical legacies and institutional path dependencies continue to shape modern energy infrastructure and governance, particularly in post-colonial contexts. Regional Development Theory (RDT) provides insight into the spatial inequalities that influence energy accessibility, focusing on the geographic and infrastructural disparities that leave certain regions underserved. Political Economy addresses the interaction between political power, economic systems, and governance structures, illustrating how global and local power dynamics affect energy policy and resource distribution. Finally, the chapter integrates the emerging framework of Energy Justice, which emphasises fairness, equity, and the ethical implications of energy production and distribution. Energy Justice critically assesses how marginalised communities are impacted by energy systems, calling for equitable and inclusive approaches to energy access that prioritise both social and environmental justice. These frameworks, when combined, offer a robust analytical lens through which to explore the empirical findings of this research.

## 3.1 Historical Institutionalism (HI)

Historical Institutionalism (HI) is an established theoretical framework used to explain how historical legacies shape contemporary policies and governance structures. In the context of energy disparities, HI posits that decisions made in the past create self-reinforcing institutional patterns that are resistant to change. This makes it particularly useful for analysing the uneven distribution of electricity access, in Nigeria and across different countries globally, where colonial legacies and early policy decisions have influenced present-day energy landscapes. For instance, Bekker et al. (2008) explain how apartheid-era policies in South Africa prioritised urban, white areas for electricity access while leaving rural and black communities

underserved. The post-apartheid government's attempts to redress this imbalance through electrification programmes have faced significant challenges due to the entrenched nature of the infrastructure laid during apartheid, illustrating the persistence of path dependency (Baker et al., 2015; Ting, 2020; Richards; 2023)

HI is also used to analysing the energy policies of former Eastern Bloc countries following the collapse of the Soviet Union. Roth (2011) shows how the legacy of centralised energy systems, built to serve Soviet industrial needs, continues to influence energy policies in countries like Poland and Hungary. These nations struggle to transition to renewable energy sources because their energy systems designed was for large-scale, fossil-fuel-based energy production, with institutional frameworks that resist change (Jirusek et al ., 2015; Horváthová et al., 2021). This example mirrors the challenges in Nigeria, where colonial-era decisions that favoured urban centres and regions of economic importance continue to shape energy accessibility across different regions (Akinwale, 2020).

### 3.1.1 Colonial Legacies and Regional Disparities

Colonial legacies are another key focus of HI in understanding energy disparities. Across Africa and Asia, colonial powers designed infrastructure to serve the needs of the colonial administration and the extraction of natural resources, rather than prioritising the needs of local populations. For example, in Kenya, Lockwood et al. (2017) found that British colonial authorities invested heavily in infrastructure that supported tea and coffee exports, while rural communities were left without basic energy access. This pattern of investment has had a lasting impact on Kenya's energy landscape, where rural electrification has been slow and remains a challenge despite efforts to decentralise energy provision through renewable energy projects.

Similarly, Chatterjee and Dey (2020) argue that colonial investment in rail and electricity networks in India, was concentrated in regions that were agriculturally productive or economically vital for the British Empire, such as Punjab and Bengal. These regions still enjoy better access to energy infrastructure, while less economically significant regions, such as parts of central and northern India, continue to experience energy deficits (ibid). This situation parallels that of Nigeria, where colonial decisions to focus on developing electricity infrastructure in resource-

rich regions like Lagos and Port Harcourt have left northern regions with inadequate energy access (Akinwale, 2019).

### 3.1.2 Institutional Inertia and Governance Challenges

One of the limitations of HI is its focus on institutional inertia, or the tendency for institutions to resist change, often overlooking the potential for contemporary governance reforms and leadership to disrupt entrenched patterns. While path dependency explains how historical legacies continue to influence energy infrastructure development, it does not fully account for the role of political dynamics and governance failures in perpetuating these disparities. For instance, Philip et al. (2018) shows how political corruption and mismanagement in energy sectors have exacerbated the unequal distribution of electricity in Brazil. Although Brazil's energy system designed was to prioritise industrial growth in the southern and southeastern regions, contemporary governance failures have prevented meaningful reforms that could address the needs of the country's northern and northeastern regions.

In Nigeria, this is equally clear, where post-independence governance failures have compounded colonial legacies. Pavanelli et al. (2023) argue that while colonial policies set the foundation for unequal energy access, post-colonial governance issues such as corruption, political interference, and poor management have further entrenched regional disparities in energy accessibility. The HI framework helps explain the persistence of these issues, but it often overlooks the potential for innovative leadership or external pressures to disrupt these patterns and improve energy access.

### 3.1.3 Technological Innovation as a Disruptor of Path Dependency

One of the main criticisms of HI is its failure to adequately account for the role of technological innovation in overcoming institutional inertia and path dependency. While HI emphasises, the constraints imposed by historical decisions, technological advancements, especially in the energy sector, have shown that these constraints are not insurmountable. For instance, in Tanzania and Zambia, the introduction of solar mini-grids and decentralised renewable energy solutions has allowed rural communities to bypass the need for centralised electricity infrastructure (Nerini et al., 2019). These innovations challenge the idea that historical legacies completely decide future outcomes by providing alternative pathways for energy access.

Similarly, in India, Jacobsson and Bergek (2004) argue that despite the country's historical reliance on large-scale, centralised energy systems, the rapid expansion of decentralised solar energy projects has provided new opportunities for energy access in remote regions. This shows that while path dependency and institutional inertia shape energy policy, technological innovations can offer new avenues for overcoming historical inequities. In Nigeria, solar energy projects in northern regions are beginning to show similar potential, offering a way to address historical disparities in energy access (Odarno et al., 2018). While Historical Institutionalism provides a strong foundation for understanding how historical legacies shape contemporary energy policies and infrastructure, it is important to integrate it with other theories that emphasise the role of innovation and governance reform.

### 3.1.4 Summary

Historical Institutionalism offers valuable insights into the persistence of regional disparities in energy access, not only in Nigeria but globally. The framework's emphasis on path dependency and institutional inertia helps explain why historical legacies, particularly those rooted in colonialism, continue to influence contemporary energy policies. However, as seen in global examples such as South Africa, Kenya, India, and Brazil, HI's limitations in accounting for addressing governance failures and technological innovations. Integrating HI with other theoretical approaches will provide a more comprehensive understanding of how to address energy disparities in Nigeria and promote equity in energy access.

## 3.2 Regional Development Theory

Regional Development Theory (RDT) provides a useful framework for understanding spatial inequalities in energy access by highlighting how geographical attributes, infrastructure, and governance shape regional disparities. Regions rich in natural resources or with strong infrastructure tend to attract more investment, whereas areas, particularly in sub-Saharan Africa and Latin America, often struggle with energy access due to inadequate governance and poor infrastructure, despite resource wealth (Harmaakorpi, 2006; De Souza, 2017; Alkhuzaim et al., 2022). RDT also explores the balance between centralised and decentralised policymaking, showing how decentralised solutions like solar systems can address energy deficits

in rural areas. However, uneven governance, especially in Latin America, has hindered the success of these decentralised projects, reinforcing the need for robust frameworks to manage these initiatives effectively.

RDT highlights the significance of regional integration, as seen in successful energy cooperation within the EU and ASEAN, but warns that wealthier regions can dominate these initiatives, exacerbating existing inequalities (Alkhuzaim et al., 2022). The concept of the resource curse, where resource-rich regions fail to translate wealth into accessible energy, is another key theme, with countries like Nigeria and Venezuela serving as examples of poor governance and lack of infrastructure investment (Fleming et al., 2015). While RDT provides valuable insights, critics argue that it focuses too much on geography while overlooking political and socio-economic factors. Combining RDT with other theoretical approaches like Political Economy could provide a more holistic understanding of regional energy inequalities and the means to address them.

### 3.2.1 Regional Development Theory and Electricity Infrastructure Development

RDT offers a comprehensive framework for examining spatial inequalities in development, particularly the distribution of essential services like electricity. According to Higgins (2017), regions rich in natural resources or with strong infrastructure tend to attract more investment, driving their development forward. In contrast, regions lacking these advantages fall behind as inadequate infrastructure and poor governance hinder development. This is evident in countries like Nigeria and Angola, where vast oil reserves have not translated into widespread energy access due to infrastructure and governance challenges (Bridge, 2008; Nalule, 2018; Tanui, 2021).

The resource curse, where regions rich in energy resources fail to develop infrastructure for consistent energy access, further illustrates these dynamics. Bridge (2008) notes that in sub-Saharan Africa, countries with abundant natural wealth often fail to provide reliable electricity because of governance and infrastructure deficiencies. A similar situation exists in Latin American countries like Venezuela and Bolivia, where political instability and corruption have hindered the conversion of energy wealth into improved electricity services (Bridge, 2008; Tanui, 2021). These examples highlight the critical role of governance and institutional frameworks in

managing resources and promoting regional development, showing that geographical advantages alone are insufficient to guarantee equitable access to electricity.

### 3.2.2 The Role of Centralised and Decentralised Policies in Regional Development

RDT also examines the tension between centralised and decentralised policymaking, a key factor in regional development strategies. Dawkins (2003) argues that centralised policies often fail to account for regional differences, leading to spatial inequalities in service provision. In contrast, decentralised approaches can better address local needs but may exacerbate existing inequalities if resources and governance are unevenly distributed. This issue is particularly evident in India, where centralised energy policies have focused on urban and industrial centres, leaving rural areas with limited electricity access (Roy & Schaffartzik, 2021). Despite significant efforts to expand the national grid, electrification has been slow and inconsistent in regions such as Bihar and Jharkhand (Palit, 2014).

Decentralised solutions, such as solar home systems and mini-grids, have emerged as more viable alternatives to traditional grid expansion in remote areas where infrastructure development is challenging (Barnes, 2019). In East Africa, renewable energy projects have improved rural access to electricity. For example, solar energy initiatives in Kenya have successfully addressed infrastructure challenges and provided electricity to underserved regions (Lee et al., 2020). However, the success of decentralised systems depends heavily on strong governance. In Latin America, decentralised energy projects in Brazil and Peru have faced implementation difficulties due to political instability and corruption (Higgins, 2017), underscoring the need for robust governance frameworks to ensure the effective and equitable deployment of decentralised solutions.

### 3.2.3 Regional Integration and Energy Cooperation

A key theme within RDT is the role of regional integration in promoting shared development and improving access to essential services like electricity. Nijkamp (2009) argues that inter-regional cooperation can lead to synergistic outcomes, as regions pool resources and expertise to enhance infrastructure and service delivery. The European Union's energy grid is an example of successful regional integration,

enabling electricity trade across borders so that regions with surplus energy can support those with deficits (EIA, 2017). This cooperation has strengthened energy security and accessibility, benefiting smaller or less developed member states like Portugal and Greece, which historically struggled with energy shortages. Similarly, the ASEAN Power Grid in Southeast Asia has enhanced electricity access in countries like Laos and Cambodia by enabling cross-border energy trade and leveraging hydroelectric potential (EIA, 2017).

However, regional integration also poses challenges. Wealthier regions may dominate cooperative initiatives, reinforcing existing disparities rather than alleviating them. Higgins (2017) cautions that affluent regions may overshadow less developed areas, leading to imbalances that worsen spatial inequalities. Therefore, it is essential to design regional integration efforts to promote equitable development across all participating regions.

### 3.2.4 Regional Development Theory and Energy Access in Nigeria

RDT highlights the persistent regional disparities in electricity access across Nigeria, driven by historical, geographical, and governance factors. Post-colonial governance challenges, including corruption and inefficiency, have further exacerbated these imbalances, impeding efforts to reform and expand the energy sector (Ojo, 2014; Adoghe et al., 2023). Additionally, the uneven distribution of energy infrastructure across Nigeria, with energy plants concentrated in the southern regions rich in oil and gas, has left northern regions disadvantaged (Monyei, 2018). This imbalance continues to shape electricity access, with rural areas, particularly in the north, facing significant energy deficits.

To address these regional disparities, the Nigerian government has explored decentralised energy solutions like off-grid solar systems. Although these systems show promise, their implementation has been slow due to institutional weaknesses and a lack of coherent regulatory frameworks (Ibrahim et al., 2022). Regional integration efforts such as the West African Power Pool (WAPP) aim to improve electricity access through cross-border energy trade, but aligning national energy policies with regional cooperation objectives remains a challenge (EIA, 2017).

### 3.2.5 Summary

Regional Development Theory (RDT) provides insights into how geographical and infrastructural factors, combined with governance, shape regional disparities in energy access. It emphasizes that regions with strong infrastructure and natural resources tend to attract more investment, while regions lacking these advantages lag behind. Centralised energy policies often fail to address regional needs, making decentralised solutions like solar mini-grids more effective in certain contexts. However, strong governance is crucial to the success of these initiatives. Regional integration can improve energy access, as seen in the EU and ASEAN, but wealthier regions often dominate, exacerbating inequalities. In Nigeria, uneven energy infrastructure and poor governance have limited electricity access, particularly in rural and northern regions, despite the exploration of decentralised solutions.

## 3.3 Political Economy

Political economy provides a critical framework for understanding the interplay between political and economic systems, focusing on how power, institutions, and governance influence economic policies and societal outcomes (Baker et al., 2018; Oatley, 2022). This framework is essential for analysing global issues like economic inequality, development, trade, and environmental sustainability. It highlights the relationship between the state and the market, illustrating how different models of capitalism, such as liberal and coordinated market economies, affect economic outcomes, particularly in terms of wealth distribution and labor relations. Case studies, such as those of East Asian economies and the resource curse in Nigeria, demonstrate how state intervention and institutional dynamics shape economic trajectories (Ugwoke et al., 2020; Newell, 2021).

Political economy also emphasises the role of historical institutionalism, examining how past decisions influence current policies and outcomes. It sheds light on the complexities of global trade, where international agreements often reflect the power dynamics between advanced and developing nations. By integrating analyses of power relations, institutional legacies, and governance structures, political economy provides valuable insights into critical issues such as energy transitions and trade policies. This approach underscores the importance of historical context and political

agency in understanding economic development and sustainability, making it a vital tool for addressing contemporary global challenges (Rodrik, 2011).

### 3.3.1 Political Economy Envisioning a More Inclusive Energy Future for Nigeria

Globally, expanding and improving energy infrastructure is essential to ensuring equitable access to electricity, fostering economic growth, and advancing sustainable development (Sarkodie & Adams, 2020; Sinha et al., 2022). Strategies for energy infrastructure development are shaped by various political, economic, and institutional factors. In many advanced economies, energy infrastructure has evolved through state-market collaboration, with an emphasis on both centralized and decentralized approaches. For instance, the U.S. follows a liberal market economy model, where private investment drives much of the energy infrastructure expansion, although state intervention plays a crucial role in setting regulatory frameworks and environmental standards (Hall & Soskice, 2001). In contrast, Germany's coordinated market economy emphasises strong state regulation and public-private partnerships, especially in promoting renewable energy through the Energiewende policy, which aims to transition from fossil fuels to more sustainable energy sources (Lockwood et al., 2017).

A key trend in global energy policy has been the diversification of energy sources, driven by concerns over climate change, energy security, and economic sustainability. In Europe, renewable energy policies have gained prominence, with countries like Denmark and Spain investing heavily in wind and solar power (Pastukhova & Westphal, 2020; Johnstone et al., 2021). The success of these strategies is largely attributed to robust governance frameworks and political commitment to environmental sustainability (Rodrik, 2011). This contrasts with energy policies in countries with weaker governance, where political instability and corruption undermine efforts to diversify energy sources and improve infrastructure.

### 3.3.2 Regional Approaches to Energy Diversification and Infrastructure

In the context of regional energy development, many countries in Africa, Latin America, and Asia face significant challenges in improving energy infrastructure. These challenges are often tied to historical legacies of colonialism, resource dependency, and institutional weaknesses. For example, in Latin America, the persistence of inequality and dependency on foreign capital has impeded efforts to

develop diverse and resilient energy systems (Johnstone et al., 2021). Despite vast natural resources, countries like Venezuela and Brazil struggle to manage their energy sectors effectively due to governance issues and corruption (Coelho & Goldemberg, 2013). Similarly, in sub-Saharan Africa, many countries remain reliant on fossil fuels, with limited investment in renewable energy due to financial and institutional barriers (Nalule, 2018; Sarkodie & Adams, 2020; Hampton, 2023).

Efforts to diversify energy sources in Africa have seen varying degrees of success. In East Africa, decentralised renewable energy systems, such as solar mini-grids, have emerged as viable solutions to address the energy access deficit in rural areas (Sarkodie & Adams, 2020). In Kenya, decentralised solar projects have improved electricity access in remote regions, supported by international investment and local entrepreneurship (Lee et al., 2020). However, in West Africa, countries like Nigeria have struggled to expand their energy infrastructure due to weak governance and over-reliance on oil exports. The lack of investment in alternative energy sources, such as solar or hydropower, has further limited efforts to diversify energy supply and improve access (Sarkodie & Adams, 2020).

### 3.3.3 Energy Infrastructure and Governance in Nigeria

In Nigeria, expanding and improving electricity infrastructure has long been a national priority, yet progress has been slow. The country's electricity sector is characterized by regional disparities in access, inefficiencies in distribution, and an over-reliance on gas-powered plants concentrated in the southern regions (Aliyu et al., 2013; Udo, 2023). To address these challenges, various strategies have been proposed, including increasing investment in infrastructure, promoting private sector involvement, and decentralising the energy supply through off-grid solutions (Monyei et al., 2018; Adoghe et al., 2023; Babatunde, 2023). These strategies aim to improve energy access, particularly in underserved northern and rural areas.

Diversifying Nigeria’s energy sources is critical for improving energy accessibility and reducing dependency on fossil fuels. Nigeria's energy mix is predominantly reliant on gas and oil, with hydropower playing a smaller role. Renewable energy sources, such as solar and wind, remain largely untapped despite Nigeria's significant potential in these areas. Recent government initiatives, such as the National Renewable Energy and Energy Efficiency Policy (NREEEP, 2015), have sought to

promote renewable energy development, but implementation has been hindered by regulatory barriers and inadequate investment (Adoghe et al., 2023).

### 3.3.4 Summary

Political Economy offers a crucial framework for understanding how political systems, governance, and economic structures impact energy policies and development outcomes. It focuses on how power dynamics, institutions, and governance influence wealth distribution, labor relations, and broader economic trends. This framework has been particularly useful in analyzing global energy transitions, infrastructure development, and the diversification of energy sources.

In developed economies like the U.S. and Germany, energy infrastructure has been shaped by different models of capitalism. The U.S. follows a liberal market economy, allowing private investments to drive much of the energy sector, while the state provides regulatory oversight. In contrast, Germany's coordinated market economy emphasises public-private partnerships, with strong state intervention promoting renewable energy policies such as the Energiewende. The success of these strategies is largely attributed to effective governance frameworks and a political commitment to sustainability.

In Nigeria, regional disparities in electricity access and inefficiencies in energy distribution remain pressing issues. The country's reliance on gas-powered plants, mostly concentrated in the southern regions, has left the northern and rural areas underserved. Nigeria's potential for renewable energy, particularly solar, is vast, but the country has yet to fully harness it. Policies such as the National Renewable Energy and Energy Efficiency Policy (NREEEP) were introduced to promote renewable energy, but progress has been stifled by regulatory barriers and a lack of investment. Improving governance, increasing investment in infrastructure, and implementing decentralised energy solutions are critical for ensuring equitable energy access and transitioning to a more sustainable energy system.

## 3.4 Energy Justice

Energy justice provides a comprehensive framework that addresses the ethical dimensions of energy production, distribution, and consumption, focusing on fairness, equity, and sustainability. It incorporates three core principles: distributive

justice (fair allocation of energy resources), procedural justice (inclusive decision-making processes), and recognition justice (acknowledging and respecting marginalised communities and their rights) (Sovacool et al., 2017; Jenkins, 2018). This framework is particularly relevant as global energy systems face growing challenges, including climate change, energy poverty, and the uneven distribution of energy access. However, while these theories provide a strong foundation for understanding energy justice, they are not without critique, particularly concerning their implementation across diverse global contexts.

### 3.4.1 Distributive Justice in Energy Access

Distributive justice in energy systems focuses on the fair and equitable distribution of energy resources across different socio-economic and geographical groups. The principle calls for addressing energy poverty, which disproportionately affects low-income and rural populations. According to the International Energy Agency (IEA) (2021), around 760 million people worldwide still lack access to electricity, with the majority residing in sub-Saharan Africa and South Asia.

Distributive justice is fundamental to ensuring that energy is treated as a basic human right, necessary for socio-economic development, poverty alleviation, and improving the quality of life (Jenkins, 2018). This is particularly significant in the context of global inequality, where access to modern energy services is often unevenly distributed, creating or reinforcing disparities. In the Global North, high energy prices and fuel poverty have emerged as major challenges, disproportionately affecting the most vulnerable populations, such as the elderly, low-income households, and those living in poorly insulated homes (Gillard et al., 2017; Brown, 2020).

Critics of the distributive justice approach argue that merely focusing on the distribution of energy resources overlooks structural factors that maintain inequalities. For example, Bridge et al. (2013) point out that a simplistic distributive focus can obscure the broader socio-political and economic systems that perpetuate energy poverty. Furthermore, Jenkins (2018) notes that while access is a critical issue, energy justice must also account for the quality and sustainability of the energy being distributed. For instance, in regions heavily dependent on coal or other

fossil fuels, increased energy access may contribute to long-term environmental degradation, which disproportionately impacts poor communities.

### 3.4.2 Procedural Justice in Energy Decision-Making

Procedural justice emphasises the importance of fair and inclusive decision-making processes in energy planning and infrastructure development. This involves ensuring that all stakeholders, especially marginalised and Indigenous groups, have a voice in decisions that affect their access to and use of energy resources.

Procedural justice is increasingly recognised as crucial in energy transitions, particularly as countries shift from fossil fuels to renewable energy sources. Involving communities in energy decisions not only promotes fairness but also enhances the legitimacy and acceptance of energy projects. For instance, Kenya's Olkaria geothermal project serves as an important case study where the exclusion of the Maasai community from decision-making led to their displacement without adequate compensation (Baker et al., 2017). The absence of procedural justice in such cases often leads to conflicts and social unrest, undermining the long-term sustainability of energy projects.

One of the major critiques of procedural justice in the context of energy transitions is its difficulty in practice. While theoretically inclusive processes are ideal, in many developing countries, the political and economic structures are not conducive to participatory governance. Sovacool et al. (2017) argue that procedural justice frameworks often fail to account for the complex power dynamics that marginalise certain groups, particularly in authoritarian or highly centralised regimes. Additionally, Newell and Mulvaney (2013) critique procedural justice for being more focused on representation rather than empowerment, suggesting that simply involving communities in consultations without giving them actual decision-making power may be tokenistic.

### 3.4.3 Recognition Justice and the Rights of Marginalised Groups

Recognition justice involves acknowledging and addressing the specific needs, rights, and identities of marginalised communities in energy policy. This is especially pertinent for Indigenous peoples and communities that have historically been excluded from energy decision-making or have been disproportionately affected by energy projects.

Recognition justice is vital in areas where energy projects intersect with land rights and cultural practices. For example, large-scale renewable energy projects, such as wind farms or solar parks, have often been developed on Indigenous lands without proper consultation or compensation. Lacey-Barnacle (2020) discusses how many renewable energy transitions, particularly in the Global South, have failed to incorporate the voices of local communities, thereby reinforcing existing patterns of exploitation.

Critics argue that while recognition justice is crucial, it is often treated as an afterthought in energy planning, particularly when large corporations or state actors are involved. Figueroa, (2022) note that recognition justice can be difficult to implement, as it requires not only legal and political changes but also a shift in societal attitudes towards Indigenous rights and environmental justice. Furthermore, Sovacool and Dworkin (2015) highlight the risk of green colonialism, where renewable energy projects are imposed on Indigenous lands under the guise of sustainability, without fully respecting local cultures and governance systems.

### 3.4.4 Energy and Climate Justice: Intersections and Challenges

Energy justice is closely linked to climate justice, as both frameworks seek to address the inequities that arise from environmental degradation and climate change. The transition to low-carbon energy systems is essential for mitigating climate change, but it must also ensure that vulnerable populations are not disproportionately affected.

The intersection of energy and climate justice is particularly important in developing countries, where communities are often the least responsible for climate change but the most vulnerable to its impacts. For instance, Bangladesh faces severe challenges from rising sea levels, which threaten energy infrastructure and exacerbate energy poverty (Bedi, 2018). In such contexts, the need for equitable energy transitions that both mitigate climate impacts and provide sustainable energy solutions is critical.

However, the global push for renewable energy transitions has not always considered the social and economic implications for marginalised communities. Critics argue that the rush to meet climate targets sometimes results in energy projects that exacerbate local inequalities. Tornel (2023) points out that renewable

energy projects, particularly in the Global South, often displace local communities, leading to land disputes and cultural displacements, thus undermining the very principles of energy and climate justice.

### 3.4.5 Technological and Policy Solutions for Energy Justice

Addressing the challenges of energy justice requires both technological innovation and policy reforms. Decentralised energy systems, such as microgrids and off-grid solar solutions, offer promising alternatives for improving access to electricity in rural and remote areas. In regions like East Africa, off-grid solar solutions have provided electricity to millions who previously had no access (IEA, 2021).

These technological solutions are particularly important for achieving distributive and procedural justice. By decentralising energy production, communities can gain greater control over their energy resources, thereby reducing reliance on national grids, which are often unreliable in developing countries. Additionally, policies such as targeted energy subsidies and energy efficiency programmes can help reduce the financial burden on low-income households.

However, technological solutions alone are not sufficient. Critics argue that without addressing the underlying political and economic systems that perpetuate inequality, these innovations may fail to deliver true energy justice. Byrne et al. (2014) warn that decentralised energy systems can sometimes reinforce existing power imbalances if wealthier communities have greater access to new technologies. Therefore, energy justice requires not only technological advancements but also policy frameworks that promote equity and inclusion at every level of the energy transition.

### 3.4.6 Summary

Energy justice is a multi-dimensional framework that addresses the ethical, social, and political issues surrounding energy production and consumption. Through the lenses of distributive, procedural, and recognition justice, energy justice highlights the need for fair and inclusive energy transitions. However, while the theoretical frameworks provide a robust foundation, critiques highlight significant challenges in their implementation, particularly in addressing power dynamics, structural inequalities, and the complexities of global energy governance.

Technological and policy solutions, such as decentralised energy systems and energy efficiency programmes, offer promising avenues for addressing energy justice. However, to achieve true equity, these solutions must be paired with reforms that address deeper systemic issues, ensuring that the most vulnerable populations are not left behind in the transition to a sustainable energy future.

This critical review underscores the need for a holistic approach to energy justice, one that balances the immediate need for equitable energy access with the long-term goal of sustainable, inclusive energy systems

# CHAPTER 4

# RESEARCH METHODOLOGY

## 4.0 Introduction

This chapter describes the approach used to investigate the underlying causes of disparities in electricity access and supply in Nigeria. The study used qualitative research methods and a case study approach to understand the issue comprehensively. The chapter begins by explaining the qualitative research methodology, philosophy, and paradigm adopted for the study. It then justifies the chosen research methods and approach and discusses the rationale for using the case study method. The chapter also describes the data collection methods, sampling framework, participant recruitment, contacting process, and interview design. It also outlines the challenges faced during data collection and the data presentation and analysis techniques used, including thematic data analysis. Finally, the chapter discusses research evaluation, validity and reliability, limitations, and ethical considerations.

## 4.1 Qualitative Research Methodology

Qualitative research is an essential tool for understanding the complexities of human experience, providing researchers with a deep and nuanced understanding of social phenomena. This methodological approach allows investigators to explore the intricate details of social interactions and the lived experiences of individuals (Creswell, 2013). Qualitative research aims to provide a detailed and in-depth understanding of individuals' and groups' subjective experiences, perceptions, and behaviours (ibid). Qualitative research, as opposed to its quantitative counterpart, is characterised by its focus on exploring and understanding social phenomena rather than measuring or quantifying variables (Bryman, 2012). Through this approach, researchers can uncover the underlying meaning, motivations, and beliefs that inform human experience (Denzin & Lincoln, 2011). By employing various data collection methods such as interviews, focus groups, and participant observation, qualitative researchers can capture the richness of human experience and the contextual factors that shape it (Denzin & Lincoln, 2011).

According to Creswell and Poth (2017), qualitative research is concerned with exploring and understanding the meaning people attach to experiences and events.

This approach allows for an exploration of the subjective experiences and perceptions of the participants, which is critical in understanding the nuances of the issue. Qualitative research is apt for this study as it allows for a nuanced and contextualized understanding of the issues surrounding electricity access and supply in Nigeria and causes and effect of disparities in this area. As Merriam (2009) pointed out, qualitative research is suited for studying complex social phenomena that cannot be easily quantified.

I chose qualitative research methods because they allow me to explore stakeholders' experiences and perspectives on Nigeria's electricity access and supply. I collected rich and detailed data using interviews, document analysis, and case studies to understand how political, geographical, economic, and social factors influence regional electricity access disparities. These methods also enable me to capture the diversity and complexity of the issue and identify possible solutions that are context-specific and inclusive. I chose interviews, document analysis, and case studies as the primary data collection methods because they have several advantages for this study, as discussed in sections 3.3, and 3.4.

In summary, using qualitative research methods and case study analysis in this study enables a more nuanced and contextualized understanding of the issues surrounding electricity access and supply in Nigeria. This study examined the experiences and perspectives of stakeholders in the electricity sector and the unique characteristics of each region. The study's findings will inform policies and interventions aimed at addressing the issue of electricity access disparities in Nigeria.

### 4.2 Research Philosophy

I adopted an interpretivist philosophy for this study, which emphasizes the importance of subjective interpretation in understanding social phenomena (Marsh and Furlong, 2002; Leeming, 2018; Denzin, 2018). Interpretivism posits that social phenomena are complex and cannot be reduced to simple cause-and-effect relationships. Instead, they must be understood through the meanings and interpretations individuals attach to them (Schwandt, 1994; Marsh and Furlong, 2002; Chowdhury, 2014).

By adopting an interpretivist research philosophy, I seek to uncover the electricity access and supply disparity phenomenon in Nigeria through the meanings and interpretations that stakeholders attach to their experiences and the context in which they occur. Interpretivism's main strength lies in its focus on participants' subjective experiences and interpretations (Noon, 2018). This focus enables researchers to delve deeper into the intricate layers of meaning that participants attribute to their experiences, thus facilitating a more comprehensive understanding of the social phenomena under investigation.

Another advantage of interpretivism is its contextual emphasis (Denzin, 2018). Interpretivists assert that social phenomena cannot be understood outside their social, historical, and cultural contexts. Accordingly, interpreting social phenomena must consider the context in which they occur. This emphasis on context aligns with the case study approach chosen for this study, which allows for an in-depth exploration of a specific phenomenon in its natural context, consistent with the interpretive philosophy of understanding social phenomena through subjective interpretation.

However, interpretivism has its limitations. One of the weaknesses of interpretivism is its subjectivity (Creswell & Poth, 2017). The interpretation of data can be influenced by the researcher's biases and beliefs, which can undermine the validity and reliability of the research findings. To mitigate this issue, I employed triangulation, using multiple data sources and methods to understand the phenomenon comprehensively. This approach strengthens the credibility of the findings and reduces potential biases, ensuring a more accurate representation of the participants' perspectives and experiences.

Another limitation of interpretivism is its limited generalizability. Interpretive research findings may not readily apply to other contexts or populations, given their focus on specific contexts and subjective experiences (Creswell & Poth, 2017). To enhance the generalizability of the research findings, I employed a comparative analysis, identifying similarities and differences in the findings across different contexts. This approach allows for a better understanding of the general patterns and trends applicable beyond the specific contexts under investigation.

In summary, the interpretivist research philosophy provides a robust foundation for exploring and understanding the complex social, economic, and political issues underlying Nigeria's electricity access and supply disparity. By focusing on the subjective experiences and interpretations of stakeholders and considering the social, historical, and cultural contexts in which the phenomenon occurs, this study offers valuable insights that can inform policies and interventions to address the issue of electricity access disparities in Nigeria. Moreover, the use of triangulation and comparative analysis enhances the credibility and generalizability of the research findings, contributing to the existing body of knowledge on electricity access and supply disparities in Nigeria and beyond.

### 4.3 Research Paradigm

Ontologically, this study adopts the constructivist stance, which acknowledges the subjectivity and multivalence of reality, implying that individuals may hold divergent views and interpretations of the same experience (Crotty, 1998). This perspective posits that reality is not fixed or universal but is constructed and shaped by individuals' experiences and interpretations (Guba & Lincoln, 1994). Consequently, this research seeks to explore the multiple and varied perspectives of the participants involved in the study and how the come to interpret the competing dynamics within Nigeria’s energy sector.

Epistemologically, the study aligns with the constructivist view that knowledge is co-constructed through interaction and discourse between the researcher and the participants (Creswell & Poth, 2017). This stance emphasizes the role of dialogue and reflexivity in the research process, which entails the researcher's acknowledgment of their values, beliefs, and potential biases that might influence the study (Berger, 2015). Thus, the study recognizes that detachment and objectivity are untenable in this research context, and the researcher's subjectivity plays a significant role in the knowledge construction process (Mertens, 2005).

In contrast, the statement accentuates a fundamental incongruity with positivist research methodologies. Positivism, deeply rooted in the philosophy of science, champions the principle of objectivity and emphasises reliance on quantifiable and observable data as the predominant mode of inquiry. This philosophical stance posits the existence of an external, measurable reality and, in doing so, aspires to

curtail the influence of subjectivity and personal bias. Researchers who adopt a positivist orientation rigorously collect and analyse empirical data, often employing controlled experiments or structured surveys as their primary methods. This approach is underpinned by the presumption that an objective reality exists and can be revealed through systematic data collection and analysis.

Methodologically, the study employs inductive and interpretive methods, which allow for the generation of themes and patterns from data instead of testing hypotheses or applying theories (Thomas, 2006). These methods facilitate a deeper understanding of the participants' experiences and perceptions and enable the researcher to identify the underlying factors contributing to the disparities in electricity access and supply in Nigeria (Patton, 2002). This methodological stance aligns with the qualitative research paradigm, which emphasizes the exploration of complex phenomena and the comprehension of the subjective experiences of participants (Denzin & Lincoln, 2011).

The interpretivist research paradigm chosen for this study is suited for exploring complex phenomena and understanding subjective experiences (Schwandt, 2000). As the ethnographer Clifford Geertz (1973) has written the interpretivist perspective acknowledges the subjectivity and multidimensionality of reality, highlighting the need for diverse perspectives and interpretations of phenomena. Moreover, interpretivists posit that knowledge is generated through interaction and discussion between the researcher and participants, which precludes detachment and objectivity (Berger, 2015). Interpretivist researchers employ inductive and interpretive methods to analyse data, focusing on generating themes and patterns from the data (Thomas, 2006).

By adopting an interpretivist research paradigm, this study acknowledges the significance of the researcher's values, perspectives, and the socio-cultural context of the research in shaping the study's findings (Ponterotto, 2005). This recognition emphasizes the importance of reflexivity and transparency in the research process, ensuring that the researcher's subjectivity is acknowledged and accounted for throughout the study (Lincoln & Guba, 1985).

In essence, the ontological, epistemological, and methodological stances adopted in this study align with the interpretivist research paradigm, which is suited for exploring

complex phenomena and understanding the subjective experiences of participants. This paradigm recognizes the subjectivity and multidimensionality of reality and the role of the researcher's values, perspectives, and socio-cultural context in the knowledge construction process. By embracing an interpretivist research paradigm, this study seeks to provide a nuanced and contextualized understanding of the disparities in electricity access and supply in Nigeria.

### 4.4 Justification for Research Methods and Methodological Choice

The choice of qualitative research methods for this study is grounded in the need to explore the complex social, economic, and political issues underlying Nigeria's electricity access and supply disparity. Qualitative research emphasizes the exploration of phenomena in their natural settings and allows for an in-depth understanding of the subjective experiences and interpretations of the participants (Creswell & Poth, 2017; Denzin & Lincoln, 2018). This is particularly relevant to this study, as it seeks to examine the perspectives and experiences of stakeholders involved in Nigeria's electricity sector.

Qualitative research methods facilitate the collection of rich, detailed, and context-sensitive data (Patton, 2015). It also enables the researcher to capture the diversity and complexity of the issue under investigation and identify possible solutions that are context-specific and inclusive. This is vital for this study, as it aims to understand the multiple dimensions of electricity access and supply disparities in Nigeria, spanning political, geographical, economic, and social factors. The qualitative research and the methodological choices are consistent with my research objectives, which are as follows:

*Objective 1 - Establishing who has access to electricity and why:* I chose qualitative research methods, with interviews, to allow for the exploration of the interviewees' subjective experiences and perspectives on electricity access in Nigeria. This enables me to gain a deeper understanding of the reasons behind the disparities in electricity access, which is vital for understanding the complex factors influencing access. Additionally, qualitative methods help me uncover the underlying social, economic, and political dynamics that contribute to these disparities, providing a comprehensive understanding of the issue.

*Objective 2 - Examining the spatiality of electricity infrastructure and its influence on accessibility:* I selected a qualitative approach, including document analysis and case studies, to facilitate the exploration of the spatial organisation and distribution of electricity infrastructure and how it affects accessibility within and between regions. This method allows me to identify patterns and trends in the location and distribution of electricity infrastructure and the factors contributing to regional disparities. Furthermore, qualitative methods enable me to capture the contextual factors, such as historical geographical and socio-political influences, which shape the spatial distribution of electricity infrastructure.

*Objective 3 - Identifying regional exclusion and inclusion between key actors in the electricity sector:* Again I have chosen qualitative research methods, including interviews and document analysis, to investigate the relationships and power dynamics between key actors in the electricity sector. These methods provide insights into the decision-making processes, resource allocation, and policy implementation that may contribute to regional exclusion and inclusion. By examining the perspectives and experiences of key stakeholders, qualitative methods facilitate the identification of potential barriers and opportunities for fostering greater inclusion and addressing disparities in electricity access.

*Objective 4 - Establishing the prospect of expanding and improving electricity infrastructure in the regions:* Here I carried about qualitative interviews with key stakeholders to explore the potential for expanding and improving electricity infrastructure in the regions particularly those distant from the power centres near the country's capital city, Abuja and the largest industrial hub, Lagos. These methods provide valuable insights into the challenges, opportunities, and strategies for enhancing electricity access and infrastructure development. Additionally, qualitative methods enable me to capture the contextual factors that may influence the feasibility and effectiveness of various interventions and policies aimed at addressing regional disparities in electricity access.

In summary, my choice of qualitative research methods for this study aligns well with the research objectives. These methods enable me to explore the complex and nuanced factors contributing to regional disparities in electricity access in Nigeria while also capturing the contextual influences and power dynamics between key

actors in the electricity sector. The qualitative approach facilitates a comprehensive understanding of the issue and informs strategies for addressing regional disparities in electricity access and supply.

### 4.5 Case Study Research Design

The case study method is a research methodology that involves a comprehensive approach whereby the researcher focuses on a specific instance of the phenomenon to be studied (Creswell, 2017; yin 2018). This method is particularly useful when a holistic, in-depth investigation is required, as it allows for exploring and understanding complex issues (Zainal, 2007). Case studies can be considered a robust research method, as they allow for an in-depth study of a particular subject or group of people, involving gathering and analysing both qualitative and quantitative data (Gulsecen & Kubat, 2006).

According to Yin (2002), case study research is an empirical study that investigates a contemporary phenomenon within its real-life context, where the boundaries between the phenomenon and context are not evident, and multiple sources of evidence are employed. Yin suggests that the design of a case study should be considered when the study focuses on answering "how" and "why" questions. Similarly, when the researcher cannot manipulate the behaviour of those involved in the study, when contextual conditions are relevant to the phenomenon under study, or when the limitations are unclear between the phenomenon and context.

As with many methods in the research’s toolkit case studies have both strengths and weaknesses. One weakness is that they tend to involve small sets of data, which may limit the generalizability of the findings. On the other hand, case studies allow for detailed, holistic, and futuristic investigations in all aspects and can utilise various measurement techniques as a methodological tool. The histories or stories that can be told about the company can also be assessed and documented, not just empirical data (Yin, 2009). According to Yin (2003), case studies are well-suited for capturing information on "how," "what," and "why" questions, enabling researchers to understand and explain causal links and pathways resulting from a new policy initiative or service development.

Selecting the case(s) to study is essential in case study research (Stake, 1995; Merriam, 1998; Yin 2018). In-depth case studies are often selected based on their

flexibility, which genuinely interests the researchers. In contrast, instrumental case studies are selected to investigate an issue or phenomenon. Collective or multiple case studies involve the careful selection of several cases to allow for comparisons to be made across several cases and replication. The selected case study site(s) should allow the research team access to the group of individuals, the organisation, the processes, or whatever else constitutes the chosen unit of analysis for the study (Yin, 2003). Access is a central consideration, and selected cases need to be interested and hospitable to the inquiry. The researcher also needs to think through the ethical implications of the study, ensuring that potential participants or participating sites are provided with sufficient information to make an informed choice about joining the study (Wang & Deggs, 2019).

### 4.5.1 Rationale for Case Study Method

In my research, I chose to use the case study method as it is a widely used research strategy in qualitative research when a contextual and time-bound investigation of a specific phenomenon is required. The role of context is highly significant in case study research, as it allows for a deeper understanding of the unique characteristics and complexities of each region being investigated. The case study method's emphasis on context ensures that the findings are grounded in the realities and nuances of each region, enabling a more accurate and comprehensive understanding of the issues at hand. By considering the context, I gained valuable insights into the factors contributing to disparities in electricity access and supply in Nigeria.

Given the complexity of my research question, which seeks to uncover the factors and phenomena underlying regional disparities in electricity access and supply in Nigeria, I felt that the case study approach was an appropriate strategy to explore the multifaceted nature of this issue and to understand the underlying factors and mechanisms that drive regional electricity access and supply.

The case study method offers several advantages and limitations in understanding complex phenomena like regional disparities in electricity access and supply. One key benefit of the case study approach is its capacity for a deep, contextually rich investigation. By focusing on the specific geopolitical zones in Nigeria, this research gained insights into the political, geographical, and social factors shaping electricity

distribution in these regions. The flexibility of the case study method also allowed for the combination of multiple data sources such as interviews and documents providing a holistic view of the issues under investigation (Yin, 2009; Creswell, 2017).

However, a limitation of case study analysis lies in its potential lack of generalisability. The findings from the selected zones in Nigeria may not be universally applicable to other contexts, particularly across sub-Saharan Africa, where the political and socio-economic landscape differs. While the comparative approach used in this study examining multiple geopolitical zones helped mitigate some of these limitations by highlighting common and divergent factors, caution must be exercised when extrapolating these findings to other regions. The complexities of electricity access and supply are unique to each nation's infrastructure, governance, and social dynamics. Nonetheless, the findings from this case study can still offer valuable insights for understanding similar challenges in sub-Saharan Africa, especially regarding the influence of governance and regional disparities on electricity distribution (Yin, 2002; Stake, 1995).

In summary, the case study approach was a valuable research strategy for my study. It allowed for an in-depth exploration of the factors and phenomena underlying regional disparities in electricity access and supply in Nigeria. The approach's flexibility and holistic view of the research question were particularly well-suited to this multifaceted issue.

### 4.6 Data Collection Methods

For this study, I employed a mixed-methods data collection approach, utilising semi-structured interviews and document analysis to gain insights into regional disparities in electricity access and supply in Nigeria, using multiple data collection methods allowed for a more thorough examination of the multifaceted issue at hand (Creswell, 2014).

I conducted a total of 67 semi-structured interviews in two phases. The first phase consisted of 17 interviews with electricity stakeholders from the public and private sectors between March and July 2020. The semi-structured nature of the interviews provided a flexible and conversational approach to data collection, allowing for an in-depth exploration of the issues under study (Kvale, 2007). I conducted the second

phase of the interviews online, due to Covid-19 restrictions in place during the period. The interview consist of communities in the selected regions from January to March 2021. The selection process of these communities was diverse as discussed in section 3.7.

To complement the interviews, I utilised document analysis to gain a broader contextual understanding of the issues, including reports, policy documents, and other relevant materials. This approach provided additional insights into factors that contribute to regional disparities in electricity access and supply (Bowen, 2009). Furthermore, I utilised secondary quantitative data sources to enhance and triangulate the qualitative data. This approach allowed for a more comprehensive understanding of the issues under study and helped to provide additional context to the qualitative data (Creswell, 2014).

