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GOVERNING THE TRANSITION OF SOCIO-TECHNICAL GRID-BASED SYSTEMS: PROMOTING SECURITY OF SUPPLY AND ACCELERATING RENEWABLE ENERGY INNOVATION IN NIGERIA

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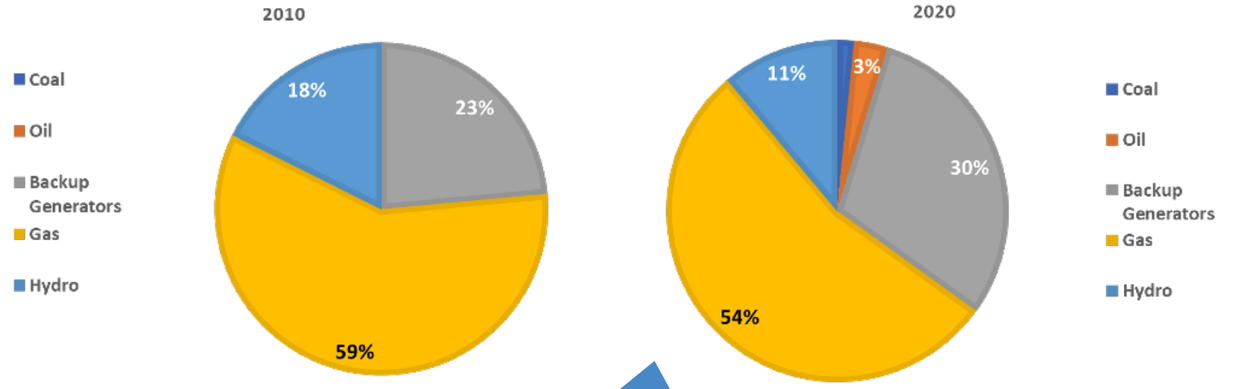
Presentation Overview

- Background and motivation
- Study Aim
- Theoretical framework
- Methodology
- Key findings
- Forward plan

Introduction



Research Problem

80.1 MILLION — Nigerians are without access to electricity (IEA 2020)

35 PER-CENT — Urban area has no access (residential and industrial) (IEA 2020)

12.5K MW — Nigeria's population is projected to double by 2050 and energy demand increase (Cookson C 2019)

4K MW — Electricity supply in 2019 (IEA 2020)

6K MW — Electricity demand in 2019 (IEA 2020)

75 PERCENT — 75% of the industrial areas are off grid (IEA 2020)

RENEWABLE ENERGY DEVELOPMENT

- The REMP aimed that renewable will account for 30% of the planned 30 GW generation by 2030 i.e available electricity
- Energy access will increase from 2016 to 75% (2020) and 90% (2030)
- However major milestones have been missed with projections looking poor for 2030 target
- Literature have looked at this issue specifically to the grid from technical, financial, economic aspect (Edomah et al 2017, Ujumadu 2018, Adeniyi 2019, Gungah 2019, Ovwigho et al 2020, Nwozor 2021)

