Economic Integration and the Question of Clean Energy Strategy in the Economic Community of West African States (ECOWAS) 2012-2022

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Certification

This is to certify that this thesis titled **Economic Integration and the Question of Clean Energy Strategy in the Economic Community of West African States (ECOWAS), 2012-2022** was carried out by Olukayode ODETUNDE with matriculation number LCU/PG/000315 in the Department of Politics and international Relations, Faculty of Management and Social Sciences, Lead City University, Ibadan, Nigeria under my supervision for the award of PhD Degree in International Relations and that this has not been previously submitted.

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Dedication

This thesis is dedicated to the memory of my late mother, Mrs. Mary Olalonpe Odetunde.

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Even though the above-mentioned institutions and persons have assisted in the process of this research work, I stand responsible for the errors, if any is found in the work.

Abstract

The study focuses on the impact of Economic Integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS), 2012-2022. The Economic Community of West African States (ECOWAS) has embarked on a path of economic integration to enhance regional development and cooperation. A critical component of this integration is the adoption of a cohesive clean energy strategy, essential for sustainable development and addressing the pressing energy needs of the region. The study adopted Physical theory & Economic Model and Real Option Theory. The sample size for the study comprised 100 individuals working in the energy sector selected five countries (Nigeria, Ghana, Togo, Liberia and Benin) out of the fifteen ECOWAS countries, ensuring a diverse and representative dataset for analysis. It employed both descriptive and inferential statistics, including the use of SPSS software for data analysis. The study finds that while ECOWAS has made significant strides in policy harmonization and regional cooperation, substantial barriers remain, including inadequate infrastructure, limited financing, and policy implementation gaps. Additionally, there is an uneven distribution of renewable energy resources and technological capabilities across member states. The research concludes that a unified clean energy strategy is vital for the region's sustainable development. The integration of renewable energy sources, such as solar, wind, and hydropower, can reduce the region's dependence on fossil fuels, lower greenhouse gas emissions, and improve energy security. Furthermore, leveraging regional cooperation can enhance the efficiency and effectiveness of clean energy projects through shared resources and knowledge. The study recommends that ECOWAS states strengthen regional institutions to better coordinate clean energy initiatives, attract international investments through favorable policies and incentives, and enhance capacity-building programs to develop local expertise in renewable energy technologies. Additionally, fostering public-private partnerships can accelerate the deployment of clean energy infrastructure. By addressing these key areas, ECOWAS can ensure that economic integration is complemented by a robust and sustainable clean energy strategy, fostering long-term economic growth and environmental resilience in West Africa.

Keyword: Economic Integration, Clean Energy, Strategy, ECOWAS.

Word Count: 300

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List of Acronyms

Abbreviation	Meaning
ASEAN	Association of South East Asian Nations
AU	African Union
COP	Conference of the Parties
EBIDEF	Ecowas Bank for Investment and Development Fund
ERDF	Ecowas Regional Development Fund
ECOWAS	Economic Community of west African States
ECREEE	Energy Center for Renewable Energy and Energy Efficiency
ERIB	Ecowas Regional Investment Bank
EU	European Union
MDG	Millenium Development Goals
MDGs	Millennium Development Goals

NAFTA	North American Free Trade Agreement
NEPAD	New Partnership for African Development
OAU	Orgarnisation of African Unity
SDG	Sustainable Development Goals
SDGs	Sustainable Development Goals
STC	Specialized Technical Commissions
UNFCCC	United Nations for Conference on Climate Change
USAID	United States Agency for International Development
WAAC	West African Air Carriers
WAEC	West African Examination Council
WAGP	West African Gas Pipeline
WAHO	The West African Health Organization
WAMA	West African Monetary Agency
WAMC	West African Monetary Commission
WAMI	West African Monetary Institute
WAPP	West Africa Power Pool

Chapter One

Introduction

1.1 Background to the Study

Energy is central to efforts towards sustainable development and poverty reduction. This claim is very important at a time when the international community is working to reduce global poverty through the Sustainable Development Goals (SDGs) and other initiatives. Emphasis is placed on the far-reaching impact of energy on all aspects of development. Social, economic and environmental issues, including livelihoods, access to water, agricultural productivity, health, population, education and gender issues. Over time, energy has been generated primarily from conventional fossil fuel sources. However, in the current energy debate, supply from these conventional sources is known to be unsustainable and it stems from the exponential growth of the world population. That is, the demand for energy exceeds the supply.

As already mentioned, energy is central to sustainable development and poverty reduction[1]. However, with almost half of the world's population living in poor and developing countries, it is reasonable to conclude that they need reliable, clean and affordable energy supplies such as wind, solar and geothermal[2]. These renewable resources can be easily accessed and decentralized, especially in Africa. Despite the benefits that developing countries can gain from adopting renewable energy, there appear to be obstacles to their development. Over the past two decades, West African countries have been embroiled in a struggle for sustainable development and self-reliance through economic integration[3]. ECOWAS was established on 28 May 1975 by 16 West African member states (15 following the exit Mauritania) to address the economic dilemma of a sub-region ravaged by extreme poverty, underdevelopment and foreign dependence. was

established as a pragmatic approach to addressing[4]. Furthermore, ECOWAS recognizes the development and expansion of regional markets as the cornerstone of a comprehensive development strategy. As articulated in the preamble to Chapter 2, Article 3 of the revised Convention, ECOWAS liberalizes trade between Member States, removes all obstacles to the free movement. It aimed at economic integration by harmonizing the national economic and fiscal policies of the country[5].

The resurgence of interest in economic integration is a global phenomenon inspired by the success of the European experience. It also reflects a growing recognition of the benefits to be gained from regional unity and cooperation in meeting the challenges posed by an increasingly competitive global marketplace. People often speak of "new regionalism"[6]. In Africa, at a time when private energies are being unleashed thanks to the empowerment of civil society and the deregulation and privatization of national economies, regional solidarity is a possible solution to the continent's deep and protracted economic and social crises is considered. Ongoing removing state-imposed trade barriers between countries paves the way for increased regional trade[7].

Regional aspirations shared by West African politicians, intellectuals and citizens alike divide the region, including a general desire to break down nation-state borders and the many barriers to the free movement of goods and services. It reflects all the negativity to do, differences in people and capital, and legal, governmental, and educational structures across countries. West Africans recognize that the kingdoms and cultures of West Africa were relatively well integrated prior to colonial times, as evidenced by accounts of the region, and many have called for regional unity[8]. These regional efforts are also a response to the state's apparent inability to generate

development. These therefore mean seeking solutions beyond what existing nation-states seem to offer. This includes improving local infrastructure, improving management of local resources[9].

This quest for new solutions also has a centripetal dimension, not only in Africa but around the world, with increasing demands from communities and individuals for more control over their problems. This is evident in calls for greater decentralization of government and public services, greater community participation in decision-making, and government withdrawal from certain types of economic interventions[10].

They are expected to share power with lower-level governments and other social units, as well as regional institutions. These pressures are not mutually exclusive and do not negate the state, but the days are clearly past when the nation-state is expected to be everything for everyone, from police officers to ultimate providers. The goal is to provide services and functions that each level of government can perform most efficiently and effectively, and what West Africans seem to be striving for is a better application of such principles.

Regional organizations are an integral function of the global economic system. It represents an intergovernmental effort to achieve regional integration. ECOWAS's establishment was therefore heralded as the beginning of an epoch in the annals of economic cooperation in the West African sub-region. The body was perceived as another tool to achieve some sort of liberation for the black race, an attempt to build an economically viable and politically formidable geographical entity. The ECOWAS was formed on 28 May 1975 by a group of countries that include Benin Republic, Burkina Faso, Cape Verde, Ivory Coast, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and

Togo. However, Mauritania was soon to exit the community in 2002 leaving fifteen-member countries[11].

In terms of economic integration, the French sphere exhibited greater success, particularly due to the organic theory of government that established a highly centralized administration. This centralized administration facilitated integration among the French West African colonies. According to a study, French West Africa was not only united administratively but also economically and culturally. Alongside a common currency, there was significant uniformity in the influence of the French language, allowing this part of the West African sub-region to remain cohesive as a distinct political entity[12].

In British West Africa, the administrative strategy leaned towards decentralization. However, there were still endeavors towards intergovernmental integration. Initiatives for consolidation included setting up a shared West African Court of Appeals and a joint Finance and Marketing Commission. Crowder suggests that ECOWAS has strong connections to the inter-colonial state relationships formed between the French and British colonies. These colonies now constitute the majority of independent states in the West African sub-region and play a significant role within ECOWAS[12].

Three main trends have been identified in the West African integration literature, depending on whether the structural framework within which the integration process takes place is explicitly recognized[13]. In the first case, ECOWAS is considered an extended market that helps reduce production overhead and introduce lower prices. This will increase demand in the sub-region and accelerate economic activity. Given this, the structural framework within which ECOWAS exists and operates is taken for granted. It is to adopt optimization measures that create an integrated

market based on the European model[13]. Integration issues and their solutions thus become dependent on the rationality of the respective entities' demands and expectations, the member states' ability to compromise, and the quality of community leadership.

In today's society, renewable energy plays an important role in economic development. Access to renewable energy is a key component of sustainability in developed and developing countries. In recent decades, there has been a steady shift from conventional energy sources to renewable energy[15]. The use of renewable energy sources is urgently needed due to the fact that conventional forms of energy production have a negative impact on the environment. The problem of climate change has arisen as a result of greenhouse gas emissions from burning fossil fuels. Long-term dependence on fossil fuels is aimed at meeting growing energy demands that can accelerate environmental degradation[16]. The current health of the economy is affected by conditions such as increased energy demand and consumption as the world's population grows. In fact, lack of access to electricity presents a bad picture in terms of alleviating poverty and accelerating development. The Development Strategy therefore describes renewable energy as a fundamental key to achieving sustainable development.

Renewable energy is a key factor in establishing an efficient, equitable and sustainable energy development model for the region. The establishment of the ECOWAS Center for Renewable Energy and Energy Efficiency has undoubtedly played a fundamental role in overcoming this important challenge. From a regional perspective, the main objective of the Center is to engage the 15 ECOWAS Member States on the development and implementation of renewable energy and energy efficiency technologies, in coordination with international policymaking on energy and climate. It's about meeting needs. Change. This mandate was recently reinforced by the

Center's appointment as the hub of West Africa's global Sustainable Energy for All (SE4All) initiative, a high-level recognition of the achievements to date16. Endowed with significant renewable energy resources, the ECOWAS region is today at the pinnacle of new regional power supply based on renewable energy options as renewable energy technologies approach grid parity under certain circumstances. With the establishment of ECREEE, ECOWAS Member States will have access to modern, reliable and affordable energy services, energy security, reduction of energy-related greenhouse gas emissions, and the impact of climate change on their energy systems. Demonstrated determination to improve. This policy therefore represents a carefully considered and necessary regional response to the specific needs of ECOWAS Member States as reflected in international declarations, global climate initiatives, and national and regional strategies[17].