Overall, mixed-methods data collection provided a nuanced and comprehensive understanding of the complex issues surrounding regional disparities in electricity access and supply in Nigeria, highlighting the need for targeted policy interventions that address the socio-economic and political factors that contribute to these disparities.

### 4.6.1 Semi-structured interviews

Semi-structured interviews have been widely used as a data collection method in qualitative research studies (Hesse-Biber and Leavy, 2011; Miller and Glaser, 2016). This approach provides a flexible and adaptable method of data collection, enabling researchers to explore participants' perspectives and experiences in a conversational and open-ended manner (Patton, 2002). Moreover, the approach can be tailored to suit the specific research context and the needs of the participants (Miller and Glaser, 2016).

Semi-structured interviews have been used in previous research to investigate the experiences of individuals and groups regarding various issues, policy-related or theoretical including health, education, and social policy (Pope and Mays, 1995; Coghlan and Brydon-Miller, 2014; Serhan and McMillan, 2020). In the context of energy access, semi-structured interviews have been used to explore the perspectives of various stakeholders, including policymakers, energy providers, and

consumers, regarding energy infrastructure, access, and supply (Cameron and Hodge, 2013; Herring and Roy, 2019).

In this study, I choose semi-structured interviews as the primary data collection method to explore the factors contributing to regional disparities in electricity access and supply in Nigeria. I conducted the interviews with a diverse sample group of interviewees, including energy actors, community leaders, settlers, urban and rural areas. The interviews were designed to elicit participants' perceptions and experiences, and the questions were adapted to suit the participants' backgrounds and the specific research context.

The use of semi-structured interviews in this study provided a flexible and conversational approach to data collection, enabling in-depth exploration of the complex issues surrounding regional disparities in electricity access and supply in Nigeria. I obtained detailed information using this method on the interviewees' experiences and perspectives, providing a rich and nuanced understanding of the factors contributing to regional disparities.

Semi-structured interviews can elicit evidence and perceptions of the subject of investigation, as well as the contexts and situations in which they occur (Miller and Glaser, 2016). I designed the interviews to use open-ended questions to allow interviewees to express their viewpoints, with consideration given to which questions the interviewees could respond to and how the interview could help construct the context. The sample group comprised individuals with diverse professional, educational, and personal backgrounds, making it challenging to use a standard interview schedule.

To conduct a comprehensive investigation of the factors contributing to regional disparities in electricity access and supply in Nigeria, I tailored my interview approach based on the type of interviewees, focusing specifically on electricity stakeholders during the initial round of data collection. This approach is consistent with existing literature, which emphasizes the importance of targeting specific groups to gain a more in-depth understanding of the issues under study (Guest et al., 2006; Miller and Glaser, 2016).

The interviews with electricity stakeholders primarily focused on policies, regulations, and challenges faced in ensuring reliable electricity supply and the strategies

employed in addressing regional disparities in electricity access. Using a targeted interview approach allowed for a focused investigation of the roles and impact of electricity stakeholders in addressing regional disparities. This approach is supported by previous research, which has emphasized the importance of understanding the perspectives and experiences of key stakeholders to address complex issues such as energy access (Patterson et al., 2016).

The energy actors interviewed in this study included policymakers, energy regulators, energy suppliers, and energy experts, all with unique perspectives on the subject. By conducting targeted interviews with these key stakeholders, I gained valuable insights into the policies and regulations guiding the energy sector, the challenges faced by energy actors, and their efforts in addressing regional disparities in electricity access and supply. This approach allowed for a comprehensive investigation of the factors contributing to regional disparities and is consistent with previous research, which has emphasized the importance of engaging with a variety of stakeholders in order to gain a more nuanced understanding of complex issues (Cornwall and Jewkes, 1995; Patterson et al., 2016).

Additionally, the semi-structured interview approach has been shown to be effective in exploring complex topics, such as regional disparities in electricity access and supply (Miller and Glaser, 2016). The use of semi-structured interviews also enabled the exploration of the different experiences and perspectives of the various interviewees in the different regions, allowing for a more comprehensive investigation of the research question.

Overall, the use of semi-structured interviews in this study provided a flexible and adaptable data collection method, enabling the exploration of the complex issues surrounding regional disparities in electricity access and supply in Nigeria.

### 4.6.2 Document Analysis

Several policy authors have argued about the complexity of conceptualising policy analysis due to the lack of robust conceptual and theoretical arguments (Weimer and Vining, 2017; Hill and Varone, 2019). In this study, I employed a three-stage approach involving contextual, textual, and outcome analyses, a common approach to policy analysis (Rizvi and Linngard, 2010).

In the contextual analysis stage, I examined the historical and political sources of specific policies to understand its origin, reason, players, and period. This approach is consistent with previous research that advocates for a historical analysis of policies to understand their development and evolution (Bacchi, 2009; Hajer and Laws, 2006).

Next, I conducted a textual analysis of the policy discourse and its structure. This approach involved examining the policy text to understand how the policy problem is conceptualised, what discourse frames the policy text, how policy works as a text, who the policy's promoters are, and why the intertextuality of the policy. This approach aligns with previous research that underscores the importance of textual analysis in understanding policy processes and outcomes (Bacchi, 2009; Hajer and Laws, 2006).

Finally, in the outcome analysis, I examined the strategies and policy outcomes, seeking to understand the approaches for implementation, unintended consequences, the social justice effect of the policy, and who benefited from the policy. This approach is consistent with previous research that emphasises the importance of evaluating policy outcomes to determine the effectiveness and equity of policies (Bacchi, 2009; Hajer and Laws, 2006).

My document analysis approach involved searching for government policy documents, archived interviews with policymakers, newspaper articles, and academic publications. I carried out this process during the literature review, case selection, data collection, and interpretation stages. All the documents retrieved throughout the study were evaluated for authorship, purpose, intended audience, and context.

Using document analysis as a research method was advantageous for my study because it allowed me to access historical, political, and economic factors that might have influenced policy development. It was more cost-effective and time-efficient, allowing me to gather a large amount of data in a relatively short period. Additionally, it was less intrusive than other data collection methods. By analysing policy documents, I identified gaps, contradictions, and inconsistencies in the policy text, which helped in making recommendation.

The cross-case analysis method used in this study facilitates the comparison of the findings from the different case studies. The method enables me to identify similarities and differences in the selected cases' policy texts and implementation processes. This analysis provides a comprehensive view of the underlying factors contributing to regional disparities in electricity access and supply in Nigeria.

In summary, the document analysis approach is a useful and practical means of examining policy-related texts and contextual factors that influence regional disparities in electricity access and supply in Nigeria. By conducting a cross-case analysis of the policy documents and other relevant sources, this study aims to understand the underlying factors contributing to these disparities comprehensively.

### 4.7 Sampling Framework

The sampling framework is an essential component of any research design, as it involves selecting a subset of items from a defined population for inclusion in the study (Bryman, 2016). For this study, I examined a range of sources, including government energy policies, international reports, local agency reports, and press releases, covering the period from 1999 to 2021. This timeframe marks the country's return to civilian rule from military governance, and the government privatised the electricity sector during this period. Furthermore, I analysed print and video interviews with ministers of power from 1999 to 2020 and key newspaper columnists who wrote on energy issues in Nigeria. I assessed the content and context of these sources focusing on the author(s), aims, and target audience. The policy analysis was instrumental in identifying themes and topics for the inquiry, which informed the development of interview questions.

The selection of documents from 1999 to 2021 for this study is grounded in the significant historical, political, and policy developments that occurred within Nigeria’s energy sector during this period. The transition to civilian rule in 1999 marked a pivotal shift in governance, initiating democratic reforms that impacted multiple sectors, including energy. This year represents a critical turning point, as new policies and frameworks for the electricity sector were formulated as part of broader reforms aimed at liberalising and restructuring key industries.

The privatisation of the electricity sector, particularly through the Electric Power Sector Reform Act of 2005, stands out as a major reform during this timeframe. The

government undertook substantial changes to the energy landscape, aiming to enhance efficiency and increase access to electricity. By covering the period from 1999 to 2021, this study captures the evolution of these reforms, the establishment of new energy market structures, and the regulatory challenges that emerged. The timeframe also encompasses recent developments in the energy sector, aligning with ongoing global trends, such as the shift towards renewable energy sources and attempts to address energy poverty. By concluding the analysis in 2021, the study offers a comprehensive view of how the transition to civilian governance influenced energy policy up to that point.

However, the research was initially intended to conclude in 2021; due to the COVID-19 pandemic and other researchers' issues, and the data collection phase ended in 2021. The study focuses on the crucial developments that shaped Nigeria's energy policies throughout the preceding two decades, providing valuable insights into the complex interplay of political, economic, and social factors influencing energy access and affordability.

The decision to analyse video interviews with ministers of power and key figures from 1999 to 2020 is similarly justified by the need to capture first-hand narratives from individuals directly involved in shaping Nigeria's energy policies during a critical period of reform. These interviews provide valuable insider perspectives on policy motivations, challenges, and objectives. By including interviews up to 2020, the study encompasses various political figures across different administrations, allowing for a nuanced analysis of how leadership changes impacted energy policy and its implementation.

Yin (2018) notes that case study research may use various sampling techniques depending on the research objectives. For this case study, a diverse range of interviewees was required, including energy actors, policymakers, and community members. I employed purposive and snowball sampling techniques in this study due to their appropriateness for the research objectives and context. Purposive sampling allowed me to select participants with specific knowledge, expertise, or experience relevant to the research topic. I used snowball sampling to identify and recruit community members and other hard-to-reach participants. By asking initial participants to refer other individuals who could potentially contribute to the research,

I was able to access a broader range of interviewees and gather diverse perspectives on the issue of regional disparity in electricity access in Nigeria. By selecting participants based on their expertise, experience, or knowledge and leveraging their networks to access additional participants, these sampling techniques contributed to a comprehensive understanding of the causes and consequences of regional disparity.

The data collection process involved conducting interviews in two stages. The first stage focused on key national actors in the energy sector and policymakers. I originally intended to conduct 20 interviews with key national actors from the electricity sector. However, due to accessibility issues I was not able to interview the initial number of interviewees. Despite this challenge, I conducted 17 interviews with electricity stakeholders including the regulators, generators and distributors. Table 1 provides details of the interviewees' backgrounds and the dates of the interviews.

In the second data collection stage, I selected participants carefully to represent various facets of the communities in the selected states in the regions, namely Kano, Lagos, and Rivers states. These states were chosen not just for their populous and cosmopolitan nature but also due to their diverse socio-economic and cultural profiles. The states span north and south regions allowing for a more holistic and nuanced understanding of the research subject (the detailed case study selection is discussed in Chapter 4).

This study included 50 participants, with at least four from each of the distinct categories identified. These categories included people from urban areas, rural locales, community leaders, and residents from settlers' areas, where non-indigenous people reside. In the Nigerian context, "settlers' areas" typically denote regions where individuals from different ethnic or cultural backgrounds have migrated and established homes in communities where they are not considered indigenous. This distinction carries significance due to Nigeria's vast diversity of ethnic groups, each with its cultural practices and traditions. The presence of non-indigenous settlers in an area can sometimes lead to complexities in land rights, community dynamics, and the coexistence of different cultural norms, necessitating a nuanced approach to social and cultural analysis. The sample was disaggregated to account for key demographic factors, including gender, age, socio-economic

background, and community dynamics, to capture the different needs and challenges of participants. Given that energy justice is a central theme of the study, it was important to understand how these factors shaped access to electricity and perceptions of fairness in energy distribution. Gender considerations were crucial, as men and women often experience energy challenges differently, especially in rural areas. Intergenerational factors were also considered, recognising that younger and older generations have distinct energy needs and priorities. Additionally, participants from varying socio-economic and educational backgrounds were included to reflect how energy access impacts different social strata. The inclusion of community leaders further enriched the study by offering diverse perspectives on energy access. This segmentation ensured that the data gathered spanned a broad spectrum of perspectives and experiences, giving a detailed view of the states' societal dynamics complexities. The diversity in the research participant pool is displayed in Table 3.

While the initial target was 60 participants for the community interviews, the principle of saturation was applied (Guest et al., 2006). This principle postulates that data collection can cease when no new or relevant information emerges. After interviewing 50 participants, this saturation point was reached, indicating that the collected data was sufficiently rich and comprehensive to address the research objectives. Qualitative research's potential issue is uncertainty about sample sizes, which can create challenges for those unfamiliar with qualitative approaches and question the legitimacy of the research (Marshall et al., 2013). To mitigate this concern, qualitative research using grounded theory or case study approaches should aim for a sample size of 20-30 participants (ibid). However, in this study, the sample size exceeded this recommendation due to Nigeria's prevalence of electricity problems. Therefore, I tried to include a diverse range of interviewees, including varying genders, educational levels, and housing tenures (owned, privately rented, and family houses), to better understand the broader context and underlying causes of each research focus.

In summary the sampling framework in this study involved examining various sources and conducting interviews with a diverse range of participants, including energy actors, policymakers, and community members. Despite exceeding the recommended sample size, efforts were made to include a diverse range of

participants to gain a better understanding of the broader context and underlying causes of each research focus.

*Table 2: Research Participants Interviewed*

| S/N | Research Participant | Background/Expertise | Date |
|---|---|---|---|
| (a) | (b) | (c) | (d) |
| 1 | Research Participant A | An engineer in energy sector with over 20years industry experience. | 13 March 2020 |
| 2 | Research Participant B | A communication expert working in energy industry. | 16 March 2020 |
| 3 | Research Participant C | A senior administrator with several years of experience in energy and cooperate strategy. | 18 March 2020 |
| 4 | Research Participant D | A clean energy specialist with a focus on financing and project management. | 20 March 2020 |
| 5 | Research Participant E | An expert in gas engineering. | 23 March 2020 |
| 6 | Research Participant F | An experienced power station Engineer. | 27 March 2020 |
| 7 | Research Participant G | An experience socio-political expert and economist. | 30 March 2020 |
| 8 | Research Participant H | An seasoned energy professional with experience in general administration and operation of one of the region's transmission firms. | 2 April 2020 |
| 9 | Research Participant I | An experience engineer with several working experience in the defunct NEPA. | 6 April 2020 |
| 10 | Research Participant J | An experience power engineer with expertise on gas turbines and heat recovery steam generators. | 7 April 2020 |
| 11 | Research Participant K | An experience power station Engineer. | 9 April 2020 |
| 12 | Research Participant L | An experience sales manager in the utility industry. | 15 April 2020 |
| 13 | Research Participant M | Principal manager, distribution planning and design. | 17 April 2020 |
| 14 | Research Participant N | Customer relationship officer with expertise on sales and marketing. | 18 April 2020 |
| 15 | Research Participant O | Head of cooperate communication. | 16 April 2020 |
| 16 | Research Participant P | A senior energy expert with several years' experience in the energy industry. He saw a large part of the utility privatisation. | 24 April 2020 |
| 17 | Research Participant Q | A senior staff at the planning research and statistics department. | 11 May 2020 |

*Table 3: The Community Research Participants*

| Categories | | No of Participant | Gender | | Marital Status | | Educational level | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | M | F | S | M | A level | Grad | Postgrad |
| North-West Region (Kano State) | Urban Area | 5 | 4 | 1 | | 5 | | 3 | 2 |
| | Rural Area | 4 | 4 | | | 4 | | 3 | 1 |
| | Settlers Area | 4 | 3 | 1 | 1 | 3 | | 4 | |
| | Community Leaders | 4 | 4 | | | 4 | 1 | 3 | |
| Total | | 17 | 15 | 2 | 1 | 16 | 1 | 13 | 3 |
| | | | | | | | | | |
| | | No of Participant | Gender | | Marital Status | | Educational level | | |
| | | | M | F | S | M | A level | Grad | Post grad |
| South-West Region (Lagos State) | Urban Area | 4 | 4 | | | 4 | | 4 | |
| | Rural Area | 4 | 2 | 2 | 1 | 3 | 1 | 3 | |
| | Settlers Area | 4 | 3 | 1 | | 4 | 2 | 2 | |
| | Community Leaders | 4 | 4 | | | 4 | | 4 | |
| Total | | 16 | 13 | 3 | 1 | 15 | 3 | 13 | |
| | | | | | | | | | |
| | | No of Participant | Gender | | Marital Status | | Educational level | | |
| | | | M | F | S | M | A level | Grad | Post grad |
| South-South Region (Rivers State) | Urban Area | 5 | 2 | 3 | 1 | 4 | | 5 | |
| | Rural Area | 4 | 2 | 2 | 1 | 3 | | 4 | |
| | Settlers Area | 4 | 4 | | 1 | 3 | 1 | 3 | |
| | Community Leaders | 4 | 4 | | | 4 | 1 | 3 | |
| Total | | 17 | 12 | 5 | 3 | 14 | 2 | 15 | |
| GRAND TOTAL | | 50 | 4 | 1 | 5 | 45 | 6 | 41 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0 | 0 | | | | | |

### 4.7.1 Positionality of the Researcher

In conducting this research, my positionality as a male from northern Nigeria, specifically Kano State, inevitably influenced various aspects of the study, from its design to data collection and interpretation. Being from the northern region provided me with an insider's perspective, particularly in understanding the cultural and socio-political nuances of the region, which was critical for exploring regional disparities in electricity access. However, when conducting fieldwork in other parts of Nigeria, such as the South-South or South-West, I had to navigate the insider-outsider tensions that arose due to my background.

I am serving in the armed forces of Nigeria one of the most diverse institutions in the country, where individuals from all states and tribes are represented helped me reconcile these tensions. My professional experience meant that I had established connections across the entire country, with course mates in all 36 states of the country, and I had personally visited 32 states during my career. These experiences provided me with a broad, inclusive perspective and a level of comfort in interacting with diverse populations, which proved beneficial during the data collection. Despite these insider connections, I remained conscious of any potential biases that could influence data collection and interpretation, ensuring that the perspectives of participants from different regions were fully represented and understood.

Most of the interviews, as mentioned in section 3.8.1 and 3.8.2, were conducted online, which mitigated many of the challenges associated with physical presence and regional identity. The online format helped maintain a degree of neutrality and minimised potential power dynamics that could arise from face-to-face interactions. I found that the power dynamics between myself and the participants, whether they were from the grassroots or elites like company officials or government actors, remained largely unchanged throughout the interviews. My military background, which had already afforded me an understanding of hierarchical structures and respect for authority, enabled me to navigate interviews with elites without disrupting the dynamics of the conversation.

Overall, my positionality as a researcher with ties to the north, my extensive travel and work across Nigeria, and the cosmopolitan nature of my background allowed me to approach the research with both an insider's insight and an outsider's objectivity, ensuring a balanced analysis of the regional disparities in electricity access.

### 4.7.2 Recruiting and Contacting Participants

The study's interviewees primarily consist of individuals involved directly or indirectly in electricity infrastructure and policy formulation. The selection process involved obtaining a list of potential interviewees from government ministry and parastatal websites and making initial contact with some Nigerian Electricity Regulatory Commission (NERC) and Transmission Company of Nigeria (TCN) staff members after receiving ethics approval. To reach the desired participants, I had to leverage mutual acquaintances and close associates to obtain some potential Interviewee's mobile phone numbers. To request their participation, I sent a brief message via SMS, providing background information and a request for an interview session later. I obtained some of the target participants' mobile phone numbers and sent a brief message through the Short Message Service (SMS).

Notably, this sampling strategy proved to be highly effective, as most of the individuals contacted responded positively and demonstrated a strong willingness to participate in the study. They expressed excitement that the research was for a doctoral degree and that the topic was timely, attempting to address Nigeria's current electricity crisis. After the initial text message, the interviewees were informed of the study's aims and objectives through a phone call, and a tentative date and time for the interview were agreed upon following their initial approval to participate in the research.

## 4.8 Design of Interviews

I employed a topic guide to keep the interview focused and maximize the allotted time. The guide contained essential topics related to energy accessibility and supply. I reminded the interviewees of the interview protocol, and I also ensure that recording equipment and backup were operational. The guide included brief questions about the participants' personal information and their role within their organization. The guide's main body consisted of open-ended questions, with notes for follow-up questions and reminders to avoid leading questions. Leading questions

can disrupt the interview flow, resulting in inaccurate or biased information and pressuring interviewees to agree with the interviewer's perspective rather than providing their own clarification. (Leech, 2002). However, most of the consent forms were acknowledged via text or WhatsApp messages due to phone interviews.

### 4.8.1 Interview Process (Phone Interviews)

The COVID-19 pandemic has caused significant disruptions to the research process, particularly in conducting in-person interviews. As a result, I had to modify the method and adopt online interviews as an alternative. Several of my interviewees left Abuja during the lockdown and relocated to their villages, and the phone connection was unreliable. It was imbued with intermittent voices and dispersed, nebulous sounds and muddled messages in one of the interviews. The interview in some cases became emotionally draining due to the interviewees' repeated apologies for poor network connectivity. This made me aware of the challenges inherent in conducting online interviews with interviewees who live in remote areas with limited phone coverage. Despite the challenges of conducting online interviews, the pandemic has created an opportunity for more flexible scheduling, as many people are cooped up at home and eager for interaction. This facilitates the recruitment of participants who may otherwise be difficult to access due to busy schedules.

However, the use of audio recording or phone recording during stakeholder interviews was rejected by some participants, despite assurances of anonymity and confidentiality. This reluctance to be recorded is a common concern that is shared by many public figures and stakeholders in various settings (Vogt et al., 2016). The participants may have preferred to have their opinions noted down using pen and paper to avoid any potential misinterpretation or misconstruing of their views (Gallagher, 2013). This highlights the importance of addressing such concerns during the research design phase to ensure that the chosen method of data collection is acceptable to all participants and does not compromise the quality of the data obtained.

The most critical difference of online interviews is their lack of presence, but researchers rarely discuss this or honestly recognise the distinction between in-person and online interviews. According to Elizabeth (2008), the importance of the spoken, is at the heart of qualitative inquiry's face-to-face interactions. Qualitative

researchers frequently view observation, conversation, and interviewing as activities in their presence. As Elizabeth argues, we presume our work is especially valid because of our face-to-face interactions with people. Qualitative research is not isolated it is present and in-person. It is partially true because human presence is required to build trust and intimacy. Online interviews also subtly lack eye contact and body language, limiting a more comprehensive interpretation of the interviewees' expressions.

Overall, the COVID-19 pandemic has necessitated the use of online interviews as an alternative to in-person interviews. However, the lack of physical presence during online interviews poses significant challenges to the validity and reliability of the data collected. To minimise these limitations, I took steps such as rescheduling interviews when the network was clearer and developing rapport-building techniques adapted for online interviews.

### 4.8.2 Challenges During the Data Collection

The initial phase of stakeholder interviews was scheduled to last six to seven weeks; however, the COVID-19 pandemic disrupted the plan. I arrived in Nigeria on 10 March 2020 when COVID-19 cases were on the rise globally, and people were hesitant to associate with individuals coming from abroad. As the number of cases increased, the Nigerian government implemented various measures to limit the virus's spread, including shutting down all airports and some states imposing total lockdowns in keeping with the measures taken in many other countries. After conducting three face-to-face interviews, I had to suspend data collection and return to my state of Kano. The change in data collection method to the use of online interviews was necessary to ensure the safety of both I and the participants. I continued the interview online as the situation improved.

However, conducting the interviews via phone presented some challenges, especially in remote locations. Despite the widespread use of mobile phones in Nigeria, the country's digital gap was exacerbated by expensive mobile data rates and connectivity issues, which made it difficult for Interviewees to use video call technology. I had a limited ability to use visual cues such as facial expressions and body language to interpret the interviewees' responses accurately.

In conducting the interviews with the stakeholders, I encountered challenges due to the lack of audio recording, which could have limited the quality of the data collected. However, by taking detailed notes and ensuring clear communication during the interviews, I was able to overcome these limitations and collect valuable data for the study. This approach is consistent with previous research that suggests that notetaking can be an effective alternative to audio recording in qualitative research (Creswell, 2014; Flick, 2018). Despite the potential limitations of this approach, it allowed me to maintain the flow of the interview while capturing key information and nuances that may have been missed with audio recording alone.

### 4.9 Data Presentation and Analysis

Thematic data analysis, one of the most widely used methods for analysing data, was used in this study (Bryman, 2016). Thematic analysis is similar to grounded theory in that it develops theory from data via coding activities. However, it can also be used in a theoretical framework to develop themes related to the notion and new hypothesis, allowing for quantitative analysis and assertions supported by text (data) (MacQueen & Narney, 2012).

Initially, case analysis was conducted by segregating stakeholders' interviews from community interviews (Creswell, 2013). The data analysis process continued with the coding and theming of all interview data. The analysis was strengthened by maintaining a codebook that linked data, codes, and themes at each process stage. The transcripts were read and re-read to detect any emerging themes or new lines of inquiry from the data.

The themes were composed of many codes that generally represented perceptions or experiences, as these were the primary topics of discussion throughout the interviews. This allowed for the organisation of codes for each group within similar themes, minimising confusion while maintaining a link between text samples and underlying codes and thoughts for future backtracking. It was challenging because several codes that applied to one theme may also apply to another. While this procedure aided in the preservation of clarity regarding codes, themes, and interview groups, it also resulted in the data becoming more emergent.

Following a review of the initial interviews and policy documents collected during the pilot phase of the data collection, this initial technique assisted in refocusing the

research objective in preparation for the continuing data collection. However, the primary shortcoming of this initial analysis was that the codes and themes were excessively descriptive, I therofre developed additional themes, with a stronger emphasis on the study's perspective. As a result, data collection continued in the same manner as previously, but with a broader theoretical framework and increased study flexibility.

After this second analysis exercise, both descriptive and deductive codes were produced, and these codes were then merged to construct themes. This approach enabled the identification of the most significant themes that emerged from the data, providing valuable insights into the research question. The second analysis increased the study flexibility helps to address any limitations or gaps identified in the initial analysis and strengthens the overall research outcomes.

### 4.9.1 Thematic Data Analysis

In this study, I used thematic data analysis, which is one of the most recent and widely used methods for analysing qualitative data (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006; Bryman, 2016). The process of thematic analysis involves engaging with the data to develop codes that refer to relevant text passages, organizing the codes into themes and sub-themes, and integrating these themes to create a unified view of the study findings (Bryman, 2016; Yin, 2014; Creswell, 2013). This section outlines the six stages of using Nvivo 12 software for thematic analysis: Data Familiarization, Coding, Finding Themes, Themes Review, Conceptualizing Themes, and Reporting.

#### *4.9.1.1 Stage 1 – Data Familiarisation*

The transcription results were transferred into Nvivo 12, a qualitative data analysis software designed by QSR International for coding using Microsoft Word 2016. While the software provides for more than just data coding, it was utilised primarily in this study to discover, combine, and organise codes to aid in searching and identifying themes that were widespread across the dataset. The transcription of the audio recordings of the interviews conducted during the study was the first step in this phase. I then imported the transcripts into Nvivo 12 for further analysis. A preliminary reading and then a series of additional readings of the data followed to determine what parts would be relevant to the study. As a type of 'pre-coding I used the

annotation feature in the Nvivo 12 software at this point to mark any snippets that stood out.43.9.1.2 Stage 2 – Coding

Thematic analysis is a widely used method for identifying recurring patterns or themes in qualitative data. This involves generating codes from the data in transcripts, as explained by Creswell (2015), who describes coding as a process of analysing qualitative data by breaking it down to determine its contents before putting it back together in a meaningful way. Elliott (2018) defines coding as highlighting and marking data relevant to specific research areas. In this study, coding was carried out in Nvivo software, utilising data that had been identified in stage 1 by grouping similar words and phrases. I spend more time with the data in this stage, leading to a deeper understanding.

#### *4.9.1.3 Stage 3 – Finding Themes*

Themes are groupings of coded data based on their similarity or trends. They can be considered a data component that can accurately represent the meaning assigned to an object or circumstance by interview participants (Labra et al., 2019). I examined the codes generated in Stage 2 to see whether they can be combined to make common topics to the entire data set when looking for themes. It is critical to note that some codes were not assigned to any theme, or some themes identified are irrelevant to the research. As Braun and Clarke (2006) said some themes (sub-themes) may be subordinate to a more significant theme.

#### *4.9.1.4 Stage 4 – Themes Review*

The review process involves interrogating the themes at the code level by examining all the data extracts used to create a theme and ensuring they represent it. Again, examining each theme and ensuring they accurately reflect the data set being analysed. This is an iterative process in which I added, deleted, or rearranged codes and themes (or sub-themes) until I was satisfied that the themes represent the data set adequately.

#### *3.9.1.5 Stage 5 – Conceptualizing Themes*

In this section, I organised the codes to match a unified narrative. The sub-themes and their hierarchy level are further analysed to see what elements of the data the theme is trying to represent. It is crucial to keep in mind that the differences between this section of thematic analysis and section 4 are not always as stark as they seem.

The primary distinction I noted was in naming the theme, which must be succinct and immediately convey its meaning to the reader.

#### *3.9.1.6 Stage 6 – Reporting*

This is the final analysis of the completed themes and the write up of the report. In this stage, I ensured that the report conveyed a clear, concise, and logical description of the data's story. To achieve this, I used the data extracts and interview excerpts to establish the pervasiveness of the themes and enhance any assertions or conclusions reached during the analysis. I also presented the data in a manner that reflected the hierarchical relationship between themes and sub-themes, where present.

As I worked on the final stage, I realised that the data analysis section was perhaps the most critical. In this section, I presented an argument based on the results to answer the research questions. The discussion section allowed me to connect the dots, highlighting the key insights gleaned from the analysis and how they answered the research questions. Additionally, the data section provided an opportunity to compare the findings with existing literature, evaluating how they fit into the current knowledge base and highlighting any novel contributions to the field.

Overall, the final stage of the thematic analysis was critical in bringing together all the pieces of the analysis to answer the research questions. It allowed me to present a clear and concise picture of the data, drawing out the key themes and providing insights that can be used to inform future research or policy decisions.

### 4.10 Research Evaluation

Using a qualitative method has its drawbacks. According to critics, qualitative research is too subjective, in which the results and findings are based solely on personal opinions and are often obtained in illogical ways. Critics argue that a researcher's perspective can affect the direction of the research and that qualitative inquiry can be challenging to replicate. However, I believe that qualitative data are more efficient in generalising theory than population findings, as argued by Bryman (2016).

To address these criticisms, I aimed to maximise the advantages of qualitative inquiry while minimising its drawbacks. I ensured that my study was trustworthy by

evaluating its credibility, reproducibility, reliability, and verifiability. Throughout the investigation, I judged its credibility and authenticity, which is unique to qualitative research. However, this method of study evaluation is also analogous to more quantitative approaches concerned with reliability and validity.

To minimise personal biases and maintain authority between myself and the study participants, I took various steps when collecting information from the social domain. I recognised that numerous factors could influence the content or information individuals choose to transmit. Interviewees may fabricate stories or outright lie, and they may be hesitant to speak or express things they do not wish to say during interviews. Additionally, generalisations can be drawn between similarly situated groups of people (Williams, 2000). I was aware that data will be placed and conveyed differently within documents, particularly those from unverified sources such as the internet or even official state documents, sometimes producing contradictory assertions.

To lend credibility to the data acquired during the research, I followed ethical norms as described in the ethical approval, avoiding bribery, bias, and coercion. I also sought interviewees consent. I also used a triangulation method to gather comparable data from multiple sources, enabling the comparison of converging lines of investigation to ensure that similar viewpoints were being offered (Yin, 2014).

As the objective of case study research, like most qualitative research, is to gain a holistic understanding of a particular person, group, region, or institution, the findings are frequently contextually distinctive (Bryman, 2016). This means that results may be more difficult to generalise than other studies or broader generalisations. However, I provided a detailed description that includes detailed explanations of the environment, which can aid in making judgments about the transferability of the findings more easily.

### 3.10.1 Validity and Reliability

Traditionally, reliability and validity have been concepts mostly associated with quantitative research. However, qualitative researchers have recently been urged to prioritize validity and reliability to enhance the robustness of research analyses. Reliability refers to the degree of consistency and absence of errors in measures, as well as their ability to accurately represent the entire population under investigation

(Noble and Smith, 2015; Joppe, 2000). While accuracy may not be a fundamental concern in qualitative research, the reproducibility and consistency of findings have been repeatedly questioned. This concept has gained support among qualitative researchers, who consider it crucial for both qualitative and quantitative research (Campbell et al., 2013; Zikmund, 2003). In quantitative research, validity is determined by the accuracy of the measurements and the authenticity of the results (Joppe, 2000).

However, the human-centered nature of qualitative research presents a significant challenge to its dependability or credibility. Bias is often cited as a characteristic of human cognition and memory that could influence how researchers conduct research (Rolfe, 2006; Norris, 1997). For example, a researcher's pre-existing beliefs and expertise may affect the development of study questions or the coding and retrieval process (Franklin et al., 2010). In addition, respondent bias can affect qualitative research, such as a tendency to withhold information or present contradictory data (Johnson, 2005).

This study acknowledges the limitations of qualitative research and aims to enhance its validity and reliability by remaining close to empirical facts and substantiating conclusions using quotations from the Interviewees'. Similarly, the research aims to increase dependability and trustworthiness by meticulously documenting occurrences and demonstrating a consistent record of decisions while ensuring that data interpretations are transparent and consistent.

### 4.10.2 Limitations

The limitations of the research must be acknowledged, particularly in terms of the data collection process. The first phase of the research involved semi-structured interviews with actors involved in policy, such as government officials. Although 48 interviews were anticipated, I only interviewed 37 respondents due to non-replies and scheduling issues. While this limitation may have impacted the breadth of responses the Phase 1 interviews covered the range of actors initially anticipated. Additionally, the data collecting method has inherent limitations. Semi-structured interviews rely on dynamic opinions and interpretations that can change with each interviewer or responder, potentially affecting the reliability and validity of the data collected (Bryman, 2016).

Another limitation of the study is the potential for researcher bias to impact the data analysis process. The researcher's pre-existing beliefs and expertise may have influenced the development of study questions and the coding and retrieval process. Additionally, respondents' biases may have influenced the data collected, such as a tendency to withhold information or present contradicting data (Johnson, 2005). To mitigate these limitations, efforts were made to ensure the study was trustworthy by evaluating its credibility, reproducibility, reliability, and verifiability, and by remaining close to empirical facts while substantiating conclusions using quotations from study participants' descriptions of the subject under investigation. The research also aimed to increase dependability and trustworthiness by meticulously documenting occurrences and demonstrating a consistent record of decisions, while ensuring that data interpretations were transparent and consistent.

### 4.11 Ethical Consideration

As part of my research, I obtained an Ethics Approval Form from the University of York. The form required a review by the University Ethics Committee (UEC) before proceeding with the study, which included conducting a risk assessment. While it was impossible to predict all potential ethical issues that may arise from conducting interviews, I was mindful of several ethical considerations, including ensuring privacy and preventing misrepresentations. All participants were provided with a participant information sheet and consent form to review and sign, acknowledging that their participation was voluntary, granting permission for their data to be recorded, and providing them with the option to withdraw at any point. The forms also informed participants that their personal information would be handled in accordance with the Data Protection Act of the United Kingdom. The participant information sheet and consent forms will be included in the appendices section.

# CHAPTER 5

# CASE STUDY REGIONS

## 5.0 Introduction

This chapter provides a comprehensive overview of the case study regions selected for this research, specifically Kano State (representing the North-West region), Lagos State (representing the South-West region), and home of the country's most populous city and industrial hub, Lagos and Rivers State (representing the South-South region). These regions were chosen to represent the diverse geographical, historical, socio-economic, and demographic contexts in Nigeria, which play a critical role in understanding the disparities in electricity access and supply across the country. By presenting a detailed account of the selection process and highlighting the unique characteristics of each region, this chapter aims to lay the groundwork for a thorough examination of the factors and phenomena influencing regional differences in electricity access and supply in Nigeria.

The background information serves as a valuable reference point for interpreting and contextualising the empirical findings gathered from the case studies. By offering insights into the specific contexts of each region, this chapter will help to understand the complexities and nuances of the electricity situation in Nigeria and appreciate the importance of considering these regional differences when designing and implementing policies and interventions aimed at improving electricity access and supply across the country.

## 5.1 Identification and Selection of the Case Study Regions

The concept of geopolitical zones in Nigeria has its roots in the country's historical, ethnic, and cultural divisions, which have informed administrative and political structures since the colonial era (Falola & Heaton, 2008; Nwodim and Adah, 2021; Suberu, 2023). However, the explicit division of Nigeria into six geopolitical zones was formally initiated during the regime of General Sani Abacha in the 1990s. The zones are North-East, North-West, North-Central, South-West, South-South, and South-East. The establishment of Nigeria's six geopolitical zones under General Sani Abacha's regime in 1996 was aimed at the equal distribution of resources across the various regions and ethnic groups within the country. While these zones are not

constitutionally recognised, they have been instrumental in administrative and political engagements (Adeyemo, 2017; Ojiego-Okoro and Ezeonwuka, 2024).

The case study method is well-suited for this research, as it aims to explore the extent and underlying causes of disparities in electricity access across Nigeria's regions. By investigating multiple regions within the country, I seek to illuminate the unique regional characteristics and the complex interplay of factors shaping electricity access disparities. I focused on three regions in Nigeria North-West, South-West, and South-South allows for an in-depth examination of the diverse socio-economic, political, and infrastructural contexts that influence electricity access.

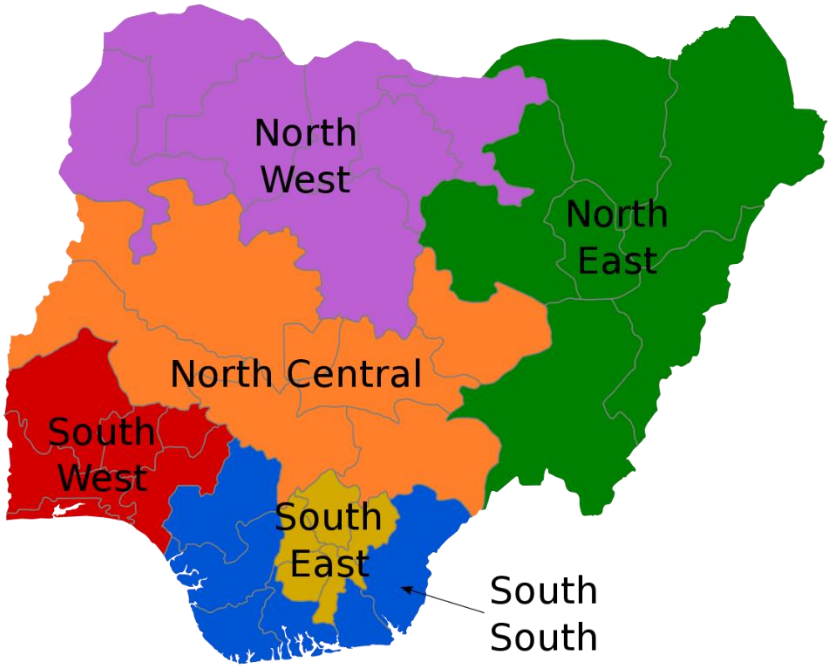


*Figure 6: Map of Nigeria showing the six regions (FMI 2015)*

I choose these regions due to their distinct characteristics, such as population density, resource endowment, and levels of electricity access. These characteristics provide a rich comparative framework for understanding the dynamics and evolving practices that have shaped these disparities on electricity access in Nigeria.

The North-West is Nigeria's most populous region, accounting for a significant proportion of the country's total population (NPC, 2006; NBS, 2021). The North-West region of Nigeria stands as a pivotal demographic hub, historically contributing

significantly to the nation's total population (NPC, 2006). Due to the absence of recent official census data beyond 2006, the reliance on this dated dataset becomes imperative.

This characteristic enables the study to examine the impact of population density and distribution on electricity access and the challenges associated with providing electricity to a rapidly growing populace.

The South-West boasts the highest level of electricity access among Nigeria's regions (NBS, 2019). The South-West region of Nigeria had a high 90.8% electricity access rate (NBS 2021), surpassing the national average of 55.4%. Electricity access was notably higher in urban areas (95.2%) compared to rural areas (80.7%). The primary sources of electricity were the national grid (85.8%), generators (11.7%), and solar panels (2.5%). Investigating the factors contributing to this achievement can provide valuable insights into the policies, infrastructural investments, and key actors' institutional and regulatory frameworks that have facilitated better electricity access in the southwest and potential lessons for other regions (Oyedepo, 2012; Ogunleye, 2017; Suberu, 2023).

The South-South is Nigeria's primary oil-producing region, the Niger Delta and the location of most of the country's thermal power plants (NERC, 2019). As a result, the South-South presents a useful context to study the relationship between natural resource extraction, electricity generation, and access to electricity. Moreover, this region allows for exploring the challenges associated with resource dependence, wealth distribution, and benefits from the oil industry (Watts, 2013; Frynas, 2020).

Additionally, Since Nigeria transitioned to democratic rule in 1999, the country has seen presidents from these three geopolitical zones: the South-West, the South-South, and the North-West. The South-West held the presidency for eight years (1999-2007) under President Olusegun Obasanjo, the South-South for five years (2010-2015) under President Goodluck Jonathan, and the North-West for eleven years (2007-2010 and 2015-2023) under Presidents Umaru Musa Yar'Adua and Muhammadu Buhari, respectively.

Though Nigeria's constitution does not mandate the rotation of presidential candidates between northern and southern states, the practice of "zoning" has

emerged as an informal norm within major political parties. Zoning aims to alleviate marginalisation tensions by ensuring that various geopolitical zones have a fair opportunity to hold the presidency (Suberu, 2023). This practice helps maintain a sense of national unity and inclusiveness by giving each region a chance to influence national policies and resource allocation (Adeleke, 2006; Asaju and Egberi, 2015; Torhemen et al., 2023).

The zoning arrangement reflects Nigeria's complex ethnic and religious diversity, where power-sharing mechanisms are crucial for maintaining political stability and fostering a sense of national identity (Torhemen et al., 2023). While this practice has effectively ensured representation from different regions, critics argue that it may limit the pool of qualified candidates for the presidency, as the focus remains on regional balance rather than meritocracy (ibid).

In Nigeria, there have been concerns about favouritism and nepotism in political appointments and allocation of resources, particularly during the rotation of power among the regions. While it is not accurate to assume that all political appointments or allocation of resources are based solely on regional identities or ethnic favouritism, some individuals and groups have indeed expressed concerns about such practices. Nonetheless, concerns about favouritism and nepotism continue to be a challenge in Nigeria's political system.

Nonetheless, concerns about favouritism and nepotism in Nigeria's political appointments and resource allocation are longstanding issues that have been sources of tension and conflict in the country's history. These concerns often revolve around regional, ethnic, and religious identities, and they can contribute to political instability and even armed conflict, as seen in the Biafran War of the late 1960s and early 1970s.

The Biafran War was a major conflict that arose as a response to separatist movements in the southeastern region of Nigeria, primarily among the Igbo ethnic group. The Igbo people, feeling marginalized and disadvantaged in Nigeria's political and economic structure, sought to secede from the country and establish the independent Republic of Biafra. The war was triggered by a combination of political, economic, and ethnic factors, including perceptions of favouritism and discrimination.

Efforts to address these concerns and promote fairness and equity in Nigeria's political and economic systems are ongoing. The country has undergone various political transitions and constitutional changes to address some of these issues. However, challenges remain, and there is a need for continued efforts to build a more inclusive and equitable society.

Existing research on regional electricity disparities, like (Bouzarovski and Prayitno 2017; Nugraha and Prayitno 2020; Wang et al., 2020; Nie et al., 2024) has illuminated valuable insights in other contexts. However, a crucial knowledge gap remains in Nigeria, where the unique interplay of power rotation and political influence significantly impacts access across different regions. This study delves into this unexplored territory, analysing how these factors contribute to inequitable electricity distribution within the country. By uncovering and understanding the extent of these disparities, the research aims to empower policymakers to craft solutions for fairer access, optimise resource allocation, and ultimately, equip communities to advocate for their rightful share of electricity. To date, few studies in the Nigerian context have focused on examining these disparities on a regional basis, thus highlighting the importance of this research in filling a critical knowledge gap (Monyei et al., 2018; Adelaja, 2020).

### 5.2 Overview of the Case Study Regions

This section provides an overview of the three selected regions and the states for the case study analysis: North-West, South-West, and South-South. Each region exhibits distinct socio-economic, political, and environmental characteristics that influence electricity access disparities within Nigeria. The regional overviews aim to establish a foundational understanding of each region's context, enabling a more in-depth analysis of the factors contributing to regional disparities in electricity access.