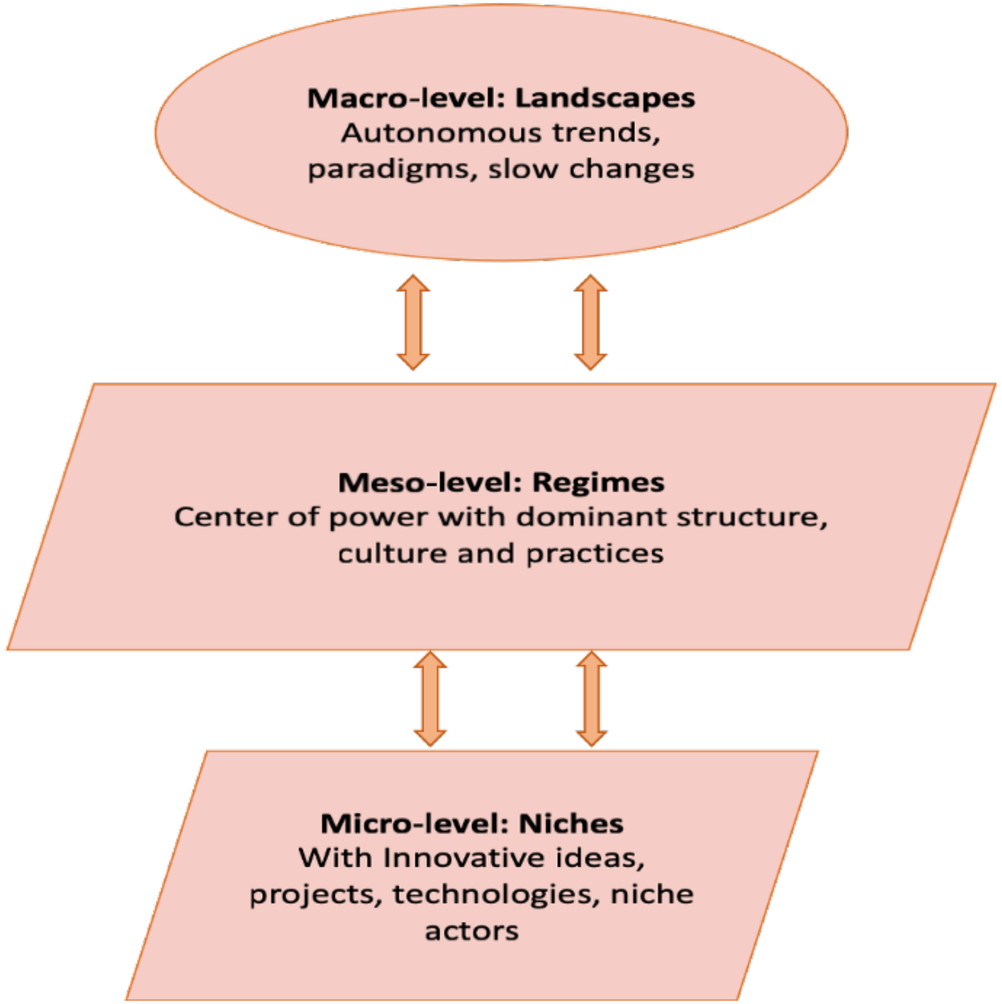
Aim

This research aims to critically investigate the enablers and inhibitors for the implementation of grid-based renewable electricity generation strategies in Nigeria.

Objectives

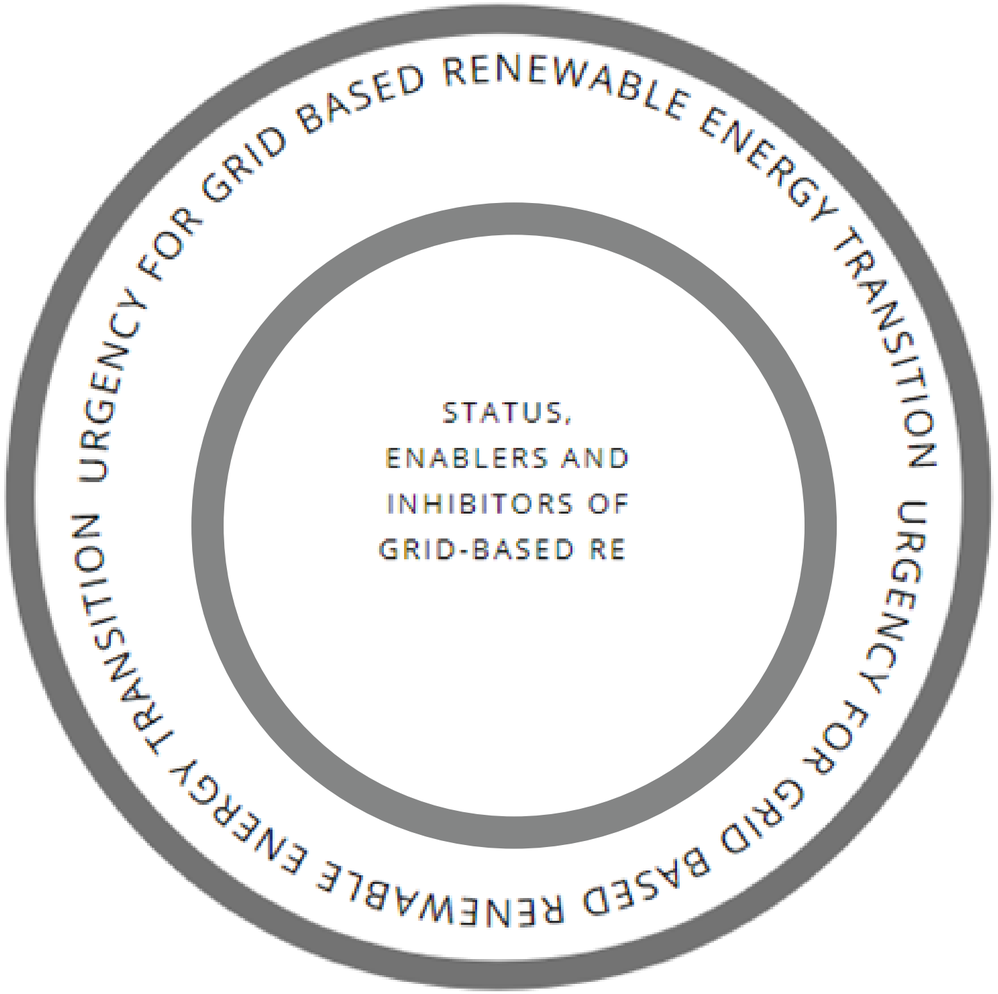
- ★ To critically assess the grid -based renewable energy development status in Nigeria.
- ★ To investigate the enablers of the grid -based renewable energy strategies implementation in Nigeria.
- ★ To investigate the inhibitors of the grid -based renewable energy strategies implementation in Nigeria