Undoubtedly, sustainable development is the most favoured way for achieving development objectives, as demonstrated by the United Nations' sustainable development goals (SDGs). The energy sector is recognised as a crucial sector for attaining the objectives of the Sustainable Development Goals (SDGs)[18]. The significance of energy in sustainable development cannot be overstated, given that energy is crucial for delivering a wide range of essential services. Energy is a crucial factor in the economic growth process, as it provides as a significant source of government revenue[19]. Energy is equally acknowledged as a fundamental infrastructure pillar for connecting Africa as documented in the African Union's (AU's) Agenda 2063[17]. The energy industry has the potential to promote sustainable development by generating and providing reliable and eco-friendly energy sources, as well as enhancing energy efficiency in consumption. This can occur via assuring energy sustainability and cost[20].

Energy sustainability focuses on ensuring that energy is both accessible and available in a manner that meets present needs without compromising the ability to meet future needs. Promoting sustainable energy frameworks is crucial for achieving sustainable development goals, as it integrates with environmental sustainability. Ensuring the sustainability of the energy sector can lead to a cleaner environment, as activities in this sector often contribute to greenhouse gas emissions. Energy sustainability contributes to sustainable development primarily through enhancing energy efficiency and increasing the adoption of renewable energy sources. The aim is not limited to environmental quality improvement; it also has the potential to broaden access to affordable, reliable, and modern energy sources[21].

Economic integration plays a vital role in accelerating progress towards the Sustainable Development Goals (SDGs)[22]. It is a key aspect of Africa's future vision, as many regional challenges can only be effectively addressed through regional cooperation. Economic integration and cooperation enable African governments to promote economic transformation while gaining access to foreign technologies, resources, ideas, and investments[23]. Nevertheless, despite various endeavors and programs, the economic integration of Africa has failed to yield significant progress in intra-regional economic communities (RECs) and intra-Africa trade. The insufficient development of infrastructure stands out as a key factor contributing to this underperformance. Infrastructure enhancement plays a pivotal role in fostering economic prosperity, and collaborative agreements facilitated by the RECs are anticipated to bolster Africa's integration by aligning with regional infrastructure Master Plans[25].

Highlighting the role of economic integration in energy supply and affordability in West Africa, it is suggested that three key factors are crucial for leveraging economic integration to promote

clean and affordable energy in the region. These elements comprise synchronized policy and regulatory frameworks, the creation of shared institutions and technical infrastructure, and cohesive execution. Moreover, prioritizing the formation of power pools is highlighted as a potent approach to tackle Africa's energy obstacles and optimize its varied energy assets.

1.2 Statement of the Problem

The Economic Community of West African States (ECOWAS) has long pursued regional economic integration as a pathway to fostering economic growth, stability, and development among its member states. However, the region continues to face significant challenges in achieving sustainable development, particularly in the energy sector. Despite abundant renewable energy resources, the majority of West African countries struggle with energy poverty, unreliable electricity supply, and heavy dependence on fossil fuels. This situation hampers economic growth, exacerbates environmental degradation, and limits the region's ability to achieve broader sustainable development goals.

From 2012 to 2022, global and regional attention to clean energy has intensified, with the Paris Agreement and the United Nations Sustainable Development Goals (SDGs) emphasizing the need for a transition to sustainable and clean energy systems. Within this context, ECOWAS has adopted various policies and initiatives aimed at promoting clean energy and improving energy access. These include the ECOWAS Renewable Energy Policy (EREP) and the ECOWAS Energy Efficiency Policy (EEEP), among others. Despite these efforts, the implementation of clean energy strategies across the region has been inconsistent and often inadequate[26].

The problem, therefore, lies in the complex relationship between regional economic integration efforts and the adoption and effective implementation of clean energy strategies within ECOWAS. While economic integration theoretically offers opportunities for harmonized energy policies, pooled resources, and regional cooperation, in practice, these opportunities have not been fully realized. National interests, varying levels of economic development, political instability, and institutional weaknesses have often hindered collective action and the successful integration of clean energy strategies into the broader economic framework of the region. The study explored the factors contributing to the successes and failures of clean energy initiatives, assess the impact of regional economic integration on these strategies, and offer recommendations for enhancing the role of clean energy in the region's sustainable development agenda.

1.3 Aim and Objectives of the Study

The aim of this study is to examine the effect of Economic Integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS). The specific objectives were to:

i. examine the impact of economic integration as an affordable clean energy strategy in Economic Community of West African States (ECOWAS);

ii. investigate existing political, socio-economic, ethical, cultural and legal frameworks for the implementation of economic integration as a Strategy for clean Energy in the Economic Community of West African States (ECOWAS);

iii. identify the various action plans for the sustainable development of energy in the ECOWAS region and their levels of implementation;

iv. assess the ECOWAS' progress in environmental sustainability and the attainment of the SDGs target of affordable and clean energy; and

v. evaluate the current and future priorities for clean and affordable energy among Economic Community of West African States (ECOWAS).

1.4 Research Questions

The following research questions were raised for this study;

1. Would the present environmental state make room for affordable and clean energy in the Economic Community of West African States (ECOWAS)?
2. What are the existing political, socio-economic, ethical, cultural and legal frameworks allowing for the implementation of economic integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS)?
3. What are the various action plans for the sustainable development of energy in the ECOWAS region and their levels of implementation?
4. Could ECOWAS' progress in environmental sustainability allow for the attainment of the SDGs target of affordable and clean energy?
5. What are the current and future priorities for clean and affordable energy among Economic Community of West African States (ECOWAS)?

1.5 Significance of the Study

Previous studies may have examined clean energy strategies or economic integration in ECOWAS separately, but this topic uniquely combines both elements. The research focuses on how economic integration within ECOWAS has influenced, or could influence, the adoption and implementation of clean energy strategies. This intersection is crucial for understanding the broader implications of regional policies on sustainable development.

The report also helps ECOWAS member countries understand that the usage of renewable energy might be a major policy option for expanding energy supply to the manufacturing and industrial sectors. However, given the vast resources required to implement renewable energy solutions for sustainable energy delivery, majority of ECOWAS member countries severely constrained in the extent to which they can individually provide renewable energy option for their citizens. This therefore makes cooperation necessary and prudent. Cooperation in the area of energy sources development exemplified by joint energy systems among member nations can lead to energy sufficiency and security in which all citizens are assured of sorely needed electricity. Energy cooperation also enable additional strategies for integrating large amounts of variable power from renewable sources. Deploying new chemical and mechanical storage technologies, using existing hydropower from reservoirs to provide storage, and implementing extensive demand management programs across the region.

The results of this study can provide additional insight into the role of economic integration in increasing energy sustainability as a critical infrastructure for development. To achieve Goal 7 of the United Nations Sustainable Development Goals, the region needs to develop viable energy integration models that can enhance energy security to achieve sustained economic growth and

development. This is seen as a viable way to accelerate progress especially in this region and across the continent.

Finally, the study assists research students in various fields, especially international relations and diplomacy, by serving as a reference point for subsequent studies.

1.6 Scope of the Study

This study examined economic integration as an affordable clean energy strategy in the Economic Community of West African States (ECOWAS). The duration under study was between 2012-2022. The site was selected based on policies developed by community groups that support the provision and distribution of affordable clean energy consistent with Goal 7 of the United Nations Sustainable Development Goals. In addition, the survey covered five (5) ECOWAS member countries which are; Nigeria, Ghana, Liberia, Togo and Benin. These are Francophone and Anglophone countries, and are member states who has been participating in regional bodies for over ten years. This ensured that the information retrieved and the overall information that will be obtained from them for this study will be reliable. Therefore, five (5) ECOWAS Member States were selected for the study and different classes of country representatives were used as the study population for this study. The reason for choosing five (5) member states out of the fifteen (15) ECOWAS is because it was not easy going round these fifteen (15) ECOWAS countries.

1.7 Limitation of the Study

The major setback experienced in the study was the difficulty of gaining access to key informant that are important to this study. Majority are not ready to share information/ideas.

1.8 Operational Definition of Terms

In order to guard against any doubt, ambiguity, vagueness and inconsistency of concepts and terms in this study and for clarity, the following terms were operationally defined according to its usage in the study.

Affordable Energy: This is a reliable, sustainable and modern energy for all.

Clean Energy: Is the energy collected from renewable resources that are naturally replenished on a human timescale.

Energy: The ability to do work or apply force to move an object. The movement of electric charges causes electrical energy. In the case of electrical energy, the force is the electrical attraction or repulsion between charged particles.

Integration: Integration is the act of bringing together smaller components into a single system that functions as one.

Region: usually referred to as zones, lands or territories, are areas that are broadly divided by physical characteristics, human impact characteristics and the interaction of humanity and the environment

Economic Integration: Economic integration is the process by which two or more nation-states agree to co-operate and work closely together to achieve a common goal.

Endnotes

1. African Union. *Report on the Status of Regional Integration in Africa.* The Third Technical Committee on Finance, Monetary Affairs, Economic Planning and Integration Experts Meeting, African Union Commission Economic Affairs, Tralac Trade Law Centre. 2019. https://www.tralac.org/documents/resources/african-union/2649-report-on-the-status-of-regional-integration-in-africa-executive-summary-february-/file.html

2. F. Garba, & T. Yeboah. *Free Movement and Regional Integration in the ECOWAS Sub-Region.* In J. K. Teye (eds) Migration in West Africa. IMISCOE Research Series, Springer, Cham. 2022. Pp. 19-34

3. B. Balassa. *The Theory of Economic Integration (Routledge Revivals).* Routledge. 2013

4. F. Onditi. *Dominatarian Theory on Regional Integration*. **Insight on Africa**, 13 (1), 2020.

5. B. Byiers & C. T. Dieye. *Regional Integration in West Africa: Wasteful Overlaps or Necessary Options*. Discussion Paper No. 322, ECDPM, Centre African Pour le Commerce L'integration et le Development CACID, 2022.

6. I. U. Unya, *ECOWAS and Regional Integration in West Africa: Issues, Challenges and Prospects*. **International Journal of African Culture, Policies and Development**, 12 (2), 2019

7. M. A. Bhuiyan., Q. Zhang., V. Khare., A. Mikhaylov., G. Pinter, & X. Huang. *Renewable Energy Consumption and Economic Growth Nexus – A Systematic Literature Review.* **Systematic Review Article Front Environ. Sci.**, 10, 2022.

8. M. Tsagkari., J. Roca, & P. Stephanides. *Sustainability of Local Renewable Energy Projects: A Comprehensive Framework and An Empirical Analysis on Two Islands.* **Sustainable Development**, vol. 30, issue 5, 2022. 1155-1168.

9. G. E. Halkos, & A. S. Tsirivis. *Electricity Production and Sustainable Development: The Role of Renewable Energy Sources and Specific Socioeconomic Factors*. **Energies**, 16 (2), 2023. 721.