The zones are divided into three in the north and three in the south, consisting of North-East (NE), North-West (NW), North-Central (NC), South-East (SE), South-West (SW), and South-South (SS). Each geopolitical zone encompasses several states with similar cultural, historical, and socio-economic attributes. This strategic categorisation of states into geopolitical zones facilitates resource allocation, policy implementation, and coordinated development efforts at a regional level. By adopting

this approach, Nigeria aims to enhance the effectiveness and efficiency of governance and development initiatives across its diverse regions.

### 5.3 Overview of the North-West Region

The North-West region of Nigeria is the most populous region, covering a land area of 216,065 square kilometres, which accounts for 25.75% of the country's total landmass (NPC, 2006). The region comprises seven states: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara. See Figure 4 below.

The North-West region of Nigeria is home to predominantly the Hausa and Fulani ethnic groups, with Islam being the dominant religion (NPC, 2006; Reed and Mberu, 2015; Ositien, 2018). The region's population comprises mainly farmers, pastoralists, and small-scale businesspeople who contribute to the region's agricultural and economic activities. Despite the region's potential for economic growth, it faces significant challenges, including high poverty rates. Each of the seven states in the region experiences poverty rates above the national average of 40.1% (NBS, 2019; NBS, 2022).

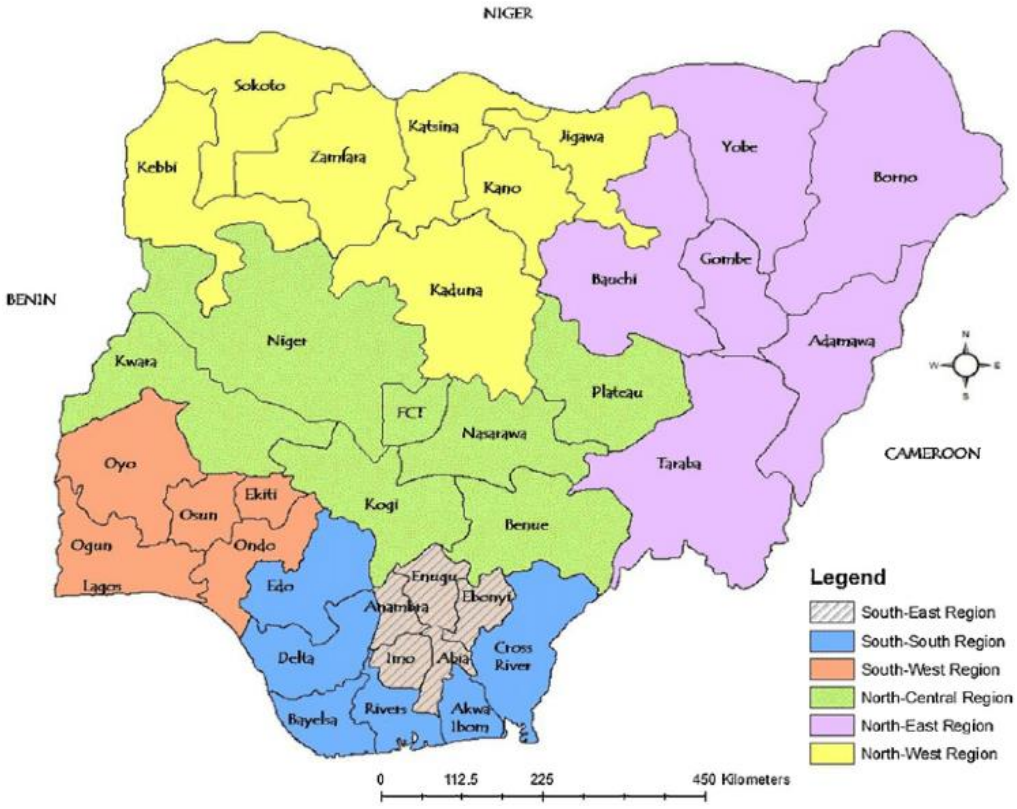


*Figure 7: Map of Nigeria showing the six regions (FMI, 2015)*

The North-West region boasts significant mineral reserves, including gold, which artisanal open-pit miners exploit. Additionally, the region has considerable agricultural potential, with the cultivation of staple crops such as sorghum, millet, maize, rice, and livestock rearing. This agricultural production contributes to the region's economy and is a significant source of employment for the population.

Despite these economic potentials, the North-West region lacks any power-generating plant only a few transmission infrastructures and two electricity distribution companies (Discos) operating, by private companies. They are Kaduna Electricity Distribution Company (KAEDCO) and Kano Electricity Distribution Company (KEDCO). KAEDCO covers Kaduna, Kebbi, Sokoto, and Zamfara states, while KEDCO covers Kano, Jigawa, and Katsina. While these Discos are responsible for distributing electricity to customers in the region, electricity access in the North-West region remains limited, with only 39% of the population having access to electricity (NBS, 2021). The rapid population growth, limited infrastructure, and high poverty rates compounded the challenges in providing adequate electricity access in the region. The region's electricity infrastructure consists of ageing power generation and distribution facilities, which often struggle to meet the increasing demand for electricity (NBS, 2021).

Accordingly, Investment in the North-West region of Nigeria's electricity sector is necessary to address the persistent electricity access deficit, which, once improved, can enhance living conditions and stimulate economic growth. However, the lack of substantial investment can be attributed to factors such as inadequate infrastructure, regulatory uncertainties, security risks, corruption, economic challenges, and revenue collection issues. These factors collectively elevate the perceived risk level for multinational firms considering investments in the sector, necessitating meticulous risk assessments to optimise potential returns.

### 4.3.1 Kano State as a Case Study

Kano State is a key focus area for this study, being the most populous state in Nigeria with a population of 9.4 million and a population density of around 458 people per square kilometre (NPC, 2006). The state serves as the economic hub of Northern Nigeria, driven by agriculture, trade, and manufacturing. Despite its economic importance, Kano State faces significant challenges in providing reliable

electricity access, hindering economic growth, and affecting the quality of life for its residents.

Kano's rich history, dating back over a millennium, has significantly influenced Nigeria's cultural, economic, and political landscape (Mamdani, 1996; Falola and Heaton, 2008). Its strategic location along the trans-Saharan trade routes and the establishment of a centralized government under the Fulani Jihad contributed to the city's development and cultural identity (Last, 1967; Zehnle, 2020). The British colonial era saw the introduction of indirect rule, maintaining the authority of local emirs while imposing a colonial administration over the region (ibid). Kano State was created as part of the Nigerian government's 12-state structure in 1967 following Nigeria's independence in 1960.

The state's natural resources, including fertile agricultural land and abundant water resources, support its thriving agricultural industry. Kano State is a significant producer of staple crops and cash crops, boasting a thriving textile industry and several small-scale industries (Oladimeji and Abdulsalam, 2013; DY and Abdulrahman, 2022). However, the state faces challenges in providing reliable electricity access to its population, which is necessary for economic growth and development (Joe-Uzuegbu, 2010; DY and Abdulrahman, 2022).

The selection of Kano State as a case study is based on specific characteristics and challenges. The state's population size, economic importance, and challenges in providing reliable electricity access make it an ideal case study for evaluating the effectiveness of policies and programs to improve the region's electricity access (Okafor and Joe-Uzuegbu, 2010).

Kano State's large population presents unique challenges for providing basic services, including electricity. The state's outdated electricity infrastructure cannot keep up with the increasing electricity demand, resulting in frequent power outages and inadequate electricity access, particularly in rural areas (Oyedepo, 2012). This lack of reliable electricity access has negative economic consequences for the state, particularly for small and medium-sized enterprises (SMEs) and affects the quality of life for its residents (Okafor & Joe-Uzuegbu, 2010; NERC, 2021; Ogunro and Afolabi, 2021).

## 5.4 Overview South-West Region

The South-West region of Nigeria, encompassing six states (Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo), is an economically significant and culturally rich area. Home to the Yoruba people, one of Nigeria's largest ethnic groups, this region offers both opportunities and challenges in terms of development due to its diverse economic, social, and infrastructural landscape (Falola and Heaton, 2008; Suberu, 2020).

With a diverse and growing population, the South-West region features Lagos State as its most populous and economically dynamic state. Lagos hosts numerous industries, businesses, and financial institutions as Nigeria's commercial centre (Fapohunda, 2012; Torhemen et. al., 2020; Nwodim and Adah, 2021). The region also boasts a thriving agricultural sector, producing cash crops such as cocoa, palm oil, and rubber. The South-West region has more advanced education and healthcare services than other Nigerian regions (NBS, 2021).

Although the South-West region has better electricity infrastructure and access than other Nigerian regions, challenges remain. The South-West region has various electricity infrastructure facilities, such as power generation plants, transmission lines, and distribution networks (Oyedepo, 2012; Adelaja, 2020). The region has the Egbin Thermal Power Station, Nigeria's largest power generating facility with an installed capacity of 1,320 MW. Some key electricity infrastructure in the region includes Power Generation Plants: Egbin Thermal Power Station, Omotosho Power Plant, Olorunsogo Power Plant, and Geregu Power Plant. Additionally, the region has three distribution companies (DisCos) such as Eko Electricity Distribution Company (EKEDC), Ikeja Electric, and Ibadan Electricity Distribution Company (IBEDC), which manage distribution lines and transformers that deliver electricity to consumers (NERC, 2021).

However, the electricity supply remains insufficient and unreliable, with frequent power outages and load shedding affecting urban and rural communities. Many households and businesses depend on alternative energy sources like generators and solar power systems to fulfil their electricity needs (Monyei et al., 2018; Kingsley and Tonuchi, 2021).

### 5.4.1 Lagos State as a Case Study

Lagos State is situated in Nigeria's South-West region, along the Gulf of Guinea and the Atlantic Ocean. It occupies approximately 3,577 square kilometres, accounting for about 0.4% of Nigeria's total landmass (NPC, 2006).

Historically, Lagos was inhabited by the Awori people, a subgroup of the Yoruba ethnic group, and was originally named "Eko" in the local language (Akinwale et al., 2014; Ojiego-Okoro and Ezeonwuka, 2024). In the late 15th century, Portuguese explorers arrived in the region and named it "Lagos" after the Portuguese word for "lakes" due to the presence of lagoons and water bodies in the area (Salau & Lawanson, 2010; Onuegbu, 2023). Lagos witnessed significant historical events, such as establishing the British colony in 1861, which transformed it into a major trading and administrative centre. After Nigeria gained independence in 1960, Lagos served as the country's capital until 1991 when the government relocated the capital to Abuja. However, Lagos remains Nigeria's economic and commercial hub.

As Nigeria's economic powerhouse, Lagos State contributes approximately 26.7% of the country's GDP (NBS,2018). Various sectors, including trade, finance, real estate, manufacturing, and tourism drive its economy (Onuegbu, 2023). The state's strategic location and vibrant economy attract local and international investors, further contributing to its rapid urbanization and development (Adelekan, 2010; Akinwale et al., 2014). The presence of the nation's two largest seaports, Apapa and Tin Can Island has also facilitated international trade and economic growth in the state (ibid).

Lagos State is the most populous state in Nigeria, with an estimated population of over 21 million people as of 2021 (NPC, 2021). Its population density is approximately 5,900 people per square kilometre, making it one of Africa's most densely populated areas (Salau & Lawanson, 2010; Suberu, 2024). The state is characterised by a diverse population, with people from various ethnic, cultural, and religious backgrounds residing within its borders. This melting pot of cultures has created a unique and vibrant social atmosphere that contributes to the state's appeal.

Lagos State has specific features and constraints, geographical location, historical background, socio-economic context, and demographics. As a result, it plays a vital

role in shaping the country's development trajectory and overall growth. The South-West region, with its better electricity infrastructure and access compared to other regions in Nigeria, offers a valuable case study for understanding and addressing electricity access disparities in the country (Oyedepo, 2012; Adelaja, 2020).

### 5.5 Overview South-South Region

The South-South region of Nigeria, also known as the Niger Delta region, is rich in natural resources and cultural diversity. Comprising six states: Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers, the region plays a crucial role in the Nigerian economy, primarily due to its vast oil and gas reserves (Nwankwo & Irrechukwu, 2015). The South-South region is home to various ethnic groups, including the Ijaw, Itsekiri, Urhobo, Isoko, and others, each with a unique cultural heritage (Okonta and Douglas, 2003; Onuegbu, 2023).

The South-South region has a population of over 21 million people, according to the 2006 census, with a significant proportion living in urban areas such as Port Harcourt, Warri, and Calabar (NPC, 2006). The region's economy heavily depends on the oil and gas sector, which accounts for a significant portion of Nigeria's GDP and export earnings (Ite et al., 2013). Besides oil and gas, the region also has a vibrant agricultural sector, producing crops like palm oil, rubber, and cassava.

The South-South region is the epicentre of Nigeria's oil and gas industry, with most of the country's oil production in this area (Nwankwo & Irrechukwu, 2015). However, the region has also faced various environmental and social challenges due to exploiting its natural resources, such as oil spills, gas flaring, and conflicts over land and resource ownership (Frynas, 2002; Charles, 2016; Jatto, 2024).

Despite its natural resources, the South-South region continues to face challenges in electricity access and infrastructure development power supply remains erratic, with frequent outages affecting urban and rural areas (Okafor and Uzodinma, 2011; Jatto, 2024). There have been efforts to increase power generation through gas-fired power plants to address these issues. The region has four power generation plants including the Afam Power Plant, Ibom Power Plant, Gbarain Ubie Power Plant and Calabar Power Plant. Several transmission substations are situated in the South-South region, helping to facilitate the transmission and distribution of electricity

(NERC, 2021). These substations convert high-voltage electricity from transmission lines to lower voltage levels suitable for consumer distribution. The South-South region is served by two distribution companies responsible for distributing electricity to consumers. These include the Port Harcourt Electricity Distribution Company (PHEDC), which serves Rivers, Akwa Ibom, Bayelsa, and Cross River States, and the Benin Electricity Distribution Company (BEDC), which serves Edo and Delta States.

The main challenges facing the South-South region include environmental degradation from oil and gas activities, social unrest, and insufficient investment in electricity infrastructure. To address these challenges, the region must focus on sustainable development initiatives, promote renewable energy sources, and invest in improving electricity access for its residents.

In summary, the South-South region of Nigeria is a vital area in terms of natural resources, economic potential, and cultural diversity. By addressing the challenges, it faces and capitalizing on its opportunities, the region can play a significant role in shaping Nigeria's development and growth.

### 5.5.1 Rivers State as a Case Study

Rivers State is situated in the South-South region of Nigeria, within the Niger Delta area. The state lies between latitudes 4°45' and 5°50' N and longitudes 6°20' and 7°20' E. It covers an area of approximately 11,077 square kilometres, accounting for about 1.2% of Nigeria's total landmass (NPC, 2006). Rivers State is known for its abundant water bodies, including the Niger and Bonny Rivers, creeks, and tributaries, contributing to its rich aquatic and mangrove ecosystems.

Rivers State was created on May 27, 1967, from the former Eastern Region of Nigeria. The state's early history was shaped by the trade activities of European merchants, who established trading posts and forts along the Niger River from the 15th century onwards. The region witnessed the growth of trade in palm oil, timber, and slaves, which attracted the attention of the British colonial administration. In the early 20th century, the discovery of oil in commercial quantities led to a shift in focus towards the petroleum industry, which has dominated the state's economy ever since.

Rivers State plays a crucial role in Nigeria's economy as the oil and gas industry hub. The oil and gas sector is the primary driver of the state's economy, contributing significantly to its GDP and providing employment opportunities. The state is home to numerous multinational oil companies, such as Shell, Chevron, and Total, which have established their regional operational bases (Uyigue & Uyigue, 2007; Saka et al., 2021). In addition to the petroleum industry, Rivers State also has a vibrant agricultural sector, with local farmers cultivating crops like cassava, yams, plantains, and oil palm.

Rivers State had approximately 5.1 million people (NPC, 2006). The state's population comprises various ethnic groups, including the Ikwerre, Kalabari, Okrika, Ogoni, and others. Port Harcourt, the state capital, is the largest city in Rivers State and serves as a major commercial and industrial centre for the South-South region. The city has experienced rapid urbanisation and population growth in recent decades, driven by the oil and gas industry expansion and the influx of people seeking employment opportunities.

In conclusion, Rivers State is a significant state in the region and Nigeria due to its strategic location, rich natural resources, and diverse cultural heritage. Understanding the state's geographical location and size, historical background, socio-economic context, and demographic data provides valuable insights into the factors shaping its development and growth

### 5.1 Comparative Analysis of Case Study States

In this section, I provide a comparative analysis of the North-West, South-West, and South-South regions, focusing on Kano State, Lagos State, and Rivers State as case studies. The analysis will cover the geographical, historical, socio-economic, demographic, and electricity infrastructure aspects.

#### 5.1.1 Geographical and Historical Aspects

Kano State (North-West) is a landlocked state with a rich history that dates back over a millennium, influenced by the trans-Saharan trade routes and the Fulani Jihad. The geographical location of Kano State provides an advantage in terms of agricultural potential, but it is a disadvantage for industrial and infrastructural development, as it lacks direct access to seaports (Mabogunje, 2007; Nwodim and Adah, 2021;

Onuegbu, 2023). Lagos State (South-West) is situated along the Gulf of Guinea and the Atlantic Ocean, with a history shaped by the Portuguese explorers and British colonial administration. The coastal location of Lagos State gives it an advantage in terms of trade, commerce, and economic development, but it also presents a disadvantage due to the risk of flooding and coastal erosion (Suberu, 2023). Rivers State (South-South) is located in the Niger Delta region, with a history marked by European merchants and the petroleum industry. The oil-rich Niger Delta has brought significant economic benefits to the region but has also resulted in environmental degradation, social unrest, and infrastructural challenges (Ibeanu, 2002; Charles, 2016; Onuegbu, 2023).

### 5.1.2 Socio-economic and Demographic Aspects

Kano State's economy is driven by agriculture, trade, and manufacturing, with a significant focus on staple crops and cash crops production. However, Kano State's reliance on agriculture has exposed it to the effects of climate change, leading to reduced agricultural productivity, increased poverty, and food insecurity (Mortimore & Adams, 2001). Lagos State is Nigeria's economic powerhouse, contributing approximately 26.7% of the country's GDP(NBC, 2021). Its economy is diversified, including sectors such as trade, finance, real estate, manufacturing, and tourism.

Lagos State has the largest population among the three states, with a projected population of 15 million people and a population density of around 458 people per square kilometre. Lagos State has an estimated population of over 21 million people and a population density of approximately 5,900 people per square kilometre. Its economy is diversified, with significant contributions from trade, finance, real estate, manufacturing, and tourism. The city’s coastal location, major seaports, and status as a commercial hub have made it attractive for domestic and international investment. However, the rapid urbanisation of Lagos has resulted in challenges such as congestion, environmental degradation, and infrastructure overstretch, straining resources like housing and public services.

Rivers State's economy is primarily dependent on the oil and gas sector, which contributes significantly to Nigeria's GDP and export earnings. The abundance of natural resources presents an advantage in terms of revenue generation but also creates a disadvantage due to overreliance on the oil sector and neglect of other

economic sectors (Obi, 2010; Nwodim and Adah, 2023; Onuegbu, 2023). The oil-driven economy has also led to environmental degradation, as frequent oil spills and gas flaring have damaged ecosystems and displaced local communities, contributing to social unrest and economic inequality.

### 5.1.4 Electricity Infrastructure and Access

Kano State faces significant challenges in providing reliable electricity access due to its outdated electricity infrastructure, resulting in frequent power outages and inadequate access, especially in rural areas. The dispersed nature of rural settlements in Kano State presents a challenge for extending the grid to remote areas, while the reliance on agriculture makes the region more susceptible to the impacts of climate change on energy resources such as hydroelectric power (World Bank, 2018). On the other hand, Kano State's abundant solar resources present an opportunity for off-grid renewable energy solutions to improve electricity access (Iwayemi, 2011; Adelaja, 2020).

Lagos State has relatively better electricity access, with approximately 82% of the population connected to the national grid (NERC, 2020). However, the state's rapidly growing population and urbanisation have put immense pressure on the existing electricity infrastructure, resulting in frequent power outages and increasing dependence on self-generation using fossil fuel-powered generators (Nwodim and Adah, 2021; Onuegbu, 2023). The coastal location of Lagos State provides an advantage for harnessing wind and marine energy resources, but it also presents challenges due to the risk of flooding and coastal erosion affecting electricity infrastructure (ibid).

Rivers State, Despite being home to Nigeria's oil and gas resources, Rivers State faces significant electricity access challenges, with only 55% of the population connected to the national grid (NERC, 2020). The state's electricity infrastructure is plagued by inadequate capacity, gas supply disruptions, and vandalism of transmission lines and distribution networks (EIA, 2020). The Niger Delta's wetlands and waterways present challenges for grid extension and maintenance, but they also offer potential for hydropower and biomass energy generation (Onuegbu, 2023). Moreover, the presence of the oil and gas sector in Rivers State creates

opportunities for gas-fired power plants, which can help improve electricity access if effectively utilised (Umejesi, 2014; Adelaja, 2020).

Overall, the three case study regions and states each present unique challenges and opportunities concerning electricity infrastructure and access. Kano State's large population and outdated infrastructure make it an ideal case study for evaluating the effectiveness of policies and programs to improve electricity access in the North-West region. Lagos State's diverse economy and better electricity infrastructure make it a valuable case study for understanding and addressing electricity access disparities in Nigeria. Rivers State's strategic location and rich natural resources provide insights into the challenges and potential solutions for electricity access in the South-South region. By comparing these regions and states, policymakers and stakeholders can better understand the different challenges and opportunities in each area, enabling them to tailor interventions and investments to address the specific needs of the populations.

# CHAPTER 6

## Rethinking Energy Accessibility in Nigeria: A Historical Analysis

### 6.0 Introduction

This chapter analyses the evolution of energy infrastructure in Nigeria, focusing on the historical development of energy demand, supply and infrastructure provisions. I employed an integrated or interdisciplinary framework that combines elements from historical institutionalism (HI), political economy, and regional development theory (RDT). The aim is to integrate these three perspectives, to unravel and access the complexities of electricity access and supply in Nigeria. This integrated framework analyses the historical legacies, institutional dynamics, political and economic influences, and regional disparities to provide a holistic view of the issues.

I critically explore the historical foundations of electricity disparities in Nigeria by closely examining the enduring impact of British colonial rule. The analysis delves into colonial policies, infrastructure initiatives, and institutional frameworks that set the stage for uneven access to electricity across various regions. By scrutinising power relations during and post-colonialism, the chapter illuminates how historical dynamics persistently shape the contemporary energy structure. Utilising concrete examples and historical evidence, the study highlights the lasting influence of colonialism on resource allocation, infrastructure development, and social inequities within the Nigerian electricity sector.

This historical analysis will serve as a foundation for the subsequent chapters, which will explore the current state of electricity provision in Nigeria and envision a more inclusive and sustainable energy future for the country. Examining the historical trajectory of energy infrastructure development will help gain valuable insights into the factors that have shaped the existing disparities in electricity access and supply across regions in Nigeria. Understanding the roots of these challenges is crucial for formulating effective strategies to address them.

I obtained the data for this study primarily from policy documents, official energy reports, literature, and media interviews with former ministers of power and energy columnists within Nigeria. Additionally, semi-structured interviews with energy stakeholders and community interviewees from the case study regions complement

this data (refer to Chapter 4: Methods for more information). This chapter relies heavily on the insights and information drawn from the policy and official sources to critically examine the electricity landscape in Nigeria. The following are the abbreviations used for interviewee references: SS (South South), NW (North West) SW (South West) GI (Government Interviewee), SI (Stakeholder Interviewee), CLI (Community Leader Interviewee), RAI (Rural Area Interviewee), UAI (Urban Area Interviewee), and SAI (Settlers Area Interviewee).

### 6.1 Historical Trajectory of Electricity Infrastructure Development

The historical trajectory of Nigeria's electricity infrastructure was shaped by a complex interplay of factors, including the enduring influence of colonial policies and priorities, the evolving landscape of the electricity chain's components (generation, transmission, and distribution), and the regional policies, reforms, and the evolving role of private actors. However, this trajectory unfolded unevenly across the country, reflecting the distinct experiences of major regions like the Northern and the Southern regions. While the South, with its resource wealth and colonial administrative centers, witnessed earlier and more extensive electrification, the North faced numerous challenges due to its vast territory, dispersed population, and limited economic base. These regional disparities were further shaped by post-colonial policies and reforms, with varying impacts across the regions.

Colonial influences played a significant role in the initial development of Nigeria's electricity infrastructure. The British colonial administration focused on providing electricity primarily to urban areas, where their interests were concentrated, resulting in an unequal distribution of resources between urban and rural areas (Baptista, 2017). This early prioritisation of urban centres laid the foundation for the regional disparities in electricity access that persist in Nigeria today. To better understand the origins of these challenges and the underlying factors contributing to regional disparities, it is crucial to examine the historical context, starting with the electricity infrastructure development in colonial Nigeria.

### 6.2 Colonial Legacy in Nigeria's Electricity Infrastructure Development

Establishing the British colonial administration's Public Works Department (PWD) in Nigeria marked a crucial turning point in the country's infrastructural development (Killingray, 1989; Havinden & Meredith, 2002). This department created key

infrastructure facilities, including roads, electricity, and ports. However, the administration's focus on urban centres as hubs for economic activities and governance resulted in skewed infrastructure development towards these areas (Falola, 2004).

One critical aspect of the PWD's work was the introduction of electricity. Initially, electricity access was mainly concentrated in urban areas and limited to the colonial administration, European settlers, and a select group of Nigerian elites (Ajaegbu, 1971). This situation created a social and technical gap between urban and rural areas and significantly transformed social relations within the country. The allocation of resources such as electricity and transportation networks primarily to urban centres, where administrative and commercial activities were concentrated (Killingray, 1989; Havinden & Meredith, 2002).

This urban-rural dichotomy had far-reaching consequences on the socio-economic dynamics within Nigeria. The urban areas, equipped with modern infrastructure and better access to services, began to draw populations from rural areas seeking better opportunities. This led to rapid urbanisation and the growth of cities. However, the migration was characterised mainly by a significant rural exodus that drained rural areas of their productive age population, leading to further marginalisation and underdevelopment (Ariyo & Jerome, 1999; Jiboye, 2011; Liu et al., 2020).

Electricity provision, in particular, symbolised a key aspect of this urban-rural technological divide. Access to electricity facilitated the growth of industries and commerce, extended work and leisure hours, improved access to information and entertainment and enhanced the overall quality of life in urban areas (Mabogunje, 1968; Ajaegbu, 1971). However, the restricted access to electricity in rural areas hindered their development potential, with implications for agriculture, education, health, and other sectors critical to rural livelihoods and the economy.

The stark disparities in electricity access between Nigeria's Northern and Southern protectorates during the colonial era cast a long shadow, laying the foundation for the enduring North-South divide that continues to shape the nation's development trajectory. Rooted in the differential influence of regional colonial governors, these inequalities entrenched socio-economic disparities that persist to this day (Falola, 2004; Killingray, 1989; Havinden & Meredith, 2002).

The British policy of indirect rule, granting greater autonomy to Northern authorities, resulted in markedly divergent approaches to electricity provision. Southern governors, driven by commercial interests and colonial objectives, actively fostered urban electrification through initiatives like the Electricity Corporation of Nigeria (ECN) established in 1951 (Amutabi, 2010). Conversely, their Northern counterparts prioritized securing political control and maintaining traditional power structures, with the Northern Regional Development Board neglecting non-agricultural infrastructure (Fika, 2012). This starkly imbalanced resource allocation heavily favored the South, where economic activities and colonial administrative centers like Lagos and Enugu concentrated (Falola, 2004).

These contrasting approaches had profound consequences. By 1960, over 70% of urban Nigerians in the South enjoyed electricity access, fueled by the construction of the first hydropower plant in Nigeria (Ebute Metta Power Station) in 1906. In stark contrast, the North, despite its vast territory and resource potential, received significantly less investment. Only 15% of urban Nigerians in the North had access in during independence in 1960, further entrenching the region's socio-economic disadvantage (Killingray, 1989).

Colonial policies further exacerbated these disparities. The Mineral Ordinance (1946) and the Electricity Corporation of Nigeria Act (1951) prioritised private sector involvement in the South, effectively excluding indigenous Northern businesses from participating in electricity generation and distribution (Akintunde, 2010). This limited demand for electricity in the North, allowing Southern biases to justify the lack of infrastructure investment. Even the Niger Delta's oil wealth could not illuminate surrounding villages, as electricity primarily served colonial mines and administrative centers like Port Harcourt (Havinden & Meredith, 2002).

The consequences of this disparity were far-reaching. Lack of electricity access in the North hindered education, healthcare, and economic development. Limited access to information and communication technologies further marginalized the region, perpetuating cycles of poverty, unemployment, and vulnerability to natural disasters (Nwajiaku, 2015). This historical legacy continues to fuel migration flows from North to South in search of opportunities and exacerbates tensions within Nigeria's federal structure (Falola, 2004).

While post-independence initiatives like the Power Holding Company of Nigeria (PHCN) and the Rural Electrification Agency (REA) have made strides towards national electrification, historical disparities persist. Acknowledging the colonial roots of this inequality is crucial for formulating effective policies and interventions.

This urban bias in infrastructure and public service delivery continued post-independence Path dependency, political considerations, and economic incentives all played a role in perpetuating the urban bias in infrastructure and public service delivery even after independence. Governments likely found it easier to build upon existing, urban-centric infrastructure established by the colonial administration, leveraging the concentrated skilled personnel and financial resources in cities. Additionally, the greater political weight of urban residents and the potential for economic growth through attracting investments and industries to cities likely swayed government priorities. However, this continued the colonial practice of neglecting rural development and reinforcing the inequalities in access to basic amenities. (Jiboye, 2011). The urban focus on infrastructural development is evident in the preference for capital-intensive projects in urban areas, such as highways, airports, and energy infrastructures, often at the expense of rural development (World Bank, 1996).

Consequently, this urban bias has significantly influenced Nigeria's socio-economic development trajectory, leading to stark disparities in socioeconomic indicators between urban and rural areas. For instance, poverty and illiteracy rates are significantly higher in rural areas than in urban areas (World Bank, 2018). Similarly, access to healthcare services is considerably lower in rural areas, contributing to worse health outcomes than in urban areas (Doctor et al., 2012).

Moreover, the historical regional disparities in infrastructure development have also persisted, contributing to the North-South divide in socio-economic indicators. For instance, literacy rates and access to healthcare are considerably lower in the Northern regions than in the Southern regions (NPC, 2019).

As per data from the Nigeria Demographic and Health Survey (NPC, 2019), the literacy rate for women in the Northern regions such as Sokoto, Yobe, and Zamfara were reported to be as low as 20%, 22.5%, and 24.6%, respectively. In contrast, the literacy rate for women in the South West, including states like Lagos and Osun, was

recorded as high as 89.1% and 88.8%, respectively. This gap becomes even more alarming when considering that literacy directly impacts other aspects of human development, including health, nutrition, and employability.

Similar disparities can be observed in access to healthcare services. Due to the historical bias in infrastructural development, the North lags behind the South regarding health facilities per capita, contributing to unequal health outcomes across the regions. For instance, the under-five mortality rate, a key indicator of child health, in the North-East and North-West was recorded to be 186 and 169 deaths per 1,000 live births, respectively, as compared to the South-West, which recorded 89 deaths per 1,000 live births (NPC, 2019).

Further compounding these disparities are insecurity issues in the Northern regions, which hamper efforts towards socially equitable development and basic services provision (International Crisis Group, 2020). Thus, Nigeria's North-South divide is not merely a reflection of the uneven distribution of infrastructure but a manifestation of socio-political issues that stem from historical processes and continue to impact the contemporary socio-economic realities of the nation (Mustapha, 2006).

In summary, the British colonial administration played a significant role in developing infrastructure in Nigeria, focusing on urban areas and economic hubs. The indirect rule and the different approaches to governance in the Northern and Southern Protectorates resulted in disparities in infrastructure development, including electricity access. The introduction of electricity profoundly impacted Nigeria's social relations and economic development during this era, and its legacy continues to shape the country's development trajectory. Having discussed the colonial administration and infrastructure development in Nigeria, I will now examine the colonial legacy in Nigeria's electricity Infrastructure development.

### 6.3 Examining the Colonial Legacy in Nigeria's Electricity Infrastructure Development

I will explore the British colonial administration's role in developing Nigeria's electricity infrastructure and how the legacy has influenced the country's power sector. The Public Works Department (PWD) constructed Nigeria's first electrical power plant in Lagos Marina during the colonial period in 1896. The government house and colonial hospital were the first facilities to be electrified, with the plant

consisting of two 30KW, 1000V, 80-cycle, single-phase supplies (Baker, 1974). Glow lamps replaced traditional oil lamps by 1899, and by 1898, the streets of Lagos Marina were lit from 6 pm to 11 pm using a series connection. Most streets on Lagos Island were lit, and peak demand reached 24 KW, leading to the installation of a third unit in 1902. By 1909, the installed capacity had increased to 120KW, and the registered energy demand was 65KW (ibid).

During this period, electricity infrastructure development was slow due to the colonial economy's focus on agriculture, which did not require a significant power supply for industrial purposes (Havinden and Meredith, 2002). Lord Frederick Lugard, a crucial figure in Nigeria's colonial administration, indeed played an instrumental role in introducing modern infrastructure to Nigeria. A significant case in point is his initiating a project to provide electricity to the government house in Zungeru, a city in present-day North-Central Nigeria, in 1901. The project, executed by the Royal Niger Company (precursor to the United Africa Company, UAC), marked one of the earliest efforts to bring electrical power to Nigeria (Falola, 2004).

At the time, Zungeru was the capital of the Northern Nigeria Protectorate, serving as a central point of administrative control and oversight for the British colonial government in the Northern region (Ajayi & Crowder, 1985). Consequently, the provision of electricity to the government house in Zungeru symbolised a significant milestone in integrating modern infrastructure into the colonial administration's operations. It served not only as a symbol of technological advancement but also as a tool to bolster the administrative capabilities of the colonial government (Falola, 2004).

However, the provision of electricity was not a widespread initiative, but a privilege limited to the colonial elites, signifying an early manifestation of socio-economic disparities in Nigeria's infrastructure development (Falola & Heaton, 2008). Additionally, the Royal Niger Company's role in this project exemplifies the close collaboration between the colonial administration and foreign corporations in the early infrastructural development of Nigeria. This relationship set the stage for foreign economic dominance and exploitation (Ayodeji, 2002).

Therefore, the electrification project in Zungeru stands as an early example of the uneven and biased nature of infrastructural development during the colonial era. It

showcases how initial infrastructural investments were concentrated in administrative hubs, laying the groundwork for the regional disparities that characterised post-colonial Nigeria (Ariyo & Jerome, 1999).

The advent of the First World War resulted in a significant shift in Nigeria's energy infrastructure trajectory. Despite the physical distance from the battlefields. The British war effort led to the conscription of skilled labourers, diverting essential resources like copper and coal away from power plant construction. Global trade disruptions further strained the availability of crucial equipment, leading to increased vulnerabilities in existing power plants and hindering new constructions. The war-induced depletion of the colonial workforce, coupled with economic shocks, strained Nigeria's finances, making it challenging for the colonial administration to invest in power plant projects. This resulted in stretched electricity resources and forced blackouts by 1918. Shifting priorities during the war postponed long-term development plans, including the expansion of the electricity grid. (Baker, 1974).

It effectively halted the construction and development of power plants, exacerbating the country's energy deficit (Ogunsola, 1990). By the war's end, the electricity demand had significantly outstripped the supply, forcing the colonial government to take drastic measures, such as switching off streetlights by 1918 (Baker, 1974).

In response to this escalating energy crisis, the colonial government took steps to tap into Nigeria's coal resources, which were discovered in Enugu, located in the south-eastern part of the country, in 1909 (Njoku, 1978; Ogunsola, 1990; Raji and Abejide, 2014; Ani and Ani, 2017). This event marked a milestone as it kick-started the country's commercial fuel production.

Despite the potential of these coal resources to alleviate the energy shortfall, it is critical to note the challenges accompanying the development of the Enugu coal-fired power plant. The plant was commissioned on June 1, 1923, representing a significant technological advancement for the country then (Ogunsola, 1990). The plant initially had a capacity of 500KW, which was increased to 2MW in 1933 (Edomah et al., 2017). The development of coal-fired power plants was instrumental in powering Nigeria's burgeoning industries and urban centres during the colonial era and beyond, providing a reliable energy source for economic development. However,

exploiting the Enugu coal mines brought about significant socio-economic and environmental repercussions.

The coal mines were notorious for their harsh working conditions, which led to several workers' protests throughout the colonial era (Falola and Heaton, 2008). In addition, coal mining in Enugu resulted in significant environmental degradation, detrimental to local ecosystems and communities (Njoku, 1978). While the Enugu power plant provided a much-needed boost to Nigeria's electricity supply, it also exposed the inherent tensions between economic development, social justice, and environmental sustainability – issues that continue to shape Nigeria's energy sector today.

Nigeria's electricity sector continued to grow and evolve during the colonial period. The government established several other power plants across the northern and southern regions to meet the increasing energy demand. The table below shows the energy plants commissioned and their locations during the colonial era. It highlights the British colonial administration's priorities and motivations in shaping Nigeria's energy landscape.

*Table 4: Major Electricity Undertakings During Colonial Government 1896-1950*

| **Region** | **Location** | **Year Commissioned** |
|---|---|---|
| **South-West** | Lagos Marina | 1896 |
| | Lagos Island | 1899 |
| | Ibadan | 1929 |
| | Abeokuta | 1935 |
| **South- East** | Enugu | 1929 |
| | | |
| **South-South** | Port Harcourt | 1929 |
| | Warri | 1939 |
| | Calabar | 1939 |
| | | |
| **North-West** | Kano | 1914 |
| | Kaduna | 1929 |

| | | |
|---|---|---|
| | Katsina | 1933 |
| | Zaria | 1938 |
| | | |
| **North central** | Jos | 1939 |
| | | |
| **North-East** | Maiduguri | 1934 |
| | Yola | 1937 |

The major electricity infrastructure projects outlined in Table 4, commissioned between 1896 and 1950 during British colonial rule in Nigeria, reveal how political and economic interests shaped the development of the power sector. By applying a political economy framework, we can critically analyse how the colonial administration's priorities influenced where and why electricity infrastructure was developed. This approach allows us to understand how the legacy of these decisions has continued to impact Nigeria’s electricity access and regional disparities today.

During the colonial period, the British government prioritised developing electricity infrastructure in regions that were economically significant to its imperial interests. The South-West, particularly Lagos, became a focal point due to its strategic importance for trade and resource export. Lagos, being the main port city, was the first to receive electricity in 1896, followed by Ibadan in 1929, both critical hubs for economic activities like port operations, railways, and European business enterprises. Similarly, power plants in the South-South cities of Port Harcourt (1929) and Warri (1939) supported the transportation of coal and other resources extracted for British industries. This pattern of infrastructure development reflects the British colonial focus on regions that contributed most to the extraction and export of natural resources, revealing how economic priorities dictated infrastructure placement.

In addition to economic interests, the colonial government also developed electricity infrastructure in areas of political importance. The North-West region, which included key administrative centres like Kano (1914) and Kaduna (1929), saw the establishment of power plants to support the needs of colonial governance. These areas were essential for maintaining political control over vast territories and housed colonial officials and administrative headquarters. By ensuring these cities had

access to modern amenities like electricity, the British administration sought to consolidate its power and influence in the region. However, rural areas and towns with little political or economic significance to the British were largely neglected, further widening the gap between urban and rural development.

This urban bias in electricity infrastructure reflects the broader colonial approach of focusing on urban centres, which were seen as hubs of production, trade, and governance. As a result, rural areas were systematically excluded from development plans, leaving large portions of the population without access to electricity. This exclusion disproportionately affected the northern regions, where most of the population was rural and economically agrarian. For instance, while the South-West saw four power projects, the North-East had only two, in Maiduguri (1934) and Yola (1937). This regional disparity is a clear manifestation of the colonial administration's focus on urban centres that supported their political and economic goals, rather than pursuing equitable development across Nigeria.

The uneven development of electricity infrastructure during the colonial period laid the groundwork for long-term regional disparities in Nigeria. The South, having received more investment in infrastructure, continues to enjoy relatively better access to electricity and development opportunities. Conversely, the northern regions, which were historically neglected, still struggle with poor infrastructure, contributing to slower economic growth and exacerbating poverty. These regional imbalances are a direct consequence of colonial-era policies that prioritised certain regions based on their utility to the British Empire rather than their potential for broad-based national development.

Moreover, the development of electricity during the colonial era was driven by the need to support industries focused on resource extraction, rather than improving the living standards of the indigenous population. Power plants in cities like Enugu (1929), where coal was mined, were primarily established to fuel industries that benefitted British economic interests. This focus on extraction, rather than local development, ensured that the benefits of electricity infrastructure were limited to colonial enterprises, administrative offices, and European settlers, while the majority of Nigerians, particularly those in rural areas, remained without access to electricity.

In summary, through the lens of the political economy framework, it is evident that the development of electricity infrastructure during the colonial period was deeply influenced by the British government's political and economic interests. By concentrating resources in economically strategic southern regions and politically important urban centres, the colonial administration created a pattern of unequal development that persisted into the post-colonial era. This historical imbalance in electricity access continues to shape regional disparities and hinder equitable development in Nigeria today. Addressing this colonial legacy will require deliberate efforts to promote energy access in neglected regions and foster a more inclusive approach to infrastructure development.

### 6.4 Resistance to Colonial Infrastructure in Northern Nigeria and its Enduring Impact on Regional Disparities

Resistance to colonial infrastructure in Northern Nigeria has a long history and has contributed to enduring regional disparities (Falola, 2004; Fagbule and Fawehinmi, 2022). During the colonial period, the British administration faced opposition from various social groups, including traditional rulers, religious authorities, and indigenous populations, who resisted imposing colonial rule and infrastructure projects (Lugard, 1922; Falola, 2004). The resistance stemmed from concerns over the loss of autonomy, cultural hegemony, and religious beliefs (Mamdani, 1996; Havinden and Meredith, 2002).

The Islamic intellectuals in Northern Nigeria perceived the colonial administration as having Christian motives, suspecting their primary objectives were to Christianize the local population and exploit the region's resources for their benefit (ibid). The northern Muslims were conscious of the operations of European Christian missionaries that had successfully converted many people to Christianity in southern Nigeria. Consequently, the northerners believed the European invasion and dominance threatened traditional beliefs and practices (Havinden and Meredith, 2002).

This distrust of colonialism extended to the infrastructural systems introduced by the British, such as electricity, piped water, and railways (Lovejoy and Hogendorn, 1990). Islamic leaders and intellectuals in Northern Nigeria feared that adopting these systems would lead to the erosion of their cultural and religious values and

increased dependence on the colonial administration (Falola, 2004). They were concerned that the widespread implementation of these technologies would result in further economic and political domination by the British, ultimately undermining their sovereignty and weakening their traditional social structures (Lovejoy and Hogendorn, 1990).

In response to these concerns, Islamic leaders in Northern Nigeria attempted to resist the introduction of colonial technologies by promoting self-reliance and encouraging the preservation of traditional practices (Falola, 2004). According to Keith and Pile (2013), the Northern resistance to colonial infrastructure led to the emergence of popular myths that further hindered the acceptance of these changes. For instance, some city dwellers speculated that drinking piped water would cause a loss of faith and prevent them from reaching paradise in the afterlife (Hiskett, 1973; Lovejoy and Hogendorn, 1990). This fear stemmed from the belief that the use of piped water, introduced by the British colonial administration, could be associated with Christianity, thus threatening their Islamic faith and traditions (Lovejoy and Hogendorn, 1990). Such concerns demonstrate the depth of resistance to colonial infrastructure projects and their perceived association with the erosion of local religious and cultural practices in Northern Nigeria (Havinden and Meredith, 2002). Some leaders even went as far as to actively oppose the construction of infrastructural projects, such as railways and power plants, viewing them as instruments of colonial control and cultural imperialism (Lovejoy and Hogendorn, 1990).