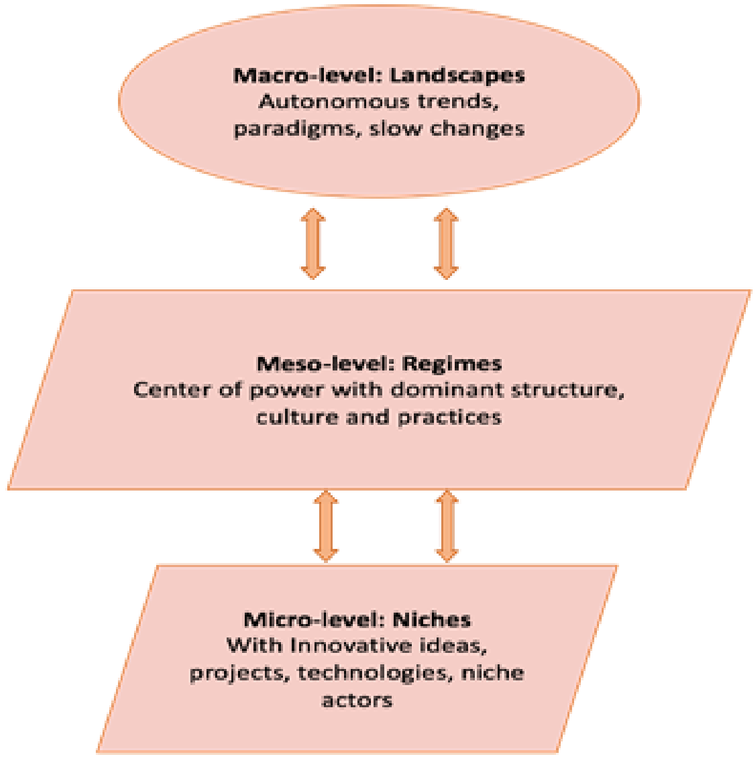
Theoretical Underpinning



Source: Multi -level Perspective (MLP) Framework (adapted from Geels 2002)

Theoretical Underpinning





MULTI-LEVEL PERSPECTIVE (MLP) FRAMEWORK (ADAPTED FROM GEELS 2002)

Author: Urgency for grid -based renewable energy generation in Nigeria

Research Methodology

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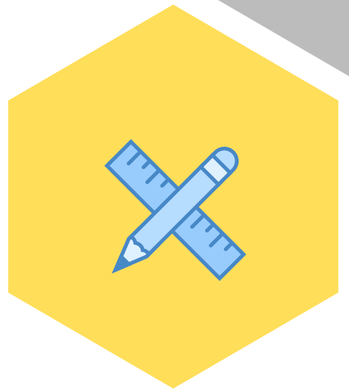
Research Philosophy
- Interpretivism