10. P., Beça & R., Santos. *Measuring Sustainable Welfare: A New Approach to the ISEW*, **Ecological Economics** 69 (4), 2010. 810-819.

11. APLANET. *Sustainability Indicators: Definition, Types of KPIs and their Use in the Sustainability Plan.* 2023. https://aplanet.org/resources/sustainability-indicators/

12. Q. Wang., X. Wang, & X. Jiang. *Reinvestigating the Environmental Kuznets Curve (EKC) of Carbon Emissions and Ecological Footprint in 147 Countries: A Matter of Trade Protectionism.* **Humanities and Social Sciences Communications**, 11 (160), 2024.

13. I. K. Ofori, & S. A. Asongu. *ICT Diffusion, Foreign Direct Investment and Inclusive Growth in Sub-Saharan Africa.* **Telematics and Informatics**, vol. 65, 2021.

14. World Bank. *Regional Integration Removes Barriers to Development in Africa*. Result Briefs, 2023. https://www.worldbank.org/en/results/2023/12/08/regional-integration-removes-barriers-to-development-in-africa

15. H. T. Mewenemesse, & Q. Yan. *Policy Analysis of the Challenges to an Effective Switch to Low-Carbon Energy in Economic Community of West African States*. **Energies**, 16 (5), 2023

16. I. U. Unya. *Regional Organisations as Strategies for Development: A Comparison of EU, OAS and ASEAN.* **Babcock University Journal of History and International Studies**, 4 (1), 2019.

17. H. P. Ishaku., H. Adun., M. Jazayeri, & M. Kusaf. *Decarbonisation Strategy for Renewable Energy Integration for Electrification of West African Nations: A Bottom-Up Energy Plan Modelling of West African Power Pool Targets*. **Sustainability**, vol. 14, issue 23, 2022.

18. O. Akinyemi-Babajide., U. R. Efobi., E. Osabuohien, & P. O. Alege. *Regional Integration and Energy Sustainability in Africa: Exploring the Challenges and Prospects for ECOWAS.* **African Development Review**, 31 (4), 2019. 517-528.

19. A. Medinilla., B. Byiers, & K. Karaki. *African Power Pools: Regional Energy, National Power.* ECDPM. Discussion Paper no. 244, 2019

20. M. Olapade., E. Selormey, & H. Gninafon. *Regional Integration in Africa: Could Stronger Public Support turn 'Rhetoric into Reality'?* Afrobarometer Round 6, Dispatch No. 91. 2016

21. A. Zakari, & H. O. Musibau. *Sustainable Economic Development Energy in OECD Countries: Does Energy Security Matter?* **Sustainable Development**, vol. 32, issue 1, 2023.

22. L. A. Edet. & A. P. Odey. *Africa and the Challenges of Globalisation: An Overview.* **Pinisi Journal of Art, Humanity and Social Studies**. Vol. 2, no. 3, 2022.124-132

23. P. Pierre-Oliver. *Electricity Sector Integration in West Africa.* **Energy Policy**, 36 (1), 2008. 210-223.

24. G. Mugwika. *The Impact of Regional Integration on SMEs Performance: A Survey of Manufacturing SMEs in the East African Community (EAC).* LAP LAMBERT Academic Publishing. Mauritius, 2020

25. T. W. Oshikoya. & A. O. Salami. *Regional Integration for African Development.* African Development Bank Group. **Africa Economic Brief**, vol. 12, issue 12, 2021.

26. United Nations Economic Commission for Africa. *UNECA Report on 'Energy for Sustainable Development'.* Africa Regional Implementation Review for the 14th Session of the Commission on Sustainable Development (CSD-14). 2005

Chapter Two

Literature Review

The chapter reviewed some existing literature relevant to the impact of economic Integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS). Some theories and empirical studies that were germane and relevant to explaining the variables under study were examined in the research work. This enabled authenticity of the findings and submissions on the study.

2.1 Conceptual Review

2.1.1 Economic Integration

Economic integration as a concept and process developed in the 1950s after the establishment of the European Economic Community[1]. Economic integration, as a process, refers to the geographical voluntary joint action between neighboring nations and ultimately an economic and political community. The security community will be strengthened. Intensive international cooperation in economic integration processes requires supranational decision-making and some degree of institutionalization. Different definitions have been offered by different scholars as the concept and its practice have evolved over time. For example, integration process is defined as "the attainment of a coalition of political communities, central institutions with binding decision-making authority and control methods that determine the distribution of value"[2]. At the local level, and also for appropriate consensus-building mechanisms, another definition was given at a more general level as "the creation and maintenance of intense and diverse patterns of interaction between formerly autonomous entities."

The incipient attempt at regionalization by African countries in the 50s and 60s was main motivated by the need to achieve technical and financial development with the hope that economic advancement of countries will lead to continental growth and ensure the wellbeing of all citizens[3]. However, the focus shifted to economic growth in the seventies. There is ample empirical proof has shown that African countries have grown to understand the importance of integration to economic development. As "monetary stagnation fed political strife at the same time as political battle exacerbated monetary uncertainty"[1]. Hence the Nineteen Seventies and Nineteen Eighties witnessed the resurgence of political economic system and the rise of new form of regional consciousness which differs from the precolonial approach through its multidimensionality and comprehensiveness within-side the mixture of each monetary and political elements.

With its recognition on economics and politics at local level, local integration stands as a subfield inside global political economic system, which itself, is a social technological know-how involved with "the interaction of economics and politics within-side the global arena"[4]. Within this context, "local integration as an example of regionalism within-side the international political economic system, ambitions at providing reflections upon and in all likelihood generalizations approximately the tendency of agencies of territorially adjoining states to cluster collectively into blocs". Indeed, Africa had various examples to emulate among its former colonial masters. European countries had created the European Union (EU), the Americans both in the north and the south had created the North American Free Trade Agreement (NAFTA). In Asia, east African countries formed the Association of South East Asian Nations (ASEAN)[4].

While the spirit and working of regional organisations have evolved with time, the overall goal of local integration has remained the same: making sure peace and the welfare of societies. Here again, improvement and mainly socio-monetary improvement is taken into consideration in its broader feel as described through five as "an incorporated procedure of enlargement of considerable freedoms interconnecting with one another"; the ones freedoms being diagnosed as "political freedoms, monetary facilities, social opportunities, transparency ensures and shielding security".

2.1.2 Establishment of ECOWAS

Before the post-independence era, there were regional cooperation and integration initiatives in West Africa[5]. Colonial regional cooperation initiatives were primarily stimulated by the need of colonialist to broker various forms of exchanges between their colonies and the industrialized nations of Europe. Towards this end, the colonialists established various regional programs in territories being colonized by Britain such as Nigeria, Ghana, Gambia, and Sierra Leone. These organisations and agencies include the West African Monetary Commission (WACB) and the West African Air Carriers (WAAC). WACB issued fiat currency to facilitate commerce in these countries, while WAAC facilitated air transportation[6]. Additionally, the West African Examinations Council (WAEC) conducted joint university entrance examinations in these colonies. In contrast, France formed a monetary union with its French-speaking colonies, with the CFA franc pegged to the French franc serving as the unit of currency.

However, most integration institutions/instruments collapsed in English-speaking West Africa during the post-independence period. African leaders viewed regional economic cooperation and integration as a faster, more comprehensive, and less expensive means to achieve rapid economic

and social development during this period. Consequently, efforts were made to establish economic integration blocs or groups. In West Africa, such efforts led by the political leaders of 16 West African countries resulted in the formation of the Economic Community of West African States (ECOWAS) in the mid-1970s. ECOWAS is currently the most populous regional economic community in Africa, with subgroups such as the Mano River Union and UEMOA.

Established on May 28, 1975, ECOWAS comprises 16 Member States that have signed the Validation Treaty (Lagos Convention): Benin, Cape Verde, Burkina Faso, Ivory Coast, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo. However, Mauritania withdrew from ECOWAS in 2001, reducing the current membership to 15 countries[7]. Article 2 of the Convention outlines ECOWAS's purpose as promoting cooperation and development in various economic sectors, including industry, transport, communications, energy, agriculture, natural resources, trade, finance, and financial affairs. Its objectives include raising the standard of living of its people, improving and maintaining economic stability, fostering closer relations among its members, and contributing to the progress and development of the African continent. Efforts are underway to establish a West African Common Market and Monetary Union in line with these goals[8].

Fig.2.1 Flags of Members of ECOWAS

Source:[8]

In 1993, the 1975 Convention was revised to speed the progress of economic unification. The updated Convention (signed on 24 July 1993) reiterated the 1975 Convention and restated the Community's purpose to promote cooperation and integration. Promote cooperation between Member States and improve economic stability in order to contribute to the advancement and development of the African continent"[9]. The new treaty expanded economic and political cooperation among member nations and emphasised the creation of a common market and single currency as an economic goal. At the political level, the Convention legally allocates communities responsibility for the prevention and resolution of regional disputes.

Furthermore, ECOWAS Member States have decided that the organization will become the only economic community in the region in terms of economic integration and achievement of the goals of the African Union (AU). In line with this, the ECOWAS Heads of State Conference adopted a Declaration and Plan of Action for the Implementation of the New Partnership for African Development (NEPAD) in May 2002, effectively vesting the ECOWAS with the ultimate responsibility of implementing the program in West Africa designated as an institution. ECOWAS therefore acquired the role of the local community charged with operating her NEPAD in West Africa. So far, the regional body has been adjudged to be doing a good job of internalizing the NEPAD program[10].

In order to facilitate cooperation, coordination, harmonization and integration, several institutions have, over time, been created or provided for to be created in the protocols. Among these are the following:

- The Conference/Authority of Heads of State and Government

- The Council of Ministers
- The Executive Secretariat (the Commission from 2006)
- The Community Parliament
- The Community Court of Justice
- The Economic and Social Council
- The West African Health Organisation (WAHO)
- ECOWAS Bank for Investment and Development (EBID)
- ECOWAS Regional Development Fund (ERDF)
- ECOWAS Regional Investment Bank (ERIB)
- West African Monetary Agency (WAMA)
- West African Monetary Institute (WAMI)
- Specialized Technical Commissions

Many of the above institutions were the products of the 1993 revised Treaty[11].

Over the years, the ECOWAS authorities have developed a strategy to review and modify the powers and structures of the Community, in order for ECOWAS as an organization to play a more effective role in integrating and developing the sub-regions into the global economic environment have been pursuing. Institution[11]. One of these reforms was the conversion of the ECOWAS Secretariat to a Commission. At a summit held in Niamey on 12 January 2006, the

ECOWAS Heads of State and Governmental Authorities established the ECOWAS Secretariat in his nine offices, headed by the President assisted by the Vice President and his seven Sectors and Commissioners decided to turn it into a committee of four members. The aim of the transformation is to strengthen supranational capacities that enable optimal functioning, to make institutions more efficient, to play their role fully in economic integration and development processes, and to better adapt to the international environment is to the first reorganization is as follows, he will be reflected in seven bureaus, each of which will have a commissioner[12].