Despite the opposition from Islamic leaders and intellectuals, the British colonial administration continued to invest in infrastructure development throughout Nigeria, including in the predominantly Muslim north (Falola, 2004). The colonial government believed that the introduction of modern technologies and infrastructure was essential for the economic development of the colony, as well as for securing their control over the vast and diverse Nigerian territory (Havinden and Meredith, 2002). Over time, as the benefits of these infrastructural improvements became more apparent, resistance to their implementation gradually diminished, although some tensions and suspicions remained (Lovejoy and Hogendorn, 1990).

The opposition to colonial infrastructure projects in northern Nigeria contributed to infrastructure development disparities between the northern and the southern regions. The North's infrastructural lag emerges not from isolated resistance but from a complex interplay of colonial strategies, resource dynamics, and pre-existing regional conditions. As Islamic leaders and intellectuals in the north resisted the construction of railways, power plants, and other infrastructure projects, the British colonial administration focused more on developing infrastructure in the south, where there was less resistance (Lovejoy and Hogendorn, 1990).

This resistance has had a lasting impact on the region's development trajectory, contributing to persistent disparities in access to essential services like electricity, education, and healthcare (Falola, 2004; Edomah et al., 2017). The southern region received more investment and attention from the colonial administration, resulting in a more advanced and extensive infrastructure network than the Northern (Falola, 2004; Killingray, 1989). Consequently, this has led to economic and social inequalities between the regions, which persist to this day and shape Nigeria's development trajectory.

I have been drawing the findings of the historical context of Nigeria's electricity infrastructure development during the colonial period, mainly from published literature and archival documents. I will now shift the focus to empirical findings on the perception of electricity access in Nigeria to provide a comprehensive understanding of the country's electricity sector. It is essential to consider both historical and contemporary perspectives. Although the interviews with key stakeholders and community members did not reveal any recurrent themes relating to colonialism, one interviewee did reference the colonial period in the late 19th century while discussing the events that led to the development of electricity infrastructure. This perspective highlights the relevance of historical contexts in shaping present-day challenges in Nigeria's electricity sector. For example, a government official explained:

> "The evolution of Nigeria's electricity industry has been a dynamic process starting with a power plant in Lagos in 1890, more than a century ago. This was followed up with eight power plants in Kano, Kaduna,

> Port Harcourt, Enugu, Maiduguri, Yola, Zaria, and Jos during the colonial era**". (**GI 1)**.**

The evolution of Nigeria's electricity sector has been shaped by a series of historical, institutional, and operational challenges, as echoed by a government official, GI1. In recounting the sector's development, GI1 highlighted that the industry's origins trace back to 1890, with the establishment of a power plant in Lagos. This was followed by the installation of more plants in key cities such as Kano, Kaduna, and Enugu during the colonial era. GI1's statement emphasises that these early developments laid the foundation for a centralised power system, which was later formalised with the creation of the Electricity Corporation of Nigeria (ECN) in 1950. However, while these moves were intended to consolidate the generation and distribution of electricity on a national scale, the centralisation effort struggled to meet the increasing energy demand, exacerbated by growing operational inefficiencies.

GI1 further underscores that the establishment of the National Electric Power Authority (NEPA) in 1972 was an attempt to address the sector's issues, including reducing financial and operational risks. Despite this reorganisation, NEPA failed to bring about the desired improvements. Instead, it became a symbol of inefficiency and decay, as it faced significant transmission and distribution losses, high levels of power theft, underinvestment, and a generally disorganised structure. GI1's observation points to the deeply entrenched problems that persisted despite the state's efforts to reform the sector. These challenges reflected a misalignment between policy reforms and the practicalities of running a robust electricity sector. The sector's inability to generate adequate revenue was compounded by the public perception of electricity as a social service, which, as GI1 emphasised, led to widespread reluctance to pay for services. This cultural attitude undermined the sector's financial sustainability, trapping it in a cycle of low revenues and poor service delivery. This misalignment between public expectations and the sector's operational realities resulted in an unsustainable financial model, which has had long-lasting implications for Nigeria's energy infrastructure.

Moreover, GI1 touches on a crucial shift in the 1980s when Nigeria made significant investments in large-scale hydroelectric projects. These projects, such as the Kainji and Shiroro Dams, were designed to harness the country's hydroelectric potential

and boost energy generation capacity. GI1's assessment of these investments, however, points to the chronic inefficiencies and mismanagement that plagued these ambitious projects. Despite the substantial financial outlays, the sector struggled with cost overruns, project delays, and, in some cases, outright abandonment of key initiatives. GI1's comments suggest that the primary issue was not a lack of resources, but rather the sector's inability to effectively manage these large-scale investments. This speaks to a broader issue of governance within Nigeria's power sector, where corruption, bureaucratic inertia, and poor planning have historically hindered progress.

GI1's insights suggest that Nigeria's electricity sector requires more than just policy reforms it requires a complete overhaul of its governance and management practices. Addressing the financial and operational challenges will necessitate a shift in how electricity is perceived and valued by the public, alongside significant improvements in how the sector is managed. The emphasis on centralisation and state control, while historically necessary, has proven to be an inadequate model for managing the complexities of a modern power sector. GI1's critical observations underline the need for a more decentralised and commercially oriented approach, which prioritises financial sustainability, operational efficiency, and public accountability. Only through such a comprehensive strategy can Nigeria hope to overcome the entrenched problems that have long plagued its electricity sector.

The quotes from GI1 which echo findings in published studies highlight the historical and institutional challenges that have plagued Nigeria's power sector. The sector's evolution has been marked by efforts to centralize and reform its management, but these have been insufficient to overcome the various operational, financial, and cultural issues that persist (Adenikinju, 2003; Iwayemi, 2008; Sambo, 2008). Addressing the sector's challenges will require a comprehensive approach, including policy reforms, investment, improved management practices, and a change in public perception regarding the value and cost of electricity services.

### 6.5 Analysing Development and Distribution of Electricity Infrastructure in post-colonial Nigeria

Nigeria's electricity sector has undergone significant changes since the country's independence in 1960. The Electricity Corporation of Nigeria (ECN) managed the

country's power sector, which was established in 1950 to oversee the country's various power plants (Adenikinju, 2003). During that period, Nigeria's power sector was relatively underdeveloped, with most electricity generated from small-scale, localized power plants (O'Connor, 2013). The country's primary energy sources were coal, hydro, and gas. In the early post-colonial period, Nigeria's electricity sector faced significant challenges, including a lack of investment, underdeveloped infrastructure, and limited human resources (Oyedepo, 2012).

One of the first significant developments in Nigeria's power sector during the post-colonial era was the establishment of the Kainji Hydroelectric Dam in Niger State in 1968 (Iwayemi, 1991). The Kainji Dam, which the Nigerian government commissioned with assistance from the World Bank and the United Nations Development Programme, marked a significant turning point in the country's electricity sector. The dam had a capacity of 960 MW and was one of Africa's largest hydroelectric power plants at the time (NERC, 2016). Following the success of the Kainji Dam, the Nigerian government initiated several other major power generation projects during the 1970s and 1980s. The most notable projects were the Jebba and Shiroro Hydroelectric Dams in Kwara and Niger State, commissioned in 1985 and 1990 (Iwayemi, 1991). Other hydroelectric projects during that period included the Dadin Kowa Hydroelectric Dam in Gombe State in the northeast region (NERC, 2016).

In addition to hydroelectric power, Nigeria began investing thermal power generation in the southern region during the post-colonial era. The first thermal power plant, Egbin Power Station, was commissioned in 1985 in Lagos State, with an initial capacity of 1320 MW (Oyedepo, 2012). Other notable thermal power plants established during this period included the Afam Thermal Power Station in Rivers State, the Sapele Power Station in Delta State, and the Ughelli Power Station in Delta State (NERC, 2016).

The Nigerian Military government of Gowon also established the National Electric Power Authority (NEPA) in 1972 to manage the country's power sector. NEPA was responsible for generating, transmitting, and distributing electricity throughout Nigeria. However, NEPA faced significant operational and financial challenges, including high transmission and distribution losses, low electricity supply, low

revenues, high-level losses, power theft, and underinvestment (Sambo, 2008; Oyedepo, 2012). To provide a comprehensive overview of Nigeria's electricity infrastructure's post-colonial state, the table below lists the operational power plants commissioned during this period, their location and the date of commissioning.

*Table 5: Operational Power Plants and their Location (NESI generation Statistics, 2022)*

| **Region** | **Location/ State** | **Power Plant Name** | **Year of Commissioning** | **Installed Capacity (MW)** | **Fuel source** |
|---|---|---|---|---|---|
| North Central | Niger | Kainji | 1968 | 800 | River Niger |
| | Kogi | Geregu | 2007 | 414 | Gas |
| | Kogi | Geregu NIPP | 2012 | 435 | Gas |
| | Niger | Jebba | 1985 | 540 | River Niger |
| | Kogi | Asco | 2005 | 22 | Gas |
| | Niger | Shiroro | 1990 | 600 | River Kaduna |
| | | | | | |
| North East | Gombe | Dadin kowa | 2020 | 30 | River Dadin-kowa |
| | Taraba | Kashinbila | 2022 | 40 | River Benue |
| | | | | | |
| North West | Nil | Nil | Nil | Nil | Nil |
| | | | | | |
| South West | Ondo | Omotosho | 2005 | 336 | Gas |
| | Ondo | Olorunsogo | 2007 | 336 | Gas |
| | Lagos | Egbin | 1986 | 1,320 | Gas |
| | Ondo | Olorunsogo NIPP | 2012 | 675 | Gas |
| | Ondo | Omotosho NIPP | 2012 | 450 | Gas |
| | Lagos | PARAS Energy | 2016 | 65 | Gas |
| | Lagos | AES | 2001 | 290 | Gas |
| | | | | | |
| South East | Abia | Alaoji NIPP | 2015 | 1074 | Gas |
| | | | | | |
| | Delta | Okpai | 2005 | 480 | Gas |
| | Rivers | Omoku | 2006 | 150 | Gas |
| | Akwa Ibom | Ibom Power | 2009 | 191 | Gas |

| | | | | | |
|---|---|---|---|---|---|
| | Rivers | Trans Amadi | 2009 | 136 | Gas |
| | Rivers | Afam VI | 2010 | 624 | Gas |
| | Delta | Sapele | 1981 | 1020 | Gas |
| | Delta | Sapele NIPP | 2012 | 450 | Gas |
| | Edo | Ihovbor NIPP | 2013 | 450 | Gas |
| | Cross River | Odukpani NIPP | 2015 | 563 | Gas |
| | Edo | Azura - Edo Ipp | 2017 | 450 | Gas |
| | Bayelsa | Gbarain | 2017 | 112.5 | Gas |
| | Delta | Delta | 1990 | 900 | Gas |
| | Rivers | Afam IV-V | 2002 | 776 | Gas |

*Table 6: Power Plants and Under construction and their Location (NESI generation Statistics, 2022)*

| **Region** | **Location/ State** | **Power Plant Name** | **Initiated Date** | **Installed Capacity (MW)** | **Fuel source** |
|---|---|---|---|---|---|
| **North Central** | Niger | Zungeru | 2013 | 700 | River Kaduna |
| | | | | | |
| **North East** | Nil | Nil | Nil | Nil | Nil |
| | | | | | |
| **North West** | Kaduna | Kudandan | 2015 | 215 | Gas |
| | Kano | Tiga | 2015 | 10 | River Chalawa |
| | | | | | |
| **South West** | Lagos | Egbin II | 2021 | 1,754 | Gas |
| | | | | | |
| **South East** | Imo | Egbema NIPP | 2012 | 338 | Gas |
| | | | | | |
| **South-South** | Delta | Ashama | 2021 | 200 | Solar |

The concentration of power plants in Nigeria, as shown in Tables 5 and 6, can be partly explained by practical considerations such as the availability of fuel sources, economic importance, and historical development patterns. The South-South and

South-West regions are rich in natural gas, which serves as the primary fuel source for most of the power plants in those areas. Additionally, these regions hold strategic economic significance due to their status as industrial hubs and their proximity to major ports, which facilitates international trade and resource extraction. While these reasons are technically sound, a critical analysis using a blend of Political Economy and Energy Justice frameworks highlights the deeper implications of this infrastructure concentration.

First, the availability of natural gas as a primary energy source for the power plants in the South is a central factor. Most of the power plants in the South-South, such as Sapele (1020 MW), Okpai (480 MW), and Afam VI (624 MW), and in the South-West, such as Egbin (1320 MW), rely on gas. These plants are strategically located near Nigeria's major gas reserves and production centres, which explains why a majority of the country’s power generation capacity is concentrated in these regions. This concentration, however, reveals an economic dependency on the fossil fuel industry and its geographic constraints, where gas pipelines and facilities are most viable near gas fields. This reliance on gas infrastructure has driven a geographic bias in energy development towards regions where fuel extraction and transport are cheaper and more feasible.

The concentration also highlights how economic interests shape infrastructure investments. The regions that host major power plants are closely tied to Nigeria’s extractive economy, which is centred around the oil and gas industries. These regions have historically received more infrastructure investment because they are economically valuable to both the Nigerian government and international corporations that benefit from oil and gas exports. Thus, infrastructure development, including electricity generation, has been disproportionately directed towards areas that contribute most to the national economy. This dynamic has led to an imbalance in regional development, with the South receiving far greater benefits from energy investments compared to the North.

While fuel availability is a rational factor for power plant location, it also raises questions of energy justice a framework that focuses on the fair distribution of energy resources and services. The North-West and North-East regions, as shown in both tables, have few operational power plants, with the North-West having no active

plants in 2022 and the North-East having only two smaller-scale hydropower plants (Dadin Kowa at 30 MW and Kashimbila at 40 MW). This lack of infrastructure severely limits access to electricity for residents of these regions, exacerbating existing socio-economic disparities. From an energy justice standpoint, the uneven distribution of power plants perpetuates inequality in access to essential services, leaving northern Nigeria disadvantaged in terms of industrial development and overall economic opportunities.

Moreover, Table 6, which outlines power plants under construction, indicates that these disparities may persist into the future. While Egbin II in Lagos is projected to add 1754 MW to the national grid, the northern regions continue to see minimal capacity expansion. The planned Kudandan plant in Kaduna (215 MW) and the small Tiga hydro plant in Kano (10 MW) represent only modest improvements compared to the large-scale investments in the South. This disparity suggests that while there are efforts to develop energy infrastructure in the North, they remain limited in scope and ambition, continuing the trend of uneven regional development.

The Historical Institutionalism (HI) framework also provides a valuable lens for understanding this ongoing disparity. The distribution of electricity infrastructure during the colonial period, as seen in earlier tables, laid the foundation for the current imbalance. Colonial administrators prioritized infrastructure development in southern regions due to their economic importance for resource extraction and administrative purposes. This historical legacy continues to shape infrastructure investments today, as regions that were historically developed, such as Lagos and Port Harcourt, remain central to national energy strategies. The inertia of past institutional decisions reinforces the imbalance in infrastructure development, with northern regions still suffering from underinvestment despite efforts to modernize the national grid.

In summary, while fuel availability and economic factors explain the concentration of power plants in the South, a critical analysis using Political Economy, Energy Justice, and Historical Institutionalism frameworks reveals deeper implications for regional disparities in Nigeria. The continued focus on southern regions for infrastructure development reflects both historical patterns of economic prioritization and the ongoing marginalization of the northern regions. Addressing this imbalance will require deliberate policies that emphasise the equitable distribution of energy

infrastructure, ensuring that all regions have fair access to electricity and the economic opportunities it creates.

### 6.6 Disparities in Electricity Access and Supply Amongst Regions

The inception of the electricity privatisation strategy in Nigeria took root in the early 2000s as part of the nation's rigorous endeavour to overhaul its power sector and rectify the persistent issues of insufficient power supply (World Bank, 2021). The rationale behind this reform and the implementation of the privatisation strategy is complex, influenced not only by Nigeria's internal dynamics but also by the influence of global institutions like the World Bank and the International Monetary Fund (IMF).

The influence of the World Bank and the IMF on the privatisation of Nigeria's electricity sector can be traced back to the 1980s, a period when these institutions actively promoted Structural Adjustment Programs (SAPs) across many African and Latin American nations, including Nigeria (Ogujiuba & Nwokoma, 2018). These policies, intended to realign economies towards free-market principles, emphasised minimisation of state involvement, private sector participation, and market-oriented approaches (IMF, 1981).

Nigeria's power sector was not exempt from these reform initiatives. In the early 2000s, the adoption of the National Electric Power Policy (NEPP) and the Electric Power Sector Reform Act (EPSRA) in 2005 established the formal structure for the privatisation of the electricity sector (World Bank, 2021). The NEPP set the framework for unbundling the National Electric Power Authority (NEPA) into separate entities responsible for the generation, transmission, and distribution of power, thereby laying the groundwork for private sector involvement.

The EPSRA of 2005 further advanced the privatisation process by creating the Nigerian Electricity Regulatory Commission (NERC) and the Power Holding Company of Nigeria (PHCN). The NERC was designed as an independent regulatory agency for the sector, and the PHCN was formed as a holding company for the newly unbundled entities, with the intention of eventual privatisation. For their part, the World Bank and IMF provided consistent technical and financial backing to Nigeria during this transition towards privatisation (World Bank, 2021).

However, despite the international influence, the decision to proceed with electricity privatisation was fundamentally driven by Nigeria's internal assessment of the sector's performance and the urgent need to reform and improve the power sector (Ogujiuba & Nwokoma, 2018). Years of underinvestment, poor infrastructure, and operational inefficiencies under the state-controlled model were key drivers for this shift towards privatisation. The government recognised that private sector participation could infuse much-needed capital, promote efficiency through competition, and enhance service delivery in the electricity sector.

However, it is crucial to highlight that while privatisation was seen as a potential solution to the chronic problems in Nigeria's power sector, its implementation has been rife with challenges, ranging from regulatory uncertainty to difficulties in attracting substantial investment. These challenges continue to pose significant hurdles to the successful privatisation and reform of the sector.

Building on the historical context and complexities of Nigeria's power sector reforms, the interviewees expressed concerns about the unevenness in electricity supply as provided by the privatised distribution companies (DISCOs). These disparities are attributable to insufficient power supply, a frail transmission network, and the intricacies of the privatisation process, which considered the DISCOs' capacity to distribute electricity under the Multi-Year Tariff Order (MYTO). The MYTO policy, introduced by the Nigerian Electricity Regulatory Commission (NERC), sought to establish a tariff structure in the power sector that accurately reflected the costs of electricity generation, transmission, and distribution. By adopting a cost-reflective approach, MYTO aimed to incentivise investment, improve operational efficiency, and ensure the financial sustainability of the power sector (NERC, 2008). Despite these intentions, the actual outcomes of the MYTO policy have been a topic of heated debates, with criticisms largely focusing on issues of electricity affordability and the actual improvement in power supply.

> “The capacity of the DISCOs were evaluated throughout the privatisation process. The Multi-Year Tariff Order (MYTO) was put in place to regulate how much each DISCO gets as well as the price of electricity (SI 01).

> “After privatisation, the Nigerian Electricity Regulatory Commission developed a framework called the Multi-Year Tariff Order that is used to determine how much each DISCO will receive in terms of electricity and the model used in pricing" (SI, 02).

The two statements by the interviewees essentially describe the implementation and effect of the Multi-Year Tariff Order (MYTO) in Nigeria's electricity sector following the privatisation of Distribution Companies (DISCOs). The MYTO introduces a structured and regulated method for distributing power and revenue among the DISCOs. The Nigerian Electricity Regulatory Commission developed the MYTO, setting the price and distribution of electricity among the DISCOs.

The (SI 01) interviewee, highlights that the capacity of the DISCOs was evaluated throughout the privatisation process. This reflects how the system recognised and responded to institutional weaknesses, aiming to create a more robust regulatory mechanism. MYTO's introduction represents a significant institutional shift designed to streamline distribution and regulate tariffs, an outcome shaped by the sector’s historical challenges. The MYTO was established to regulate both the distribution of electricity and the tariff each DISCO receives. This implies that the model is designed to ensure fairness and balance in the distribution of resources and earnings among the different DISCOs.

The (SI 02) interviewee expands on this, explaining that the MYTO is used to set the amount of electricity each DISCO receives and the price of the electricity. This might suggest an attempt to bridge the gap between more developed urban areas and underserved regions, promoting more equitable economic growth. Nevertheless, challenges remain, particularly as less developed regions often face infrastructural and operational hurdles that the MYTO alone cannot fully mitigate.

In addition to the perspectives provided by the industry interviewees regarding the Multi-Year Tariff Order (MYTO), insights from a government interviewee shed light on the challenges faced by the Distribution Companies (DISCOs) in effectively

utilising their allocated electricity capacity and the factors contributing to their debt burden.

> "The discos were evaluated throughout the privatisation process based on their capacity and demand. That assessment was used to allocate a certain percentage of the generated electricity to the various discos, but the discos are still unable to utilise their allocations. They constantly refuse loads, blaming consumers for non-payment of bills and energy theft, which adds to their debt burden" (GI 01).

The GI 01 comments about the challenges faced by the Distribution Companies (DISCOs) in utilising their allocated electricity capacity point to entrenched issues within Nigeria's electricity sector, despite the regulatory reforms introduced by privatisation. The evaluation of DISCOs during privatisation based on their capacity and demand reflects an attempt to establish a more efficient and equitable distribution system. However, the ongoing issues with load refusals, energy theft, and non-payment highlight the persistence of historical institutional weaknesses. Despite efforts to improve the sector through privatisation and the Multi-Year Tariff Order (MYTO), these problems suggest that the institutional legacies of inefficiency and mismanagement continue to affect performance.

The regional imbalances suggested by GI 01, particularly the differences in how effectively DISCOs manage their allocations, can be understood through the lens of regional development. DISCOs in regions with lower economic activity, such as the Northwest and South-South, may face greater challenges in billing efficiency and infrastructure management. This uneven performance reinforces regional disparities in electricity distribution, where more economically developed areas like the Southwest are better positioned to manage and distribute electricity effectively. These differences reflect broader regional development issues, where infrastructure, governance, and economic capacity directly impact the ability of DISCOs to meet demand and manage resources.

The economic pressures faced by DISCOs, as indicated by their increasing debt burden due to non-payment and energy theft, reflect deeper political economy

dynamics. While privatisation was intended to make the electricity sector more efficient, the reality of low payment rates and widespread energy theft undercuts the financial sustainability of these companies. Consumers' inability or refusal to pay, often tied to economic hardship or dissatisfaction with service quality, creates a revenue shortfall that drives DISCOs further into debt. At the same time, political pressures to keep tariffs low prevent the companies from adjusting prices to reflect their true operational costs, resulting in a financially unsustainable model that neither fully supports the DISCOs nor guarantees affordable energy for consumers.

The implications of this situation for energy justice are significant. The refusal of loads and the blame placed on consumers for non-payment or theft reflect a breakdown in the relationship between energy providers and users. Energy justice advocates for fair and equitable access to electricity, yet in this case, the financial and operational failures of the DISCOs disproportionately affect poorer consumers who are often left with unreliable service or disconnected entirely. This creates a vicious cycle where consumers, unable to access reliable electricity, are less inclined to pay, further deepening the service and revenue gaps. Ultimately, the burden of these systemic failures is borne by the most vulnerable, who are denied the basic right to consistent and affordable energy.

In Nigeria, grid access does not guarantee affordable and reliable electricity supply, mainly due to high demand and supply gaps (Oyedepo, 2012; Chineke and Igwiro, 2015; Sambo, 2017; Ajayi, 2019; Oladiran and Kholopane 2021). This disconnect isn't unique to Nigeria. Similar struggles with grid-connected unreliability have been documented across Africa. For instance, in Ghana, despite significant investments in recent years, power outages remain common, hindering economic activity and daily life (Agyemang et al., 2018). In Kenya, rural electrification initiatives, while expanding access, often grapple with inadequate generation capacity and transmission infrastructure, limiting the impact on household well-being (Omondi et al., 2020).

Despite efforts to improve grid infrastructure, the electricity demand often exceeds the available supply, resulting in frequent power outages and load shedding (World Bank, 2018). Additionally, inadequate generation capacity, transmission losses, and distribution inefficiencies contribute to supply gaps, leading to an unreliable power supply (Ogujiuba & Nwokoma, 2018; Ebohon & Uzoejinwa, 2017). Furthermore,

issues such as non-payment of electricity bills and illegal connections also impact the affordability and sustainability of the electricity system (World Bank, 2020; Olotu & Atubi, 2019). Consequently, addressing these challenges requires a comprehensive approach encompassing generation expansion, transmission upgrades, distribution improvements, demand management, and financial sustainability measures (World Bank, 2018; World Bank, 2020; Olotu & Atubi, 2019).

The NERC quarterly reports have indicated the disparities in electricity supply among the regions in the MYTO load allocation among the DISCOs. According to NERC, the Southwest DISCOs have been allocated 39.1%, the Northwest 16%, and the South-South 15.5% of the electricity generated. Despite the allocation differences, the Southwest DISCOs received 2.35% more energy than the allotted. In contrast, the northwest and south-south DISCOs received energy of 3.62% and 2.64 % less than their allocation, respectively (NERC, 2021). The reports suggest that the DISCOs' ability to manage and distribute electricity effectively, as well as their billing efficiency, are considered when determining the allocation percentages.

The disparities in electricity supply among regions, as outlined in the NERC quarterly reports, reflect broader issues tied to the MYTO load allocation system. The Southwest DISCOs receiving more energy than their allocation while the Northwest and South-South DISCOs receiving less illustrates an imbalance rooted in the operational capacities and efficiencies of the respective DISCOs. This uneven distribution aligns with the earlier point that the DISCOs' ability to manage, distribute, and bill for electricity directly influences their allocations.

These disparities point to unequal infrastructural and administrative capabilities across different parts of the country. The Southwest, being more developed and likely more equipped to handle larger electricity loads, may have benefitted from the system's inherent bias toward regions that demonstrate higher billing efficiency and capacity. In contrast, the Northwest and South-South, with their lower allocations and further reductions in actual energy received, are more likely to face challenges in maintaining a reliable supply. This suggests that regional inequalities are not only a matter of demand but also the ability to effectively manage distribution, which could exacerbate existing developmental divides.

Political economy considerations further reveal how these imbalances may stem from broader systemic issues in Nigeria's electricity sector. The allocation of electricity, as reported by NERC, reflects a market that prioritises efficiency and revenue generation over equitable distribution. As DISCOs in wealthier, more urbanised areas demonstrate better billing performance, they are rewarded with larger shares of the available energy, while less efficient DISCOs struggle to meet both demand and financial obligations. This market-driven approach to allocation, while perhaps rational from a business perspective, risks deepening the existing disparities between regions, as less efficient DISCOs remain trapped in a cycle of underperformance and inadequate supply.

The energy justice framework becomes critical here as well, particularly regarding fairness in access to electricity across the country. The fact that regions like the Northwest and South-South receive less energy than they are allocated suggests a systemic failure to ensure equitable access to this essential resource. Energy justice demands that all regions, regardless of their administrative or billing efficiency, have fair access to electricity. The current model, as suggested by the NERC report, prioritises performance-based criteria, potentially at the expense of regions with lower capacity, which risks marginalising communities that are already energy-poor.

In essence, the NERC reports underscore the importance of capacity and efficiency in determining energy distribution, but they also highlight the potential for deepening regional inequities. While the MYTO framework provides a structured approach to tariff and energy allocation, it may inadvertently perpetuate disparities, leaving less efficient regions with fewer resources to develop their infrastructures and meet their populations' energy needs. This imbalance calls for a more nuanced approach to energy distribution, one that considers regional development needs alongside efficiency metrics to ensure a more just and equitable energy system.

### 6.7 Assessing the Role of Energy Plant Locations in Shaping Electricity Supply in Nigeria

The location of energy generation plants plays a crucial role in shaping the dynamics of electricity supply in any country (Heijdra, 2013; Ren et al., 2015; Chen et al., 2016) It determines the proximity of power generation facilities to the resources they utilise, such as coal, natural gas, or hydroelectric sources. This strategic positioning

influences the electricity supply's efficiency, effectiveness, and geographical distribution. In the case of Nigeria, the concentration of energy plants in specific regions has resulted in an uneven distribution of energy infrastructure and supply across the country.

To further explore the implications of energy plant location and its impact on electricity supply dynamics, insights from stakeholder interviews provide valuable perspectives on the challenges and opportunities associated with Nigeria's energy infrastructure.

> "You already know that 80% of the electricity is generated from gas and they are all located in the southern part of the country. Again, the hydro plants in Niger state contribute only about 20% of the total electricity demand. Nigeria operates on a single grid where all the electricity generated must be pooled together at the national control centre before being distributed to various discos. So, the cost of transporting the electricity from the south, which is about 1000 km, is very expensive coupled with the multiple transmission losses. Hence, all these factors contribute to the price differences" (GI, 01).

> "As you know, most of the electricity is generated in the south. You can imagine the cost of transmission the electricity from south to north, which is more than 1000 kilometres, together with the energy loss along the line" (SI, 02).

Both interviewees' observations about Nigeria's energy plant locations and their impact on electricity supply dynamics highlight critical challenges within the country's infrastructure. The fact that 80% of electricity is generated from gas plants concentrated in the southern part of the country, while hydro plants in Niger State contribute only 20%, reflects historical institutional decisions about energy generation. Over time, these decisions have shaped the geographical concentration of power plants, embedding a structural imbalance into the system. The reliance on

a single grid further amplifies these historical choices, as the centralisation of electricity generation and transmission creates bottlenecks and inefficiencies, particularly for regions far from the generation source.

The regional disparity between energy generation in the south and the demand for electricity across the country directly ties into regional development theory. The heavy concentration of gas plants in the south naturally favours that region, as transmission costs are lower and access to energy is more direct. In contrast, the north, which relies on electricity transmitted over 1,000 kilometres, bears the brunt of transmission losses and higher costs. These differences in transmission costs and losses reflect broader patterns of uneven development across Nigeria, where infrastructural investments and economic activity are heavily skewed towards the southern regions. As a result, regions in the north, already facing developmental challenges, experience further disadvantages in terms of energy access, reinforcing regional inequalities and limiting growth opportunities.

Political economy considerations are evident in the discussion of transmission costs and losses. The centralisation of the grid and the concentration of power plants in the south have economic implications, particularly regarding the pricing of electricity. Transmission over long distances increases costs, which inevitably get passed down to consumers in the form of higher tariffs. This creates a pricing disparity that disproportionately affects regions farther from the generation sites, such as the north, where consumers may already be economically disadvantaged. The higher transmission costs and losses also raise questions about the efficiency of the current system and the potential for decentralised energy solutions, which could reduce costs and improve service delivery. However, shifting away from the current system would require significant political and economic restructuring, as vested interests in maintaining the status quo may resist reforms that could redistribute control over energy resources.

From an energy justice perspective, the current system’s inherent inefficiencies and regional disparities raise concerns about fairness in electricity access. The high cost of transmitting electricity from the south to the north, coupled with significant energy losses along the transmission lines, means that consumers in northern regions pay more for less reliable electricity. This disparity highlights a fundamental inequity in

the energy system, where geographical location determines the cost and quality of access to a vital resource. Energy justice advocates for an equitable distribution of energy resources, ensuring that all regions, regardless of their proximity to power generation plants, have access to affordable and reliable electricity. However, the current framework, as described by the interviewees, suggests that these principles are not being upheld, with northern consumers disproportionately burdened by the inefficiencies of the system.

The resource-centric approach to energy production in Nigeria, while offering advantages, has not been without challenges. The Transmission Company of Nigeria's (TCN) expansion plan highlights these issues, particularly the concentration of power plants near oil and gas reserves in the south. Although this location ensures easy access to fuel and efficient resource use, it also presents significant obstacles, such as gas availability for capacity expansion and the need to extend the gas pipeline network.

TCN's 2017 report emphasises the importance of developing power plants in other regions to ensure reliable transmission. The ongoing Ajaokuta-Kaduna-Kano (AKK) gas pipeline project, spanning about 614 kilometres, is a major initiative aimed at diversifying energy infrastructure. By supplying gas from the south to the north, the AKK project could decentralise energy production, reducing dependence on southern reserves and facilitating the establishment of gas power plants in the north. This shift could spur industrial growth along the pipeline's route, with potential benefits for sectors like agro-processing, fertiliser production, and solid mineral extraction.

Expanding the transmission network, however, involves navigating socio-political and economic challenges. The unequal distribution of resources is tied to political dynamics, land use issues, and economic considerations. Extending transmission into sparsely populated regions may not be economically viable, while land disputes in densely populated areas can obstruct construction efforts. Moreover, the concentration of resources in politically favoured areas exacerbates regional disparities in power access.

Political influence often shapes infrastructure development, with powerful figures directing resources to their constituencies, creating imbalances. Such dynamics can

delay or derail projects, as seen in Nigeria, where political instability disrupts development. Vietnam and Indonesia offer lessons on mitigating political influence and ensuring equitable infrastructure distribution through policy reforms and institutional interventions. Socio-cultural factors, particularly land ownership disputes, further complicate infrastructure projects. Nigeria’s dual land use system, governed by statutory and customary laws, often leads to conflicts during development.

However, studying other countries can also offer valuable lessons. Vietnam's experience with infrastructure development (Vu Thanh Tu et al., 2017) mirrors Nigeria's vulnerability to political influence and resource allocation imbalances. Yet, Vietnam implemented policy interventions and institutional reforms to mitigate these challenges. Similarly, research on Indonesia (Firman et al., 2018) sheds light on effective strategies for navigating political complexities and ensuring equitable infrastructure distribution.

In pursuing a more reliable and efficient electricity system, technical reports from the Transmission Company (TC) have consistently emphasised the need for an expanded gas pipeline network to Northern Nigeria, complemented by an increase in generation plants in the region (TCN, 2019, TCN, 2020; TCN 2021). Currently, the northern regions are underrepresented in transmission infrastructure, hosting merely three out of the total eight transmission facilities in the country (TCN 2021). This disparity signifies the geographical imbalance in Nigeria's energy infrastructure, potentially contributing to regional energy access and supply disparities.

The regional imbalances in Nigeria's power sector over the past two decades are evident in the political appointment patterns. Between 1999 and 2019, there were notable regional imbalances in Nigeria's power sector, particularly in the political appointments of power ministers. During this period, most of the country's power ministers were from the three southern regions, namely the South-West, South-South, and South-East. This regional concentration of power ministers had implications for the distribution of investments and the establishment of electricity-generating plants.

During this period, the dominance of power ministers from the southern regions resulted in increased attention and investments in the power generation sector. The southern regions, particularly the South-West, witnessed the establishment of

multiple electricity-generating plants, expanding power infrastructure in those areas. During this period, the investments aimed to address the longstanding issue of inadequate power supply and the need for increased generation capacity.

However, despite the overall advancements in the power sector, a notable disparity arose regarding the regional distribution of new power facilities. Among the newly established electricity-generating plants, only the Zungeru hydro plant was located in the northern region of Nigeria. This concentration of power generation infrastructure in the southern regions, particularly in the South-West, raised concerns about regional imbalances and equitable distribution of resources.

The Zungeru Power Project, with an expected installed capacity of 700 MW utilising the water resources of the Kaduna River, plays a crucial role in Nigeria's efforts to enhance electricity production capacity and expand access to electricity. The plant's completion is projected for late 2024 and is expected to contribute significantly to the national grid. The government initiated the Ajaokuta-Kaduna-Kano (AKK) gas project to address the electricity challenges. However, there has been criticism from sections of the media.

In light of the ongoing discussions surrounding Nigeria's power projects, including the Zungeru Power Project and the Ajaokuta-Kaduna-Kano (AKK) gas project, it is crucial to consider different perspectives and criticisms from stakeholders and media commentators.

> But any discerning observer of the industry will ask whether this AKK should be a priority now when you can deploy the $2.8 bill to solve the immediate problems of the stranded 10 gas-powered generating plants in the hands of NIPP/Niger Delta Power Holding Company. It is certain that this $2.8 Billion project will not be completed in the next 3-4 years and may never get sufficient gas to reach Abuja nor Kano when even the Kaduna refinery built since 1989 with Crude Pipeline from Escravos has never gotten enough to refine Nigeria's export crude daily" (Ruben Abati, Thisday Newspaper 2019).

> "I hope the government has put mechanisms in place to complete the Ajaokuta, Kaduna Kano gas (AKK) because we lack project continuity in Nigeria (SI, 04)".

Former presidential spokesperson Ruben Abati expressed scepticism about prioritising the AKK gas project, questioning whether the allocated funds could be better utilised to address immediate challenges in the power sector. Abati's critique of the Ajaokuta-Kaduna-Kano (AKK) gas project highlights the broader challenges in Nigeria's energy sector, drawing attention to both institutional inefficiencies and regional development concerns. Through the lens of Historical Institutionalism (HI), his argument underscores how past failures like the long-standing issues with the Kaduna refinery persist in influencing current energy policy. The fact that the Kaduna refinery, built in 1989, has not received adequate crude supply for years suggests a deep-seated institutional legacy of ineffective infrastructure management. Abati questions whether the AKK project will follow a similar trajectory, raising concerns about the future gas supply and the ability to complete the project, which mirrors the inefficiencies rooted in Nigeria's historical governance structures.

Similarly, Abati's argument suggests that the prioritisation of the AKK project may not align with the immediate energy needs of other regions, particularly those where stranded gas-powered plants remain underutilised. The deployment of $2.8 billion toward AKK, while leaving other critical assets like the Niger Delta Power Holding Company's gas plants in limbo, points to a regional imbalance in energy infrastructure development. These stranded assets could potentially provide immediate relief to Nigeria's energy deficit, especially in regions that already possess the necessary infrastructure but lack operational support.

The political economy of the energy sector is also central to the (SI 04) interviewee his argument reflects concerns that political motivations may override economic rationality, with large-scale projects like AKK favoured for their symbolic and political capital rather than their immediate utility. The risk of non-completion, a challenge often tied to Nigeria's lack of project continuity, points to governance weaknesses and the misallocation of resources that often hampers infrastructure development. By directing substantial funds towards a project that may not yield returns for years,

Nigeria’s political actors could be prioritising long-term political gains over urgent economic solutions.

Finally, the decision to prioritise the AKK project could be viewed as neglecting the immediate energy needs of communities that could benefit from optimising existing gas plants. Energy justice focuses on ensuring that energy resources are fairly distributed and accessible, yet Abati’s critique reveals a potential misalignment in addressing the needs of communities with stranded power-generating infrastructure. Redirecting the $2.8 billion toward solving immediate energy crises could serve a greater number of people more quickly, aligning with the principles of justice in energy access. Abati’s argument is deeply rooted in concerns about historical inefficiencies, regional imbalances, political economy dynamics, and energy justice, all of which raise questions about the prudence of prioritising the AKK gas project over more immediate energy challenges.

In examining the lived experiences of the people connected to Nigeria's utility grid, it becomes evident that the narrative is less about grid access and more about the quality, consistency, and reliability of electricity delivered. As interviewees reflect upon their experiences, they highlight a widespread issue in Nigeria's electricity supply, not simply a regional disparity but a systemic deficiency.

> "I think the problem of electricity is more really like a general problem, and the same challenges I am facing in my area. Even in FCT Abuja, some areas are still having electricity problems” (SW UAI 03).

> "I travel often, let's say once a month. Still, I observe that some urban areas like the seat of power Abuja tend to have a better electricity supply, though not 100% compared to some urban areas. I also noticed that some rural areas tend to have a little better energy supply because they didn't have much demand in those areas " (NW RAI 02).

> "I don't travel much, but the places I have visited in the Northern part of the country also have the problem of power supply. I think it's a general problem"(SS SAI 01).

The electricity issues described by the interviewees reveal a complex interplay of historical inefficiencies, regional disparities, and governance challenges in Nigeria's energy sector. For instance, the (SW UAI, 03) mentions that even in the Federal Capital Territory (FCT), Abuja, electricity supply is unreliable in all areas, reflecting the nationwide scope of the problem. This point underscores the enduring impact of past institutional failures, where even critical areas like the seat of power struggle with power supply, despite numerous reforms over the years. The persistence of these challenges points to how historical governance structures have shaped the uneven development of infrastructure, affecting both urban centres and rural areas alike.

The (NW RAI 02) adds another dimension by observing that while Abuja may have comparatively better electricity supply, certain rural areas experience more stable power due to lower demand. This highlights the regional disparities in energy distribution, where some rural areas benefit simply because their electricity needs are not as high. This situation reflects the broader trend of uneven energy development across regions, where political and economic considerations often dictate the allocation of resources. The (NW RAI 02) observation suggests that infrastructural investments tend to favour more politically influential urban centres, while less populated rural areas remain overlooked unless demand is minimal.

In contrast, the (SS SAI 01) reflects on the general nature of Nigeria's electricity problems, stating that even in the northern parts of the country, the issue remains widespread. This perspective ties into the overall narrative that electricity access is influenced not just by geographical location but by broader governance and political dynamics. Despite efforts to address the energy crisis, political priorities often skew investments towards certain regions, leaving others both urban and rural under-served. The result is a patchy and inconsistent power supply across the country, with no clear alignment between regional energy needs and infrastructural support.

Collectively, these accounts from the interviewees reveal how deeply intertwined historical governance patterns, regional inequalities, and political decision-making continue to shape Nigeria's energy sector, leading to widespread and persistent electricity challenges across different areas of the country.

Reinforcing the testimony of those connected to Nigeria's utility grid, a fresh perspective emerges when considering the narratives of those who have had the opportunity to travel across the nation. These personal accounts illustrate that the nation's electricity challenge is a general predicament, pervasive in urban and rural areas, irrespective of geographical location.

The interviewees from various regions, who have traversed the length and breadth of the country, echoed the sentiment that power shortfalls are not unique to any single area. The testimonies underscore that power stability is elusive even in high-profile urban locales such as Abuja and Lagos. An insightful observation by the interviewee from Kano highlights the profit-driven disposition of distribution companies, often at the expense of customer satisfaction, further aggravating the situation.

> "I do visit the Southern part and Abuja. The story of electricity is, all the same, the discos are not sincere at all. They are after profit maximisation without recourse to the customers' satisfaction. Everywhere I went to have a maximum supply of 12 hours" (NW, SAI 02).

> I don't travel much, but the places I have visited in the Northern part of the country also have the problem of power supply. I think it's a general problem (SS, CLI 02).

> "I used to travel a lot because of the nature of my business sometimes, I do travel to Abuja, but there, I reside in a hotel. However, in the Northern part of Nigeria, Kaduna has almost the same problem as Kano. Sometimes they give electricity for 12 hours a day or less than 12 hours a day" (NW, UAI 04).

> "I understand that in Lagos, they make a lot of profit because you don't compare Lagos with any other state, even Abuja's capital city. There are many international companies and many factories in Lagos, so the supply is better. Hence, they get to have a lot of profit here" (SW, UAI 03 ).

> "I do that regularly, like once a month. Places like Ibadan and Ekiti have a better power supply than my area in Lagos. But because they don't have load demand like Lagos" (SW, RAI 01).

> "I travel twice a year. There was minimal improvement when I visited Niger State before they have three hours a day and three hours at night. However, now they have five hours in the day, five hours at night. There might not be any state with enough power supply in Nigeria, but I'm not sure" (SS SAI, 03).

> "Well, mostly during festive holiday periods. When you go to places like Kebbi state, you will see them enjoying light for almost 18-20 hours. When you go to places like Niger, you will just see them for 8-10 hours. Some areas enjoy more while others enjoy less" (SW SAI 03).

The recurring theme of electricity scarcity is reinforced in the testimony from interviewees who frequented both Northern and Southern regions, further dispelling any notions of regional disparities. The shared concern across the interviewee responses is the glaring inadequacy of electricity provision, a systemic challenge that transcends regional boundaries and socio-economic differences.

The shared stories of experiences reveal a stark image of the current state of electricity in Nigeria: fleeting moments of power availability interspersed within long periods of blackout. These perspectives collectively highlight the intersection of historical inefficiencies, regional disparities, economic priorities, and justice concerns in Nigeria’s electricity distribution. The testimonies from the interviewees reveal how these factors continue to shape the uneven and inadequate power supply across the country, affecting both urban and rural communities. Therefore, these narratives accentuate the urgency for robust policy interventions and substantial investments in Nigeria's power infrastructure.

### 6.8 Summary

In summary, this chapter offers a detailed and comprehensive historical analysis of electricity infrastructure development in Nigeria and its implications for energy

accessibility. By examining the colonial legacy, post-colonial development, and the role of energy plant locations, the chapter highlights the historical factors contributing to regional disparities in electricity access and supply. It emphasises the need for a deeper understanding of the historical context to effectively address the current challenges and work towards more equitable and accessible energy systems in Nigeria.