Research Approach
- Inductive

Data Analysis Technique
- Thematics Analysis (NVivo Software)

Methodological Choice
- Mono method - Qualitative

Data collection
- Semi- Structured Interview



Research Strategy
- Case Study

Energy and non -energy industry actors

S/N	Energy and Non-energy Industry Actors		Number of Participants	Level of Experts
1	Public Authorities	Regulatory	3	Managerial
2		Policy-making	3	Managerial
3		Government parastatal	1	Managerial
4			1	Managerial
5			3	Managerial
6	Research and Development institute		1	Managerial
7	Associations		1	Executive
8			1	Executive
9	Climate change Movement		1	Executive
10	NGO		1	Executive
11	Universities		1	Researcher
12			1	Researcher
13	Electricity Generation companies		1	Senior manager
14			1	Senior manager
15	Electricity Distribution companies		1	Senior manager
16	Electricity Transmission Company		1	Managerial
17	Renewable Energy Technology Funding Company		1	Senior Executive
18			1	Senior Executive
19	Independent Researchers		2	Researcher
20	Renewable energy businesses	Solar	1	Senior Executive
21		Wind	1	Senior Executive

- Non-probability sampling
- Purposive sampling
- Disproportionate stratified sampling
- Snowball sampling (where applicable)

Results and findings: Enablers of grid RE systems using NVivo

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Energy Access and Security	Environmental Enablers	Financial Enablers	International Influence	Political Enablers	Support Networks	Technological Enablers
• Energy access • Energy security • Quality power supply	• Climate change mitigation • Global warming	• Environmental Trust Fund • Financing • Private investment arrangement	• International agreement i.e, Kyoto protocol, Paris Agreement • International grants and funding • International trends and pressure	• Government partnerships • Government policies	• Emerging support networks • Improved technology standards and regulations (i.e., SON)	• Cheaper maintenance • Competitive cost of renewable energy • Pressure from new technology

Availability of RE resources	Economic development	Emerging Information	Energy mix and diversification	Geographical expansion of power stations	Growing energy demand	Growing population	Societal acceptance	Sustainability

Results and findings: Inhibitors of grid RE systems using NVivo

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Administrative Inhibitors	Economic Inhibitors	Financial Inhibitors	Infrastructural Inhibitors	Institutional Inhibitors	Legal Inhibitors
• Accountability and transparency • Existing bureaucracy • Management challenge	• Devaluation of Naira • Foreign exchange • Social budget gains	• Existing financing structure of the power sector • Funding challenges • Investment in gas • Lack of incentives • RE Investments drawback	• Grid expansion challenge (Grid capacity) • Grid unreliability • Lack of infrastructure security • Maintenance culture • Metering • Obsolete infrastructure • Transmission line and distribution challenges	• Existing players inhibiting new entrants • Government control of the system • Lack of institutional synergy • Lack of specific agency for grid renewable energy • The power sector structure • Too many agencies without institutional leadership	• Legal Framework Challenge

• Market-related Barrier	• Policy and Regulatory Inhibitors	• Political Inhibitors	• Social Inhibitors	• Technical Inhibitors	• Technological Inhibitors
• Comparable advantages of gas • Ease of doing business • Ineffective revenue collections • Lack of cost-reflective tariff • Liquidity challenge • Petroleum subsidies and support • Pre-existing industry agreements • Resistance and sabotage from current energy producers	• Favourable gas policies - PIA • Unattractive Feed-in Tariff • Lack of continuity in policy and government synergy • Lack of regulations • No clear implementation action plan for the policies	• Influence of the political regime • Lack of government commitment • Lack of state and federal government synergy	• Corruption • Disinterest of industrial players on the grid • Distrust in management of the national grid • Insecurity (kidnapping, banditry and vandalism) • Lack of awareness of benefit • Land use issues • Unethical behaviours • Wastage culture	• Incompetence in the sector • Project delay and cost over-run • Research and Development initiative • Technical challenge	• Cost of technology • Lack of technological expertise • Narratives from off-grid systems • Technology implementation challenge • Technology maintenance • Technology technical challenges