- Administration and Finance with four departments: General Administration; Human Resources; Conference services; and Finance.
- Agriculture, Environment and Water Resources, with two departments: Agriculture and Rural Development; and Environment and Water Resources.
- Human Development and Gender, with three departments: Education, Science and Technology; Gender, Youths, Sports and Culture; and Humanitarian and Social Affairs.
- Infrastructure, with three departments: Transport and Telecommunications;
- Industry and Energy.
- Macroeconomic Policies, with three departments: Multilateral Surveillance;
- Research and Statistics; and Private Sector.
- Political Affairs, Peace and Security, with three departments: Political Affairs;
- Observation Centre; and Peace Support Operations and Regional Security.
- Trade, Customs and Free Movement of Persons with three departments: Trade and Customs; Free Movement of Persons and Tourism; and Industry and Mines.

The ECOWAS Commission was de facto inaugurated on Thursday 1st February 2007 with the appointment of the Vice President and six members1[4]. Due to another restructuring later, the Directorate General is now called a Division. Against the backdrop of the need to increase the effectiveness of the integration process and improve the sub-region's development outcomes, in 2007 the ECOWAS Heads of State and Government Authorities introduced his innovative ECOWAS Vision 202015. This vision aims to transform ECOWAS from the current 'Nation's Her ECOWAS' to 'People's Her ECOWAS'. Here is our mission statement: "Borders built on good governance, where all people have the opportunity to access and use the region's abundant resources by providing equal opportunities for sustainable development and environmental protection create a peaceful, prosperous and cohesive ECOWAS sub-region free of This includes enabling the people of ECOWAS to conduct business, live in dignity and peace under the rule of law and good governance, access the sub-region's abundant resources and use them by creating opportunities. Includes transformation of ECOWAS into a single economic space sustainable environment. Achieving the vision relies on his five building blocks: Regional resource development, peace and security, governance, economic and monetary integration, private sector growth. The Vision 2020 plan is the current framework for community integration activities[13].

2.1.2.1 Overview of ECOWAS Programmes and Performance

Over the years, ECOWAS has emerged as the central organization for sub-regional cooperation, integration, and development in West Africa[15]. To achieve these aims, several programs have been devised and implemented or are still ongoing, reflecting priorities such as poverty reduction,

peace and security consolidation, food security, infrastructure development, trade capacity enhancement, and market integration. Some key programs include:

Free Movement of Persons and Goods: This major ECOWAS program aims to promote trade and integration by facilitating the free movement of people, goods, services, and capital, along with granting the right of residence and establishment for all Community citizens. It involves abolishing entry visas, introducing the ECOWAS passport, and issuing the ECOWAS brown card.

ECOWAS Trade Liberalization Scheme (ETLS): This program aims to facilitate free trade among members by eliminating tariff barriers on all forms of trading among members. Significant progress has been made with the implementation of the Common External Tariff (CET) in January 2015, marking ECOWAS's achievement of customs union status.

ECOWAS Monetary Cooperation Programme (EMCP): Initiated in 1987, this program aims to establish a harmonized monetary system for ECOWAS by adhering to convergence criteria to strengthen member states' macroeconomic fundamentals. Although the target date for the operationalization of the EMCP has been delayed, efforts continue towards establishing a single monetary policy and currency for the sub-region[13]. The establishment of the West African Monetary Zone (WAMZ) is part of this effort.

Peace and Security, Democracy, and Good Governance: This program focuses on promoting regional peace and security through interventions in crisis areas such as Liberia and Sierra Leone. ECOWAS engages in conflict prevention through initiatives such as preventive diplomacy, fact-finding missions, diplomatic pressure, and mediation, aiming to ensure free, fair, and credible elections to prevent conflicts in the region.

Common Agricultural Policy: The ECOWAS Common Agricultural Policy (ECOWAP) aims to develop modern and sustainable agriculture in the sub-region, promoting effective and efficient family farms and agricultural enterprises[14].

Infrastructural Development: Recognizing the importance of infrastructure for trade, competitiveness, and development, this program focuses on improving transportation, energy, communication, and water infrastructure. Efforts include establishing road, rail, and air links between member states and implementing the Programme of Infrastructure Development in Africa (PIDA) to mobilize resources and involve the private sector.

Overall, ECOWAS has made modest progress, although the goal of full monetary and economic union remains unachieved. Significant achievements include the introduction and implementation of various programs, such as the approval of a common external tariff and progress towards establishing the WAMZ. Additionally, ECOWAS has contributed to peace and security in the region, gaining international confidence for its interventions in conflict areas. The establishment of the Council of Wise further strengthens efforts to promote peace and prevent conflict in the region[15].

However, implementation of most programs remains weak, leaving a large gap between decision-making and implementation. As a result, the sub-region's economic and social situation remains unattractive. Despite being Africa's most dynamic regional economic community, West Africa has struggled to translate its economic growth into tangible benefits for its citizens. Despite an average economic growth rate of around 6.0% in recent years, poverty remains pervasive, with most member states ranking low on the Human Development Index, with over 56% of the region's 300 million people living below the poverty line of $1 a day in 2014.

Additionally, 40% of the population is illiterate, and approximately 40% lack access to clean drinking water. Unemployment, particularly among youth, is alarmingly high throughout the sub-region. Consequently, despite some progress, genuine development has remained elusive, and ECOWAS continues to grapple with endemic poverty and human suffering[16].

Numerous factors have contributed to the lack of significant progress within the community. These include historical legacies of colonialism, weak political will, insufficient funding of community institutions, institutional shortcomings, and governance challenges. Inadequate private sector involvement, proliferation of economic integration initiatives leading to overlapping memberships, and economic constraints, such as protectionist policies and high tariff barriers, have further hindered progress. Colonial legacies have perpetuated dependency on former colonial powers, undermining intra-regional ties, while weak political commitment has hindered the surrender of sovereignty on macroeconomic policymaking to regional bodies. Moreover, decisions made at the regional level often face delays or obstacles when being implemented at the national level, hindering the effective execution of agreements and protocols reached within the community[17].

2.1.2.2 The Origins of ECOWAS Energy Integration

Regional cooperation in the energy sector commenced in the late 1960s. After the construction of the Kainji dam in northern Nigeria in 1968, the Nigeria-Niger transmission line was established to ensure Niamey's access to electricity at historically low prices. Subsequently, in the 1970s, the first power interconnections were established between Togo and Ghana in 1972, and between Ghana and Benin in 1973, enabling Ghana to export energy from the Akosombo Lake Dam on the Volta River to neighboring countries. This progress continued with interconnectors between

Ghana and Côte d'Ivoire in 1983, Côte d'Ivoire and Burkina Faso in 2000, and Nigeria and Benin in 2003. Additionally, under the OMVS organization in the Senegalese Basin, countries began developing a common infrastructure, resulting in a 1,700 km network connecting Mali's Manantali Dam to all three national networks[18].

These early initiatives demonstrate the leadership of Ghana, Nigeria, and Ivory Coast in energy production since the 1970s and 1980s, a position they maintain today. Moreover, they underscore the significance of bilateral and trilateral agreements, showcasing certain countries' willingness to collaborate beyond their narrow national interests, as evidenced by the case of OMVS. Building upon these bilateral relations, the ECOWAS Energy Agenda and Priorities were articulated in the ECOWAS Convention of 1975, the ECOWAS Energy Policy of 1982, and its 1993 Amendment. These emphasize the harmonization of national energy policies among Member States, coordination of integration programs, projects, and activities, and the enhancement of collective energy autonomy within subregions. Energy has been identified as one of 12 priority sectors for achieving collective self-reliance and economic modernization[19].

Over the years, these ambitions materialized into three main pillars: the establishment of the West Africa Power Pool (WAPP) in 1999, the development of the West Africa Gas Pipeline initiated in 1982 and commenced implementation in 2003, and the establishment of the Energy Center for Renewable Energy and Energy Efficiency (ECREEE) in 2010. WAPP, launched in 1999 by the ECOWAS Minister of Energy, aims to interconnect all power grids in 14 out of the 15 ECOWAS member states. It leverages lessons learned from establishing power pools in Southern Africa and benefits from technical support from the United States Agency for International Development (USAID). WAPP's overarching goal is to facilitate the development of power generation and transmission infrastructure, create a regional electricity market

attractive to investors, and promote economic growth in underserved countries. Tripartite agreements on interconnection, generation, transmission, and distribution have been established between member states. While Ghana has been a key driver of energy trade in the region, smaller market member states and energy-producing countries such as Togo, Benin, the Sahel countries, Nigeria, Côte d'Ivoire, and Ghana stand to benefit from enhanced security of supply and increased economic exchange through this regional initiative[20].

2.1.2.3 The Unequal Distribution of Supply and Demand in the ECOWAS Region

Today, much of the region's power generation potential rests in Nigeria (oil and gas), Guinea (hydropower), Côte d'Ivoire (oil and gas), Ghana (hydroelectricity, oil and gas), and Niger (uranium). Benin and Togo (Hydro). The region's renewable energy potential resides principally in Senegal, Niger and the Volta Basin, concentrated in five of the 15 Member States. The land also possesses solar and wind energy potential is hidden. Coal supplies and water may be allocated more evenly and give opportunity for all ECOWAS member countries[21].

Table 2.1: Sources of Energy and Distribution in the Region

Source of energy	Distribution in the region
Oil and gas	Nigeria accounts for nearly all of proven crude oil and natural gas deposits in West Africa (98%). Meanwhile, West Africa is home to thirty percent of the entire African crude oil reserves (3017 million tonnes) and thirty-one percent of natural gas deposit (3581 billion m)

Hydropower	While West Africa has a potential of 23.9 GW of exploitable hydropower, 91% of the hydropower potential is concentrated in five countries: Nigeria (37.6%), Guinea (25.8%), Ghana (11.4%), Côte d'Ivoire (10.9%) and Sierra Leone (5.2%)
Solar irradiation	Solar irradiation is higher than 5 kW·h/m2 /day, available practically in all West African countries.

Source:[21]

2.1.2.4 Promoting Use of Renewable Energy in ECOWAS

ECOWAS convention held in 1975 made provision for the establishment of the Transport, Telecommunications and Energy Commissions, and Article 48 of the Convention directed the ECOWAS MS to harmonize energy policies and develop a common energy policy. The region has "the highest concentration of least developed countries in the world". Energy was therefore given particular attention at the 4th MS Leaders' Summit in 1981, when leaders encouraged the adoption of energy programs focused on "short-term 'survival' measures for communities and long-term development programs" Decided[22].