The chapter underscores the long-lasting impact of colonial administration on electricity infrastructure development. It reveals how infrastructure concentration in urban areas, particularly in the southern region, and the neglect of rural and northern regions have resulted in significant disparities in electricity access and supply. By examining resistance to colonial infrastructure in northern Nigeria, the chapter highlights the enduring effects of the historical opposition to colonial infrastructure, further contributing to regional disparities.

Furthermore, the chapter analyses the post-colonial period, emphasising the role of government policies, investments, and international partnerships in shaping electricity infrastructure. It identifies various factors influencing electricity access and supply, including infrastructure investments, geographical location, and socio-economic conditions. The chapter highlights the challenges faced in extending electricity infrastructure to underserved areas, particularly rural regions, and the implications of such challenges on energy accessibility.

# CHAPTER 7

# PERCEPTIONS OF THE CURRENT STATE OF ELECTRICITY PROVISION IN NIGERIA

## 7.0 Introduction

Building on the insights from Chapter 6, which analysed Nigeria's electricity supply and explored the historical, economic, and infrastructural challenges, this chapter delves deeper into the complex realities of electricity provision across the country. Using Political Economy and Regional Development Theory as analytical lenses, this chapter interrogates how the intersection of socio-economic factors, policy frameworks, and geographic disparities shape access to electricity and reinforce regional inequalities.

This chapter critically examines stakeholders' perceptions, ranging from government officials and energy providers to local communities, to uncover the systemic patterns of exclusion embedded in the current electricity provision system. It also assesses how the physical location of infrastructure contributes to the uneven distribution of electricity, with significant implications for both urban and rural populations.

Through a detailed analysis of key themes including the affordability of grid electricity, the diverse needs of consumers, the functioning of the billing system, and consumers' willingness to pay this chapter reveals how these factors collectively impact access and equity in electricity provision. Moreover, the chapter addresses the pressing issue of energy theft, a pervasive problem that not only disrupts service provision but also exacerbates the challenges of maintaining a stable and equitable electricity grid in Nigeria. The chapter's exploration of these interconnected issues will contribute to a deeper understanding of the structural barriers that continue to shape Nigeria's energy landscape. As mentioned earlier the following are the abbreviations used for interviewee references: SS (South South), NW (North West) SW (South West) GI (Government Interviewee), SI (Stakeholder Interviewee), CLI (Community Leader Interviewee), RAI (Rural Area Interviewee), UAI (Urban Area Interviewee), and SAI (Settlers Area Interviewee).

### 7.1 Affordability of Grid Electricity

The affordability of grid electricity is a critical factor influencing both individual livelihoods and broader economic development, especially in developing countries like Nigeria. Access to reliable and reasonably priced electricity can drastically improve living standards by powering essential household activities, businesses, and industries. However, in regions where electricity costs are high or unreliable, communities often face significant barriers to economic growth and improved quality of life. The issue of affordability is deeply tied to socio-economic factors, including income disparities, energy infrastructure quality, and government policies. In Nigeria, the challenge is exacerbated by high energy production costs, inefficiencies in transmission, and regional disparities in electricity access.

While existing research has established the socioeconomic underpinnings of grid electricity affordability in Nigeria, often relying on national-level data and quantitative approaches, this study delves into the lived experiences of stakeholders, individuals and within the diverse case study regions. These empirical findings offer a nuanced understanding of how the high cost of electricity affects daily life, particularly for low-income and underserved communities.

These quotes below reveal a multifaceted crisis in Nigeria's electricity sector, one that cannot be understood in purely economic or technical terms. It is a crisis shaped by historical neglect, regional inequality, and a political economy that favours profit over people.

> "What I just understand with these private companies is exploitation. They are after money, and those who do not have a prepared meter in my area pay N10,000 in a month even if they travel and don't use any light in their house. You must pay that estimated bill (SW, RAI 2)".

> "I was raised and brought up in Bebeji, which is a village where most of the people are lower class living in low income. They only use electricity to light their homes some areas don't have electricity because they cannot pay the monthly bills (NW RAI 1)".

> "The bill almost doubled by about a 150% increase, which is not fair considering the supply and economic situation in the country (SS, SAI 1)".
>
> "The bills are so outrageous, especially for unmetered customers. The bill goes about 200%; you can not even understand how they came about it. There is no consideration for the income level of the people supposed to pay this bill. They send an invoice of more than the monthly income for a person how you expect them to cope.( NW UAI 2)".

These quotes vividly expose the deep-rooted and systemic issues surrounding electricity provision in Nigeria, where affordability is not just a financial concern but a reflection of long-standing institutional failings and regional inequalities. The challenges of electricity access are not simply a result of recent policy missteps but are the outcome of decades of entrenched institutional practices. Nigeria's power sector has historically been marred by corruption, poor governance, and underinvestment, particularly in regions like the North. The legacy of these institutional failures continues to haunt the present, as highlighted by (NW RAI 1), where entire communities are left without access because they simply cannot afford the exorbitant electricity bills. This situation underscores how historical neglect perpetuates inequity in the distribution of essential services like electricity.

The disparities between wealthier southern cities and underdeveloped northern areas, such as Bebeji, become starkly apparent. The (NW RAI 1) accounts reveal a geographic bias in Nigeria's energy infrastructure, where regions like Lagos benefit from better access and infrastructure, while more remote, rural areas bear the brunt of unreliable and unaffordable electricity. The testimony of the interviewee reinforces this regional divide, where lower-income, rural communities are effectively priced out of the energy market. These are not isolated incidents but part of a broader pattern where development, investment, and attention have historically favoured the south, exacerbating the socio-economic and infrastructural divide between Nigeria's regions.

From a Political Economy perspective, the experiences shared by the interviewees point to the exploitative tendencies of privatised electricity companies. The (SW RAI 2) interviewee highlights the predatory nature of estimated billing, where households without prepaid meters are charged arbitrary and excessive amounts. This speaks to a wider neoliberal agenda that prioritises profit over public good. The privatisation of Nigeria's power sector was intended to introduce efficiency and competition, but instead, it has led to monopolistic practices where companies, unchecked by effective regulation, can impose inflated costs on vulnerable consumers. The phrase "they are after money" resonates with the broader critique of neoliberal reforms, where essential services are treated as commodities, and consumers, particularly those with limited means, are left at the mercy of profit-driven entities.

The exorbitant bills described by the interviewees violate the core principles of energy justice, particularly distributive and procedural justice. Distributive justice demands fair access to energy, ensuring that no one is unfairly burdened by costs. Yet, as (NW UAI 2) points out, some unmetered customers receive bills that far exceed their monthly income, leaving them in a precarious position. The lack of transparency in billing practices and the absence of accountability on the part of energy providers violate procedural justice, which insists on clear and equitable decision-making processes. The injustice here is glaring: the poorest, often living in the most neglected regions, are asked to shoulder the heaviest financial burden for a service that, for many, remains unreliable or inaccessible.

Nonetheless, distrust is not a new phenomenon; numerous studies have demonstrated a growing cynicism and lack of confidence in energy companies' policies and intentions (Greenberg, 2014; Jiang and Zhao, 2021; Oh et al., 2022). According to Hobman et al.,(2016) high and volatile energy prices are the fundamental reason consumers lack confidence in energy providers. Global energy prices have been growing for various reasons, including increased demand, supply constraints, geopolitical conflicts, and government policies (ibid). The high energy cost has prompted consumer resentment and mistrust of energy providers, who are viewed as avaricious and indifferent to consumer welfare (Hobman et al., 2016; Ndukwe et al., 2022). Another factor contributing to the lack of confidence is the opaque pricing structure. Energy companies frequently employ intricate pricing systems that make it difficult for consumers to comprehend the actual cost of

electricity. Customers frequently believe that energy providers take advantage of their ignorance regarding energy prices (Ibid).

Establishing trust between electricity customers and providers is difficult and complex. It requires a broad strategy that addresses the underlying factors contributing to the mistrust, such as the perception that energy companies are profit-driven and lack transparency and accountability. Energy companies can develop credibility and improve their reputation through increasing transparency, encouraging renewable energy sources, and communicating with consumers. The approach can lead to a more sustainable and mutually beneficial relationship between consumers and electricity providers. The subsequent section will investigate the needs of consumers.

### 7.2 Electricity Needs of Consumers.

Understanding the electricity needs of consumers is critical to devising effective energy policies, especially in developing nations like Nigeria, where energy poverty and access inequalities remain pervasive. Electricity needs are not homogenous; they vary across residential, commercial, industrial, and public service sectors, each with distinct requirements shaped by socioeconomic status, geographic location, and the nature of the activities they support. Households, for example, may use electricity for lighting, heating, or basic appliance usage, but the level of consumption differs significantly between low-income and higher-income families. In contrast, businesses and industries require more substantial and consistent electricity to power equipment and production processes, while public services like hospitals and schools depend on reliable power to deliver essential services.

However, simply connecting to the grid does not equate to having reliable or affordable access to electricity. Consumers frequently face unreliable power supplies marked by frequent outages, voltage fluctuations, and inflated costs, which can severely affect their daily lives and operations. This gap between grid connection and actual utility highlights the inadequacies of traditional measures of electricity access. The empirical findings presented in this study shed light on these electricity needs, drawing from the lived experiences of consumers. The following interviewees provide a first-hand perspective into the disruptions and hardships experienced due

to inconsistent power supply and its domino effect on daily routines and essential services.

> “Because of the power outage, our usual routine has been disrupted and stressful. Most of us use generators to pump water for our homes, and some of us haven't been able to use things like TVs and ironing boards because we don't have power (NW, UAI 5)”.
>
> “The current scarcity of petrol in the state has exacerbated the problem, making it impossible for us to power our pumping equipment to obtain water for domestic use like bathing, washing, and cooking (NW SAI 1)”.
>
> “I only need power for lights since I don't want to obtain any appliances that I won't be able to use because there is no electricity. I have a television that I cannot use due to the power supply timing if I have to rely on a generator to use it (SS RAI 2)”.

These direct testimonies from various individuals in different regions of Nigeria paint a vivid picture of the far-reaching impact of unreliable electricity supply on everyday life. They highlight the fragility of routines and normalcy in the face of a lack of consistent power, presenting a stark illustration of the human dimension of Nigeria's electricity provision challenge.

The first quote from (NW UAI 5) underlines the disruption of usual routines due to power outages. The dependence on generators for powering necessities such as water pumps demonstrates the immediate effects of power interruptions on household routines. Beyond the disruption, the reliance on generators also underscores the additional financial burden on households to access essential services like electricity. The challenges of unreliable electricity extend beyond affordability. Operating generators involves significant effort and resources, further compounding the inconveniences and hardships faced by households.

The second quote from (NW SAI 1) illustrates how the issue of electricity provision is interconnected with other systemic challenges, such as the scarcity of petrol. This

scarcity has further exacerbated the electricity problem, highlighting the ripple effects of energy deficits on other aspects of social and economic life.

The third quote from (SS RAI 2) captures the unfulfilled potential and restrictions that a lack of reliable electricity imposes on households. Individuals must limit their need for electricity to the basics due to the uncertainty of power supply, restricting the use of appliances that many of us take for granted in our daily lives. Such insight demonstrates how Nigeria's electricity provision challenges are not merely technical or financial but deeply social and human-centred. It emphasises the need for a more user-centred approach to energy policy that considers the real and diverse needs, experiences, and constraints of the individuals it aims to serve.

The previous discussion in section 7.1 laid the groundwork for understanding the harsh realities that people face in areas with unreliable electricity supply. Delving further into personal testimonies, looking at the dire circumstances and individual strategies for mitigating these challenges. These accounts reveal not just the woeful inadequacy of the current power situation but also the resourcefulness and resilience of people in the face of adversity.

> "We now consider light to be a luxury. We expect the light to last up to three hours, but sometimes it lasts only for less than one hour. This does not stop the distribution company from showing up at the end of each month with astronomical electricity bills. The charge they provided me for a 2-bedroom flat in October was N28,000 ($31.4/£24.5 at the official exchange rate) I don't know how they expect us to pay that much when you can even use the electricity (SS, UAI 4)".

> "After giving up on steady electricity, I decided to get an inverter. Even though it cost me a lot to purchase and install, I have peace of mind knowing that there is a power supply source when I'm at home, despite the fact that they continue to give me an outrageous estimated bill (SW, CLI 2)".

These different interviewees' quotes bring to the fore the complicated reality of electricity access and the coping strategies adopted in response. These individuals' experiences underscore how unaffordable and unpredictable electricity can create profound disillusionment, leading to drastic steps and framing access to electricity as a luxury rather than an essential service.

The quote (SS UAI 4) reveals a paradoxical situation where access to electricity, rather than being seen as a common utility, is considered a luxury. The unreliability of the power supply and the high bills at the end of each month signify a frustrating scenario for consumers. This speaks to a critical issue in the Nigerian electricity market, the disparity between service received and the cost levied, echoing broader discussions in the literature around fair pricing and the need for transparent, usage-based billing (Jamasb & Nepal, 2010).

The quote from (SW CLI 2) illustrates the extreme measures that individuals resort to in the face of inconsistent power supply. Despite its high initial cost, the investment in an inverter is seen as a more reliable and peace-inducing alternative to the inconsistent grid supply. This quote emphasises the lengths to which consumers must go to ensure a basic level of energy security, bringing out a reliable electricity supply for daily life. This highlights the impact of limited access to electricity and the resulting need for individuals to take personal responsibility to ensure a stable power supply. The mention of an "outrageous estimated bill" suggests problems with the billing process, adding to the dissatisfaction with the electricity situation.

In essence, these accounts underscore Nigeria's urgent need for energy reforms. They highlight the importance of improving the technical aspects of electricity provision and addressing the financial and regulatory challenges that exacerbate energy poverty. This could involve implementing effective metering to ensure fair billing, enhancing infrastructure to improve service reliability, and creating a conducive policy environment that encourages investment and competition in the energy sector.

As we delve deeper into the concerns related to Nigeria's electricity provision, the regulatory environment's role becomes more apparent. Nigerian Electricity Regulatory Commission (NERC) reports that only 45 per cent of electricity customers have meters (NERC, 2020). The absence of meters and correct utility bills for

consumers has frequently resulted in overbilling for electricity consumption, leading to consumer reluctance to pay, utility service disconnection, and subsequent community demonstrations. Ultimately, electricity providers accrue substantial unpaid bills and debts, which limit their ability to deliver electricity in the future. Consequently, the design of Nigeria's future energy system, driven by proper knowledge of residential consumption patterns and backed by disaggregated household-level data, would contribute to resolving Nigeria's energy access issue.

Despite the severity of the situation, hope remains that systemic changes can bring about improvements. The (SW UAI 3) quote highlights this aspiration and reflects the public sentiment towards privatising the power sector. The interviewee showed an initial sense of optimism followed by disillusionment as the much-anticipated improvement in electricity provision did not materialise.

> "I was overjoyed when I learned that the Federal Government had privatised the power sector, but the situation has remained unchanged for the past seven years. It's becoming worse because they bring the light at night when you can't even use it and take it before morning (SW UAI 3)".

The quote reveals the frustration and disappointment that followed Nigeria's privatisation of the power sector. Initially, privatisation was met with hope as it was viewed as a potential solution to the public sector's challenges in delivering reliable electricity. However, the interviewee's experience indicates that not only did the situation remain unchanged, but it also deteriorated in some respects. The (SW UAI 3) criticism of scheduling electricity supply during the least useful hours is a significant point. This illuminates the importance of electricity availability and availability at the correct times, highlighting the need for reliable and customer-oriented electricity services.

The quote also underscores the importance of managing public expectations during significant reforms. In the case of privatisation, if the anticipated benefits do not materialise, it can lead to public disillusionment, potentially undermining trust in future reforms. This highlights the need for comprehensive planning, practical implementation, and transparent communication during such transitions. Overall,

such sentiments emphasise that while policy reforms such as privatisation are important, they need to be backed by actual service delivery improvements to impact electricity consumers' lives positively. It also points to the need for future policies to be grounded in a solid understanding of consumers' experiences, needs, and expectations.

Transitioning from individual consumer experiences to larger systemic issues, infrastructure shortcomings emerge as significant contributors to the problem of inadequate power provision. The NERC's 2020 energy report illustrates this vividly, noting that the nation has grappled with a generation capacity shortfall for many years. The main culprits behind this shortfall are generation unit failures and a lack of gas for power generation, frequently disrupted by pipeline network sabotage (NERC, 2020). These factors destabilise the power system, triggering frequent outages and load shedding.

However, the country's generally dismal power consumption picture does not apply to all regions uniformly. Disparities are evident between different geographic regions in Nigeria. For instance, households in the South tend to consume more electricity than those in the North. As outlined in Chapter 5, the southern region enjoys higher living standards, reflected in more favourable socioeconomic and demographic indicators. Reduced poverty, higher literacy, and smaller household sizes indicate superior living conditions (NBS 2020). Higher living standards enable residents in the southern region to afford alternatives to the public grid. Most interviewees from this region report less dependence on public energy, which could be attributed to the shorter periods of power delivery.

A closer look at the perspectives of residents from rural areas in Nigeria reveals a more nuanced understanding of electricity consumption in regions often overlooked in mainstream narratives. The following quotes provide a glimpse into these individuals' lived experiences and perceptions regarding electricity access and use.

> "I do not have the money to be spending on a generator I would rather use money for feeding (NW RAI 5)".

> "You see everything is expensive I cannot afford the money to buy those luxury electricity appliances. I see a phone as a necessity, and I usually take it to a

> charging point and pay 20 Naira which is very cheap for me (SS RAI 2)".
>
> "I spend fewer hours at home so the need for electricity for me is very minimal at home since I am not married, the issue with electricity in Nigeria is for people to just find alternatives I don't think in our lifetime the country can get it right (SW RAI 1)".

Each of these quotes reflects different aspects of energy poverty and the complex relationship that rural inhabitants have with electricity in Nigeria. The quote from (NW RAI 5) highlights the harsh economic reality many face in rural areas, where even using a generator, a typically common alternative, is considered unnecessary. This quote is a stark reminder that for many households, especially in rural areas, the struggle for basic needs such as food often precedes access to electricity.

In the quote from (SS RAI 2), the interviewee illustrates how they prioritise and ration electricity consumption due to financial constraints. In this case, the individual identifies the mobile phone as a necessity and uses a charging point for the same, hinting at a market for such services in areas with limited electricity access.

The statement from (SW RA1) reflects a sense of resignation towards the energy crisis in Nigeria. This individual expresses a minimalist need for electricity based on personal circumstances and suggests that others find alternatives given the seemingly insurmountable task of resolving the energy crisis. This pessimism could reflect the broader disillusionment among the population due to the persistent energy crisis in Nigeria.

From the quote by (NW CLI 04), we understand that the high poverty levels in rural areas often make electricity access a secondary concern. When basic needs such as food and shelter are not met, the need for electricity becomes a non-essential luxury, particularly when appliances to use electricity are not available. This speaks to the larger issue of energy poverty and its intersection with other forms of deprivation.

In contrast to the other quotes, (SW CLI 03) emphasises the importance of electricity, viewing it as an integral part of life. This quote highlights that despite the

myriad challenges and constraints individuals face in accessing electricity, it remains a highly valued and essential resource, underlining its importance in efforts towards socio-economic development.

> "There is a very high level of poverty in villages we don't see electricity as a priority, we don't even have the appliances" (NW CLI 04).
>
> "Electricity is part of us we can not do without it (SW CLI 03)".

Overall, these quotes highlight the vast differences in the perception and use of electricity in different contexts and the urgent need for strategies and interventions that are cognisant of these differences. While some people view electricity as a luxury they cannot afford, others see it as an indispensable part of life. This broad spectrum of experiences and needs points to a multi-faceted, inclusive, and context-specific approach to addressing Nigeria's energy crisis.

This section has analysed the interviewees' perceptions and tension between the need and the ability to access electricity. The study reveals the impact of limited access to electricity and the resulting individuals' efforts to ensure a stable power supply. The study finds a significant disparity in electrification rates between urban and rural regions, with urban regions having more energy access. The study also shows the perception of unfair billing and distrust towards energy companies.

### 7.3. Electricity Billing System in Nigeria

The electricity billing system in Nigeria has been a subject of ongoing debate and contention. Despite reforms in the energy sector, the billing process continues to face significant challenges, affecting both consumers and providers. One of the most critical issues is the widespread use of estimated billing, where consumers, especially those without prepaid meters, are charged based on estimates rather than actual consumption. This practice often leads to inflated bills, creating dissatisfaction and mistrust among users.

The introduction of prepaid meters was intended to address some of these concerns, allowing consumers to monitor and pay for the electricity they use. However, the rollout of these meters has been inconsistent and plagued by delays, leaving many

households still subjected to estimated billing. According to the NERC Energy Policy Report 2021, the eleven (DISCOs) supplied 79,850 prepaid meters in 2019. However, around 4.6 million households in Nigeria remain unmetered, resulting in irregularities in the estimated billing that are frequently disadvantageous to the consumer (NERC, 2021).

Additionally, the billing system is further complicated by poor electricity supply, where consumers are charged for services that are often unreliable and inconsistent. This creates a scenario where many households are forced to pay high electricity costs without receiving an equivalent service. These issues are not just technical they reflect deeper systemic problems, including the lack of transparency and accountability within the energy sector. The empirical findings provide first-hand accounts of these experiences.

> “Whether we use the light or not, they just go house to house to pay 2000 or 3000 Naira monthly (NW, CLI 1)”.
>
> “The officials come and give an estimated bill. They just tell us what they feel we should pay, there is no meter” (SS, RAI 3)”.
>
> “My house has a prepaid metered I usually pay online or sometimes send someone to buy the scratch card at their office (SW UAI 4)”.

These quotes depict contrasting realities of Nigeria's electricity consumers and underscore the issues in the country's electricity billing system. The quote from (NW, CLI 1) highlights a flat-rate billing system in which consumers are charged a set amount, irrespective of their actual electricity consumption. This reveals an inherent lack of fairness in the billing process as it fails to account for individual electricity usage patterns. It can also discourage energy conservation as consumers may feel they are not reaping the benefits of their conservation efforts when they must pay a fixed amount regardless of usage.

The quote from (SS RAI 3) points out the prevalent issue of estimated billing. This arbitrary system allows utility officials to determine bills based on their judgement rather than the consumer's actual consumption, which may lead to inflated bills. The

lack of transparency in this process can further erode trust between consumers and electricity providers and lead to customer dissatisfaction and reluctance to pay.

The third quote from (SW UAI 4) offers an insight into a more equitable and transparent billing system the prepaid metering system. In this arrangement, the consumer pays for electricity in advance and can monitor and control their usage, thus promoting better energy management. This quote also highlights the convenience of digital payments, contributing to a positive user experience.

These quotes underscore the pressing need for broader implementation of prepaid metering systems and transparent billing practices to enhance consumer trust and satisfaction in Nigeria's electricity sector. They also highlight the importance of leveraging digital technology to improve service delivery and customer experience.

According to the National Bureau of Statistics (NBS 2023), approximately 40% of Nigeria's population lives below the poverty line. Given this, the systemic issues of the electricity sector disproportionately impact this vulnerable demographic. The flat-rate and estimated billing systems, prevalent in several regions, significantly strain these households' already limited financial resources. A study by the NBS (2023) revealed that households earning below the median income spend an average of 10% of their monthly electricity bills, a stark contrast to the 5% spent by those earning above the median income. This disparity underscores the regressive nature of the current billing system.

Another key issue is the overall reliability and quality of the power supply. NBS (2023) data indicates that power outages in Nigeria occur almost daily. These interruptions significantly impact households' daily routines, productivity, and, ultimately, their quality of life. Furthermore, these constant disruptions can lead to the deterioration of appliances and other electronic equipment in homes, adding to the financial burden of the consumer.

Building upon the diverse customer experiences in Nigeria's electricity sector, insights from key stakeholders provide an additional perspective. The quote from (SI 5) offers a deeper insight into the technical and data-related challenges plaguing Nigeria's electricity sector.

> "He (an engineer) emphasised the absence of accurate network information, which made it impossible to pinpoint the source of significant technical losses caused by inaccuracies in measuring a customer's consumption. Due to a lack of data, estimated bills were frequently incorrect, resulting in significant customer dissatisfaction (SI 5)".

The (SI 5) remarks highlight the need for improved data collection and management to enhance the accuracy and fairness of electricity billing. It also underscores the necessity of investing in robust and reliable metering infrastructure as a crucial step towards rectifying these systemic issues.

This perspective reinforces the idea that tackling Nigeria's energy challenges will require addressing not just financial and policy issues but also technical and data-related ones. By ensuring accurate consumption measurement, the country could improve billing fairness, boost consumer confidence and satisfaction, and reduce technical losses that drain resources and undermine the sustainability of the power sector. The perspective from one of the industry's key stakeholders.

> "The task of regulating the electricity industry, guaranteeing customer protection, and ensuring that customers receive high-quality service is challenging. It is our responsibility to ensure that the operators recover their incurred costs. We are familiar with the economic difficulties Nigerians are experiencing since we are also experiencing the same problems as our citizens. We are subject to the same electricity rate as the rest of Nigeria". (SI 1)

This quote offers insight into the intricate balance regulators in the electricity sector must strike. On the one hand, they must ensure the viability and sustainability of service providers by allowing cost recovery. On the other hand, they must protect consumers, many of whom are already facing economic challenges, from excessive charges and poor service quality.

The stakeholder's mention of "regulating the electricity industry" suggests their role in shaping the rules and mechanisms that govern the sector. This includes setting tariffs, monitoring service quality, and handling customer complaints. It underscores the complexity and multi-dimensionality of the task, with various stakeholders to satisfy, each with their demands and expectations.

The statement "We are subject to the same electricity rate as the rest of Nigeria" (SI 1) is interesting. It humanises the regulators, emphasising that they, too, are consumers affected by the same conditions and challenges. This dual role could align the interests of the regulator and the consumers, as regulators, being consumers themselves, would be motivated to improve the quality and affordability of the services.

However, the tension between consumer protection and cost recovery remains challenging, particularly in a context like Nigeria's, where a significant portion of the population struggles with economic hardships. Navigating the tension between consumer protection and cost recovery in Nigeria's energy sector requires a delicate balance, particularly given the prevalence of fuel poverty. While targeted subsidies, gradual tariff adjustments, and improved service delivery have been proposed, these measures alone may not sufficiently address the unique challenges faced by fuel-poor communities.

To effectively tackle energy poverty, a more comprehensive approach is needed, prioritising affordability and empowering communities. This could involve exploring alternative financing models that prioritize essential electricity needs for vulnerable households before tariff increases. Promoting energy efficiency through incentives for efficient appliances and technologies can help reduce consumption and bills. Decentralized renewable energy solutions, such as solar microgrids, hold the potential for providing independent and affordable access in underserved areas. Strengthening consumer protection mechanisms is crucial to ensure transparency and prevent exploitation. Finally, engaging communities in finding solutions, such as through local energy cooperatives, can harness local knowledge and resources to build sustainable energy systems.

### 7.4 Electricity Consumers' Willingness to Pay for Electricity

Electricity consumers' willingness to pay (WTP) is crucial to the power business. Indeed, a key component to understanding the dynamics of electricity consumption in Nigeria is the consumers' willingness to pay (WTP) for the service. WTP is crucial in determining consumers' perceived value of the electricity they consume, which is a derivative of multiple variables. These variables range from the consumers' income levels and the service's affordability to the service's quality and reliability (Baurzhan and Jenkins, 2016; Oseni, 2017; Guo et al., 2018; Oteh, 2021).

A nuanced understanding of WTP is fundamental for devising effective pricing regulations that strike a balance between ensuring revenue for electricity companies and ensuring access and affordability for consumers. It also becomes significant in forecasting potential revenue and exploring ways to enhance electricity access to households nationwide.

Within the Nigerian context, the discourse surrounding energy pricing is particularly salient, given the complexities of its power sector. A significant concern that frequently surfaces in these discussions is the perception of many households that the cost of electricity is disproportionately high. This sentiment, coupled with the reported inconsistencies in the billing system, can lead to low bill payment rates and high incidences of electricity theft. Despite efforts to reform the billing system, namely by implementing prepaid meters, a significant disconnect remains. There is a palpable disparity between the number of registered consumers and those who have installed meters. This gap further exacerbates the issues of fairness and transparency in electricity billing.

To delve deeper, these quotes give valuable insights into the perspectives of different electricity consumers in Nigeria, shedding light on their willingness to pay for a reliable electricity supply and their experiences with the current system.

> "Normally, the officials come and give an estimated bill. They just tell us what they feel we should pay, and there is no meter. I will do everything to pay. I can pay anything provided there is steady light, It's not nice at all to stay in the darkness, but I am willing to pay" (SS RAI 04).

> "I think electricity is important if it's available. I'm ready to pay and a lot of people are ready to pay because life revolves around electricity, so I'm ready to pay as long as it's available" (SW UAI 02).

The (SS RAI 04) quote speaks volumes about consumers' struggle due to unreliable electricity supply and questionable billing practices. The individual is subject to estimated billing, which means they are given a bill based on assumptions about their electricity usage rather than accurate meter readings. This practice often leads to overbilling, causing dissatisfaction among consumers. However, this consumer's willingness to endure these billing irregularities highlights the desperation for a reliable electricity supply. They express a readiness to pay, even potentially more than they should, if it guarantees them a constant electricity supply. It underscores the essential nature of electricity, and the lengths individuals are willing to go to avoid staying in the darkness.

The (SW UAI 02) quote echoes a similar sentiment. The interviewee here emphasises electricity's critical role in everyday life that life "revolves around electricity." This statement resonates with the fact that electricity is no longer a luxury but a fundamental need, enabling various aspects of modern life, from household chores to work and communication. The interviewee acknowledges that they and many others are willing to pay for electricity if it is reliably available. This implies that the primary issue is not necessarily the cost of electricity but its unreliable supply.

In essence, both quotes show that despite the systemic issues and challenges, consumers' willingness to pay for electricity remains high, provided they receive a reliable and continuous supply. This situation indicates an urgent need for reforms in Nigeria's electricity sector, focusing on improving reliability and billing transparency. These efforts will enhance consumer trust and foster a more equitable relationship between consumers and electricity providers, ensuring that payments are fair, and services meet the essential demands of everyday life.

While the previous perspectives have elucidated the nexus between reliable electricity supply and the willingness to pay, a deeper investigation into this sentiment from different contexts is required. The following quotes from (SW CLI 04)

and (NW UAI 03) further stress the critical condition of uninterrupted power supply in determining consumers' payment willingness and patterns.

> “I'm willing to pay so long as I get the light 24 hours a day at home; my house is metered. (SW CLI 04)”.

> “We are willing to pay as much as the supply is constant because it is the major source of electricity, and we use it every day and is something we are willing to pay in as much as the supply is constant. (NW UAI 03)”.

Therefore, the spotlight falls on the need for the Nigerian electricity sector to enhance service reliability and billing transparency to sustain customer satisfaction and willingness to pay, fostering compliance and overall socio-economic development.

Moving from the consumers' perspectives, it is also essential to consider the stakeholders' viewpoints directly involved in Nigeria's electricity sector. The following statements offer a unique understanding of the relationship between service quality, consumer trust, and willingness to pay for electricity.

> Consumers are paying more than the tariff through self-generation. Investors must earn consumers' trust by offering efficient service. Once consumers obtain better service, their resistance to paying decreases (SI 08)”.

> "if we supply them with electricity, they will not complain about bills. when there is an improvement in the electricity supply. We witnessed it, people pay (SI 11)”.

These quotes from stakeholders within the Nigerian electricity sector shed light on some fundamental principles driving customer behaviour, specifically around payment for electricity services.

The first quote from (SI 08) observes that through using generators and other independent power solutions, consumers often spend more than they would under regular tariff conditions. However, these extra costs are the price consumers are

willing to pay to ensure a consistent electricity supply. The quote also emphasises the role of trust, pointing out that efficiency and reliability in electricity service are vital for building consumers' trust. Once trust is established and consumers experience improved services, their resistance to paying for the services will likely decrease.

The second quote from (SI 11) reinforces this idea. The stakeholder notes that consumers generally do not complain about electricity bills as long as the supply is consistent. Improved electricity supply directly correlates with increased willingness to pay, as observed by the stakeholders. This supports the argument that the issue is less about the cost and more about the quality and reliability of the electricity service.

Empirical data from the World Bank (2023) aligns with these stakeholders' observations, confirming that many Nigerians rely on self-generation methods to supplement their electricity needs. The report indicates that 41% of Nigerian households own a generator, rising as high as 58% in urban areas. The average Nigerian household using a generator spends around 40% more on electricity than those solely dependent on the national grid (ibid).

This high reliance on self-generation underlines the consumers' need for reliable electricity, affirming (SI 8) assertion that consumers are willing to pay for a consistent power supply, even if it means higher costs than the grid. It also underscores the extent of the Nigerian power sector's unreliability, necessitating this large-scale resort to self-generation methods.

A study conducted by the Nigerian Electricity Regulatory Commission (NERC 2022) further corroborates the insights provided by Stakeholder 11. The study found a significant correlation between improved power supply and increased bill payment compliance rates. Areas that experienced a 50% improvement in electricity supply witnessed a 35% increase in compliance with electricity bill payments, demonstrating that consumers are more likely to pay for a satisfactory and reliable service.

Many Interviewees express a commendable willingness to pay for reliable electricity, their desperation is often exploited by companies employing a range of manipulative tactics. These practices not only create financial burdens but also erode trust in the entire electricity sector, hindering its development and perpetuating a cycle of

darkness and injustice. (SS RAI 04) confirms prevalent manipulation in estimated billing. Companies deliberately underestimate initial usage, lulling consumers into a false sense of security with seemingly low bills. Then, suddenly, a massive bill arrives, often exceeding the total monthly income of vulnerable households. This practice traps consumers in a debt cycle, forcing them to pay inflated charges for an unreliable service.

Lack of transparency in the billing structures with confusing wording, ambiguous charges, and hidden fees become complex for consumers to navigate. This lack of clarity allows companies to manipulate rates without facing scrutiny, leaving consumers feeling cheated and powerless. Companies often weaponise the desperate need for electricity, particularly in underserved areas. They promise affordable rates and improved service, only to deliver unreliable supply and inflated bills. Consumers, trapped in the darkness, are forced to pay whatever it takes to keep the lights on, even if it means sacrificing other necessities. This exploitation of vulnerability targets their desperation and perpetuates a cycle of poverty and dependence.

To provide a path towards a fairer and more sustainable electricity sector in Nigeria, tackling these manipulative tactics is crucial. Such as establishing robust mechanisms for consumers to challenge unfair practices and seek redress. Invest in consumer education and awareness campaigns to equip individuals with the knowledge to protect their rights. Strengthen regulatory frameworks and enforce existing laws to deter manipulative practices. Implement effective penalties for companies engaging in unfair billing, misleading guarantees, and other exploitative tactics.

### 7.5 Analysing the Impact of Energy Theft in Nigeria

Energy theft has emerged as a formidable challenge with global implications, costing up to $96 billion in losses annually (World Bank, 2022). Nigeria suffers an estimated annual financial loss of approximately $1.5 billion due to electricity theft (ibid). This critical concern, which manifests in various forms such as illegal connections, meter tampering, and bypassing meters, is both a symptom and a cause of more significant systemic and socio-economic problems.

The Nigerian Electricity Regulatory Commission (NERC) report in 2021 revealed that for every ₦10 worth of electricity distributed by Distribution Companies (DisCos), ₦2 is lost due to energy theft and poor distribution infrastructure. This substantial loss, accounting for 20% of the total value, not only undermines the financial health of DisCos but also hinders attempts to develop and upgrade the sector's infrastructure. The scale of this problem highlights the urgency of finding effective countermeasures against energy theft and improving the robustness of the infrastructure.

Considering these challenges and the significant impact of energy theft on the power sector's financial viability and infrastructure development, various perspectives must be considered, both from stakeholders and the government:

> "Energy theft and non-payment of bills have a ripple effect throughout the value chain. This necessitated the tariff review to ensure that the power market remained viable (GI 1)".
>
> "Many losses and inefficiencies are caused by the inability to transmit all the power they generate, power theft, and government debt. Because of this, only a select few people are paying for electricity that is insufficient to meet the needs of the entire value chain" (SI 3)".

The (GI 1) elaborates on the impact of energy theft and non-payment of bills. These activities disrupt the stability of the entire power market, prompting regulatory authorities to revise and often increase tariffs to maintain market viability. This upward adjustment in tariffs can exacerbate the financial burden on law-abiding consumers, who dutifully pay their bills, creating a vicious cycle that potentially fuels further instances of energy theft and prevents access for fuel poor.

The (SI 3) highlights the multiple challenges confronting the Nigerian power sector. The quote presents the compounding issues of power transmission inefficiencies, energy theft, and government debt contributing to system-wide losses. Moreover, it raises an issue of equity, suggesting that a disproportionately small group of people bear the cost of maintaining the power sector, which remains insufficient to meet

comprehensive demands. This indicates an urgent need to ensure equitable burden-sharing and to expand the payer base whilst concurrently addressing the issues of energy theft and power transmission deficiencies.

> "The organisation used GIS to find areas where consumption suddenly increased. As a result, it can more efficiently allocate resources to send inspectors to suspected energy theft hotspots (SI 9)".

The (SI 9) highlights the value of employing innovative, data-driven strategies to combat energy theft. This strategic deployment of Geographic Information Systems (GIS) technology allows for more efficient resource allocation and targeted interventions, signifying the promising potential of technological solutions in tackling energy theft. Empirical validation of the effectiveness of technological strategies comes from a case study by Okafor et al. (2021), which demonstrated a 30% decrease in energy theft incidents after implementing Advanced Metering Infrastructure (AMI) and Geographic Information Systems (GIS), echoing the innovative approach employed.

Furthermore, the data reveals many reasons behind this phenomenon. A primary factor is the prevalent poverty levels and inconsistent income rates that characterise several of Nigeria's households. The data shows that a complex interplay of socio-economic factors, weak law enforcement, and corruption within the power sector drives energy theft in Nigeria. Recognising these systemic challenges is crucial in formulating comprehensive strategies addressing the root causes of energy theft, fostering transparency, and promoting sustainable and equitable access to electricity.

Another stakeholder interviewee's perspective highlights the systemic nature of the problem, with customers perceiving electricity as a social service that should not require payment, particularly in instances of inadequate and unreliable supply.

> "The complexity of energy theft is a systemic problem. Many Nigerians believe that power is a social service that should not be paid, especially when it is insufficient. When the service is inadequate, customers

> typically view the price as an overcharge and will grab at any chance to defraud the system (SI 6)".

The (SI 6) quote highlights the intricate nature of energy theft in Nigeria, framing it as a systemic issue beyond mere criminal intent. The underlying sentiment of many Nigerians is the perception of electricity as a social service human right, a public good that they should ideally receive without charge. This belief is ingrained due to a historical context of public utilities being subsidised or free.

Moreover, the quote also draws attention to the quality and reliability of the electricity supply earlier covered. The sporadic, insufficient, and often inadequate quality of power supply exacerbates the resentment towards paying for this service. As a result, when the power supply is inconsistent or inadequate, customers tend to perceive the tariffs as overcharges. This feeling of being unjustly billed, combined with the inherent belief that power should be free, predisposes them to exploit any opportunity to evade payment or manipulate the system hence the prevalence of energy theft.

The 'overcharge' perception might result from the tariff adjustments that are often necessary due to the extensive energy theft and non-payment of bills, as discussed earlier. This vicious cycle of energy theft leading to tariff increases, which spur more energy theft due to perceived overcharging, presents a complex problem. Thus, the statement emphasises the necessity for systemic changes, including consistent and quality power supply, fair and transparent tariff structures, and public education about the costs involved in power generation, to alter this perception and reduce the instances of energy theft.

Another stakeholder interviewee highlights the persistent challenges in Nigeria's electricity sector:

> "Energy theft is not limited to rural areas, metered or unmetered consumers. It cuts across every segment of society. Since we took over, we never realised the cost of the electricity transmitted to our franchise area for a month. (SI 08)"

This interviewee comprehensively highlights the pressing challenges in Nigeria's electricity sector, identifying non-payment of bills, energy theft, and vandalism of equipment as the most significant obstacles. First and foremost, the issue of unpaid electricity bills is highlighted, which severely impacts these companies' revenue and hampers their operational efficiency. The inability to collect payment for services rendered disrupts the cash flow necessary to maintain, improve, and expand electricity infrastructure.

The energy theft, stated by the interviewee indicates that it is not limited to any societal segment or region but is pervasive across all strata. It is alarming that metered consumers often initiate the violation, implying that energy theft is not solely a by-product of inadequate metering but stems from deliberate intentions to evade payment. Concern about the lower revenue generation from urban areas despite high energy consumption, suggests a high prevalence of energy theft or bill evasion. Furthermore, the ubiquity of these problems across all states emphasises the nationwide scale of these challenges. The stark revelation that the cost of electricity transmitted to their franchise area has never been fully realised since taking over speaks volumes about the substantial financial deficit brought on by these issues, reinforcing the urgent need for resolution.

Adding to these perspectives, a quote from (NW UAI 3) presents the viewpoint of a consumer who expresses frustration and despair at the escalating costs of electricity in Nigeria.

> "How can we continue to pay for darkness? People must survive this hike in electricity prices (NW UAI 3)".

This quote from (NW UAI 3) presents the perspective of a consumer who expresses frustration and despair at the escalating costs of electricity in Nigeria. The statement "How can we continue to pay for darkness" is a poignant metaphor to express dissatisfaction with the perceived poor quality of service. Consumers are expected to pay for an essential service that is either irregular or absent entirely. This sentiment may stem from the frequent power outages experienced in various parts of the country, making the consumers feel as though they are 'paying for darkness.'

"People must survive this hike in electricity prices" signifies a growing concern over electricity affordability, particularly given the tariff reviews and price hikes. For many consumers, these increased costs might stretch their financial resources thin, impacting their ability to meet other basic needs. This quote thus highlights the difficult choices that consumers are forced to make in the face of financial constraints. It may also indicate why some consumers resort to energy theft as a survival mechanism.

The off-record admission of some interviewees about meter bypassing reveals the presence of a corrupt network within the system. This assertion that the energy company staff facilitated the meter bypassing for him points towards potential internal corruption within the power sector. This is a grave concern because such corrupt practices undermine the integrity and efficacy of efforts to curb energy theft. It also deepens the problem by encouraging and normalising such violations among consumers. Therefore, this systemic corruption within the power sector must be addressed to tackle the issue of energy theft effectively.

### 7.6 Summary

This chapter provides an in-depth analysis of the various aspects related to electricity consumption in Nigeria, focusing on affordability, consumer needs, billing systems, willingness to pay, and the impact of energy theft. The affordability of grid electricity is a key concern in Nigeria, where the high cost of electricity often places a substantial financial burden on consumers. Frequent tariff reviews and price hikes compound this. The high cost of electricity coupled with a low average income level makes access to reliable electricity a significant challenge for many Nigerians.

The chapter also delves into the specific electricity needs of consumers, which vary greatly depending on their location (urban or rural), income level, and nature of use (domestic or commercial). Meeting these diverse needs poses significant challenges, especially in the context of the country's existing power infrastructure and supply reliability. The electricity billing system in Nigeria, which has been fraught with issues of transparency and accuracy, is another area of focus. Due to the unavailability of prepaid meters, the prevalent use of estimated billing often leads to disputes and non-payment of bills. A lack of trust in the billing system can further exacerbate problems such as energy theft and non-compliance with payment.

The willingness of consumers to pay for electricity, influenced by factors such as perceived value, affordability, and quality of service, is examined. A key finding is that while most consumers recognise the importance of paying for electricity, issues such as high tariffs, unreliable service, and a perceived lack of fairness and transparency in the billing system affect their willingness to do so.

The chapter concludes by analysing the impact of energy theft in Nigeria, a rampant issue contributing to substantial revenue losses in the power sector. Energy theft exacerbates infrastructure inadequacies, reduces the quality of service, leads to higher tariffs, and ultimately perpetuates a cycle of non-payment and theft. In essence, this chapter presents a holistic view of the challenges facing Nigeria's electricity sector from a consumer perspective, underscoring the interconnected nature of these issues and their impact on the overall health and sustainability of the sector.