Result samples: Enablers

Main Category	Interpreted repetitions	Sample Quotes
Societal acceptance		…that's what I'm saying for the solar wind, it would be a welcome idea for those times of the year, because they'll be 24 hours power supply for everybody, which I know every Nigerian will be excited and happy to have… IR 05 …Yeah, Nigerians has receive it very well, in the sense that…IR 11
Growing energy demand		…So that's basically it's what the government has been able to do. But in terms of the former question that you asked about, what drives it, I said one population, which is very key, we have had like an increase in population over a period of time. Then we have had, when I said increase I mean growth, then we have had also because of the growth in population, more demand for energy…IR13 …Also, there's a need for transition, because even with our excess energy, resources, we are still not been able to sort of, you know, provide the required energy for our population…IR12
Energy Access and Security	Energy access	…in reality, it's really all about addressing energy access in the end…IR02 …So basically, it was out of necessity. So that's basically it was necessity that drove a lack of access. So that's basically what started driving it… IR 08

Result samples: Inhibitors

Main Category	Interpreted repetitions	Sample Quotes
Policy and Regulatory Inhibitors	Lack of continuity in policy and government synergy	…the issue of synergy is a challenge? All the key players I mentioned are playing their game not as stakeholders, they are playing their games individually… IR13 …taking renewable energy to a different level, but what we have right now is, several agency objecting to one thing or the other on renewable energy, and there is no synergy, that synergy among them is lacking and that is why I'm canvasing for having institutional and regulatory support if there is an institutional leadership then all these agency that are actually doing one or two things on renewable energy can… IR15
Administrative Inhibitors	Existing bureaucracy	…all of them are also the various levels of check. So yeah, the bureaucracy is much and all of these people in one way or another, you interact, keep you on your toes and ensure that the right things are been done…IR09 …I don't have any problem, but because of that bureaucracy introduced, you know, so, so, the thing now is that there are so many people that need power and so many they want to sell power, because of … and the distribution companies, these solutions have not seen the light of day. And that is reason why I feel that, you know, you know, something needs to be done. And this is this something is a total U-turn in policy… IR01
Infrastructural Inhibitors	Obsolete infrastructure	…Because there are other issues that are connected to the centralised grid, for example, we have cases lots of losses, we have lots of old infrastructure that needs upgrade… IR O2 …Because you have old technologies on it the eight of them cannot work… IR05

Key findings

A strong societal acceptance of RE technologies.

Socio-technical landscape pressure from electricity demand on existing regime and the multifaceted challenges of the grid system has created opportunities for niche development. However, the strong incumbent socio-technical regime, conflicting multiple actors' interests, Government petroleum subsidies and policy and the system's inefficiency is reinforcing the incumbent regime (technology lock-in).

This study demonstrates that there is a need to protect renewable energy niche innovation to provide an enabling environment for growth and maturity of the technology.

Conclusions

The study shows that inhibitors to Grid-based renewable energy is higher than the drivers. Government involvement, deficiencies in governance system and Financing challenge coupled with Grid infrastructure challenges and no clear implementable action plan challenges is identified as a major bottleneck for transition to renewable energy. The need to address energy access, enhance the energy supply and meet the growing energy demand to achieve energy security have been identified as the pertinent enablers of the transition in Nigeria.

The study also found out that there Is a lack of a dedicated agency handling Grid RE just like the REA. Hence, this study proposes the establishment of an agency to beef-up the niche and RE innovations with appropriate support mechanism i.e., financing established to accelerate transition and create an actionable implementation plan.

MLP was useful at understanding the enablers and inhibitors of Energy transition in Nigeria.

The state of the transition arena is unable to exert strong pressure n the incumbent sociotechnical regime to foster transition.

Forward Plan

- To critically assess the renewable energy planning process and governance incorporating accountability for sustainable development in Nigeria using the developed framework.

- To propose to policymakers and other stakeholders a roadmap for the implementation of grid-based renewable electricity strategies in Nigeria to promoting security of supply and accelerating renewable energy innovation in Nigeria.

Thank you!

Questions, Comments and feedbacks

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