To ensure this survival, assistance was requested, albeit for a short period of time, in the form of a qualified staff of MS Civil Servants at his ECOWAS facility. The leaders did not hesitate to call for external reinforcements. They considered the possibility of seeking advice and support from international development organizations such as the United Nations, or to fill gaps in domestic expertise. In 1981, he was invited to provide advisory services on energy programs. As part of the program, a symposium was held in November 1981, and USAID helped form a team of US energy experts to serve as a reference point. We also sponsored the preparation of the symposium proceedings. The ECOWAS Symposium was titled "Energy for Survival" and was attended by representatives of several donor organizations and representatives of all Member

States. A report prepared by the USAID team showed that there was a unanimous decision by the symposium delegates that ECOWAS should prioritize renewable energy sources, especially hydropower and solar power. The Community Secretariat also had a policy coordination role for MS to take steps to "promote energy conservation and mainstream renewable energy sources"[23].

The 1981 symposium report by USAID highlights that energy was not included as part of the policy areas covered by ECOWAS until 1981. Some attribute the introduction of energy as a policy area in ECOWAS to the 1993 restructuring. However, Article 48 of the 1975 treaty establishing ECOWAS already called for the formulation of a common energy policy. Moreover, after the 1981 meeting of the Authority of Heads of States and Government and the 'Energy for Survival' symposium, there was increased attention to renewable energy sources within ECOWAS. Notable West African leaders also participated in the 1981 United Nations conference on new and renewable sources of energy, which issued the Nairobi Programme of Action for the development and utilization of such energy sources[24].

In line with this, ECOWAS released the Conakry Declaration in 1982, mandating member states to set up energy commissions to coordinate and supervise all energy functions and activities within each country. Despite these initiatives, the development of an ECOWAS energy policy and the creation of an ECOWAS Energy Resources Development Fund, discussed at the 1982 meeting of the Authority of Heads of States and Government, did not materialize. Nonetheless, it is evident that energy was on the agenda at the time of ECOWAS's founding in 1975, and the topic of renewable energy had been broached before the 1993 revision of the ECOWAS treaty[25].

Similar to the global decrease in interest in renewable energy due to a glut in oil prices, there was also diminished interest in renewable energy in the region in the late 1980s. During this period,

issues such as free movement within the community, cultural integration, member states' financial contributions, and economic concerns, particularly debt financing, dominated the agenda of the Authority of Heads of States and Government meetings. However, with the outbreak of violence in Liberia in 1989, the 1990s were marked by addressing the conflict and its spread to other parts of the region.

Meanwhile, the 1990s saw a renewed global awareness of the use of renewable energy to combat climate change. In 1992, the United Nations Earth Summit in Rio led to commitments from over 100 countries to "transform conventional energy" and signed the legally binding Convention on Climate Change. As part of this agreement, the UNFCCC launched the Africa Renewable Energy Initiative to promote renewable energy use in African countries. However, within ECOWAS, climate change did not emerge as a discussion topic at heads of state meetings during the Earth Summit or for the remainder of the 1990s[26].

ECOWAS' lack of consistency with efforts to combat climate change suggests that commitments to the UNFCCC in the 1990s may not have facilitated the transmission of renewable energy policy. Notably, during the United Nations Conference on Climate Change and Development in Africa, an ECOWAS Commission official mentioned that “the issue of climate change has not been specifically addressed” within the community. Therefore, when energy returned to the agenda in 2003, it was not relevant to concerns about climate change[27].

At a conference in 2003, West African leaders highlighted the region's ongoing energy challenges and introduced the ECOWAS Energy Protocol, which provides guidelines for economic trade related to aspects of energy exploration, generation, distribution, and energy decided to create and sign a The Energy Protocol, the West Africa Power Pool (WAPP), and the

premise of the West Africa Gas Pipeline project have emerged[28]. WAPP was awarded ECOWAS Professional Organization status in 2006 and has been active ever since. The 1981 symposium report by USAID highlights that energy was not included as part of the policy areas covered by ECOWAS until 1981. Some attribute the introduction of energy as a policy area in ECOWAS to the 1993 restructuring. However, Article 48 of the 1975 treaty establishing ECOWAS already called for the formulation of a common energy policy. Moreover, after the 1981 meeting of the Authority of Heads of States and Government and the 'Energy for Survival' symposium, there was increased attention to renewable energy sources within ECOWAS. Notable West African leaders also participated in the 1981 United Nations conference on new and renewable sources of energy, which issued the Nairobi Programme of Action for the development and utilization of such energy sources. In line with this, ECOWAS released the Conakry Declaration in 1982, mandating member states to set up energy commissions to coordinate and supervise all energy functions and activities within each country. Despite these initiatives, the development of an ECOWAS energy policy and the creation of an ECOWAS Energy Resources Development Fund, discussed at the 1982 meeting of the Authority of Heads of States and Government, did not materialize. Nonetheless, it is evident that energy was on the agenda at the time of ECOWAS's founding in 1975, and the topic of renewable energy had been broached before the 1993 revision of the ECOWAS treaty[28].

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> *This (White Paper) reflects our vision for 2015 and will play a critical role in the improvement of the conditions and well-being of the ECOWAS rural and peri-urban populations. These populations jeopardize their health and that of their children by burning harmful domestic fuels; they spend a great part of their day trekking several kilometres with heavy loads; they give birth in semi-darkness; in short, they are deprived of economic opportunities because*

they do not have access to or cannot afford adequate energy services. In short, it is needless to say that our populations deserve better and we have to free them from these hardships[29].

The involvement of the United Nations as a transfer agency should also be noted in the preparation and adoption of the White Paper, although the intervention of the United Nations was not linked to the signing of ECOWAS by any international regime or organization. Policies and Renewable Energy - Agreements, so in this case the transfer mechanism cannot be said to be compulsory. As the Millennium Development Goals were designed to secure funding for poverty eradication from international donors, the White Paper focuses on easing the burden of energy sacrifice rather than racing to beat the bad guys. As noted above, the White Paper suggests a renewable energy policy shaped by the climate change challenge, but not directly aimed at stopping climate change, but rather focused on ending energy poverty increase. However, despite the goals set in the White Paper, ECOWAS MS continues to meet the challenges of providing energy to residents and ensuring that the region's energy activities are sustainable. Cumulatively, the region also has the lowest access to energy in the world[30]. Based on performance level assessments in the 2011 ECOWAS/WAEMU Energy White Paper, the West African region appears to lag in rural access to electricity and access to modern cooking fuels. Among the world's developing countries, West Africa has a surprisingly low access to energy at 17%, in contrast to Latin America (85%), the Middle East (79%) and North Africa (99%)[31]. Moreover, despite existing efforts by ECOWAS and other international donors involved in ensuring the availability of energy services in the region, there has been no visible improvement in the situation in the region. It seems that it was not. As the table below shows, in 2009, 58% of the region's population had no access to electricity, and by 2011 the percentage of West Africans

without energy had risen to his 63%. Against the backdrop of this devastating situation and unsuccessful attempts to address the situation of lack of access to energy in West Africa, the EU has facilitated the transition of its renewable energy policy to her ECOWAS.

Table 2.2: Achievements of the ECOWAS/UEMOA White Paper on Energy Access

White Paper Goals	Goals Target	Achievement of Goals
Access to modern cooking fuel	100% of the population	17% of the populations (30% urban, 7% rural)
Individual electricity access	66% of the population	42%
Electricity access in urban and peri-urban areas	100%	70%
Electricity access in rural areas	36%	11%

Source:[32]

2.1.3 The Concept of Clean Energy

Opinions differ on the definition of the term "clean energy". But simply put, unlike coal and oil, it is electricity or nuclear power that does not pollute the air when used. This is because the technology contributes less to global warming and is less polluting. As a concept, renewable energy refers to energy sources that regenerate naturally in a short period of time, either directly from the sun (thermal, photochemical, photovoltaic, etc.) or indirectly from the sun (wind, hydro, and photosynthetic energy) stored in biomass energy from other natural motions or environmental mechanisms (such as geothermal or tidal energy)[33].

2.1.3.1 Motivation for Renewable Energy

A cornerstone of the global search for renewable energy is its envisaged potential to protect the environment by controlling emissions, combating climate change, and accessing modern energy services. Others include domestic energy security and its potential to create jobs and reduce dependence on fossil fuel imports. Domestic interests in this context determine a country's position on the renewable energy debate. This perception highlights, for example, the recent allocation by the United States of so-called "efficient natural gas" and "clean coal" to clean energy categories, contrary to conventional logic. Similarly, large global private issuers such as Exxon/Mobil and BP PL are driven by profit-seeking and, as exemplified by the Volkswagen car emissions scandal moving to clean energy. The capitalist system is only using the global environmental crisis as a means of growth, without actually using it solve. For renewable energy, two classes of propulsion have been identified. Countries with unresolved energy problems and abundant renewable resources, usually with more ambitious policies, and with a vested interest in maintaining the system[34].

Apparently, West Africa does not fall into Moe's classification. There is no denying that the region faces a chronic energy crisis. However, West Africa's renewable energy potential appears to be unnecessarily exaggerated, with the region declining at various stages. More than 75% of primary energy comes from domestic renewable sources. Ghana appears to be one of the potential growth poles. In a coordinated West African renewable energy policy. Despite this achievement, half of Ghanaians did not have access to modern energy in 2010. Based on Ghana's experience, renewable energy potential in West Africa is considered to be rich. Though conceived, it doesn't seem to offer the serious promise of efficiency that it is often praised for[35].

2.1.3.2 Why is Energy Important?

Following the energy crisis of the 1970s, extensive studies were conducted on the relationship between energy usage and economic growth, indicating a highly positive correlation between the two. Energy serves as a crucial input to numerous manufacturing and consumption activities, contributing at least half to the overall growth of the modern economy while accounting for only 10% of associated costs. According to the World Bank Development Indicators, energy consumption significantly impacts various aspects of life including wealth, health, food, water, infrastructure, education, and individual life expectancy[36].

Over the past 50 years, energy development has significantly improved people's lives, enabling billions to enjoy unprecedented levels of comfort and mobility. Present-day energy primarily relies on fossil fuels, which have played a pivotal role in shaping modern economies and lifting millions out of poverty in certain regions. However, despite these advancements, around 13% of the global population still lacks access to energy, while even highly developed countries experience occasional blackouts. Particularly in low- and middle-income countries, the rate of electrification remains notably low, with only a small percentage of the population having access to electricity. This poses ongoing challenges for economic development in these regions, exemplified by very low electricity prices observed in Sub-Saharan Africa, ranging from 0% to 50% across different areas[37].

Nevertheless, alongside the benefits, there are significant drawbacks associated with fossil fuels. Increased attention has been given to the issue of climate change over the past decade, with criticisms mounting against fossil fuels due to their role in releasing large amounts of carbon dioxide into the atmosphere, accelerating global warming and leading to various environmental

and health risks. Furthermore, fossil fuels are non-renewable resources, and while efforts to reduce dependence on them are underway, global energy demand continues to rise, raising concerns about depletion[38].