# CHAPTER 8

# ENVISIONING A MORE INCLUSIVE ENERGY FUTURE FOR NIGERIA

## 8.0 Introduction

The preceding chapters, 6 and 7, have examined the historical origins of energy inequalities in Nigeria and analysed the current state of the nation's energy landscape, highlighting the underlying historical, governance, policy, and socioeconomic factors that contribute to regional disparities in electricity access. This chapter builds on this foundation and explores potential solutions and strategies for addressing the challenges facing Nigeria's electricity sector and promoting a more sustainable and inclusive energy future.

This chapter outlines an array of solutions projected to address Nigeria's persistent energy challenges drawing from the insights obtained from the interviewee's perspectives. A common thread amongst the narratives was the urgency to transition towards renewable energy sources. This transition is a critical step in diversifying Nigeria's energy mix and enhancing energy security. The role of enhanced governance and stringent regulatory enforcement was underscored as a fundamental precondition for building a sustainable energy system. The data underpinning this chapter is derived from policy document analysis, in-depth interviews with stakeholders and communities involved in the energy sector provided valuable insights into the challenges and opportunities.

This chapter adopts the theoretical lens of Energy Justice to critically examine and address challenges in the Nigerian energy sector. Stakeholders interviewed underscored the imperative for greater transparency, robust public participation, and technological innovation to rebuild public trust and ensure equitable access to energy resources. The chapter aligns with the Energy Justice theory, which emphasises the fair distribution of benefits and burdens in the energy system. The discourse on enhanced governance and regulatory enforcement reflects the theory's concern with addressing power imbalances. Furthermore, the recognition of technological advancements, such as smart grid systems, resonates with the theory's emphasis on modern and efficient energy infrastructure. The chapter's exploration of community engagement initiatives as instrumental in optimising

service delivery and curtailing energy theft aligns with the inclusive decision-making processes advocated by Energy Justice.

### 8.1 Strategies for Expanding and Improving Electricity Infrastructure in Nigeria

Expanding and improving Nigeria's electricity infrastructure is crucial for addressing the persistent issues of inadequate access, unreliable supply, and socio-economic inequalities. Despite ongoing efforts, the electricity grid remains fragile, leaving many communities reliant on generators and other costly alternatives. A holistic strategy, guided by energy justice principles, is essential to create equitable and sustainable solutions for all regions of the country. The interviewees' experiences reveal the complex challenges they face and the urgent need for systemic reforms. As some interviewees observed,

> "Even when they say the grid is improving, we hardly see any change in our area. We still have long power cuts and depend on generators, but the noise and cost are unbearable (NW RAI 4)."

> "They say they are improving electricity, but they don’t think about how this affects our businesses. We need stable power to run, but with the constant outages, we lose money every day (SW UAI 3)."

The (NW RAI 4) highlights the enduring disparities in electricity access, particularly in rural regions. Despite claims of infrastructure upgrades, the benefits of such investments are not reaching the most vulnerable areas, leaving residents reliant on expensive and polluting generators. This is a clear failure of distributional justice. A fair and just approach to expanding electricity infrastructure should ensure that all communities, regardless of location, have equal access to reliable power. Investments must be made in rural transmission lines and alternative energy sources to alleviate this burden.

The (SW UAI 3) points to the critical role that electricity plays in economic productivity. For businesses, particularly small and medium enterprises (SMEs),

unstable electricity directly translates into financial losses. This issue ties back to both distributional and procedural justice. Infrastructure improvements must not only ensure fair access but also involve inclusive decision-making processes where business owners and community members can voice their concerns. The government and energy providers need to prioritise grid stability in commercial areas, ensuring that SMEs can thrive without the constant fear of power outages.

In addition to these distributional concerns, the lack of procedural justice is evident in the way tariff changes, and infrastructure developments are communicated to consumers. The interviewees observe,

> "We were not even told when they were increasing the tariffs. The bills just kept rising, and there was no explanation. How can we trust a system that doesn't even communicate with us? (NW UAI 2)".

> "They keep focusing on the big cities while the rest of us in the rural areas are left behind. We also need reliable electricity, but no one listens to us (SS RAI 4)."

The (NW UAI 2) reflects a systemic problem in the decision-making process, where consumers are left out of critical conversations about electricity pricing and service provision. To build a more transparent and accountable system, energy providers must engage with consumers regularly and provide clear information about tariff adjustments and service changes. Procedural justice demands that decision-making processes be inclusive, allowing stakeholders to participate meaningfully in shaping policies that affect their daily lives.

The quote from SS RAI 4 underscores the issue of recognition justice, where the unique needs of marginalised groups are overlooked in favour of more affluent urban populations. Expanding Nigeria's electricity infrastructure must involve targeted interventions that recognise and address the specific needs of rural and underserved areas. Failure to do so perpetuates historical inequalities and exacerbates the energy divide between urban and rural regions. A just strategy must focus on decentralised renewable energy solutions, such as solar power, that can provide

reliable electricity to off-grid communities without the need for extensive transmission infrastructure.

Despite the challenges, there is a significant demand for clean energy solutions as other interviewees expressed,

> "I don’t mind solar power, but I can’t afford it. If the government could provide some subsidy or support, it would help us switch from the generator (SS UAI 2)".
>
> "We need to be part of the conversation about how electricity is distributed. Right now, it feels like decisions are made without any input from the communities that depend on it (SW CLI 2).”

The (SS UAI 2) highlights the financial barriers many consumers face when attempting to transition to renewable energy sources. Although solar power offers a sustainable alternative to grid electricity, its high upfront costs make it inaccessible for many low-income households. From a distributional justice perspective, the government must implement subsidy programmes and financial incentives that make solar energy affordable for all. By doing so, Nigeria can reduce its dependence on fossil fuels, lower household energy costs, and provide cleaner, more reliable power to underserved regions.

The (SW CLI 2) pointed out the need for greater inclusivity in energy policy discussions his quote encapsulates the importance of procedural justice in energy governance. Decisions about electricity distribution and infrastructure investments should not be made behind closed doors but rather in collaboration with the communities they affect. Public consultations, town hall meetings, and regular engagement between energy providers, government officials, and citizens are essential for building trust and ensuring that policies reflect the diverse needs of all stakeholders.

In sum, the expansion and improvement of Nigeria's electricity infrastructure require more than just technical upgrades and increased investments. It demands a just and

equitable approach that recognises the specific needs of different regions and communities, particularly those historically marginalised in energy policy. By applying the principles of energy justice, Nigeria can move towards a more inclusive energy future where all citizens have access to reliable, affordable, and sustainable electricity.

### 8.2 Perspective on Diversifying Energy Sources to Improve Accessibility in Nigeria

Diversifying Nigeria's energy sources is not just a matter of improving accessibility. it is fundamental to ensuring the country's energy security and long-term sustainability. Reliance on a narrow energy mix, particularly dominated by natural gas and hydroelectric power, has left the country exposed to supply disruptions and energy shortfalls. This dependency, coupled with an ageing and inadequate power infrastructure, exacerbates the frequency of power outages and continues to limit electricity access for millions. Addressing these challenges requires a strategic shift towards a broader energy portfolio, incorporating renewable sources such as solar, wind, and bioenergy. Such diversification is not only about enhancing supply but also about building resilience against the systemic vulnerabilities that have historically plagued the Nigerian power sector. To gain insights into these challenges, the following quotes provide nuanced perspectives on Nigeria's energy structure.

> “We hear about mega-projects in the southern cities, but here in the north, we suffer daily blackouts. We feel like our electricity needs are an afterthought (NW CLI 02)”.

> “Our energy needs are different from larger cities. We need decentralized solutions like mini-grids powered by local resources, not just relying on the national grid (NW CLI 03)”.

> “Our pleas for repairs to the faulty transformer fall on deaf ears. We're treated like second-class citizens, denied the basic right to reliable electricity (SS RAI 4)”.

> "My children cannot study at night without proper lighting. Their education suffers because of this blatant neglect." (SW UAI 2)
>
> "Running my small business on generators is draining my profits. We cannot compete with urban enterprises who enjoy stable power." (NW RAI 1)
>
> "Politicians only care about areas with large voting blocs. We're a small community, so our pleas for basic infrastructure are ignored." (SS RAI 2)

These quotes collectively emphasise the multifaceted nature of energy injustice in Nigeria, encompassing issues of regional disparities, neglect, denial of basic rights, educational and economic impacts, and political marginalisation. Examining these narratives through an energy justice lens provides a comprehensive understanding of the challenges faced by different communities and the imperative for more equitable and inclusive energy policies and infrastructure development.

The first quote from a resident in the north (NW CLI 02) highlights the stark regional disparities in electricity access. The mention of daily blackouts and the perception that electricity needs in the north are an afterthought suggests an uneven distribution of resources and attention, raising concerns about distributive justice within the energy sector.

The second quote (NW CLI 03) underscores the need for decentralised solutions tailored to the specific energy needs of smaller communities. This perspective aligns with the energy justice principle of procedural justice, emphasising the importance of inclusive decision-making processes that consider the unique requirements of different regions.

The third quote (SS RAI 4) reflects a sense of neglect and denial of basic rights, emphasising the denial of reliable electricity. This resonates with recognition justice, as the community feels disregarded and marginalised, facing a lack of acknowledgement and respect for their energy needs.

The (SW UAI 2), and (NW RAI 1) highlight the direct consequences of inadequate electricity access. The inability of children to study at night and the economic

challenges faced by businesses relying on generators point to issues of both distributional and procedural justice. The impacts on education and business profitability underscore how energy injustices can perpetuate broader social and economic inequalities.

The (SS RAI 2) quote brings attention to political marginalisation, where smaller communities feel overlooked in favour of larger voting blocs. This highlights the need for political processes that ensure equitable representation and distribution of resources, aligning with the principles of procedural and distributive justice.

Nigeria's rapid population growth and urbanisation have outpaced the development and expansion of the power sector, resulting in a widening gap between electricity supply and demand. Nigeria has abundant renewable energy resources, such as solar, wind, and biomass, which remain largely untapped (IRENA, 2018). The government has established ambitious renewable energy targets through the National Renewable Energy Action Plan (NREAP) and the Vision 30-30-30 initiative.

The Nigerian NERC's (2020) annual report, the National Renewable Energy Action Plan, and the Minister of Power emphasise the need for energy source diversification and a comprehensive and targeted approach to policy development and support, particularly in the renewable energy sector. This highlights the importance of a coherent and well-integrated policy framework that addresses Nigeria's challenges and opportunities associated with renewable energy and energy efficiency**.**

> "To maintain the improvement in the generation fuel mix, the Commission shall continue to work with other key stakeholders in the Nigerian electricity supply industry to unfold regulatory and policy interventions for the actualisation of improved energy mix through coal–to–power generation, and on-grid and off-grid renewables. In this regard, the Commission's constant engagement with the Rural Electrification Agency (REA) indicates that potential investors have continued to take advantage of the opportunities created by the Mini-Grid Regulations (NERC, 2020)."

> "Renewable energy is a key element in the overall strategy of the Federal Government in rapidly expanding access to electricity services in the country. Beyond large hydropower, the total contribution of renewable energy in Nigeria's electricity industry is about 35MW composed of 30MW of small hydropower and about 5MW of solar PV. This represents about 0.06% of total electricity generating capacity in the country (NREAP)".
>
> "However, to provide sufficient baseload power in future, large coal-fired power plants may have to be included in the generation expansion program (TCN 2018)".

These reflect the evolving energy landscape in Nigeria, with a growing emphasis on diversifying the energy mix and expanding renewable energy sources. The regulatory and policy interventions, along with the recognition of the role of renewables and the potential inclusion of coal-fired power plants, indicate a multifaceted approach to address the challenges of power generation and meet the increasing electricity demand in the country. While Nigeria's multifaceted approach to electricity generation offers flexibility, it is crucial to carefully examine the environmental costs as discussed in the subsequent paragraph.

The NERC report highlights the collaboration between NERC and other stakeholders in the electricity supply industry, such as the Rural Electrification Agency (REA), to develop regulatory and policy interventions for an improved energy mix. However, the proposal to include large coal-fired power plants in Nigeria's generation expansion program and Fashola's proposed energy mix raises distributional and recognition justice concerns. It may exacerbate environmental and social impacts, disproportionately affecting vulnerable communities close to power plants or coal mining sites (Urama & Ozor, 2010; Jenkins et al., 2016).

At the same time, renewable energy sources, like solar and small hydropower, hold the potential to deliver clean and affordable energy services while minimising

negative environmental consequences (IPCC, 2019). The generation expansion program does not elaborate on the rationale or implications of such a decision and the potential trade-offs between coal-fired power and renewable energy options regarding sustainability, climate mitigation, and social justice. Despite these concerns, former Minister of Power, Works, and Housing, Fashola, has emphasised the potential of coal to contribute to Nigeria's overall generation capacity stating that the historic coal mines in Enugu can still generate sufficient base load power in the future:

> "We are looking at the Middle Belt, and North Central for the most prolific area for coal production. As you would also see the area and parts of the Northeast in areas like Taraba will have a mixture of solar and hydro because of the projects that are coming there like Mambilla, and you already know about Kainji, and Jebba. Zungeru, is under construction now, in Niger. The Energy Mix in that area will be a combination of solar, hydro and some coal. For down South, in the South South and Southwest, it will be gas. In parts of the Southeast, it will be a combination of gas and coal because the mines in Enugu still have their historic capacity which my colleagues in the Ministry of Solid Minerals are looking at. So once that Energy Mix is completed which should happen before the end of the second quarter this year, it is easier for investors to then know that if you want to do gas stay here, if you want to do solar, stay here and so on (Fashola, 2018)."

> "The Nigerian government and other partners need to expand the TCN or privatise it and encourage investments in renewables (GI 1)."

The consideration of a diverse energy mix, as proposed by Fashola (2018), offers a significant opportunity to address regional inequalities in energy access and

affordability in Nigeria. This approach recognises different regions' unique characteristics and resource potential and advocates for tailored policy interventions that align with local conditions and promote energy justice.

Moreover, a region-specific energy mix approach can have profound socio-economic implications. It can spur local economic development by creating job opportunities and supporting the growth of renewable energy industries, particularly in rural and underserved areas. Establishing renewable energy projects, such as solar and hydroelectric power plants, can stimulate economic activities, attract investments, and empower local communities.

Moreover, the region-specific energy mix aligns with the concept of multiple transitions within the broader context of energy transitions. Recognising that different areas possess unique energy demands, resources, and challenges, this approach acknowledges the need for diverse and customised solutions. Various regions may have distinct energy requirements, influenced by factors such as geography, climate, and existing infrastructure. By tailoring energy solutions to meet these specific needs, the approach aligns with the idea of multiple transitions, illustrating the flexibility required to navigate diverse energy landscapes.

Additionally, the localisation of energy production can reduce transmission losses, improve the reliability of the electricity supply, and enhance the overall quality of energy access. Nigeria can take significant strides towards achieving a more equitable and sustainable energy future by ensuring that each region's energy mix is tailored to its specific needs and resources. Further research and comprehensive assessments are needed to evaluate the technical, economic, and social feasibility of implementing a region-specific energy mix and to explore potential synergies and trade-offs among different renewable energy sources, energy storage technologies, and grid solutions.

In addition, the expansion of the Transmission Company of Nigeria (TCN) or its privatisation, as suggested by (GI 1), holds promise in mitigating the challenges faced by Nigeria's electricity transmission and distribution infrastructure. These challenges have persisted due to insufficient investment, inadequate maintenance, and system losses. To address this, initiatives such as the collaboration between the Kaduna Electric Distribution Company (KEDC) and Konexa to install 2.5MW of solar

off-grid solutions in selected rural areas of Kaduna demonstrate proactive steps towards promoting renewable energy development.

> "We are currently deploying renewable energy in such villages, specifically solar off-grid. We have started it as a pilot study in a few communities to see how it goes. KEDC is collaborating with Konexa to install 2.5MW in some selected rural areas of Kaduna. We start that and see how it goes. If we find it very economical, we will replicate this method throughout the service area (SI 2)."

The statement from (SI 2) highlights the active deployment of renewable energy solutions, specifically solar off-grid systems, in rural villages as part of a pilot study. This approach demonstrates the practical implementation of sustainable energy initiatives and signifies a proactive step towards addressing energy access challenges in underserved areas. By collaborating with Konexa, the Kaduna Electric Distribution Company (KEDC) aims to install a 2.5MW solar off-grid system in selected rural areas of Kaduna. This initiative aims to assess the economic viability and effectiveness of the solar off-grid model in providing reliable and affordable electricity to these communities.

The pilot project represents a crucial opportunity to evaluate the technical, economic, and social aspects of deploying renewable energy systems in rural areas. The performance and outcomes of this pilot study will provide valuable insights into the scalability and replicability of the solar off-grid approach within the KEDC service area. Suppose the project proves to be economically feasible. In that case, it holds the potential for broader implementation across the region, offering a scalable solution to improve energy access and contribute to the socio-economic development of rural communities.

However, despite the comprehensive nature of the National Renewable Energy Master Plan, one primary impediment to implementing the strategy is the challenge of financing, as mentioned in (GI 2).

> "The National Renewable Energy Master Plan is highly comprehensive in that it considers all possible renewable energy sources for the country. However, the primary impediment to implementing the strategy is the finance (GI 2)."

The quote from (GI 2) highlights the National Renewable Energy Master Plan's comprehensive approach, considering all possible renewable energy sources for Nigeria. This demonstrates a forward-thinking approach to promoting a diverse and sustainable energy mix. However, the quote also emphasises that the primary impediment to implementing the plan is securing the necessary financing. This aligns with the common challenge many countries face in transitioning to renewable energy, as large-scale projects require significant upfront investments.

Nigeria has been actively seeking international foreign loans and engaging with donor agencies to address the finance impediment to secure financial support for renewable energy projects. The Nigerian government has proactively sought partnerships and collaboration with international financial institutions, such as the World Bank, African Development Bank (AfDB), and other bilateral and multilateral donor agencies. These partnerships aim to leverage financial resources, technical expertise, and knowledge sharing to facilitate the implementation of renewable energy projects.

International foreign loans and donor agencies are crucial in providing the financial resources and technical assistance to support Nigeria's renewable energy ambitions. These agencies offer financial aid, concessional loans, and technical expertise to help bridge the financing gap and mitigate the risks associated with renewable energy investments. They are also critical in capacity building, policy advice, and project implementation support. Through these collaborations, Nigeria can access the resources and expertise needed to accelerate the deployment of renewable energy technologies and achieve its sustainable energy goals. The role of international foreign loans and donor agencies, therefore, extends beyond financial support to encompass capacity development, knowledge transfer, and institutional strengthening, contributing to the overall success of Nigeria's renewable energy initiatives.

The interviewees' perspectives shed light on the potential of renewable energy sources, particularly solar, in addressing Nigeria's electricity challenges.

> “Government should also harness other sources of electricity like solar, wind and hydro. We should not rely on the federal government. Kano has more dams so we can generate our electricity. Furthermore, let there be a political will to address the electricity supply” (NW CLI 1)

> “People are ready to install solar though its expensive, but the advantages are enormous not only is it safe for the environment the noise pollution is taken away too just the financial implication that is the drawback” (NW SAI 1).

> “We can think of solar generation, we can think of through other sources like methane gas using animals and other wastages to generate electricity (SS SAI 4).

> “The world is talking of smart grid renewable solar energy, batteries, cutting down emissions. We have the resources, especially solar and wind Instead of the government subsidising the energy companies with no improvement let the government subsidise the solar panels and batteries to be affordable to many households” (SW UAI 04).

> “I have solar in my house that I used for 3 years although it is very expensive at least I am not using generator now unless I want to pump water from the borehole”(SW CLI 4).

These quotes reflect a growing awareness of Nigeria's potential benefits of renewable energy, particularly solar power. The interviewees recognize the environmental advantages, reduced noise pollution, and potential cost savings associated with solar energy. They also underscore the need for government support, including subsidies and policies that promote the adoption of renewable energy sources, to make them more accessible and affordable for households and communities.

The quotes provided offer diverse perspectives and critical analyses regarding the role of renewable energy sources, specifically solar power, in addressing Nigeria's electricity challenges. The interviewee from the Northwest region emphasizes the importance of diversifying energy sources beyond federal government reliance, suggesting the harnessing of solar, wind, and hydropower. This perspective highlights the potential for localized electricity generation through available resources, such as dams in Kano. The call for political will reflects the recognition that addressing electricity supply issues requires proactive leadership and commitment.

Another interviewee from the same region underscores the readiness of people to adopt solar power due to its environmental benefits and noise pollution reduction. However, the financial implications are identified as a significant drawback. This analysis emphasizes the need for measures to make solar power more affordable and accessible to a broader population. In the South-South region, the interviewee's suggestion to explore solar and alternative energy sources like methane gas demonstrates a forward-thinking approach to electricity generation, utilizing available resources and reducing dependence on conventional methods.

Furthermore, the quote referring to global discussions on smart grids, renewable solar energy, and emission reduction highlights the recognition of the worldwide transition towards sustainable energy systems. The mention of Nigeria's abundant solar and wind resources indicates the potential to leverage these sources to meet the country's energy demands. In the Southwest region, the critical analysis of government subsidies directs attention towards redirecting financial support from energy companies to subsidize solar panels and batteries, promoting affordability and widespread adoption. The personal reflection on the benefits of solar power further

underscores its practicality and positive impact on reducing dependence on conventional energy sources.

These perspectives highlight the potential of solar power and other renewable energy sources to address Nigeria's electricity challenges. They emphasise the need for supportive policies, financial incentives, and political will to facilitate the widespread adoption of sustainable energy solutions. The critical analyses provide valuable insights into the barriers and opportunities associated with renewable energy deployment, contributing to the ongoing discourse on sustainable energy transitions and the role of solar power in Nigeria's energy landscape.

In summary, this section has argued that Nigeria faces significant challenges in promoting renewable energy development, including financial barriers, inadequate infrastructure, and policy uncertainties. Addressing these challenges requires collaboration between regulatory bodies and private sector actors to create a stable regulatory environment and develop the necessary infrastructure, thereby unlocking the full potential of the renewable energy sector in Nigeria. The Renewable Energy Feed-In Tariff (REFiT) policy introduced by the Nigerian Electricity Regulatory Commission (NERC) is a promising step towards renewable energy development in Nigeria. However, to ensure the sustainability and scalability of such initiatives, supportive policies and measures, such as innovative financing mechanisms and greater public-private partnerships, are necessary to overcome financial barriers and promote investment in the renewable energy sector.

### 8.3 Transitioning Towards an Inclusive Energy Sector: Perspectives on Governance and Policy Reforms

The global energy landscape is rapidly evolving, with the push for renewable energy sources, technological innovation, and a growing focus on sustainability driving significant changes. These shifts are forcing governments and policymakers to rethink energy governance and policy frameworks, aiming to create a more inclusive and sustainable energy sector. This discourse is essential for addressing pressing global challenges such as energy security, climate change, and socio-economic development. Countries like Germany, China, and the United States are already taking bold steps in this direction, showcasing the potential of inclusive energy reforms.

Transitioning towards an inclusive energy sector requires re-evaluating energy governance and policy frameworks. As highlighted by the statement from (GI 3)

> "There is a policy lacuna in the energy sector. Energy Commission of Nigeria (ECN) is the policy-making body for the energy sector in Nigeria, but hardly acts or does anything that will project ideals of the power sector (GI 3)."

> “We recognize that some of our policies have not been as effective as we hoped. We are currently conducting a comprehensive review and revising them to better meet the needs of the sector (G1 9).”

> “The success of our policies depends on strong collaboration between, other government agencies, and other private sector players. We are actively seeking to build these partnerships (SI 5)”.

The first quote highlights a perceived policy gap within the Nigerian energy sector, pointing out that the Energy Commission of Nigeria (ECN), the designated policy-making body, is not effectively translating policies into actions that align with the ideals of the power sector (GI 3). This observation reflects a potential deficiency in the implementation aspect of energy policies, indicating a gap in distributive justice. From an energy justice perspective, effective policy implementation is crucial to ensure the fair distribution of benefits and burdens among various stakeholders. The acknowledgement of a policy lacuna implies a recognition of potential disparities in the outcomes of energy policies, underscoring the importance of addressing this gap to achieve more equitable energy governance.

The second quote recognizes the limitations of existing policies, expressing a commitment to conducting a comprehensive review and revision to better meet the needs of the energy sector (G1 9). This commitment aligns with the principles of procedural justice within the energy justice framework. Procedural justice emphasises the importance of inclusive and transparent decision-making processes,

ensuring that stakeholders' voices are heard in shaping policies that affect them. The dedication to reviewing and revising policies indicates a commitment to rectify any procedural shortcomings, fostering a more participatory and just governance of energy resources.

The third quote emphasises the necessity of strong collaboration among government agencies and private sector players for the success of energy policies, and the active pursuit of partnerships (SI 5). This reflects an understanding of the interconnected nature of the energy sector and aligns with distributive justice, as it recognizes that successful policy outcomes depend on the fair distribution of responsibilities and benefits among diverse stakeholders. Moreover, the emphasis on collaboration suggests a commitment to recognition justice, acknowledging the importance of diverse perspectives and experiences in shaping and implementing energy policies. Actively seeking partnerships underscores a commitment to inclusivity and cooperation, contributing to a more equitable and just distribution of the benefits associated with energy initiatives.

These quotes, reveal an awareness of potential disparities in policy implementation, a commitment to inclusive decision-making through policy review, and an emphasis on collaboration and partnerships for more equitable policy outcomes. This signifies a dedication to addressing justice concerns within the energy sector and working towards a more just and inclusive energy governance framework.

Additionally, regulatory certainty is vital to attract investment and encourage participation from domestic and international stakeholders, as emphasized in the quote from (GI 8). Without a stable and predictable regulatory environment, investors may be hesitant to enter the market, hindering the development and expansion of the energy sector.

> "Only regulatory certainty can attract investment, as no investor will enter a market if they fear they will be unable to recover their cost (GI 8)."

The quote from (GI 8) underscores the critical importance of regulatory certainty in attracting investment in the energy sector. It suggests that without a predictable and stable regulatory environment, investors may hesitate to enter the market due to

concerns about recouping their investments. This statement highlights the significance of providing a conducive business climate that instils confidence and trust among investors, ultimately driving the much-needed financial resources into the energy sector.

Regulatory certainty refers to the clarity and consistency of rules, regulations, and policies governing the energy industry. It entails having transparent and predictable frameworks that outline market participants' rights, obligations, and incentives. The quote also emphasises the role of regulatory certainty as a key driver for attracting investment in the energy sector. It underscores the need for governments and regulatory authorities to create an enabling environment that provides clear rules and regulations, ensures fair competition, protects investor rights, and offers stable and predictable incentives. By establishing a robust regulatory framework, Nigeria can foster an attractive investment climate that encourages private sector participation, promotes innovation, and facilitates the development of a sustainable and inclusive energy sector.

In the context of energy sector governance and policy reforms, several perspectives shed light on the implications of reversing privatisation and the significance of a stable regulatory environment. One view, expressed by (GI 4), opposes the call to reverse privatisation, emphasising the importance of sending a positive message to the international community about Nigeria's investor-friendly stance. The argument is that reversing privatisation could undermine investor confidence, deter much-needed financial resources from entering the power sector, and highlight the government's financial limitations to make substantial investments in the sector over the long term.

> “The Manager opposes the call to reverse privatisation, arguing that it would send a message to the entire world that Nigeria is not investors friendly. He argues that the government lacks the financial resources necessary to invest in the power sector over the long run (GI 4)”.

> "We appear to have a more favourable regulatory environment now in the past, we experienced dramatic policy reversals that prevented adequate planning (SI 7)”.

Another perspective, by (SI 7), highlights the recent positive shift towards a more favourable regulatory environment. Acknowledging that the past was marked by dramatic policy reversals, resulting in inadequate planning and hindering the development of the energy sector. Recognising a more stable regulatory environment is a significant step forward in promoting better planning, attracting investments, and fostering long-term sustainability.

These contrasting perspectives reflect the ongoing discourse surrounding the role of privatisation, regulatory stability, and policy consistency in Nigeria's energy sector. The debate underscores the need for careful consideration of the implications of policy reversals and the importance of creating an enabling environment that encourages private sector participation, ensures regulatory certainty, and fosters long-term planning and investment in the power sector.

In summary, the global energy sector is undergoing significant transformations, prompting governments and policymakers to re-evaluate energy governance and policy frameworks. This study examines the challenges and opportunities in Nigeria's energy sector and explores the implications of privatisation, regulatory stability, and policy consistency. The analysis considers contrasting perspectives on privatisation, highlighting its potential for efficiency, investment, improved service delivery, and concerns about access and affordability, particularly in rural areas. The study underscores the importance of regulatory certainty in attracting investments and emphasises the need for a stable and predictable regulatory environment.

The study highlights the government's efforts to promote renewable energy sources and expand electricity access in underserved areas through initiatives like the Renewable Energy Master Plan (REMP). Ongoing monitoring, addressing regulatory uncertainties, and ensuring sufficient financing are critical factors for successfully implementing these policies.

### 8.4 Perceptions on the Efficacy of Cost-Reflective Tariffs in Addressing Electricity Supply Challenges in Nigeria

The introduction of cost-reflective tariffs in Nigeria's electricity sector has sparked considerable debate, as it seeks to address the chronic challenges of inadequate supply, financial instability of utility companies, and underinvestment in infrastructure. The idea behind cost-reflective tariffs is to align electricity prices with

the actual costs of generation, transmission, and distribution, enabling utility companies to recover their operational and capital expenses. In theory, this should create a more sustainable energy market by attracting investments and promoting the efficient allocation of resources. However, its implementation has been met with both optimism and scepticism, reflecting the diverse experiences and concerns of various stakeholders. To provide further insights into the issues of cost-reflective tariffs in Nigeria's electricity sector, some experts shared their perspectives.

> "A cost-reflective tariff is critical for the sector to achieve financial viability (GI 5)."

The statement underscores the importance of aligning electricity tariffs with the actual costs of generating and distributing electricity. It suggests that without cost-reflective tariffs, the electricity sector may face financial challenges and struggle to attract investments. Implementing cost-reflective tariffs is viewed as a means to improve the revenue collection of electricity distribution companies (DisCos) and create a sustainable financial framework for the sector. By ensuring that tariffs reflect the true costs of providing electricity, the sector is believed to generate sufficient revenue to cover operational expenses, invest in infrastructure upgrades, and facilitate future expansion.

The statement implies that cost-reflective tariffs are seen as a mechanism to address Nigeria's electricity sector's financial viability. It suggests that the previous practice of subsidizing electricity tariffs may have contributed to revenue shortfalls and hindered the sector's ability to operate efficiently and make necessary investments. By implementing cost-reflective tariffs, the sector is expected to improve its financial performance, attract private investments, and create a more sustainable and robust electricity market. This perspective highlights the belief that aligning tariffs with the actual costs of electricity generation and distribution is essential for the sector's long-term financial stability and success.

In analysing the challenges faced by the Nigerian electricity sector, it becomes evident that the absence of cost-reflective pricing is perceived to be a significant contributing factor:

> "When the tariff is less than the cost of production, the entire value chain begins to fail. That is the situation in

> the Nigerian electricity sector today, and most of the issues are regulatory. Other difficulties Egbin faced were the absence of cost-reflective pricing, forex differentials that exceeded N200 per naira, inflation rates growing from 8% at acquisition to 18-19%, and also debts owing to them by Nigerian Bulk Electricity Trader, NBET (SI 4)."
>
> "Tariff Review: Approach cost reflective tariff over a short period – 5 years, maximum; this reduces the size of the revenue shortfall FGN will need to subsidise." (PSRIP, 2020)."
>
> Residents who own generators pay a higher rate for diesel and petrol than those who use the grid. Therefore, why not increase the tariff by 20% to 30% to guarantee reliable power he said. He emphasises the critical significance of maintaining an investment-friendly tariff. (GI 3)

The quotes presented offer a multifaceted perspective on the complex issues surrounding Nigeria's electricity tariff structure, specifically focusing on the necessity of cost-reflective pricing, the economic pressures faced by electricity generation companies, and the political challenges of implementing higher tariffs.

The (SI 4) highlights a fundamental problem in Nigeria's energy sector: when tariffs are set below the cost of production, the entire value chain from generation to distribution begins to crumble. This misalignment between tariffs and production costs creates a financial strain on energy providers, leading to systemic inefficiencies. The absence of cost-reflective tariffs leaves companies unable to cover operational expenses, leading to an underinvestment in infrastructure and maintenance. Egbin Power Plant, one of Nigeria’s largest power stations, faces additional economic hurdles like forex fluctuations and rising inflation. These macroeconomic factors exacerbate the already challenging financial conditions,

illustrating that the regulatory environment, particularly concerning tariff structure, is a major barrier to a sustainable energy system.

However, PSRIP (2020) offers a pragmatic solution to this issue, proposing a gradual approach to implementing cost-reflective tariffs over five years. The phased implementation of tariffs also suggests a compromise between the need for financial sustainability in the electricity sector and the need to maintain political and social stability. A sudden shift to cost-reflective tariffs could lead to public unrest, as seen in other countries where utility prices have rapidly increased. The five-year timeframe provides a cushion, allowing consumers, regulators, and energy providers to adjust and for service improvements to justify the higher costs.

While (GI 3) quote adds another layer to the debate, pointing out the paradox in Nigeria's current energy pricing his perspective also reveals an implicit form of inequality in Nigeria's energy landscape. Wealthier individuals or businesses that can afford generators bear a higher cost, but those unable to afford alternative power sources are left with unreliable electricity. Raising tariffs to more accurately reflect production costs could, paradoxically, benefit low-income consumers in the long run if it leads to better and more reliable grid services. However, such an increase must be accompanied by assurances that the higher costs will result in improved service delivery or the public may reject the change.

Thus, the efficacy of cost-reflective tariffs hinges on the ability of consumers to bear the costs associated with electricity consumption and their willingness to accept changes in billing practices. Simon Kolawole a prominent Nigerian journalist and columnist known for his insightful and often critical commentary on social, political, and economic issues in Nigeria acknowledges this challenge, noting that implementing economic tariffs entails a substantial political cost, which may reflect difficulties in engaging diverse stakeholders and addressing their concerns.

> "Allow the energy chain to charge economic tariffs so that they can invest properly and improve the power situation although this has a huge political cost (Simon Kolawole, 2021)"

Kolawole's statement underscores the need for cost-reflective tariffs that align with the real costs of electricity generation, transmission, and distribution. The rationale is that if energy companies can charge tariffs that reflect these costs, they will have the financial resources to invest in infrastructure, improve service reliability, and enhance the overall power situation. This view aligns with economic theories that argue for market-based pricing mechanisms to ensure the efficient allocation of resources, attract investment, and promote the long-term sustainability of essential services like electricity.

Kolawole's statement highlights a broader challenge in energy governance the need to strike a balance between economic efficiency and social equity. While charging economic tariffs may indeed help the energy sector become more financially viable, it also raises questions about the fairness of such a move in a society where access to reliable and affordable electricity is still uneven. Without parallel efforts to protect vulnerable populations such as targeted subsidies, improved social safety nets, or phased tariff increases such a policy could deepen inequality and lead to further marginalisation of already disadvantaged groups.

Similarly, Kolawole also acknowledges the "huge political cost" of this approach. In Nigeria, where poverty rates are high and the majority of the population lives on low incomes, raising electricity tariffs to reflect real costs can lead to significant public backlash. Politicians are often wary of endorsing such measures due to the potential for social unrest and the loss of public support. In this context, energy pricing is not just an economic issue but a deeply political one, as it directly impacts people's livelihoods and the broader social contract between the government and its citizens.

In sum, this section has demonstrated that while the quotes emphasise the critical role of cost-reflective tariffs in ensuring Nigeria's electricity sector's financial viability and investment attractiveness, a critical analysis reveals the need for a comprehensive and balanced approach that accounts for affordability, acceptability, and broader governance and policy reforms. By incorporating these factors, Nigeria can implement cost-reflective tariffs that foster investment while minimising adverse impacts on low-income households and addressing the regulatory challenges faced by the sector.

### 8.5 Promoting Public Participation and Coordinated Decision-Making

Public participation is critical in energy policy, where decisions can have far-reaching implications for economic development, environmental sustainability, and social equity. Studies have shown that when citizens are involved in the process, they can contribute valuable local knowledge and perspectives that can improve the quality of decision-making (Chess & Purcell, 1999). In line with this perspective, a community leader opined,

> "It is crucial for the government to also prioritise the needs of end-users by implementing programs that aim to educate and inform them about why certain policies are implemented (SW CLI 2)".

This statement reflects the need for enhanced public engagement in government decision-making processes, specifically regarding policy implementation. When the government prioritises, end-users needs, it ensures that their interests and perspectives are taken into account, leading to policies that are more likely to be accepted by the public and, therefore, more effective in achieving their intended outcomes.

The call for programs that aim to educate and inform end-users highlights the importance of transparency and communication in policy implementation. Implementing such programs can help to ensure that end-users understand why specific policies are being implemented and how they can benefit from them.

For instance, if the government implements a policy to promote energy efficiency, it should educate end-users about its reasons (e.g., reducing energy consumption, lowering energy costs, and contributing to environmental sustainability). This can involve explaining the benefits of energy efficiency, providing practical tips on how to save energy, and informing end-users about any incentives or supports available for implementing energy-saving measures.

Moreover, such programs can also be used to gather feedback from end-users, providing valuable insights that can be used to refine further and improve policies. This can involve setting up channels for end-users to express their views or concerns about the policy, such as public consultations, surveys, or feedback forms.

Therefore, empowering the public is not just about feel-good gestures; it's a strategic move for better policy. When governments prioritise end-user needs and invest in programs that educate and inform them, the benefits ripple outwards. Policy acceptability soars, driven by public understanding and ownership of decisions. The "why" behind this transformation echoes Stirling's arguments for public engagement (PE). Engaging the public serves instrumental, normative, and substantive goals. Informed citizens provide valuable feedback, strengthening policy outcomes. Open communication fosters democratic values, respecting people's right to a say in their future. By listening to diverse perspectives, governments craft policies that truly resonate with the needs of those they serve. So, instead of shutting down engagement and leaving the public in the dark, governments should embrace transparency and education. Another perspective supported this point by stating,

> "There should be consultations between the customers and the electricity companies so that if there are any changes, the community should be well informed (NW RAI 1)".

This statement highlights the importance of open dialogue and active communication between electricity providers and their customers. Communication plays a crucial role in ensuring service quality and customer satisfaction in any utility service, including electricity. When the speaker mentions "consultations," it suggests an interactive process wherein electricity companies proactively seek feedback, share information, and involve customers in decision-making processes. This is particularly important when any changes are proposed, such as adjustments to tariffs, service modifications, or infrastructure developments.

When there are public consultations, they are likely to better understand the need for such changes, which could lead to greater acceptance. For instance, if there is a proposed tariff increase, the electricity company could explain why this is necessary, perhaps due to increased costs of generation, transmission, or distribution. They could also explain how they plan to use the additional revenue to improve service quality or invest in sustainable energy infrastructure.

By fostering this dialogue, electricity companies can also gain customer insights. Customers can share their concerns or suggestions, and this feedback can be valuable in shaping changes to better meet customer needs or in identifying alternative strategies that may be less disruptive or more acceptable to customers.

However, public participation in energy policy-making is not without challenges. One concern is that participation processes may be dominated by well-resourced and organised groups, leading to imbalances in representing different interests (Van Bommel and Höffken, 2021). The lack of communication between suppliers and consumers is also a significant issue. As another interviewee indicated,

> "There is no engagement between the community and electricity suppliers in tariff increment; you just see that either in the print media (SS SAI 1)".

The given statement emphasises the perceived lack of direct engagement between electricity suppliers and their customer base, particularly concerning changes in tariff structures. The phrase "you just see in that either in the print media" indicates that any information on tariff changes tends to be conveyed through media outlets rather than through a more interactive and personal dialogue between the companies and the consumers.

Lack of direct engagement can lead to feelings of exclusion and misunderstanding. The speaker suggests that the information about tariff increases is often a one-way communication process. In this model, electricity suppliers publish the changes, and the consumers cannot question, understand, or influence the decision. This can lead to a disconnect between the suppliers and the consumers and possibly create distrust or dissatisfaction among the consumers.

Tariff changes can significantly impact consumers, particularly those in lower-income brackets who may struggle with higher costs. Therefore, not having the opportunity to discuss these changes, ask questions or voice concerns can lead to feelings of disempowerment and frustration.

The sentiment from (SS SAI 1) implies that a more engaged, two-way communication model might be more suitable. By incorporating such a

communication model, energy justice is advanced through increased transparency, accountability, and participation. Consumers become active participants in the decision-making process, and their concerns, needs, and perspectives are acknowledged and considered. This approach fosters a sense of recognition justice, ensuring that consumers are not merely recipients of decisions but active contributors to the energy governance process.

However, the technical complexity of energy issues poses another substantial barrier to public participation (Walker et al., 2010). Energy policy and management cover many technical topics, demanding specific expertise for comprehensive understanding and informed decision-making. For laypersons, these complexities can be overwhelming, hindering their engagement in dialogues or decision-making processes related to energy. The ensuing knowledge gap threatens the effectiveness of public participation, potentially leading to a disproportionate influence of technical experts over the general public in shaping energy policy.

Given these challenges, the need for initiatives to boost public comprehension of energy issues becomes paramount. Diverse approaches, such as educational programs, information sessions, or simplifying communication materials, can prove instrumental in meeting this goal. Also, fostering dialogues between technical experts and the public can demystify these complexities, enabling laypersons to contribute meaningfully to energy-related discourses.

In summary, Nigeria's effective and efficient energy provision requires strategic, multi-pronged reforms. Implementing a two-way communication model, which allows for the direct exchange between electricity suppliers and consumers, has been underscored as crucial. This model facilitates a better understanding of consumer needs, fosters trust, and ensures that decisions are more informed and widely accepted.

Coordinated decision-making was identified as a critical aspect of the energy sector, given the intersectionality of energy issues with various policy areas. However, bureaucratic divisions, organizational cultural differences, and agency conflicts challenge achieving such coordination. Overcoming these obstacles calls for robust leadership and the establishment of appropriate institutional mechanisms, such as

inter-agency committees and cross-departmental task forces. In coordination with efforts to increase public understanding and participation, these reforms can enable a more effective, inclusive, and sustainable energy sector in Nigeria.

### 8.6 Building Trust and Improving Communication in Nigeria's Electricity Sector

Building trust and improving communication in Nigeria’s electricity sector requires a holistic approach that addresses both the systemic issues and the human factor. The long-standing challenges in this sector, such as erratic supply, high tariffs without commensurate service, and poor maintenance of infrastructure, have eroded public trust. Service providers must ensure that promises of improved electricity are not merely rhetorical but backed by tangible improvements in service delivery. For instance, effective customer service that addresses billing disputes and service disruptions is a starting point for rebuilding trust between electricity companies and consumers.

Several interviewees raised concerns about transparency, corruption, and the influence of private investors in Nigeria's electricity sector. These concerns indicate that governance and trust issues are significant barriers to achieving a sustainable and just energy system in Nigeria.

> “The government should handle the issues of the power sector transparently. The general perception is that there is no transparency on anything related to electricity (NW RAI 3).”

> “I don't have confidence in the government controlling the sector here in Nigeria. The private investors are above the law they do things with impunity (SS RAI 3”

> “No matter how hard you try to believe in the government, the action will make you not believe them. Their friends own the DISCOS and GENCOS and they will not do anything to them. (SW SAI 2)”.

> “I'm not confident because of course corruption, if you look at it, it's like these private companies that are

> distributing the electricity, some of them may be friends to those in power so you can't expect any justice (SS UAI 2).”

> “The main problem is corruption in Nigeria. We have all the regulations and the laws. But the implementation is the problem. When the government fights corruption, sincerely we will have a 24-hour electricity supply (NW CLI 1)”.

The common thread across these quotes is a deep-seated frustration with the entrenchment of corruption in Nigeria’s electricity sector. Public perception suggests that the government and private sector have colluded in ways that undermine the interests of ordinary citizens, leading to inefficiencies, lack of accountability, and poor service delivery. The absence of transparency and regulatory enforcement feeds into a cycle of mistrust, where even well-meaning policies are viewed with scepticism.

From an energy justice perspective, the lack of procedural justice (fair and inclusive decision-making) is evident, as is the failure of recognition justice (acknowledging and addressing the needs and concerns of all stakeholders, especially the marginalised). These issues not only exacerbate the inequalities within the sector but also hinder potential reforms that could lead to a more sustainable and reliable electricity supply for all Nigerians.