Efforts to transition to renewable energy sources face challenges, particularly given the continued affordability and high energy density of fossil fuels, as well as entrenched political and economic interests in the fossil fuel industry. However, a shift towards renewables could contribute to greater stability and sustainability in developing countries, offering solutions to power shortages, reducing pollution, and promoting equitable distribution of wealth. Technologies such as solar and wind power offer decentralized generation options, bypassing the need for extensive transmission infrastructure. Additionally, renewables provide cleaner alternatives to fossil fuels, mitigating environmental and health risks associated with their combustion[39].

In summary, renewable energy presents itself as an enabler for sustainable development, offering solutions to various challenges faced by developing countries, including energy access, pollution, and economic inequality. A concerted effort to promote renewables could lead to a more equitable and sustainable energy future, benefiting both present and future generations.

2.1.4 Renewable Energy in Africa

Africa relies heavily on biomass, oil, natural gas and coal to meet its energy needs. These energy sources are also known to have serious health and environmental impacts. For example, the use of biomass in unventilated cookstoves promotes indoor air pollution, which is known to be a major cause of respiratory disease, especially in West Africa. Charcoal, which is widely used as

a fuel, also accelerates soil degradation as trees are cut down for production, often causing erosion and exposing the topsoil to harsh weather conditions. Health and environmental impacts aside, these traditional sources of energy are out of reach for many of Africa's poor due to rising costs. As a result, paying higher costs reduces the level of support African economies can provide to meet the energy needs of their populations[40].

Despite the harsh reality of its dependence on conventional energy sources, Africa has opportunities to tap its vast assets of renewable and conventional energy sources. The region has 1.1 GW of hydropower capacity, 9000 MW of geothermal potential, abundant biomass, solar and wind potential.

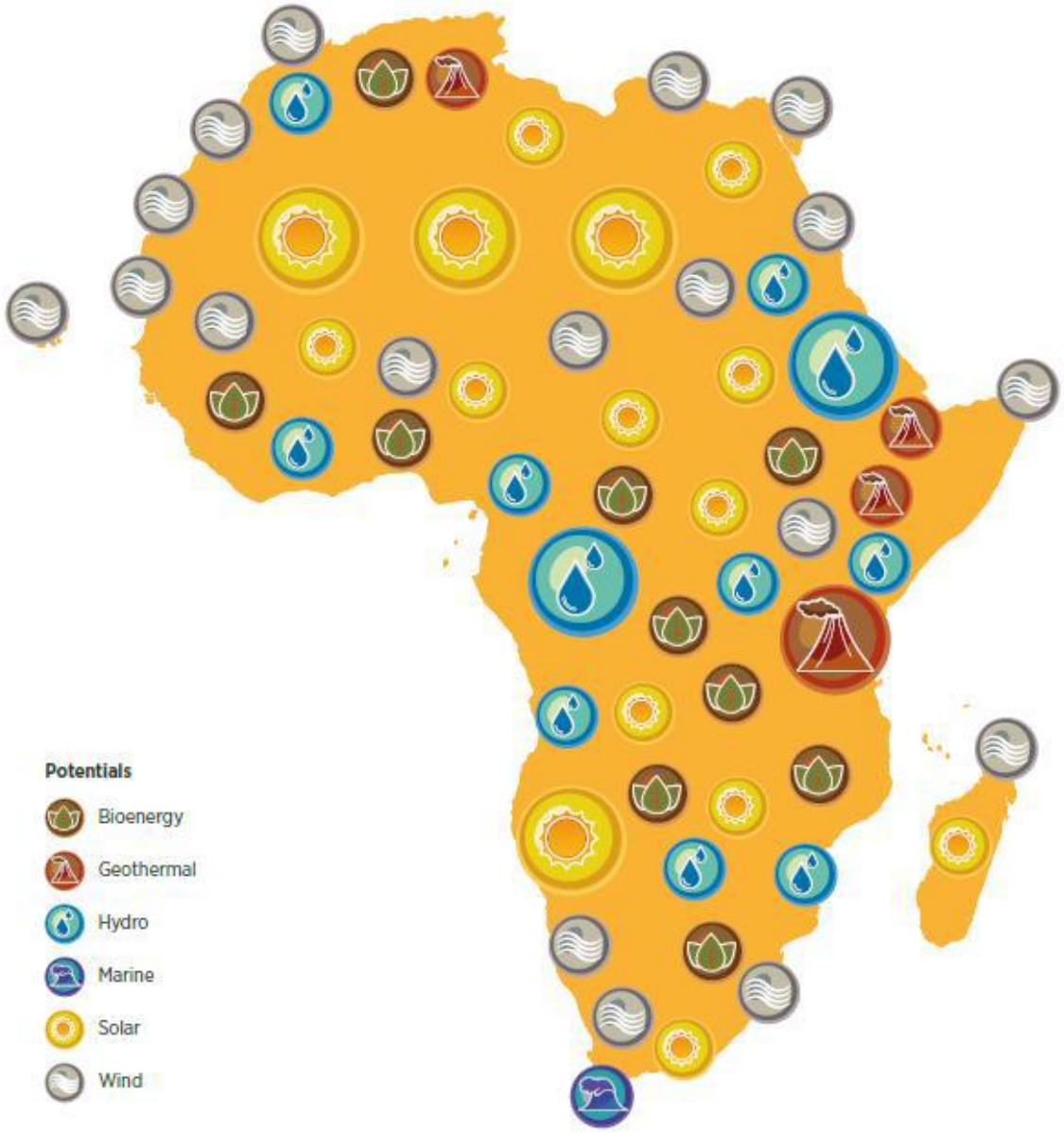

Fig.2.2: The Distribution of Renewable Energy Potential Identified in Africa.

Source:[40]

The question then is, beyond the obvious resource limitations that developing countries have, what are the principal obstacles developing countries must overcome so as to meet their energy needs through renewable and sustainable sources? The succeeding paragraphs discuss the barriers to the development of renewable energy technologies in Africa.

2.1.4.1 Barriers to the Development of Renewable Energy Technologies in Africa

Several factors have inhibited the development and the subsequent broad adoption of renewable energy. Studies identified economic, institutional, technical, social, cultural, behavioural and political barriers to the development of renewable energy in Africa[41].

Political Factors: Energy is central to a nation's national security because it is central to all human activity and a vital component of the growth of any economy. Not surprisingly, states usually prefer to control energy and energy sources by enforcing national policies in the form of laws and regulations. However, strong political interventions to maintain state control often come with many disadvantages, such as limited private sector access and monopoly on energy supply and distribution[81]. All this ultimately discourages private sector investment, which is very important for the successful development of renewable energy. Moreover, given the development costs of renewable energy, especially given the economic conditions of developing countries, there is a need for public-private partnerships to provide investment and control over new sources of production. This also leads to a lack of innovation coming from close cooperation with the private sector or private companies.

In addition to state control of energy sources through legal and regulatory instruments, lack of political will also represents a major obstacle to renewable energy development. Governments in

most developing countries are keenly engaged in social and political problems such as internal conflicts, famine, drought, population growth and fragile health systems. These problems appear to be separate from energy shortages in developing countries. It should also be noted that many of the social problems facing developing countries are a result of climate change, largely due to carbon emissions from burning fossil fuels. Efforts are being made to implement measures to address these issues, leaving fossil fuels, especially renewable energy, on the backburner. 83 notes that a lack of government support could deprioritize renewable energy and render it unworthy of legislative and administrative action, as well as research funding[42].

Another barrier entrenched in these policy drivers is the overall policy surrounding renewable power generation. Public policy is the end result of the political system, and it is argued that influencing policy is the primary intention of interest groups. As a result, interest groups that influence political circles and profit economically or politically from the old order can block renewable energy development through political or coercive means[43]. Moreover, political parties and governments are usually lip service to renewable energy adoption. As such, policy formulation and implementation did not live up to verbal promises. For example, at the 2009 Copenhagen Climate Conference, South African President Jacob Zuma announced that South Africa would reduce its carbon emissions by 42% by 2025. It remains questionable whether It is politically, or more importantly, one of the world's top 20 greenhouse gas (GHG) emitters, and is by far the largest emitter in Africa because it relies primarily on coal. Because of the willpower needed to achieve this goal. The economy has set fire to generators. Other developing countries also have energy subsidies that ultimately favor conventional fossil fuels. These energy subsidies limit investors' willingness to support the renewable energy development process. This gives it a higher cost and discourages consumers who are unable or unwilling to patronize its use. Lack of

government policies to support and promote renewable energy technologies stems from the uncertainties associated with the technology being relatively new compared to the tried and tested conventional technologies used in fossil fuel exploration[44].

Social Factors: One of the fundamental principles of sustainable development, according to the Rio Declaration on Environment and Development, is that:

> *environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available*[45].

This principle assumes that all environmental decisions must take into account a bottom-up approach. In other words, to achieve sustainable development, we need to give people of all countries a voice in the decision-making process. However, the majority of Africans lack information and awareness of government decisions, especially energy needs. This is due, in part, to the long tenure of dictatorships that do not allow public participation in decision-making or the provision of information about government procedures. Authoritarian regimes are particularly detrimental to renewable energy development in Africa. It needs continued public support to succeed. 88 describes the need for broader participation as critical to the development process. However, the illiteracy rate is high, with more than 1 in 3 adults being illiterate, and about 47 million young people between the ages of 15 and 24 who are illiterate. This, combined with the lack of access to information, has resulted in society being unaware of the environmental challenges and economic opportunities associated with renewable energy technologies. Clearly, social acceptance is critical to the success of renewable energy. This leads

to a lack of consumer acceptance of renewable energy products, shrinking market size and further increasing production costs and cost per household.

A scholar identified her three dimensions of social acceptance. Socio-political, social and market acceptance. They argue that both policy and technology need to be accepted by society at large for the initiative to be successful. Success requires determination and social acceptance of renewable energy projects by local stakeholders, residents and local governments[46].

Technical & Technological Factors: Technological progress in all fields, including education, health, and the economy, is essential for the development of a country. From the general to the concrete, for renewable energy to spread, the technology needs to be widely spread. However, one of the barriers to renewable energy adoption in developing countries is the unavailability of the necessary technologies. This may be due to relatively new renewable energy technologies that investors find unattractive, so they want to invest in established and proven technologies. As a result, the lack of political and technological innovation increases the production costs of renewable energy. Conversely, innovation can lower the cost of producing renewable energy and enable alternative energy to compete better with the subsidized fossil fuels currently in use. In other words, public policy can accelerate renewable energy to grid parity. For example, supports this argument, arguing that innovation can make renewable energy technologies more competitive[47].

Other technical barriers are the lack of standards, codes and certifications that affect product quality and product acceptance, increasing purchasing and business risks. Lack of qualified staff and training facilities. This can be a constraint for producers. Lack of infrastructure, impossibility of connection to the power grid, weak tech culture, a shortage of entrepreneurs can

lead to a lack of competition and a shortage of supply. And most importantly, there is a lack of funding to sustain innovation.

2.1.5 The Need for Regional Energy Integration

The ongoing shifts in the global economy, transitioning from geopolitics to globalization, necessitate specific measures for individual countries to address systemic market failures and structural weaknesses, thereby accelerating their integration into the global economy. These measures, complemented by transitions from threats, aim to tackle common issues arising from rapid global integration[48].

Following political independence, Africa's fragmentation into numerous nation-states with limited economic, political, or geographic coherence prompted African leaders to prioritize economic integration in their development strategies. The relatively small size of typical African economies provided a foundation for pursuing mutually beneficial economic cooperation and integration, particularly among neighboring countries. There is a growing recognition among African nations that further integration holds significant potential for minimizing the costs of market fragmentation and is essential for their integration into the global economy. Regional cooperation and integration are crucial for enhancing Africa's competitiveness and maximizing the benefits of globalization. Improving Africa's access to global markets, particularly in developed countries, is essential, alongside measures such as debt relief and state aid[49].

The vision and commitment of African leaders to the goals and principles of political and economic cooperation led to the establishment of the Organization of African Unity (OAU) in 1963 as a platform to promote development and unity in Africa. This commitment was

reaffirmed in subsequent initiatives such as the 1980 Lagos Plan of Action and the 1991 Abuja Treaty, which aimed at the definitive establishment of the African Economic Community.

Regional economic integration plays a pivotal role in accelerating economic growth and sustainable development in Africa, facilitating market expansion, greater specialization, faster industrialization through economies of scale, and addressing the challenges associated with smaller market sizes in Africa. It also stimulates growth in domestic and foreign direct investment, enhances the competitiveness of African countries in the global economy, and promotes economic efficiency through increased competition and incentives for technological innovation and production methods[50].

Regional energy cooperation and integration hold significant promise for developing countries, particularly in Africa, to further develop the energy sector and harness the environmental, social, and economic benefits of resource utilization efficiency. Four major benefits are associated with regional energy integration: improved security of supply, better economic efficiency, enhanced environmental quality, and the development of renewable resources. Additionally, economic integration and regional interdependence can contribute to peace and stability, with power interconnections being considered as a means to develop alternative clean or environmentally sound energy resources, aligning with the increasing concern for environmental considerations in development planning[51].

2.1.5.1 Security of Supply and Accessibility

Access to electricity and other modern energy sources is crucial for economic and social advancement. Modern energy services are essential for improving quality of life, as eradicating poverty requires access to clean water, sanitation, healthcare, education, and communication

networks, all of which rely on energy[52]. As of the year 2000, aggregated data shows that 1.64 billion people, or 27% of the global population, lack access to electricity. Power shortages are closely linked to extreme poverty, with nearly 2.4 billion people in poorer nations relying on traditional biomass for cooking and heating, especially in Africa where 80% of the population exclusively uses biomass for their basic needs.

Regional energy integration plays a significant role in ensuring energy supply for millions of people in sub-Saharan Africa. Initiatives like the West Africa Power Pool (WAPP) aim to increase overall electrification levels in the region by prioritizing the construction of generating and transmission projects to support economic development and provide energy access to more consumers[53]. Examples such as the Mombasa-Nairobi petroleum products pipeline, which supplies petroleum products to Uganda and other inland areas, demonstrate the impact of regional energy infrastructure on supply security and affordability.

Expanding existing power lines between countries and regions enhances supply security by sharing operating reserves and installed capacity, thereby reducing the need for new investments in power plants. Interconnections between countries like Ghana and Côte d'Ivoire provide backup power sources during emergencies, while connections between Algeria and Tunisia offer mutual support during power crises. The unequal distribution of energy resources across regions and nations in Africa, coupled with the small size of many African economies, makes it challenging for individual countries to develop effective energy strategies. This underscores the importance of regional cooperation in energy sector development to harness Africa's abundant energy resources for improving electrification rates, enhancing access to modern energy services, reducing rural poverty, and fostering sustainable development across the continent[54].

2.1.5.2 Increased Economic Efficiency

Economic efficiency stands as a fundamental pillar of sustainable development. Energy plays a pivotal role in fostering local economic growth by enhancing productivity and enabling income generation at the local level. Lack of access to modern energy severely limits job availability, hampers productivity gains, and restricts economic opportunities. Ensuring consistent and affordable energy availability is essential to support the Sustainable Development Goals (SDGs). Strengthening regional cooperation on infrastructure projects, such as energy, can reduce transaction costs, promote market integration, foster economic growth in Africa, and enhance investment incentives, particularly for the private sector[55].

Enhanced energy trade and improved industrial competitiveness through energy integration programs contribute to accelerating economic growth and achieving the first Millennium Development Goals (MDGs) of the United Nations, namely, ending extreme poverty and hunger. For instance, the power interconnection between Togo and Benin with Ghana has bolstered their economies by securing a reliable electricity supply from Ghana for 25 years, while also providing access to cheaper energy compared to local resources[56].

Moreover, the establishment of regional energy pools among small economic groups mitigates risks and facilitates the development of capital-intensive energy projects by domestic and international investors. Economies of scale allow for the sharing of reserve responsibilities across regions, leading to larger generating capacity, improved power quality, and reduced costs. Optimizing investments in power infrastructure becomes more feasible, especially when interconnected regions possess complementary load profiles on a daily or seasonal basis.

2.1.5.3 Enhanced Environmental Quality

The utilization of fossil fuels in electricity production leads to the emission of pollutants such as SO2, NOx, CO2, among others, resulting in environmental degradation, poor air quality, and adverse effects on public health and overall quality of life. At the global level, the escalating atmospheric concentrations of greenhouse gases (GHGs) present one of the most pressing environmental challenges, with potential repercussions on climate patterns. While industrialized nations are the primary contributors to GHG emissions, the adverse impacts are anticipated to be most severe in developing countries, particularly the least developed nations in Africa, which are highly vulnerable to the effects of climate change.

One mitigation strategy to address air pollution and GHG emissions involves the adoption of clean technologies and reducing reliance on fossil fuels for electricity generation. Widespread deployment of renewable energy sources such as hydropower, solar, wind, or geothermal energy, as well as transitioning to natural gas instead of coal or oil, could diminish Africa's dependency on high-carbon fuels and mitigate associated air pollution and GHG emissions[57].

Natural gas presents several advantages for Africa, including environmental benefits, enhanced industrial diversity, opportunities for regional cooperation, and expanded trade prospects. Regarding natural gas utilization, options include constructing pipelines from gas sources to generation facilities near consumption hubs or generating electricity at the source and transmitting it through the grid to load centers. Africa accounted for 8.3% of global natural gas production in 2002, with major producers like Algeria, Nigeria, Angola, and Egypt exploring expansion opportunities, potentially bolstering regional trade. Factors driving the development of

cross-border gas pipelines in Africa include rising energy demand and the imperative for oil-producing nations to utilize natural gas resources previously flared[58].

While gas markets typically operate on a national level, regional development emerges as a vital long-term objective. Projects such as the Mozambique-South Africa gas pipeline and the West Africa Gas Pipeline (WAGP) from Nigeria to Ghana via Benin and Togo exemplify regional integration initiatives, delivering economic and environmental benefits across multiple nations. Moreover, natural gas could facilitate cross-border electricity trade from gas-fired power plants, fostering enduring partnerships between developing African countries and industrialized nations. Examples include the Trans-Mediterranean (Trans-med) project linking Algeria to Italy via Tunisia and the Maghreb-Europe Gas Pipeline connecting Algeria to Spain and Portugal via Morocco, reinforcing Algeria's position as a global gas producer and exporter[59].

Despite the environmental benefits of regional energy integration, several energy projects in Africa have been scrapped due to failure to meet international environmental standards set by institutions like the World Bank. These standards mandate placing energy projects away from environmentally sensitive areas or densely populated regions, avoiding displacement of communities for hydropower projects, and conducting thorough environmental impact assessments. While mitigating environmental and social impacts remains crucial, priority should be given to expanding energy access to alleviate poverty and foster socio-economic development in Africa[60].

2.1.5.4 Facilitate Development of Renewable Energy Resources

Renewable energy sources like hydro, geothermal, or wind are often confined to specific locations and cannot be easily transported except through power links. For certain resources such

as hydropower, lignite, and renewables, power interconnection represents the most viable method of making these resources accessible to distant regions. Power interconnections play a crucial role in facilitating the development of diverse energy resources for the collective benefit of the entire continent. For example, Africa's vast hydropower potential could significantly benefit the majority of its population if integrated into economic integration initiatives. Historically, many power interconnections in Africa have stemmed from the development of hydropower projects, including landmarks like the Owen Falls hydropower plant in Uganda (1950s), the Kariba North hydropower station on the Zambia-Zimbabwe border (1960s), and the Akosombo hydroelectric dam in Ghana (1960s). Additionally, the Inga hydropower station in the Democratic Republic of Congo (DRC) features a 351 MW plant (Inga 1) commissioned in 1972 and a 1424 MW unit (Inga 2) operational since 1982. This station supplies electricity to the Republic of Congo via a 220 kV line connecting Inga to Brazzaville, as well as to other Southern African countries through a 500 kV HVDC line linking Inga to Kolwezi (Katanga province) and then to Zambia via an existing 220 kV power line[61].

Moreover, local economies, particularly those in remote or small-scale regions, stand to benefit significantly from the initiation of power connectivity projects and associated power generation facilities. The development of energy resources such as hydropower, which rely on electricity interconnections for distribution to major load centers, can enhance the economic prospects of remote areas by generating more employment opportunities, increasing tax revenues, and fostering additional income streams.

2.1.6 The State of Renewable Energy in West Africa: The Institution of ECREEE

In 2010, members of the Economic Community of West African States (ECOWAS) established the Center for Renewable Energy and Energy Efficiency (ECREEE) with the aim of promoting renewable energy through various initiatives such as policy formulation, capacity building, awareness campaigns, technology transfer, and pilot projects. Additionally, ECREEE has been actively involved in coordinating research efforts and attracting investments in the renewable energy sector. Since its inception, ECREEE has achieved several significant milestones, including the adoption of a regional renewable energy policy in 2012 through externally coordinated political processes.

However, the Center has heavily relied on partnerships with foreign institutions, particularly those from capitalist states, to sustain its operations. This reliance on external entities has presented a challenge for ECREEE, as it has sometimes led to a perceived subordination to the European Union (EU) due to ECOWAS' historical ties with the EU through various treaties like the Lomé and Cotonou Treaties. Such ties have raised concerns about ECOWAS' internal autonomy and have been criticized for undermining the autonomous vision of economic integration within the region. Moreover, these linkages have been exploited to perpetuate imperialist agendas, including the divisive tactic of pitting member states against each other, as evidenced by Ghana and Côte d'Ivoire's bilateral agreements with the EU that stalled trade negotiations between ECOWAS and the EU in 2006. Critics argue that the renewable energy industry in West Africa has become increasingly reliant on partnerships with foreign-dominated multinational corporations, thereby raising questions about economic sovereignty and self-determination within the region[62].