Furthermore, the collusion between government officials and private investors, as highlighted in several quotes, shows the risk of regulatory capture, where the interests of the powerful override public welfare. This undermines the credibility of any reforms and perpetuates a system where consumers are left to bear the consequences of mismanagement and corruption.

> "No sincerity in what the government is doing. They are some areas that didn't have light at all. But the areas where the distribution company officials' lives have light always (SS UAI 5)”.

The (SS UAI 5) statement underscores a clear issue of distributional injustice, where access to basic public utilities like electricity is not fairly distributed. In this case, the benefit of consistent access to electricity appears skewed towards those with power and influence, leaving large parts of the population disenfranchised. This inequality exacerbates existing social divides, as those without reliable access to electricity face difficulties in maintaining livelihoods, education, and health, while others enjoy uninterrupted services due to their connections.

Moreover, this quote reflects a significant breach in procedural justice, in this case, certain individuals, by their positions, manipulate the system to their advantage, it undermines public trust in the regulatory framework and reinforces perceptions that the system is inherently corrupt. This erodes confidence in any reforms aimed at improving the electricity supply, as citizens perceive that the powerful can always bypass rules to secure preferential treatment.

Another interviewee suggested a practical approach to improve transparency and communication by stating, "The government needs to establish a mechanism that allows for better interaction with the people they serve.

> "The government needs to establish a mechanism that allows for better interaction with the people they serve. This can be achieved by creating a feedback system like this interview. For instance, the government can select some communities and gather feedback about the services they're receiving from the DISCOS. The government should act as a mediator between the service providers and the masses by facilitating better communication channels. (SS SAI 1)"

The (SS SAI 1), highlights the absence of a structured communication framework. The suggestion for a feedback mechanism indicates a significant gap in the government's role as a mediator between service providers and the people. In this context, procedural justice is missing because there is no platform for community voices to be heard, much less addressed. A feedback system would empower citizens, fostering greater accountability and transparency, and allowing communities to actively participate in shaping the services they receive.

Similarly, (SS SAI 3), points to the need for direct interaction between DISCOs and the communities.

> “Proper community engagement with the DISCOS should also be encouraged (SS SAI 3).”

Effective community engagement would ensure that the grievances and needs of the people are considered in the operational decisions of DISCOs. It would also help to rebuild trust, which has eroded due to inconsistent service and poor communication. A participatory approach, where communities have a say in how electricity services are delivered, is critical to achieving energy justice. Engagement should not be superficial but instead involve consistent dialogue, transparency in billing practices, and responsiveness to consumer complaints.

> “They only engage when they have a problem collecting bills in the community. They come to the community leaders to help them talk to the people and pay for the electricity. (NW CLI 2)”.

The (NW CLI 2) critiques the existing relationship between DISCOs and communities as transactional and exploitative. Engagement with communities only happens when it benefits the DISCOs, particularly in the form of bill collections, rather than to address service quality issues or to seek input on how to improve electricity delivery. This selective engagement reflects a failure to ensure recognition justice, as the people are seen merely as consumers rather than partners in the electricity delivery process. The lack of regular, meaningful interaction leads to a one-sided relationship where the service providers wield disproportionate power over the consumers, reinforcing feelings of exploitation and exclusion.

This critique emphasises the need for improved synergy between all stakeholders, as highlighted in the following quotes.

> “Emphasises the importance of synergy between all stakeholders and conversation with customers to reach a consensus solution that benefits everyone (SI 4)”.

> "All stakeholders must work in harmony to develop solutions to the numerous obstacles in the electricity sector (S1 3)".

Both quotes advocate for a collaborative approach where service providers, government, and communities work together in addressing the challenges of Nigeria's electricity sector.

By calling for synergy, (SI 4) and (SI 3) underline the importance of cooperation and dialogue between stakeholders to create mutually beneficial outcomes. The absence of such collaboration has led to the current situation where consumers feel marginalized and exploited. A harmonious relationship between DISCOs and communities, grounded in regular interaction and transparent communication, would not only address the immediate service quality concerns but also rebuild trust, empowering communities as active participants in shaping their energy future.

Moreover, these calls for collaboration align with the principles of procedural justice, which stresses the need for inclusive, transparent, and participatory decision-making processes. Ensuring that community voices are heard and valued in these processes can help to counterbalance the disproportionate power that DISCOs currently hold. Without this synergy, efforts to reform the electricity sector will remain superficial and fail to address the underlying power imbalances that perpetuate consumer dissatisfaction and exclusion.

This collaborative approach can help address diverse stakeholder needs and concerns. According to Parkhill et al. (2013), an inclusive decision-making process that involves all stakeholders is critical to ensuring that energy policies and services are responsive. Moreover, Eberhard et al. (2016) suggest that such an approach is more likely to result in electricity policies that are both economically and socially viable. In line with this, former Nigerian Minister of Power, Works and Housing Babatunde Fashola emphasised the importance of transparency and customer service as critical components of a collaborative approach, which can be enhanced through the use of customer service outlets and online portals, as the TELCOS have done (Fashola 2018).

> "At our meeting in Enugu, I said to the DisCos you have to lead this reform now by taking ownership. You must

> have complaints officers that people can reach to explain why they could not have service and how long they have to wait to get it". That is customer service. They can wait out a problem if they know what the problem is and how long it will take to solve it. But it becomes frustrating if they do not know what's going on. They need to open more customer service outlets just like the TELCOS have done. Some of them are already opening up portals on the internet which we must also use because they are trying to cut cost (Fashola 2018)!"

Fashola's statement points to the need for service providers to adopt innovative and customer-centric approaches to enhance trust and communication with consumers. By leveraging technology and increasing the number of customer service outlets, electricity providers can foster better relationships with their customers and address their concerns more effectively (Fashola, 2018).

Similarly, consumer education and awareness initiatives, such as the Nigerian Electricity Regulatory Commission's (NERC) dedicated radio program "Electricity Spotlight Today," play a significant role in fostering trust and communication within the electricity sector (NERC, 2020). In the 2020 quarterly report, NERC stated:

> "To ensure continuous customers' education on their rights and obligations during the first quarter of 2020, the Commission continued the monitoring of the 2020 customer enlightenment programmes of the eleven (11) DisCos. On its part, the Commission also continued the airing of a dedicated weekly radio program titled 'Electricity Spotlight Today' on FRCN to engage and enlighten electricity consumers on various issues. The program focuses on but not limited to customers' rights and obligations, customers' redress mechanism, estimated billing, outstanding metering gaps and the

> strategy being adopted by the Commission to bridge the metering gap in the industry (NERC, 2020)."

The focus of the 'Electricity Spotlight Today' radio program on issues such as customers' rights and obligations, customers' redress mechanism, estimated billing, and the metering gap strategy is in line with the recommendations of previous studies. For instance, a study by Trotta (2021) highlights the importance of educating customers on electricity estimated billing and the need for more accurate billing practices. Additionally, a study by Ohimain (2020) emphasises the significance of metering gaps and the need for strategies to bridge the gaps.

In summary, restoring trust and improving policy communication in Nigeria's electricity sector requires a critical examination of strategies addressing transparency, accountability, public participation, effective service delivery, coordination, regulatory enforcement, and consumer education. By incorporating insights and recommendations from community members and leaders, the Nigerian government can work towards fostering greater trust in its electricity policies, enhancing policy communication, and promoting a more sustainable and inclusive energy future.

### 227.7 Summary

In summary, this chapter provides insights into the steps that can be taken to address the challenges and disparities in electricity provision across different regions of Nigeria. The chapter begins by emphasising the importance of diversifying energy sources to improve accessibility in Nigeria. It highlights the potential of renewable energy and the need for supportive policies to promote its development and integration into the energy mix. The research findings emphasise that leveraging Nigeria's abundant renewable energy resources, such as solar and wind power, can enhance electricity access, particularly in remote and off-grid areas.

Furthermore, the chapter emphasises the significance of governance and policy reforms in creating an inclusive energy sector. It evaluates the effectiveness of cost-reflective tariffs in resolving electricity supply constraints in Nigeria and highlights the importance of striking a balance between affordability for consumers and ensuring the financial sustainability of the electricity sector. The research findings also emphasise the need for promoting public participation and coordinated decision-

making processes in energy sector governance to ensure that the voices and interests of all stakeholders, including local communities, are considered.

Additionally, the chapter emphasises the importance of building trust and improving communication in Nigeria's electricity sector. It underscores the need for transparent and effective communication channels between electricity providers, regulatory bodies, policymakers, and consumers to enhance trust, resolve disputes, and facilitate informed decision-making processes.

Overall, Chapter 7 provides a comprehensive analysis of the strategies and reforms required to envision a more inclusive energy future for Nigeria. It highlights the importance of diversifying energy sources, promoting renewable energy development, implementing supportive policies, and improving governance and communication in the electricity sector. By implementing the recommendations outlined in this chapter, Nigeria can make significant strides towards achieving a more equitable and sustainable energy system that ensures reliable and affordable electricity access for all its citizens.

# CHAPTER 9

## CONCLUSION AND RECOMMENDATIONS

The concluding chapter summarises the key findings and insights from the thesis and offers comprehensive conclusions and recommendations based on the research conducted. It provides a synthesis of the main arguments, highlights the implications of the research, and suggests actionable steps for addressing the challenges and disparities in electricity access and provision in Nigeria. The conclusions chapter serves as a final reflection on the research journey and provides a roadmap for future actions in the energy sector.

This thesis explored the multifaceted factors contributing to regional disparities in electricity access. By examining into historical, socio-economic, and spatial factors, the research provides a nuanced understanding of the root causes of the disparities, contributing to a more comprehensive analysis of energy justice in Nigeria.

As outlined in Chapter One the main aim of this thesis is to analyse Nigeria's regional disparities in electricity access and supply and identify the underlying causes and consequences. This study tackled this aim by engaging a case study of three regions to represent what happened in the Nigerian electricity sector. This was done through the lens of historical institutionalism, regional development, and energy justice theories (See Chapter 3). A review of relevant literatures to the study; generated the following research objectives.

- To investigate the factors influencing access to electricity across the Nigeria’s regions and to determine the extent to which these factors contribute to the existing disparities between the north and south and between Kano, Lagos and Rivers States.
- To assess the spatial distribution of electricity infrastructure and its impact on accessibility within and between regions.
- To examine the role of key actors in the electricity sector in promoting or hindering regional access to electricity and to identify any patterns of regional exclusion or inclusion.

- To propose recommendations for expanding and improving the region's electricity infrastructure and promoting a more equitable distribution of energy resources.

How these objectives were addressed, is briefly considered below with a view of how well they meet the goals. Third, it discusses the wider contributions to knowledge made by this research. Finally, it outlines new research directions.

**Objective One: Investigating Factors Influencing Access to Electricity Across Nigeria's Regions**

For decades, the discourse surrounding Nigeria's electricity challenges has often been reduced to a simplistic narrative of "North vs South". While acknowledging regional disparities, this binary framing has obscured a more profound reality, the pervasive inadequacy of electricity across the entire nation. Through lived experiences and regional comparisons, this study exposes the limitations of this perspective. Interviews with diverse individuals from Kano, Lagos, and Rivers States reveal that, irrespective of geographical location, Nigerians experience frequent outages, unreliable service, and severe disruptions to daily life and economic activities.

This study uncovers that consumers despite widespread frustration with unreliable service and opaque billing practices, express a high willingness to pay (WTP) for steady electricity. Phrases such as "I can pay anything provided there is steady light" (SS RA 04) reflect this sentiment. However, WTP is contingent on transparency and trust in the electricity providers, both of which are critically needed. The prevalence of estimated billing, often exceeding household incomes, further erodes confidence in the system, leading to significant resentment.

Additionally, historical factors contribute to the regional disparities. The legacies of colonial infrastructure investments, which favoured urban centres and regions considered economically valuable, continue to perpetuate inequalities. Southern Nigeria, benefiting from abundant natural gas deposits, has greater access to generating capacity, while the hydropower potential in the North remains underutilised. These historical imbalances, coupled with contemporary policy decisions, have entrenched unequal access to electricity.

**Objective Two: Assessing the Spatial Distribution of Electricity Infrastructure**

In Chapter Six, the spatial distribution of electricity infrastructure in Nigeria was examined, revealing stark regional disparities. The uneven spread of infrastructure is heavily influenced by the country's resource endowments and historical development patterns. The southern

regions, particularly those rich in natural resources, such as Lagos and Rivers, benefit from a concentration of power plants. In contrast, the northern regions, which possess untapped hydropower resources, lag behind in terms of infrastructure development. These regional imbalances result from historical legacies and present-day economic and political considerations that prioritise certain areas over others.

Moreover, the study exposes how affordability challenges exacerbate these infrastructural gaps. In regions with limited access, consumers face exploitative billing practices. The sentiment captured by NW RA 2, regarding entire communities without electricity due to unaffordable tariffs, illustrates how poor infrastructure disproportionately affects marginalised populations. This study reveals the social and emotional toll of electricity unaffordability, which goes beyond mere economic hardship.

Manipulative tactics employed by some electricity providers, such as underestimating initial usage and inflating subsequent bills, further deepen the inequality. Consumers are trapped in cycles of debt, which perpetuates exclusion, especially in underserved regions. These findings highlight the urgent need for policy interventions to address not only the geographical distribution of infrastructure but also the procedural injustices that worsen regional disparities.

**Objective Three: Examining the Role of Key Actors in Promoting or Hindering Access to Electricity**

Nigeria's electricity sector is shaped by a complex interplay of actors, including the government, regulatory bodies, distribution companies (DISCOs), and generation companies (GENCOs). Each of these actors influences regional access to electricity, either promoting inclusion or exacerbating disparities.

The government, wielding significant power through infrastructure investments and policy decisions, can extend the grid to underserved areas. However, inefficiencies, corruption, and prioritisation of politically influential regions have hindered these efforts. As revealed in this study, there are widespread perceptions that government interventions are compromised by vested interests. For instance, participants noted that areas where distribution company officials live enjoy more reliable electricity than other regions (SS UA 5). This highlights the risk of regulatory capture, where the interests of the powerful override the public good.

The Nigerian Electricity Regulatory Commission (NERC), which should serve as a watchdog ensuring fair practices and quality service, struggles with enforcement. As noted, weaknesses within NERC, such as susceptibility to influence by vested interests and internal inefficiencies, undermine its ability to hold electricity providers accountable. This lack of

oversight allows DISCOs to exploit consumers through practices like estimated billing, especially in rural and low-income areas. These practices not only burden consumers financially but also reinforce regional exclusion.

Additionally, the study reveals that GENCOs, particularly those reliant on outdated gas-fired plants, contribute to power shortages. The failure to diversify energy sources and invest in renewable projects further limits the potential for equitable electricity access. Therefore, the role of these actors in promoting or hindering access is critical to understanding the ongoing disparities in the electricity sector.

**Objective Four: Proposing Recommendations for Expanding and Improving Electricity Infrastructure**

Nigeria's electricity landscape is marked by a combination of inadequate infrastructure and unequal access to energy resources. Addressing this disparity requires a transformative approach that prioritises infrastructure expansion alongside equitable distribution of resources.

The findings of this study suggest that strategic investments should be directed towards underserved regions, particularly rural areas. Extending the grid, upgrading transmission lines, and implementing distributed generation solutions, such as mini-grids and renewable energy systems, are essential for expanding access. Furthermore, diversifying Nigeria's energy mix to include more solar, wind, and hydroelectric power will reduce the over-reliance on gas-fired plants and address regional energy imbalances.

Simultaneously, the study highlights the importance of transparency and accountability in improving the electricity sector. Strengthening regulatory frameworks and consumer protection measures is crucial in preventing manipulative practices by DISCOs. Equitable policies, such as temporary electricity subsidies for low-income households, can help alleviate energy poverty.

Empowering local communities by involving them in planning processes and providing them with ownership of local energy solutions can foster accountability and build trust. Targeted interventions, such as addressing gender disparities in energy access and promoting digital inclusion in rural areas, are also necessary to ensure that all segments of society benefit from improvements in electricity infrastructure.

## 9.1 Future Research

This thesis has shed significant light on the complexities of electricity access and affordability in Nigeria, it has also opened the door to a multitude of avenues for

future research. By delving deeper into specific areas, expanding the scope of inquiry, and employing diverse methodologies, researchers can refine our understanding, inform future policy interventions, and pave the way towards a more equitable and sustainable energy future for all Nigerians.

**Expanding the Analytical Lens:**

1. Deepening the Understanding of Lived Experiences: Moving beyond the scope of this thesis, future research could explore the lived experiences of marginalised groups, such as women, children, and the disabled, to uncover the nuanced impacts of electricity disparities on their daily lives and opportunities. Employing participatory action research approaches and incorporating traditional or local knowledge systems can offer valuable insights into their specific needs and priorities.

2. Unmasking the Sociopolitical Dynamics: Beyond individual experiences, future research could unpack the power dynamics and political struggles shaping electricity access and distribution. This could involve investigating the role of corruption, vested interests, and political influence in decision-making processes, along with the resilience and agency of communities confronting unjust energy policies and practices.

3. Investigating the Psychological Dimensions: Researching the psychological impacts of energy insecurity, such as anxiety, stress, and social isolation, could offer valuable insights into the human cost of electricity disparities. Understanding these psychological dimensions can inform interventions that not only address physical access but also promote mental well-being and resilience within affected communities.

**Broadening the Geographical Scope:**

1. Comparative Analysis: Examining Nigeria's electricity challenges within a comparative framework, alongside other developing countries or regions grappling with similar issues, could reveal valuable best practices and common pitfalls. Comparative research can inform policy learning and identify effective strategies for promoting equitable access in diverse contexts.

2. Regional and Rural Realities: While this thesis focused on three specific regions, future research could investigate the nuances of electricity access and affordability within smaller towns, villages, and rural areas. This research would need to employ culturally sensitive methodologies and incorporate the traditional knowledge and practices of rural communities to paint a more accurate picture of their challenges and potential solutions.

3. Decentralised and Renewable Solutions: As Nigeria explores diversifying its energy mix, research on the potential and challenges of decentralised renewable energy solutions, such as solar mini-grids or micro-hydropower, could shed light on their viability in various regions and communities. This research should also consider the socio-economic and cultural factors that affect the adoption and success of these alternative energy systems.

### 9.2 Recommendations

To address Nigeria's electricity challenges effectively, it is essential to implement targeted solutions that account for the diverse roles of stakeholders in the sector. The persistent issues of unreliable electricity supply, regional disparities in access, and affordability concerns cannot be resolved by any single entity. Instead, they require coordinated efforts from policymakers, regulatory bodies, energy providers, local communities, and international partners.

The following recommendations are categorised to ensure that each stakeholder can take specific, actionable steps toward creating a more inclusive and equitable electricity sector in Nigeria.

#### Government and Policymakers

1. Expand Electricity Infrastructure in Underserved Regions: Policymakers must prioritise strategic investments in transmission and distribution networks, particularly in Northern Nigeria. Investments should focus on bridging the regional disparities in electricity access, improving both urban and rural electrification.

2. Diversify Energy Sources: Policymakers should promote renewable energy development, harnessing Nigeria’s abundant solar, wind, and hydro resources. By enacting supportive policies and incentivising investments in renewables, the

government can create a more sustainable and diversified energy mix that improves accessibility and reliability.

3. Support Affordability through Regulatory Reforms: Implement targeted subsidies and flexible tariff structures for low-income households and marginalised regions. Financial mechanisms should be introduced to make electricity more affordable and to reduce the disparities in access between different socio-economic groups.

**Regulatory Bodies**

1. Enhance Transparency and Accountability: The Nigerian Electricity Regulatory Commission (NERC) must enforce regulations ensuring transparency in the billing system, addressing estimated billing issues, and promoting the widespread use of smart meters. This will improve trust in the sector and ensure more accurate energy consumption monitoring.

2. Improve Consumer Engagement: NERC should foster better communication between service providers and consumers, establishing robust mechanisms for customer feedback and dispute resolution. Regular public education campaigns are necessary to inform consumers of their rights and obligations regarding electricity services.

**Energy Providers (DISCOs and GENCOS)**

1. Enhance Service Quality and Reliability: Distribution and generation companies should focus on improving the quality of service by investing in network expansion, maintaining existing infrastructure, and enhancing the reliability of electricity supply. This will boost consumer confidence and increase willingness to pay for services.

2. Adopt Inclusive Community Engagement Practices: Electricity providers must engage local communities regularly, not only during bill collection. By collaborating with community leaders and holding consultations, DISCOs can build trust and address the specific needs of different regions.

**Local Communities and Civil Society**

1. Advocate for Accountability and Public Dialogue: Communities should organise collectively to advocate for fairer electricity policies and better service delivery. Reporting issues like billing errors and outages to NERC will hold providers accountable. Local leaders can mediate between communities and service providers, ensuring that community concerns are addressed, and feedback is maintained.

2. Promote Community Ownership of Energy Solutions: Communities can explore local energy solutions, such as mini-grids or solar projects, to improve access in underserved areas. Partnering with NGOs and local government can secure funding and support. Educating members on their rights and encouraging energy-efficient practices can further empower communities and improve electricity reliability.

3. Collaborate with Authorities and Service Providers: Communities must work with local authorities to advocate for infrastructure investment and policy reforms. Maintaining regular communication with service providers, not just during billing, but to address service quality issues, ensures transparency. Local leaders should facilitate discussions that promote equity and long-term service improvements.

**International Donors and Development Partners**

1. Support Renewable Energy Initiatives: International organisations and development partners can provide more financial and technical assistance to support Nigeria's transition towards renewable energy as well as capacity-building initiatives for local stakeholders.

2. Strengthen Institutional Capacity: Donors should focus on building the capacity of Nigerian regulatory agencies and energy providers to manage energy projects effectively. Technical training and knowledge transfer programs can help improve the governance and operational efficiency of the electricity sector.

## REFERENCES


Abam, F. I. et al. (2014). Energy resource structure and on-going sustainable development policy in Nigeria: a review. International Journal of Energy and Environmental Engineering, 5 (2–3), p.102.

Abdulai, A.G. and Hulme, D., 2015. The politics of regional inequality in Ghana: state Elites, Donors and PRSP s. Development Policy Review, 33(5), pp.529-553.

Acemoglu, D., Johnson, S. and Robinson, J.A., 2005. Institutions as a fundamentalcause of long-run growth. Handbook of economic growth, 1, pp.385-472.

Adaramola, M. S., Agelin-Chaab, M., & Paul, S. S. (2014). Assessment of electricity generation and energy cost of wind energy conversion systems in north-central Nigeria. Energy Conversion and Management, 77, 369-376.

Adelaja, A.O., 2020. Barriers to national renewable energy policy adoption: Insights from a case study of Nigeria. *Energy strategy reviews*, *30*, p.100519.

Adelekan, I. (2010). Vulnerability of Poor Urban Coastal Communities to Flooding inLagos, Nigeria. Environment and Urbanization, 22(2), 433-450.

Adeleke, O.K. and Olomola, P.A., 2023. An Empirical Investigation of Financial inclusion, Poverty and Inequality in Nigeria. Redeemer's University Journal Economics, 20(3), pp.391

Adenikinju, A. F. (2008). Efficiency of the energy sector and its impact on the competitiveness of the Nigerian economy. International Association for Energy Economics, 12(2), 1-33.

Adenikinju, A., 2014. Electricity reforms in Nigeria: Challenges and policy options. In NAEE Energy Forum. A Publication of Nigerian Association for Energy Economics.

Adeoye, O. and Spataru, C., 2019. Modelling and forecasting hourly electricity demand in West African countries. Applied Energy, 242, pp.311-333.

Aderounmu, B., Azuh, D., Onanuga, O., Oluwatomisin, O., Ebenezer, B. and Azuh, A., 2021. Poverty drivers and Nigeria's development: Implications for policy intervention. Cogent Arts & Humanities, 8(1), p.1927495.

Adoghe, A.U., Adeyemi-Kayode, T.M., Oguntosin, V. and Amahia, I.I., 2023. Performance evaluation of the prospects and challenges of effective power generation and distribution in Nigeria. *Heliyon*, *9*(3).

Adusah-Poku, F. and Takeuchi, K., 2019. Energy poverty in Ghana: any progress so far?. *Renewable and Sustainable Energy Reviews*, *112*, pp.853-864.

Aemro, Y.B., Moura, P. and de Almeida, A.T., 2023. Energy access during and post-COVID-19 pandemic in sub-Saharan countries: The case of Ethiopia. *Environment, Development and Sustainability*, *25*(2), pp.1236-1257.

Afigbo, A.E., 1991. Background to Nigerian federalism: Federal features in the colonial state. Publius: The Journal of Federalism, 21(4), pp.13-29.

Africa. Profiles of Change: African Society and Colonial Rule. Edited by V. Turner, 3, pp.1870-1960. Suberu, R. (2009). Federalism and the Management of Ethnic and Religious

Agora Energiewende. (2021). Energiewende: Germany' s energy transition. Retrieved from The German Energiewende (agora-energiewende.de)

Agoundedemba, M., Kim, C.K. and Kim, H.G., 2023. Energy Status in Africa: Challenges, Progress and Sustainable Pathways. *Energies*, *16*(23), p.7708.

Agyeman, J., Bullard, R. D., & Evans, B. (2003). Just sustainabilities: Development in an unequal world. MIT Press.

Ahazuem, J.O., 1988. The Nigerian Coal Industry and the Dilemma of a Shrinking Market for Coal. Transafrican Journal of History, 17, pp.139-151.

Ahmed-Gamgum, W.A., 2014. Nigeria at 100 Years: The Process and Challenges of Nation Building. Public Policy and Administration Research, 4(8), pp.114-39.

Ajaebili, C.N., 2015. A Century After Amalgamation: Reflections On History and Nation Building In Nigeria, 1914-2014. Journal of the Historical Society of Nigeria, pp.95-107.

Ajao, K.R., Ajimotokan, H.A., Popoola, O.T. and Akande, H.F., 2009. Electric energy supply in Nigeria, decentralised energy approach. Cogeneration and Distributed Generation Journal, 24(4), pp.34-50.

Ajayi, O. O. and Ajayi, O. O. (2013). Nigeria’s energy policy: Inferences, analysis and legal ethics toward RE development. Energy Policy, 60, pp.61–67. [Online]. Available at: doi:10.1016/j.enpol.2013.05.095.

Ajayi, O.O. and Ajanaku, K.O., 2009. Nigeria's energy challenge and power development: the way forward. Energy & environment, 20(3), pp.411-413.

Akinlo, A.E., 2009. Electricity consumption and economic growth in Nigeria: evidence from cointegration and co-feature analysis. Journal of Policy Modeling, 31(5), pp.681-693.

Akinwale, A. A., Adewunmi, A. A., & Ibrahim, F. (2014). Urbanization, Cities, and Health: The Challenges to Nigeria - A Review. Annals of African Medicine, 13(4), 323-328.

Akinwale, Y., Jesuleye, O. and Siyanbola, W., 2013. Empirical analysis of the causal relationship between electricity consumption and economic growth in Nigeria. British Journal of Economics, Management and Trade, 3(3), pp.277-295.

Akinyele, D.O. and Rayudu, R.K., 2013, December. Distributed photovoltaic power generation for energy-poor households: The Nigerian perspective. In 2013 IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC) (pp. 1-6). IEEE.

Aklin, M., Bayer, P., Harish, S.P. and Urpelainen, J., 2018. *Escaping the energy poverty trap: when and how governments power the lives of the poor*. MIT Press.

Akorede, M. F., Hizam, H., & Pouresmaeil, E. (2018). Distributed energy resources and benefits to the environment. Renewable and Sustainable Energy Reviews, 82, 83-90.

Akuru, U.B., Onukwube, I.E., Okoro, O.I. and Obe, E.S., 2017. Towards 100% renewable energy in Nigeria. Renewable and Sustainable Energy Reviews, 71, pp.943-953.

Alapiki, H.E., 2005. State creation in Nigeria: Failed approaches to national integration and local autonomy. African Studies Review, 48(3), pp.49-65.

Aliyu, A.S., Dada, J.O. and Adam, I.K., 2015. Current status and future prospects of renewable energy in Nigeria. Renewable and sustainable energy reviews, 48, pp.336-346.

Alkhuzaim, L., Kouhizadeh, M. and Sarkis, J., 2022. Resource and natural resource dependence theories in supply chains. In *Handbook of Theories for Purchasing, Supply Chain and Management Research* (pp. 153-167). Edward Elgar Publishing.

Al-Saidi, M., Roach, E.L. and Al-Saeedi, B.A.H., 2020. Conflict resilience of water and energy supply infrastructure: Insights from Yemen. *Water*, *12*(11), p.3269.

Ambler, C. and Larkin, B., 2008. Signal and Noise: Media, Infrastructure, and UrbanCulture in Nigeria. Journal of African History, 49(3), p.485.

Ani, U.S. and Ani, K.J., 2017. Nigerian coal industry: Focus on effects of under-utilisation to the economy, 1909–2015. In The Political Economy of Energy in Sub-Saharan Africa (pp. 138-151). Routledge.

Ariza-Montobbio, P., 2013. Large-scale renewable energy?: a transdisciplinary view on conflicts and trade-offs in the implementation of renewable energy. Universitat

Asaju, K. and Egberi, T., 2015. Federal character and national integration in Nigeria: The need for discretion and interface. *Review of history and political science*, *3*(1), pp.126-134.

Asantewaa, A., 2023. *Electricity sector reforms in sub-Saharan Africa* (Doctoral dissertation, Durham University).

Ashagidigbi, W.M., Babatunde, B.A., Ogunniyi, A.I., Olagunju, K.O. and Omotayo, A.O., 2020. Estimation and determinants of multidimensional energy poverty among households in Nigeria. *Sustainability*, *12*(18), p.7332

Asia and Latin America. Eberhard, A. and Shkaratan, M., 2012. Powering Africa: Meeting the financing and reform challenges. Energy Policy, 42, pp.9-18.

Autònoma de Barcelona,.Bauknecht, D., & Dütschke, E. (2013). Technological and societal changes in the German energy system. Energy, Sustainability and Society, 3(1), 1-11.

Ayaburi, J., Bazilian, M., Kincer, J. and Moss, T., 2020. Measuring “Reasonably Reliable” access to electricity services. The Electricity Journal, 33(7), p.106828.

Babatunde, O., Buraimoh, E., Tinuoye, O., Ayegbusi, C., Davidson, I. and Ighravwe, D.E., 2023. Electricity sector assessment in Nigeria: the post-liberation era. *Cogent Engineering*, *10*(1), p.2157536.

Baddeley, M., 2006. Convergence or divergence? The impacts of globalisation on growth and inequality in less developed countries. International Review of Applied

Baker, L., Newell, P. and Phillips, J., 2014. The political economy of energy transitions: the case of South Africa. *New political economy*, *19*(6), pp.791-818.

Baker, P.H., 1974. Urbanization and political change: the politics of Lagos, 1917-1967 (p. 274). Berkeley: University of California Press.

Balogun, J.A., 2022. Reimagining the Nigerian healthcare system to achieve universal and high-quality health care by 2030. In *The Nigerian Healthcare System: Pathway to Universal and High-Quality Health Care* (pp. 407-454). Cham: Springer International Publishing.

Banerjee, R., Mishra, V. and Maruta, A.A., 2021. Energy poverty, health and education outcomes: evidence from the developing world. *Energy economics*, *101*, p.105447.

Bank Publications. Bridge, G., Bouzarovski, S., Bradshaw, M., & Eyre, N. (2013). Geographies of energy transition: Space, place and the low-carbon economy. Energy Policy, 53, 331-340.

Baurzhan, S. and Jenkins, G.P., 2016. Off-grid solar PV: Is it an affordable or appropriate solution for rural electrification in Sub-Saharan African countries?. Renewable and Sustainable Energy Reviews, 60, pp.1405-1418.

Baxter, J. (2008). Post-Structuralist Analysis of Classroom Discourse. Encyclopedia of Language and Education, pp.826–836

Bazilian, M., Nussbaumer, P., Rogner, H. H., Brew-Hammond, A., Foster, V., Pachauri, S., ... & Yumkella, K. K. (2012). Energy access scenarios to 2030 for the power sector in sub-Saharan Africa. Utilities Policy, 20(1), 1-16.

Bedi, H.P., 2018. ‘Our energy, our rights’: national extraction legacies and contested energy justice futures in Bangladesh. *Energy research & social science*, *41*, pp.168-175.

Berger, P.L., 2015. The social construction of reality: A treatise in the sociology ofknowledge. Open Road Media.

Blimpo, M.P. and Cosgrove-Davies, M., 2019. Electricity access in Sub-Saharan Africa: Uptake, reliability, and complementary factors for economic impact. World

Blyth, W., Bradley, R., Bunn, D., Clarke, C., Wilson, T. and Yang, M., 2007. Investment risks under uncertain climate change policy. *Energy policy*, *35*(11), pp.5766-5773.

Bouzarovski, S. and Simcock, N., 2017. Spatializing energy justice. Energy Policy, 107, pp.640-648.

Bouzarovski, S. and Tirado Herrero, S., 2017. The energy divide: Integrating energy transitions, regional inequalities and poverty trends in the European Union. *European Urban and Regional Studies*, *24*(1), pp.69-86.

Bradshaw, M., 2013. *Global energy dilemmas*. Polity.

Braun, V. and Clarke, V. (2012). Thematic analysis. Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. Qualitative research in psychology, 3(2), pp.77-101.

Bridge, G., 2011. Resource geographies 1: Making carbon economies, old andnew. Progress in Human Geography, 35(6), pp.820-834.

Bryman, A. (2016). Social research methods. Oxford university press. Creswell, J.W., Klassen, A.C., Plano Clark, V.L. and Smith, K.C., 2011. Best practices for mixed methods research in the health sciences. Bethesda (Maryland): National Institutes of Health, 2013, pp.541-545.

Bussell, J., 2019. *Clients and constituents: Political responsiveness in patronage democracies*. Modern South Asia.

Cantarero, M.M.V., 2020. Of renewable energy, energy democracy, and sustainable development: A roadmap to accelerate the energy transition in developing countries. *Energy Research & Social Science*, *70*, p.101716.

Charles, E.O., 2016. *Oil, Politics and Regional Development in Nigeria: a Comparison of the South-South and the South-West Regions*. University of Exeter (United Kingdom).

Cherp, A. and Jewell, J., 2011. The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration. *Current opinion in environmental sustainability*, *3*(4), pp.202-212.

Chess, C. and Purcell, K., 1999. 'Public participation and the environment: Do we know what works?' Environmental Science & Technology, 33(16), pp.2685–2692.

Chowdhury, M.F., 2014. Interpretivism in aiding our understanding of the contemporary social world. Open Journal of Philosophy, 2014.

Christensen, T. and Lægreid, P., 2007. 'The whole-of-government approach to public sector reform.' Public Administration Review, 67(6), pp.1059–1066.

Cloke, J., Mohr, A. and Brown, E., 2017. Imagining renewable energy: Towards a Social Energy Systems approach to community renewable energy projects in the Global South. Energy research & social science, 31, pp.263-272.

Coelho, S.T. and Goldemberg, J., 2013. Energy access: Lessons learned in Brazil and perspectives for replication in other developing countries. *Energy policy*, *61*, pp.1088-1096.

Consolidation: A Historical Exploration. African Journal of Political Science and International Relations, 4(4), 127-134.

Cook, P., 2011. Infrastructure, rural electrification and development. Energy forSustainable Development, 15(3), pp.304-313.

Cooper, F., 1994. Conflict and connection: rethinking colonial African history. TheAmerican Historical Review, 99(5), pp.1516-1545.

Creswell, J. W., & Poth, C. N. (2017). Qualitative inquiry and research design:Choosing among five approaches. Sage publications.

Crotty, M., 1998. The foundations of social research: Meaning and perspective in theresearch process. Sage Publications.

Da Silva, V.O., dos Santos, F.G., Diniz, I.N., Baitelo, R.L. and Ferreira, A.L., 2024. Photovoltaic systems, costs, and electrical and electronic waste in the Legal Amazon: An evaluation of the Luz para Todos Program. *Renewable and Sustainable Energy Reviews*, *203*, p.114721.

Dada, J.O., 2014. Towards understanding the benefits and challenges of Smart/Micro-Grid for electricity supply system in Nigeria. Renewable and Sustainable Energy Reviews, 38, pp.1003-1014.

Dauda, R.S., 2017. Poverty and economic growth in Nigeria: Issues andpolicies. Journal of Poverty, 21(1), pp.61-79.

Day, R., Walker, G. and Simcock, N., 2016. Conceptualising energy use and energy, poverty using a capabilities framework. Energy Policy, 93, pp.255-264.

De Ruyter, A., 2023. *Truth to power: My three years inside Eskom*. Penguin Random House South Africa.

Deichmann, U., Meisner, C., Murray, S. and Wheeler, D., 2011. The economics of renewable energy expansion in rural Sub-Saharan Africa. Energy policy, 39(1), pp.215-227.

Demissie, F., 2007. Imperial legacies and postcolonial predicaments: an introduction. African Identities, 5(2), pp.155-165.

Demski, C., Butler, C., Parkhill, K. A., Spence, A., & Pidgeon, N. F. (2015). Public values for energy system change. Global Environmental Change, 34, 59-69.

Denzin, N.K., 2018. The qualitative manifesto: A call to arms. Routledge.

Depository, B., 2011. Nigeria at 50: A Compendium : 1 October : 9789789119004. [online] Bookdepository.com. Available at: & lt; https://www.bookdepository.com/Nigeria-at-50-Compendium-1-October/9789789119004> [Accessed 1 February 2022].

Diaz, G.R., 2017. The contractual and administrative regulation of public-private partnership. *Utilities Policy*, *48*, pp.109-121.

Diversity in Nigeria. In Managing Nigeria' s Diversity: State, Civil Society, and Community Responses to Ethnic and Religious Conflict (Vol. 5). Institute for Development Studies, University of Nigeria.

Duruji, M. M. (2010). Democracy and the challenge of ethno-nationalism in Nigeria&#65533;s Fourth Republic: Interrogating institutional mechanics. Journal of Peace, Conflict and Development, (15), pp.92–106.

DY, D.M. And Abdulrahman, D., 2022. The Role of Kano Industrial Economies, Urban Settlement and Migration in The West African Integration. *International Journal of Humanities, Literature and Art Research*.

Eberhard, A. and Catrina Godinho, C., 2017. A review and exploration of the status, context and political economy of power sector reforms in Sub-Saharan Africa, South

Eberhard, A., Gratwick, K., Morella, E. and Antmann, P., 2017. Independent power projects in sub-Saharan Africa: Investment trends and policy lessons. *Energy Policy*, *108*, pp.390-424.

Eberhard, A., Gratwick, K., Morella, E., & Antmann, P. (2016). Independent power projects in sub-Saharan Africa: Lessons from five key countries. World Bank Publications. Economics and Management Studies, 2(10), pp.62-75.

Edomah, N., 2016. On the path to sustainability: Key issues on Nigeria’s sustainable energy development. Energy Reports, 2, pp.28-34.

Edomah, N., Ndulue, G. and Lemaire, X., 2021. A review of stakeholders and interventions in Nigeria's electricity sector. Heliyon, 7(9), p.e07956.

EIA (2021). Nigeria: International energy data and analysis. U.S. Energy InformationAdministration. https://www.eia.gov/international/analysis/country/NGA

Elum, Z.A. and Mjimba, V., 2020. Potential and challenges of renewable energy development in promoting a green economy in Nigeria. Africa Review, 12(2), pp.172-191.

Emodi, N.V. and Yusuf, S.D., 2015. Improving electricity access in Nigeria: obstacles and the way forward. International Journal of Energy Economics and Policy, 5(1), pp.335-351.

European Commission. (2019). The European Green Deal. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM:2019:640:FIN.

Fairclough, N.(1995). Language and power.London: Longman. Fairclough, N. and

Fairclough, Norman and Ruth Wodak, Discourse as Social Interaction (London: Sage Publications, 1997)

Falchetta, G., Pachauri, S., Byers, E., Danylo, O. and Parkinson, S.C., 2020. Satellite observations reveal inequalities in the progress and effectiveness of recent electrification in sub-Saharan Africa. One Earth, 2(4), pp.364-379.

Falchetta, G., Stevanato, N., Moner-Girona, M., Mazzoni, D., Colombo, E. and Hafner, M., 2020. M-LED: multi-sectoral latent electricity demand assessment for energy access planning.

Falola, T., & Heaton, M. M. (2008). A History of Nigeria. Cambridge University Press.

Falola, T., 2004. Economic reforms and modernization in Nigeria, 1945-1965. KentState University Press.

Fashola, B. (2016). Fashola at the Power Nigeria Conference. Fashola Raises Hope for Better Electricity Supply – Thisdaylive

Fashola, B. (2018). Don' t blame FG for poor power supply - Fashola – Vanguard News (vanguardngr.com)

Ferguson, R., Wilkinson, W. and Hill, R., 2000. Electricity use and economic development. Energy policy, 28(13), pp.923-934.

Fischer, W., Hake, J.F., Kuckshinrichs, W., Schröder, T. and Venghaus, S., 2016. German energy policy and the way to sustainability: Five controversial issues in the debate on the “Energiewende”. *Energy*, *115*, pp.1580-1591.

Foster, V., Eberhard, A. and Dyson, G., 2021. The evolution of electricity sectors in Africa: Ongoing obstacles and emerging opportunities to reach universal targets. In *Handbook on Electricity Markets* (pp. 595-628). Edward Elgar Publishing.

Franco, A., Shaker, M., Kalubi, D. and Hostettler, S., 2017. A review of sustainable energy access and technologies for healthcare facilities in the Global South. Sustainable Energy Technologies and Assessments, 22, pp.92-105.

Fridley, D., 2010. Nine challenges of alternative energy. The post carbon reader: managing the, 21.

Frynas, J. G. (2000). Oil in Nigeria: Conflict and Litigation Between Oil Companies and Village Communities. LIT Verlag Münster.

Fung, A., 2006. 'Varieties of participation in complex governance.' Public Administration Review, 66(s1), pp.66–75.

Gallagher, K. (2013). The ethics of research with high-profile participants. International Journal of Social Research Methodology, 16(3), 231-242. doi:10.1080/13645579.2013.765523

Gebreslassie, M. G., Salite, D., & Kirshner, J. (2022). What does it take to electrify rural households in Africa with decentralized renewable energy systems? Energy Policy.

Gebreslassie, M.G., Cuvilas, C., Zalengera, C., To, L.S., Baptista, I., Robin, E., Bekele, G., Howe, L., Shenga, C., Macucule, D.A. and Kirshner, J., 2022. Delivering an off-grid transition to sustainable energy in Ethiopia and Mozambique. Energy, Sustainability and Society, 12(1), pp.1-18.

Geissler, S., Österreicher, D. and Macharm, E., 2018. Transition towards energy efficiency: Developing the Nigerian building energy efficiency code. Sustainability, 10(8), p.2620.

George, E.O. and Oseni, J.E., 2012. The relationship between electricity power and unemployment rates in Nigeria. Australian journal of business and management research, 2(2), p.10.

Godinho, C., 2023. Power Sector Reform and Regulation. *State and Business in Tanzania's Development: The Institutional Diagnostic Project*, p.262.

Goldemberg, J. and Lucon, O., 2010. Energy, environment, and development. Earthscan. Guest, G., MacQueen, K.M. and Namey, E.E., 2012. Introduction to applied thematic analysis. Applied thematic analysis, 3(20), pp.1-21.

Gómez, M.F. and Silveira, S., 2010. Rural electrification of the Brazilian Amazon–Achievements and lessons. *Energy policy*, *38*(10), pp.6251-6260.

González-Eguino, M., 2015. Energy poverty: An overview. *Renewable and sustainable energy reviews*, *47*, pp.377-385.

Gough, K.V. and Yankson, P.W., 2000. Land markets in African cities: the case of peri-urban Accra, Ghana. Urban studies, 37(13), pp.2485-2500.

Greenberg, M.R., 2014. Energy policy and research: the underappreciation of trust. *Energy Research & Social Science*, *1*, pp.152-160.

Grogan, L. and Sadanand, A., 2013. Rural electrification and employment in poor countries: Evidence from Nicaragua. World Development, 43, pp.252-265.

Gungah, A., Emodi, N.V. and Dioha, M.O., 2019. Improving Nigeria' s renewable

Guo, Z., Zhou, K., Zhang, C., Lu, X., Chen, W. and Yang, S., 2018. Residential electricity consumption behavior: Influencing factors, related theories and intervention strategies. Renewable and Sustainable Energy Reviews, 81, pp.399-412.

Hampton, B., 2023. An analytic framework to advance understanding of power sector reforms in Sub-Saharan Africa.

Hanke, F., Grossmann, K. and Sandmann, L., 2023. Excluded despite their support-The perspectives of energy-poor households on their participation in the German energy transition narrative. *Energy Research & Social Science*, *104*, p.103259.

Hardy, C., Harley, B. and Phillips, N., 2004. Discourse analysis and content analysis: Two solitudes. Qualitative methods, 2(1), pp.19-22.

Haverkamp, B.E., 2005. Ethical perspectives on qualitative research in applied psychology. Journal of counseling psychology, 52(2), p.146.

Havinden, M. and Meredith, D., 2002. Colonialism and development: Britain and itstropical colonies,

Herrero, S.T., 2017. Energy poverty indicators: A critical review of methods. *Indoor and Built Environment*, *26*(7), pp.1018-1031.

Hicks, C., 2015. Africa's new oil: Power, pipelines and future fortunes. Development, 58(4), pp.620-630.

Hobman, E.V., Frederiks, E.R., Stenner, K. and Meikle, S., 2016. Uptake and usage of cost-reflective electricity pricing: Insights from psychology and behavioural economics. Renewable and Sustainable Energy Reviews, 57, pp.455-467.

Horváthová, B., Dobbins, M. and Labanino, R.P., 2021. Towards energy policy corporatism in Central and Eastern Europe?. Interest Groups & Advocacy, 10, pp.347-375.

Howlett, M., Ramesh, M., & Perl, A. (2017). Studying public policy: Policy cycles and policy subsystems. Oxford University Press.

https://www.ipcc.ch/site/assets/uploads/2018/03/SRREN_FD_Summary_for_Policy makers.pdf

https://www.irena.org/publications/2018/Feb/Renewable-Energy-Prospects-for-Nigeria

Ibitoye, F.I. and Adenikinju, A., 2007. Future demand for electricity in Nigeria. Applied Energy, 84(5), pp.492-504.

IEA (2019). Energy access outlook 2019: From poverty to prosperity. International Energy Agency. https://www.iea.org/reports/energy-access-outlook-2019

Igawa, M. and Managi, S., 2022. Energy poverty and income inequality: An economic analysis of 37 countries. *Applied Energy*, *306*, p.118076.

Ikein, A. A., Alamieyeseigha, D. S., & Azaiki, S. S. (2008). Oil, democracy, and the promise of true federalism in Nigeria. University Press of America.

Ikeme, J. and Ebohon, O.J., 2005. Nigeria's electric power sector reform: what should form the key objectives? Energy policy, 33(9), pp.1213-1221.

In IOP Conference Series: Earth and Environmental Science (Vol. 730, No. 1, p. 012025). IOP Publishing.

International Energy Agency. (2017). Energy Access Outlook 2017: From Poverty to Prosperity. International Energy Agency. https://www.iea.org/reports/energy-access-outlook-2017

International Energy Agency. Key World Energy Statistics; International Energy Agency: Paris, France, 2017.

Internet Journal of Criminology, pp.1–29. Saint, S. (2008). A critical discourse analysis of corporate environmental harm. Internet Journal of Criminology, pp.1–29.

IPCC (2011). IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation.

IRENA (2018). Renewable Energy Prospects for Nigeria. International Renewable Energy Agency. Retrieved from

Irvin, R.A. and Stansbury, J., 2004. Citizen participation in decision making: is it worth the effort?. Public administration review, 64(1), pp.55-65.

Ite, A. E., Ibok, U. J., Ite, M. U., & Petters, S. W. (2013). Petroleum Exploration and Production: Past and Present Environmental Issues in Nigeria's Niger Delta. American Journal of Environmental Protection, 1(4), 78-90.

Itumo, V.N., 2017. What Hinders Economic Development in Africa? European Journal of Interdisciplinary Studies, 9(2), pp.13-31.

Iwayemi, A. (2008). Investment in electricity generation and transmission in Nigeria: Issues and options. International Association for Energy Economics, 11(3), 47-62.

Jaiyeola, A.O. and Bayat, A., 2020. Assessment of trends in income poverty in Nigeria from 2010–2013: An analysis based on the Nigeria General Household

Jamasb, T., & Nepal, R. (2010). Issues and options in waste-to-energy systems. Applied Energy, 87(11), 3523-3532.

Jatto, A.L.A., 2024. *Oil and Gas Pipeline Infrastructure Insecurity: Vandalism, Threats, and Conflicts in the Niger Delta and the Global South*. Springer Nature.

Jatto, A.L.A., 2024. *Oil and Gas Pipeline Infrastructure Insecurity: Vandalism, Threats, and Conflicts in the Niger Delta and the Global South*. Springer Nature.

Jenkins, K., McCauley, D., Heffron, R., Stephan, H., & Rehner, R. (2016). Energy justice: A conceptual review. Energy Research & Social Science, 11, 174-182.

Jiang, W. and Zhao, X., 2021. Trust and the intent to cooperate in energy performance contracting for public buildings in China. *Engineering, Construction and Architectural Management*, *28*(1), pp.372-396.

Johnstone, P., Rogge, K.S., Kivimaa, P., Fratini, C.F. and Primmer, E., 2021. Exploring the re-emergence of industrial policy: Perceptions regarding low-carbon energy transitions in Germany, the United Kingdom and Denmark. *Energy Research & Social Science*, *74*, p.101889.

Jones, R.V.; Lomas, K.J. Determinants of high electrical energy demand in UK homes: Socio-economic and dwelling characteristics. Energy Build. 2015, 101, 24–34.

Joppe, G., 2000. Testing reliability and validity of research instruments. Journal of American Academy of Business Cambridge, 4(1/2), pp.49-54.

Jørgensen, M. W. and Phillips, L. J. (2002a). Critical discourse analysis. Discourse.

Jørgensen, M. W. and Phillips, L. J. (2002b). Discourse analysis as theory and method. Sage.

Jørgensen, M.W. and Phillips, L.J., 2002. Discourse analysis as theory and method. Sage.

Kabeyi, M.J.B. and Olanrewaju, O.A., 2022. Sustainable energy transition for renewable and low carbon grid electricity generation and supply. *Frontiers in Energy research*, *9*, p.1032.

Kambule, N., Yessoufou, K. and Nwulu, N., 2018. A review and identification of persistent and emerging prepaid electricity meter trends. Energy for Sustainable Development, 43, pp.173-185.

Kaminker, C. and Stewart, F., 2012. The role of institutional investors in financing clean energy.

Kashwan, P., MacLean, L.M. and García-López, G.A., 2019. Rethinking power and institutions in the shadows of neoliberalism:(An introduction to a special issue of World Development). *World Development*, *120*, pp.133-146.

Kaygusuz, K., 2011. Energy services and energy poverty for sustainable rural development. Renewable and sustainable energy reviews, 15(2), pp.936-947.

Kern, F. and Howlett, M., 2009. 'Implementing transition management as policy reforms: a case study of the Dutch energy sector.' Policy Sciences, 42(4), pp.391–408.

Keshavadasu, S.R., 2023. Regulatory and policy risks: Analyzing the uncertainties related to changes in government policies, regulations, and incentives affecting solar power project development and operations in Kenya. *Energy Policy*, *182*, p.113760.

Killingray, D., 1989. Labour exploitation for military campaigns in British colonial Africa 1870-1945. Journal of Contemporary History, 24(3), pp.483-501.

King, A.D., 2012. Colonial urban development: Culture, social power and environment. Routledge.

King, N., Horrocks, C. and Brooks, J. (2018). Interviews in qualitative research. SAGE Publications Limited.

Kingsley, I. and Tonuchi, J.E., 2021. Contribution to the empirics of electricity blackouts and productivity in Nigeria. Energy Economics Letters, 8(1), pp.60-69.

Kolawole, B. O., Omobitan, O. A. and Yaqub, J. O. (2015). Poverty, inequality and rising growth in Nigeria: Further empirical evidence. International Journal of Economics and Finance, 7 (2), pp.51–62

Last, M. (1967). The Sokoto Caliphate. Longmans.

Lazo, J., Escobar, C. and Watts, D., 2023. From blackouts to breakthroughs: Examining electricity's relevance in healthcare during COVID-19 and the future role of renewable energy. *Energy Research & Social Science*, *103*, p.103224.

Leahy, E.; Sean, S.L. Energy use and appliance ownership in Ireland. Energy Policy 2010, 38, 4265–4279.

Leech, B.L., 2002. Asking questions: Techniques for semi structured interviews. PS: Political Science & Politics, 35(4), pp.665-668.

Leeming, D., 2018. The use of theory in qualitative research. Journal of Human Lactation, 34(4), pp.668-673.

Lewis, G.H., 1991. From Common Dullness to Fleeting Wonder: The Manipulation of Cultural Meaning in the Teenage Muntant Ninja Turtles Saga. Journal of Popular Culture, 25(2), p.31.

Lionel, E., 2013. The dynamic analysis of electricity supply and economic development: Lessons from Nigeria. Journal of sustainable society, 2(1), pp.1-11.

Liu, Y., Zang, Y., & Yang, Y. (2020). China’s rural revitalization and development: theory, technology and management. Journal of Geographical Sciences, 30(12), 1923-1942. https://doi.org/10.1007/s11442-020-1819-3

Locatelli, G., Mariani, G., Sainati, T. and Greco, M., 2017. Corruption in public projects and megaprojects: There is an elephant in the room!. *International journal of project management*, *35*(3), pp.252-268.

Louw, K., Conradie, B., Howells, M. and Dekenah, M., 2008. Determinants of electricity demand for newly electrified low-income African households. Energy policy, 36(8), pp.2812-2818.

Lovejoy, P.E. and Hogendorn, J.S., 1990. Revolutionary Mahdism and resistance to colonial rule in the Sokoto Caliphate, 1905–61. The Journal of African History, 31(2), pp.217-244.

Luke, A. (1997). Theory and practice in critical discourse analysis. International encyclopedia of the sociology of education, 8, pp.50–57.

Mabogunje, A.L., 1990. Urban Planning and the Post-Colonial State in Africa: A Research Overview1. African Studies Review, 33(2), pp.121-203.

Madlener, R. and Sunak, Y., 2011. Impacts of urbanization on urban structures and energy demand: What can we learn for urban energy planning and urbanization management?. Sustainable Cities and Society, 1(1), pp.45-53.

Mamdani, M., 1996. Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism (Princeton, NJ: PUP). Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism.

Marsh, D. and Furlong, P., 2002. A skin not a sweater: Ontology and epistemology in political science. Theory and methods in political science, 2(1), pp.17-41.

Marshall, B., Cardon, P., Poddar, A. and Fontenot, R., 2013. Does sample size matter in qualitative research?: A review of qualitative interviews in IS research. Journal of computer information systems, 54(1), pp.11-22.

Mason, M., 2010, August. Sample size and saturation in PhD studies using qualitative interviews. In Forum qualitative Sozialforschung/Forum: qualitative social research (Vol. 11, No. 3).

McGregor, S. L. T. (2003). Critical discourse analysis: A primer. In: Kappa Omicron Nu FORUM. 15 (1). 2003. pp.11–15.

Mees, H.L., Uittenbroek, C.J., Hegger, D.L. and Driessen, P.P., 2019. From citizen participation to government participation: An exploration of the roles of local governments in community initiatives for climate change adaptation in the Netherlands. Environmental Policy and Governance, 29(3), pp.198-208.

Meeus, L., Govaerts, N. and Schittekatte, T., 2020. Cost-reflective network tariffs: experiences with forward looking cost models to design electricity distribution charges.

Mentis, D. et al. (2016). The benefits of geospatial planning in energy access—A case study on Ethiopia. Applied geography, 72, pp.1–13.

Milanovic, B. (2003). Is inequality in Africa really different? The World Bank. Momah, S., 2013. Nigeria beyond divorce: Amalgamation in perspective. African Books Collective.

Monyei, C.G., Adewumi, A.O., Obolo, M.O. and Sajou, B., 2018. Nigeria's energy poverty: Insights and implications for smart policies and framework towards a smart Nigeria electricity network. *Renewable and Sustainable Energy Reviews*, *81*, pp.1582-1601.

Mosse, D. (2010). A relational approach to durable poverty, inequality and power. The journal of development studies, 46 (7), pp.1156–1178.

Murshed, M. and Ozturk, I., 2023. Rethinking energy poverty reduction through improving electricity accessibility: a regional analysis on selected African nations. Energy, 267, p.126547.

Nadin, V., Stead, D., Dąbrowski, M. and Fernandez-Maldonado, A.M., 2021. Integrated, adaptive and participatory spatial planning: trends across Europe. Regional studies, 55(5), pp.791-803.

Nalule, V.R., 2018. *Energy poverty and access challenges in sub-Saharan Africa: The role of regionalism*. Springer.

National Bureau of Statistics, Nigeria Statistical Data Portal, 'Revised Absolute Poverty

National Bureau of Statistics. (2019). Nigerian Living Standards Survey (NLSS) 2018-2019.

National Bureau of Statistics. (2021). Nigerian Living Standards Survey (NLSS) 2021

National Population Commission of Nigeria. (2006). 2006 Population and Housing Census of the Federal Republic of Nigeria: National and State Population and Housing

National Population Commission, Nigeria Demographic and Health Survey 2008, November 2009, p. 121.

National Renewable Energy Action Plans (NREAP) (2015-2030). Federal Ministry of Works and Housing. Retrieved from https://www.worksandhousing.gov.ng/themes/front_end_themes_01/images/download/NATIONALENERGYEFFICIENCYACTIONPLANS.pdf

NERC (2021). Nigerian Electricity Regulatory Commission. Retrieved fromhttps://nerc.gov.ng/index.php/library/documents/

NERC. (2020). Nigerian Electricity Regulatory Commission: 2020 Q1 quarterly report. Nigerian Electricity Regulatory Commission. [Accessed: 2021-04-19]. URL:https://nerc.gov.ng/index.php/library/documents/NERC-Reports/NERC-Quarterly-Reports/

Nerini, F.F., Broad, O., Mentis, D., Welsch, M., Bazilian, M. and Howells, M., 2016. A cost comparison of technology approaches for improving access to electricity services. Energy, 95, pp.255-265.

Nerini, F.F.; Broad, O.; Mentis, D.; Welsch, M.; Bazilian, M.; Howells, M. A cost comparison of technology approaches for improving access to electricity services. Energy 2016, 95, 255–265.

Newell, P., 2021. *Power shift: The global political economy of energy transitions*. Cambridge University Press.

Nicolson, I.F., 1969. The administration of Nigeria, 1900-1960: men, methods and myths (pp. 180-215). Oxford: Clarendon Press.

Nie, Y., Zhang, G., Zhong, L., Su, B. and Xi, X., 2024. Urban–rural disparities in household energy and electricity consumption under the influence of electricity price reform policies. *Energy Policy*, *184*, p.113868.

Nigerian Electricity Regulatory Commission (NERC). (2021). Retrieved from https://nerc.gov.ng/

Nigerianstat.gov.ng. (2018). NATIONAL BUREAU OF STATISTICS. [online] Available at: https://www.nigerianstat.gov.ng/.

Njoku, O.N., 1978. Development of Roads and Road Transport in South eastern Nigeria, 1903-1939. Journal of African Studies, 5(4), p.471.

Nkalo, U.K. and Agwu, E.O., 2019. Review of the impact of electricity supply on economic growth: A Nigerian case study. IOSR Journal of Electrical and ElectronicsEngineering (IOSR-JEEE), 14(1), pp.28-34.

Nna, C. D., Gbadegesin, A. O. and Lawal, K. O. (2016). A decentralized, renewable-energy-powered business hub for rural areas: A case study of Ilakan community, Nigeria. In: 2016 Clemson University Power Systems Conference (PSC). 2016. IEEE. pp.1–7.

Noon, E.J., 2018. Interpretive phenomenological analysis: An appropriate methodology for educational research. Journal of Perspectives in Applied Academic

Nugraha, A.T. and Prayitno, G., 2020. Regional disparity in western and eastern Indonesia. *International Journal of Economics and Business Administration*, *8*(4), pp.101-110.

Nwankwo, O.C. and Njogo, B.O., 2013. The effect of electricity supply on industrial production within the Nigerian economy (1970–2010). Journal of Energy Technologies and Policy, 3(4), pp.34-42.

Nwodim, O. and Adah, R.U., 2021. Colonial Policies and Post-Independence Development in Nigeria. *International Journal of Social Science and Human Research*, *4*(4), pp.795-802.

Nwozor, A., 2014. Power rotation, ethnic politics and the challenges of democratization in contemporary Nigeria. African Study Monographs, 35(1), pp.1-18. O' Connor, A., 2013. The African City. Routledge.

Nwozor, A., Oshewolo, S., Owoeye, G. and Okidu, O., 2021. Nigeria's quest for alternative clean energy development: A cobweb of opportunities, pitfalls and multiple dilemmas. Energy Policy, 149, p.112070.

Oatley, T., 2022. *International political economy*. Routledge.

Obiorji, J.N. and Iwuoha, V.C., 2022. Privatisation, prepaid metering and electricity billing scam of Enugu electricity distribution company (EEDC) in Enugu metropolis of Nigeria. Journal of Public Affairs, 22(4), p.e2644.

Ogunkan, D.V., 2022. Achieving Sustainable Environmental Governance in Nigeria: A Review for Policy Consideration. Urban Governance..

Ogunleye, E.K. Political Economy of Nigerian Power Sector Reform; UNU-WIDER: Helsinki, Finland, 2016.

Ogunro, T. and Afolabi, L., 2021. Evaluation of access to electricity and the socioeconomic effects in rural and urban expanses of Nigeria. International Journal of Social Economics.

Ogunsola, O.I., 1990. History of energy sources and their-utilization in Nigeria. Energy Sources, 12(2), pp.181-198.

Oh, Y., Kim, S. and Kim, S., 2022. Searching for New Human Behavior Model in Explaining Energy Transition: Exploring the Impact of Value and Perception Factors on Inconsistency of Attitude toward Policy Support and Intention to Pay for Energy Transition. *International Journal of Environmental Research and Public Health*, *19*(18), p.11352.

Ojiego-Okoro, C. and Ezeonwuka, I.F., 2024. FROM COLONIALISM TO IDENTITY POLITICS: NIGERIA'S HISTORICAL TRAJECTORY. *AWKA JOURNAL OF HISTORY (AJOH)*, *2*(1).

Okafor, E. C., & Okonta, I., & Douglas, O. (2003). Where Vultures Feast: Shell, Human Rights, and Oil. Verso.

Okeke, O. C., & Eme, O. I. (2015). Challenges of privatization of Nigeria's power sector and the imperative of national development. Arabian Journal of Business and Management Review, 5(2), 1-15.

Okosun, S.E., Fasakin, J.O., Basorun, J.O., Olamiju, I.O. and Aluko, E.A., 2021. An Appraisal of Electric Energy Supply Security in Residential Estates of Ado-Ekiti, Nigeria. In Sustainable Education and Development 9 (pp. 466-479). Springer International Publishing.

Olaniyan, K., McLellan, B.C., Ogata, S. and Tezuka, T., 2018. Estimating residential electricity consumption in Nigeria to support energy transitions. Sustainability, 10(5), p.1440.

Olatunji, O., Akinlabi, S., Oluseyi, A., Abioye, A., Ishola, F., Peter, M. and Madushele, N., 2018, September. Electric power crisis in Nigeria: A strategic call for change of focus to renewable sources. In IOP Conference Series: Materials Science and Engineering (Vol. 413, No. 1, p. 012053). IOP Publishing.

Olugbenga, T.K., Jumah, A.G.A. and Phillips, D.A., 2013. The current and future challenges of electricity market in Nigeria in the face of deregulation process. African Journal of Engineering Research, 1(2), pp.33-39.

Omilusi, M. (2016). The Practice of Zoning and Power Rotation in Nigeria' s Fourth Republic: Implications for Political Stability. International Journal of Development and Sustainability, 5(3), 156-168.

Onuegbu, F.C., 2023. History And Evolution of The Nigerian State, 1770-1960: Revisiting Our Past. *Nigerian Journal of Arts And Humanities (Njah)*, *2*(1).

Onyeji, I., Bazilian, M. and Nussbaumer, P., 2012. Contextualizing electricity access in sub-Saharan Africa. Energy for Sustainable Development, 16(4), pp.520-527.

Osaghae, E.E. and Suberu, R.T., 2005. A history of identities, violence and stability in Nigeria (Vol. 6). Oxford: Centre for Research on Inequality, Human Security and Ethnicity, University of Oxford

Oseni, M.O., 2012. Improving households' access to electricity and energy consumption pattern in Nigeria: Renewable energy alternative. Renewable and Sustainable Energy Reviews, 16(6), pp.3967-3974.

Oseni, M.O., 2017. Self-generation and households' willingness to pay for reliable electricity service in Nigeria. The Energy Journal, 38(4).

Ostien, P., 2018. The Muslim majority in northern Nigeria. *Creed & grievance: Muslim-Christian relations & conflict resolution in Northern Nigeria*, *11*, p.37.

Oteh, O.U., Oloveze, A.O., Chukwu, I.P., Nto, C.P.O., Ahaiwe, E.O. and Nduka, C., 2021. Electricity Consumption in Nigeria: How Prepaid Metering Influence Consumers' Experience and Trust towards Electricity Consumption. Covenant Journal of Business and Social Sciences, 11(3).

Ouedraogo, N.S., 2019. Opportunities, barriers and issues with renewable energy development in Africa: a comprehensible review. Current Sustainable/Renewable Energy Reports, 6, pp.52-60.

Oyedepo, S. O. (2012). Energy and Sustainable Development in Nigeria: The Way Forward. Energy, Sustainability and Society, 2(1), 15. doi: 10.1186/2192-0567-2-15

Oyedepo, S. O. et al. (2018). Towards a Sustainable Electricity Supply in Nigeria: The Role of Decentralized Renewable Energy System. European Journal of Sustainable Development Research, 2 (4).

Oyedepo, S.O., 2014. Towards achieving energy for sustainable development in Nigeria. Renewable and sustainable energy reviews, 34, pp.255-272.

Oyedepo, S.O., Babalola, O.P., Nwanya, S.C., Kilanko, O., Leramo, R.O., Aworinde, A.K., Adekeye, T., Oyebanji, J.A., Abidakun, A.O. and Agberegha, O.L., 2018. Towards a sustainable electricity supply in nigeria: the role of decentralized renewable energy system. European Journal of Sustainable development research, 2(4), p.40.

Paden, J. N. (2008). Faith and politics in Nigeria: Nigeria as a pivotal state in the Muslim world.

Parkhill, K., Demski, C.C., Butler, C., Spence, A. and Pidgeon, N.F., 2013. Transforming the UK Energy System: Public Values, Attitudes and Acceptability-Synthesis Report.

Passey, R., Haghdadi, N., Bruce, A. and MacGill, I., 2017. Designing more cost reflective electricity network tariffs with demand charges. *Energy Policy*, *109*, pp.642-649.

Pastukhova, M. and Westphal, K., 2020. Governing the global energy transformation. *The geopolitics of the global energy transition*, pp.341-364.

Peters, B.G., 1998. 'Managing horizontal government: The politics of coordination.' Public Administration, 76(2), pp.295–311.

Peterson, M., 2022. Unsustainable Development: The Impact of Power Sector Reform on Policy Regimes in Sub-Saharan Africa. Salite, D., Cotton, M. and Kirshner, J., 2020. Electricity access and social sustainability in Mozambique.

Petrakos, G., 2001. Patterns of regional inequality in transition economies. European Planning Studies, 9(3), pp.359-383.

Pierre, E. A. (2008). Decentering Voice in Qualitative Inquiry. International Review of Qualitative Research, 1(3), 319-336.

Pistelli, L., 2020. Addressing Africa's energy dilemma. *The Geopolitics of the Global Energy Transition*, pp.151-174.

Pollitt, C., 2003. 'Joined-up government: a survey.' Political Studies Review, 1(1), pp.34–49.

Practice, 6(1). Nwankwo, O. (2010). The Nigerian State, Political Assassination and Democratic

Prasad, G. and Visagie, E., 2006. Impact of energy reforms on the poor in Southern Africa.

Raheem, W. M. et al. (2014). Regional imbalances and inequalities in Nigeria: Causes, consequences and remedies. Research on Humanities and Social Sciences, 4 (18), pp.163–174.

Raji, A.O.Y. and Abejide, T.S., 2014. The British mining and oil regulations in colonial Nigeria c. 1914-1960s: an assessment. Singaporean Journal of Business,

Rao, N. D. and Pachauri, S. (2017). Energy access and living standards: some observations on recent trends. Environmental Research Letters, 12 (2), p.25011.

Rao, N.D. and Pachauri, S., 2017. Energy access and living standards: some observations on recent trends. Environmental Research Letters, 12(2), p.025011.

Reardon, T., Stamoulis, K. and Pingali, P., 2007. Rural nonfarm employment in developing countries in an era of globalization. Agricultural Economics, 37, pp.173-183.-410.

Reed, H.E. and Mberu, B.U., 2015. Ethnicity, religion, and demographic behavior in Nigeria. *The international handbook of the demography of race and ethnicity*, pp.419-454.

Reed, M.S., 2008. 'Stakeholder participation for environmental management: A literature review.' Biological conservation, 141(10), pp.2417–2431.

Retter, L., Frinking, E., Hoorens, S., Lynch, A., Nederveen, F. and Phillips, W., 2019. Relationships between the economy and national security.

Richards, N.D.M., 2023. Beyond resistance? Exploring dynamics of incumbency in South Africa's power sector reform.

Rowley, J. E. (2002). Reflections on customer knowledge management in e-business. Qualitative Market Research: An International Journal, 5 (4), pp.268–280.Saint, S. (2008). A critical discourse analysis of corporate environmental harm.

Salite, D., Kirshner, J., Cotton, M., Howe, L., Cuamba, B., Feijó, J. and Macome, A.Z., 2021. Electricity access in Mozambique: A critical policy analysis of investment, service reliability and social sustainability. Energy Research & Social Science, 78, p.102123.

Sambo, A. S. (2008). Matching Electricity Supply with Demand in Nigeria. International Association for Energy Economics, 2008(4), 32-36.

Sambo, A. S. (2009). Strategic developments in renewable energy in Nigeria. International Association for Energy Economics, 16 (3), pp.15–19.

Sambo, A. S. et al. (2012). Electricity generation and the present challenges in the Nigerian power sector. Journal of Energy and Power Engineering, 6 (7), pp.1050–1059.

Sanusi, Y.A. and Owoyele, G.S., 2016. Energy poverty and its spatial differences inNigeria: Reversing the trend. Energy Procedia, 93, pp.53-60.

Sanz, M.J., De Vente, J., Chotte, J.L., Bernoux, M., Kust, G., Ruiz, I., Almagro, M., Alloza, J.A., Vallejo, R., Castillo, V. and Hebel, A., 2017. Sustainable land management contribution to successful land-based climate change adaptation and mitigation: A report of the science-policy interface. In Bonn, Germany: United Nations Convention to Combat Desertification (UNCCD).

Sarkodie, S.A. and Adams, S., 2020. Electricity access, human development index, governance and income inequality in Sub-Saharan Africa. *Energy Reports*, *6*, pp.455-466.

Schwandt, T.A., 1994. Constructivist, interpretivist approaches to human inquiry. Handbook of qualitative research, 1(1994), pp.118-137.

Shaaban, M. and Petinrin, J. O. (2014). Renewable energy potentials in Nigeria: meeting rural energy needs. Renewable and Sustainable Energy Reviews, 29, pp.72–84.

Simon, D., 1984. Third world colonial cities in context: conceptual and theoretical approaches with reference to Africa. Progress in Human Geography, 8(4), pp.493-514.

Sinha, A., Balsalobre-Lorente, D., Zafar, M.W. and Saleem, M.M., 2022. Analyzing global inequality in access to energy: Developing policy framework by inequality decomposition. *Journal of environmental management*, *304*, p.114299.

Siyaranamual, M., Amalia, M., Yusuf, A. and Alisjahbana, A., 2020. Consumers' willingness to pay for electricity service attributes: A discrete choice experiment in urban Indonesia. Energy Reports, 6, pp.562-571.

Somefun, O. A. (2015). The Eratic Electric Power Supply in Nigeria: Causes and Remedy. Technical Report, 1-16. Southall, A., 1971. The impact of imperialism on urban development in

Sovacool, B. K., & Dworkin, M. H. (2015). Energy justice: Conceptual insights and practical applications. Applied Energy, 142, 435-444

Sovacool, B.K. and Mukherjee, I., 2011. Conceptualizing and measuring energy security: A synthesized approach. *Energy*, *36*(8), pp.5343-5355.

Sovacool, B.K., 2012. The political economy of energy poverty: A review of key challenges. Energy for Sustainable Development, 16(3), pp.272-282.

Sovacool, B.K., 2016. Cobenefits and trade-offs of green and clean energy: Evidence from the academic literature and Asian Case Studies. Asian Development Bank Economics Working Paper Series, (502).

Soyemi, A.O., Samuel, I.A., Ayobami, A.O. and Akinmeji, A., 2021, April. The Challenges of Estimated Billing on Electricity Consumers in Nigeria: A Review.

Starman, A. B. (2013). The case study as a type of qualitative research. Journal of Contemporary Educational Studies/Sodobna Pedagogika, 64 (1).

Starman, A. B. (2013). The case study as a type of qualitative research. Journal of Contemporary Educational Studies/Sodobna Pedagogika, 64 (1)

Suberu, M. Y. et al. (2013). Power sector renewable energy integration for expanding access to electricity in sub-Saharan Africa. Renewable and Sustainable Energy Reviews, 25, pp.630–642.

Suberu, M.Y., Mustafa, M.W., Bashir, N., Muhamad, N.A. and Mokhtar, A.S., 2013. Power sector renewable energy integration for expanding access to electricity in sub-Saharan Africa. Renewable and Sustainable Energy Reviews, 25, pp.630-642.

Suberu, R., 2023. De/centralization in Nigeria, 1954–2020. *Regional & Federal Studies*, *33*(5), pp.699-724.

Survey. Journal of Poverty, 24(3), pp.185-202. Jaiyeola, A.O. and Choga, I., 2021. Assessment of poverty incidence in Northern Nigeria. Journal of Poverty, 25(2), pp.155-172.

Tamuno, T.N., 1970. Separatist agitations in Nigeria since 1914. The Journal of Modern African Studies, 8(4), pp.563-584.

Tanui, D.C., 2021. *The Political Economy of Oil and Its Role in Enhancing Development in Africa: a Case Study of Nigeria and Angola* (Doctoral dissertation, University of Nairobi).

Tarekegne, B., 2020. Just electrification: Imagining the justice dimensions of energy access and addressing energy poverty. Energy Research & Social Science, 70, p.101639.

Tayo, O., Thompson, R. and Thompson, E., 2016. Impact of the digital divide on computer use and internet access on the poor in Nigeria. *Journal of Education and Learning*, *5*(1), pp.1-6.

Teriba, A. (2014). Confronting Inter-regional Disparities in Nigeria. Available at SSRN 2443340.

Thorbecke, E. (2013). The interrelationship linking growth, inequality and poverty in sub-Saharan Africa. Journal of African Economies, 22 (suppl_1), pp.i15--i48.

Tollefson, J. W. (2006). Critical theory in language policy. An introduction to language policy: Theory and method, 1, pp.42–59.

Torhemen, M.T., Akede, A.E. and Daudu, B.O., 2023. Values and the National Integration Question in Nigeria. *IBE JOURNAL OF PHILOSOPHY*, *3*(1).

Trotta, G., 2021. Electricity awareness and consumer demand for information. International Journal of Consumer Studies, 45(1), pp.65-79.

Umbach, F., 2010. Global energy security and the implications for the EU. *Energy policy*, *38*(3), pp.1229-1240.

United Nations Department of Economic and Social Affairs Population Division. World Population Prospects: The 2017 Revision; Key Findings and Advance Tables; Working Paper No. ESA/P/WP/248; United Nations: New York, NY,mUSA, 2017.

United Nations Development Programme. (2019). Sustainable Development Goals Report 2019. United Nations Development Programme.

Usman, Z.G., Abbasoglu, S., Ersoy, N.T. and Fahrioglu, M., 2015. Transforming the Nigerian power sector for sustainable development. Energy Policy, 87, pp.429-437.

Uzodinma, E. O. (2011). The Nigerian Electricity Failure: Causes, Consequences and Remedies. JORIND, 9(1), 264-272.

Van Dijk, T. A. (2011). Discourse studies: A multidisciplinary introduction. Sage.

Vande, P.T., 2012. Ethnicity and the politics of state creation in Nigeria. European Scientific Journal, 8(16).

Vogt, W. P., Gardner, D. C., & Haeffele, L. M. (2016). When to use what research design. New York: Guilford Press.

Walker, G., Devine-Wright, P., Hunter, S., High, H. and Evans, B., 2010. 'Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy.' Energy Policy, 38(6), pp.2655–2663.

Wang, S., Liu, H., Pu, H. and Yang, H., 2020. Spatial disparity and hierarchical cluster analysis of final energy consumption in China. *Energy*, *197*, p.117195.

Webler, T. and Tuler, S., 2006. 'Four perspectives on public participation process in environmental assessment and decision making.' Policy Studies Journal, 34(4), pp.699–722.

Weimer, D.L. and Vining, A.R., 2017. Policy analysis: Concepts and practice. Taylor & Francis.

Wodak, R. (1997). Critical Discourse Analysis', in van Dijk, TA (ed.) Discourse as Social Interaction. Discourse studies: A multidisciplinary introduction. Volume, 2, pp.258–284

Wodak, R. and Meyer, M. (2015). Methods of critical discourse studies. Sage Zhou, S.; Teng, F. Estimation of urban residential electricity demand in China using household survey data. Energy Policy 2013, 61, 394–402.

World Bank. (2018). Incomplete Electricity Access in Sub-Saharan Africa: Causes and Consequences. World Bank.

World Bank. (2021). World Development Report 2021: Data for Better Lives. World Bank Publications.

Yang, Y., Xia, S. and Qian, X., 2023. Geopolitics of the energy transition. *Journal of Geographical Sciences*, *33*(4), pp.683-704.

Zehnle, S., 2020. *A geography of jihad: Sokoto jihadism and the Islamic frontier in West Africa* (Vol. 37). Walter de Gruyter GmbH & Co KG.

Zhou, K. and Yang, S., 2016. Understanding household energy consumption behaviour: The contribution of energy big data analytics. Renewable and Sustainable Energy Reviews, 56, pp.810-819.

Zigah, E. and Creti, A., 2023. A Comparative Analysis of Electricity Access Initiatives in Sub-Saharan Africa. In Regional Approaches to the Energy Transition: A Multidisciplinary Perspective (pp. 271-306). Cham: Springer International Publishing.

Zikmund, W.G., Babin, B., Carr, J. and Griffen, M., 2003. Basic data analysis: Descriptive statistics. Health Economics Research

# APPENDICES

## Appendix 1

Department of Environment and Geography
University of York
YO10 5DD
United Kingdom

**PARTICIPANT INFORMATION SHEET**

I am a PhD student at the Department of Environment and Geography at the University of York (UK). I am carrying out a research project entitled "Energy Geography of Nigeria: Governance, Power and Social Exclusion with emphasis on electricity". Your community has been selected for this research. I wish to speak with you to hear your views, experiences and knowledge about this topic.

**Purpose of the Research**
The research aims to make a major contribution to knowledge by examining the discourses associated with politics, governance and electricity infrastructural investment in Nigeria. In this context, such issues and the pathways through which they evolved will be analysed.

**What will your participation involve?**
Should you decide to take part in the research, your participation will involve an interview that is expected to last approximately 30 – 60 minutes. The interview will take the form of a guided conversation. There are specific topics the interview will address, and the interviewer will ask some broad questions throughout to guide the conversation. The interview can be conducted online at a time convenient for you, via skype, or via the telephone. With your permission, the interview will be audio-recorded to allow for in-depth analysis. If at any point you change your mind about taking part in the research, you can withdraw at any time without reason or a penalty, by contacting me on the details provided below.

**Anonymity and Confidentiality**
Interviews will be audio-recorded and fully transcribed. The recordings will be stored in a secure location (password protected computer, university approved cloud service) and individual files will be password protected where possible. Only the I, my PhD supervisor plus select others we give permission to, will have access to any of the data. Your name or other identifiable features will not be included in the transcripts, reports, publications or any other outputs, unless you wish to be identifiable. You may ask to see the data or request that it be destroyed at any time. Data will be kept until 2024 to allow time for a full analysis and publication.

**How will the data be used?**

The data will be used in academic research and will be used to produce a PhD thesis, reports, presentations, conference papers, and academic publications.

**Key Contacts:**
If you have any questions regarding this study or would like additional information about participation, please contact me at +234803423523 or by email ssm544@york.ac.uk. You can also contact my supervisors Dr Karen Parkhill by email at karen.parkhill@york.ac.uk or Dr Joshua Kirshner by email at joshua.kirshner@york.ac.uk

Thank you in advance for your interest and assistance with this research.

**Sani Shehu Matawalle, PhD Student.**

## Appendix 2

## PARTICIPANT CONSENT FORM

Department of Environment and Geography
University of York
YO10 5DD
United Kingdom

I agree to take part in the above research. I have read the participant information sheet for the study. I understand that this project will involve taking part in an interview that will last approximately 30-60 minutes. **Yes** **No**

I understand that participation in this study is entirely voluntary and that I can withdraw from the study at any time without giving a reason. **Yes** **No**

I understand that the information provided by me will be held confidentially with access limited to the research team (i.e. the researcher, the researchers PhD supervisors), and select people given permission by the research team. **Yes** **No**

I understand that the data will contribute to a range of academic outputs including: a PhD thesis, presentations, journal articles and posters. **Yes** **No**

I understand that I can ask for the information I provide to be deleted/destroyed at any time and, under the Data Protection Act. I can have access to the information at any time. ☐ **Yes** **No**

I agree for the researcher to keep hold of my contact details in case they wish to ask clarificatory questions after the interview. I also understand that I am under no obligation to answer such questions. **Yes** **No**

I agree that my institutional affiliation may be used as a generic identifying feature if no other features (e.g. gender, age) are used. ☐ **Yes** **No**

I agree that my name may be cited in the research. **Yes** ☐ **No**

I prefer to remain completely anonymous. **Yes** ☐ **No**

Data Protection: I agree to the university processing personal data which I have supplied. I agree to the processing of such data for any purposes connected with the research project as outlined to me.

I, **(PRINT NAME)** _____ consent to participate in the study conducted by Sani Shehu Matawalle from the University of York, in UK under the supervision of Dr Karen Parkhill and Dr Joshua Kirshner.

SIGNED:
DATE:

## Appendix 3

Department of Environment and Geography
University of York
YO10 5DD
United Kingdom

**INTERVIEW PROTOCOL/DISCUSSION GUIDE (INDICATIVE QUESTIONS)**

**PREAMBLE**

Thank you for accepting the invitation to participate in the research. I am Sani Shehu Matawalle, a PhD student at the University of York, in the UK. I'm currently investigating the causes and consequences of regional disparity in electricity access between the geographical regions in Nigeria. I'm having this discussion with you because you are someone whose knowledge and views on the subject will contribute to advancing information on the subject. There are no right or wrong answers. However, sometimes I'll challenge you but, please don't think I'm judging you. You will notice that I have a digital audio-recorder here which will help me to turn this conversation into text. When I transcribe the recording, I'll remove all identifying information like your name and replace them with an anonymous identifier (i.e. stakeholder 1) depending on what level of anonymity you prefer. The anonymised versions of the interview will be used for my PhD thesis and any other outputs.

If there are any quotes which I think might be particularly sensitive – in addition to anonymity – I'll contact you to ensure you are happy for the quote to be used.

**INFORMATION AND CONSENT** Check read/signed information sheet and consent forms. This contains the information I've just given you in more detail.

Does that sound ok? Is there anything you want to ask before we start?

**INTRODUCTION**

To start, please tell me about your professional background?

Please outline your organisation and describe your role within the organisation.

What is general aspiration and goals of your organisation in terms of outcome?

What are the key challenges your organisation has encountered while trying to achieve those goals and objectives?

How did your organisation overcome the challenges/issues?

How would you describe the evolution of the electricity infrastructure in Nigeria and what are the key issues you have observed with regards to the recent privatisation of the utility company?

How would you characterise the ability of Nigeria to meet the demand of energy consumers?

Are there particular elements of the electricity supply chain which are problematic?

At what scales do different energy actors operate? At what scale or with in which agencies are the key priorities determined?

How would you view the current energy policy goals?

The allocation of electricity to various DISCOS shows great disparities between the DISCOS why do you think this is the case?

Different regions appear to pay different tariffs, what factors were put in place to arrive at the said tariff?

How do you feel consumers view the electricity network?

There was outcry from the public with the recent increase in the proposed electricity tariff what led to the increase and what impact, if any, will the increase have on electricity supply?

Have you had any reason to engage with consumers or local people before or since the proposed increase in tariffs? How did that go?

Do you think ordinary Nigerians understand the ownership of the electricity network?

To what extent are consumers willing to pay for the electricity and is it common all around the regions?

What are the barriers or limitations you have encountered connecting people to the grid?Is the connection rate improving?

What are the most important infrastructures to support energy access?

What accounts for the discrepancy in access between different regions or between urban and rural areas?

Does the city of Kano have particular challenges that differs from other cities?

What information sources are used to monitor and manage the energy system? What information do you use? Do you use any kind of map or cartographic information?

Who are the actors involved in the decision to place electricity project in certain location?

What aspect influences the decision to site certain projects in a particular location? Is there zoning plan in terms of electricity infrastructure?

Would you characterise the Nigerian electricity system as a fair and just system? Please explain why(not)?

Do particular regions or social groups face particular difficulty in accessing electricity? If so, why do you think this is the case?

Do you view access to electricity as human right?

What do you consider to be the main drivers for medium to long term energy planning?

CLOSING

Is there anything else we haven't discussed so far that you think is important/would like to add?

Thank you and Close

## Appendix 4

Department of Environment and Geography
University of York
YO10 5DD
United Kingdom

**INTERVIEW PROTOCOL/DISCUSSION GUIDE (INDICATIVE QUESTIONS)**

**PREAMBLE**

Thank you for accepting the invitation to participate in the research. I am Sani Shehu Matawalle, a PhD student at the University of York, in the UK. I'm currently investigating the causes and consequences of regional disparity in electricity access between the geographical regions in Nigeria. I'm having this discussion with you because you are someone whose knowledge and views on the subject will contribute to advancing information on the subject. There are no right or wrong answers. However, sometimes I will challenge you but, please don't think I'm judging you. I will be recording the interview, which will help me to turn this conversation into text. When I transcribe the recording, I'll remove all identifying information like your name and replace them with an anonymous identifier (i.e. stakeholder 1) depending on what level of anonymity you prefer. The anonymised versions of the interview will be used for my PhD thesis and any other outputs.

If there are any quotes which I think might be particularly sensitive – in addition to anonymity – I'll contact you to ensure you are happy for the quote to be used.

**INFORMATION AND CONSENT** Check read/signed information sheet and consent forms. The forms contain the information I have just given you in more detail.

Does that sound ok? Is there anything you want to ask before we start?

**INTRODUCTION**

Please tell me about your background, including how you came to live in this region and a specific area?

Please tell me a bit about your home, including how long you have been living in this house and what source of energy you use in the home?

How would you describe your electricity usage in your home? Are there any particular barriers or opportunities in gaining access to electricity here?

Is the experience you have just outlined similar or different from others in your community?

How often do you visit other parts of the country? What do you observe in terms of electricity supply in other states/regions?

To what extent are you willing to pay for electricity? How do you pay for it? Is your house metred?

Please could you outline the ownership of the Nigerian electricity network?
What are the key issues you have observed with regards to the former government-owned utility (NEPA) and the current private utility companies?

How does the DISCO respond to the repair of electrical installations in your community?

Were you engage by the DISCOS before or since after the increase in tariffs? How did that go?

What changes occurred to your electricity bill and were these expected or unexpected?

Would you characterise the Nigerian electricity system as a fair and just system? Please explain why(not)?

In what way does electricity use relate to other rights as a citizen of Nigeria or human rights?

What do you think the DISCOS/GENCOS priorities should be to address the electricity challenges?

How confident are you in the government's ability to regulate the operation of the DISCOS/GENCOS?

What do you think is the best way to address the electricity challenges in Nigeria?

CLOSING

Is there anything else we haven't discussed so far that you think is important/would like to add?

Thank you