2.1.6.1 West African Renewable Industry in the Regime of External Conglomerates and The Prospect of Integration

The fate of small-region renewable energy exploration will be undermined in the era of multinational corporations. Responsible countries and regions do not rely on the goodwill of donors to build, finance and sustain strategic industries like energy in so-called "cooperative partnerships". In West Africa, that approach contradicts the logic of history. For example, contrary to their proclaimed ideal of powering Africa, the Desertec Foundation in Morocco and Tunisia will divert solar energy from the Sahara for export to imperialist Europe after 2018 is proposing.

A common objection to partnerships with transnational corporations is their attack on national sovereignty, often denying them the necessary environment for making constructive political and social decisions for development. Fundamental decisions affecting the entire population had to be made without consultation by a small number of technocrats[63].

International investors and multilateral financial partners took steps to solve the problem expectations are unrealistic. Similar considerations may have led to unsubstantiated claims that partnerships with multinationals in West Africa's renewable energy industry are now "led by Africa and its institutions''[64].

Which steering tool does the West African country have in the equation? Is it capital or entrepreneurial power? Almost every component used in industry, except natural resources, is usually foreign are brought in from outside by investors in this has even hampered discussion of the technology's dissemination potential, given the historical conservatism of cross-border intellectual property issues. Unfortunately, West Africa's future renewable development is

mortgaged to the goodwill of multinational corporations. The assumption that underdevelopment in Africa can be solved by partnership with the West is deeply flawed[65]. This often leads to local resistance, as the partnership typically takes a top-bottom approach to development and ignores local demands. Multinational-dominated African clean energy industries tend to perpetuate the generally unequal international political economy in a different style. That is, the multinational moguls in fossil fuel development simply plunder more air and solar resources with the backing of renewable energy companies of sub-regions to oil. The takeaway from the above discourse is that the role of multinational corporations in unregulated neoliberal regimes is disruptive.

While these manifestations seem not to be obvious in the West Africa clean energy industry arising from its relative infancy, the TNCs' activities in the Niger Delta and elsewhere presents opportunity for reflection[66]. On the whole, the developed nations and their agencies had consistently demonstrated infidelity to assistance promises in previous partnerships with the Africa continent. The latest of such promises on a multilateral scale was the 2005 Gleneagles initiative on debt cancellation, which ended with most of the African beneficiaries in a more complicated debacle[67]. There is no evidence that the attitude is different today to warrant amateurish enthusiasm about the prospect of acquiring clean energy technology from them on mutual terms. Still, the pro-market character upon which the partnership is based is also weak.

Neo-liberalism projects a perspective that good policies and good economic management were those that promote market forces. The phenomenon of the Asian "miracle", invoked to support this argument, has since become anachronistic in the face of contradicting evidence.

2.1.6.2 Internal Structure of West Africa Political Economy and Prospects for Renewable Energy

Apart from foreign control of the emerging West African renewable energy industry, the internal structure of the West African economy tends to complicate the situation as access to energy varies across subregions. Some countries do not even have basic energy generation infrastructure and systems, but some states export energy to neighboring countries. Nigeria and Ghana have significant fossil energy resources, they lack the technology to take advantage of it, but economic realism will require them to move to a fossil fuel-based economy, adopting the US example cited earlier in this paper represents a situation that, coupled with disproportionate economic power, may be unsuitable for a common regional energy production strategy, a situation that makes potential functional spillover impractical. The alternative in the new scenario therefore requires conscious and decisive political action in the form of the establishment of a central authority with the capacity to make binding decisions within the federal system[68]. ECREEE may have played this role. Unfortunately, the presence of external actors in the renewable energy sector complicates the situation, operating in the context of well-written WTO rules rather than regional agreements. Spain is the Center's main technical and financial partner and a member of its Executive Board. This has serious implications when placed in the context of imperialism. ECREEE's foreign origins and control deprive it of the internal autonomy it needs to operate. The problem is exacerbated by the inadequate political will of West Africa's ruling class to make social and political decisions.

Historically, no country has developed without protecting emerging industries. Neoliberalism has eliminated this path. The asymmetric process of global interaction thus fostered undermines the proper framework for the interaction of economic actors and governments within subregions. Its constant forging of vertical integration with the global economy denies horizontal connectivity, economic convergence and industrial growth between subregions[69].

2.1.6.3 Political Economy of Clean Energy Integration in West Africa

Inadequate energy generation and distribution has continued to plague Africa's socioeconomic growth. Privatization of the energy sector has perpetuated the problem, as called for in the 2005 Washington Consensus and Sachs Report. The World Bank reports that two-thirds of West Africa's total population do not have access to 'modern energy'. While the issue has long attracted the attention of academics and administrators, the global call for clean energy tends to present a scenario in which Africa is again left behind, so existing narratives on the issue always dominate. Therefore, regional coordination from carbon-based to clean energy could be an appropriate strategy to liberate the continent from its current epileptic power generation and address the health threats typically associated with fossil fuels migration was recommended. Pursuing clean energy is just one issue against the geopolitical backdrop of neoliberalism and globalization, shaping the balance of power in today's environmental reforms[70]. In West Africa, neoliberal reforms have consistently defined the political environment since their introduction in the 1980s, but with fatal consequences.

Current discourse in development studies tends to suggest that reform of the Washington Consensus is over, as evidenced by the frequent use of the concept of "post-Washington Consensus". The hegemony of the "market forces" that imposed it on the global economy will persist. While the overall impact on Third World economies is still debated, it has fundamentally affected their internal autonomy, undermined their governments and people, and severely disempowered them. This study examines the realization of affordable and clean energy integration in West Africa using functionalist and related models. Assuming the starting point is

West African countries cannot control their economies in the context of the prevailing neoliberal regime[71].

2.1.7 The Concept of Sustainable Development

Sustainable development has been defined in many ways, but the most frequently quoted definition is from Our Common Future, proposed by World Commission on Environment and Development also known as the Brundtland Report. This report defines sustainable development as follows:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It contains within it two key concepts:

- the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs".

All definitions of sustainable development require that we see the world as a system – a system that connects space; and a system that connects time.

Following the release of the WCED's report, Our Common Future, debates on the environment and its impact on the socioeconomic and political development have dominated the centre stage at various international fora. Established by the United Nations (UN) in 1983, with Gro Harlem Brundtland (the then Prime Minister of Norway) as chairman, the WCED had the following terms of reference:

- to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond;
- to recommend ways concern for the environment may be translated into greater cooperation among developing countries and between countries at different stages of economic and social development and lead to the achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment, and development;
- to consider ways and means by which the international community can deal more effectively with environmental concerns; and
- to help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long-term agenda for action during the coming decades, and aspirational goals for the world community[71].

WCED defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It goes on to recognize the inevitability of contending interpretations of the concept, but nevertheless argues that these "must share certain general features and must flow from a consensus on the basic concept of sustainable development and on a broad strategic framework for achieving it". Everybody agrees with the basic argument of the concept, but there seems to be no universal consensus on its meaning and implications.

The WCED's conceptualisation of sustainable development argues that the present generation has failed to consider the earth and its future inhabitants as shown in their exploitation and use of

natural resources by pursuing a series of socioeconomic and industrial policies which endanger global environmental security[122]. Seen as a principle advocating for significant societal transformation, sustainable development emphasizes the dangers posed by worldwide environmental deterioration, including incidents such as oil spills, deforestation, acid rain, ozone depletion, and toxic waste. It urges the implementation of policies aimed at addressing these issues.

•a conscious effort to mitigate negative effects of human living on the environment;

• a strategic approach to meet the "needs" of the present generation; and

•recognition of the fact that unborn generations also have the right to use the environment.

To attain the foregoing objectives, the WCED recommended governments to pursue a new developmental strategy that can both ensure continuing economic growth and ecological stability with reduced exploitation and use of natural resources. It decried the injustices within and among nations, and urged for a reform of existing economic relations to guarantee an equitable distribution of national and international wealth[72].

Two concerns emerged as crucial from the WCED's idea of what constitute sustainable development. First, there is need for development so that all members of the society can enjoy decent livelihood devoid of natural and man-made problems." Secondly, it is crucial that the current generation's consumption patterns do not deplete natural resources to the extent that future generations are unable to fulfill their own needs. Equity, whether within or between generations, as well as on an international scale, is highlighted as a key component in the World Commission on Environment and Development's interpretation of sustainable development[73].

2.1.7.1 Important Milestones in Sustainable Development: Stockholm Agreement of 1972

In 1972, 113 nations attended the United Nations' Conference on the Human Environment in Stockholm, Sweden. It was the start of the global efforts to tackle environmental problems. The delegates at the conference discussed many issues. These included:

- the human impact on the environment;
- population growth;
- social and economic development;
- help to developing nations;
- the part that governments should play in developing their own countries without harming the environment for other countries;
- the contributions that technology and education can make to tackling environmental issues.

The conference made the link between securing a good quality of life for all the people on the planet. This needed to be considered for future generations as well as the present. The conference led to the establishment of the United Nations Environment Program (UNEP) and other environmental organizations.

The Brundtland Report

In 1983, the United Nations established a commission to examine environmental concerns, with Gro Harlem Brundtland, the Prime Minister of Norway, appointed as its head. This commission, commonly referred to as the Brundtland commission, conducted extensive research on

environmental and economic issues, culminating in the publication of its final report titled "Our Common Future" in 1987[74].

The report introduced the concept of sustainable development, defining it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It proposed that governments worldwide should convene to address how to effectively mitigate the environmental impacts of human activities for the sake of future generations. This initiative ultimately led to the convening of the first Earth Summit, held in Rio de Janeiro, Brazil, in 1992.

Rio Earth Summit of 1992

In June 1992, the first truly global conference on environmental issues took place, attracting over 30,000 delegates, including more than 100 heads of state. The conference served as a platform for governments, environmental groups, businesses, and individuals from around the world to come together.

During the conference, agreements were reached on several key issues, including:

- Preserving the biodiversity of the planet

- Mitigating climate change

- Sustainable management of the world's forests and rainforests

- Issuing a declaration on environment and economic development

- Establishing a plan, known as Agenda 21, for governments to implement actions to address a wide range of environmental concerns. Agenda 21 continues to influence local and national sustainable development policies to this day.

Agenda 21 committed governments to explore ways to transition toward a more sustainable future. This involved addressing social development aspects such as poverty reduction, education improvement, and enhancing the representation of various groups like youth, women, and indigenous peoples. It also focused on environmental issues, emphasizing how local improvements can have a global impact. For instance, individual efforts to reduce energy consumption can contribute to national and global reductions in carbon dioxide emissions[75].

Kyoto Protocol of 1997

The Kyoto conference of 1997 addressed the issue of global warming and the imperative to decrease emissions of gases like carbon dioxide, which contribute to it. It established a framework mandating country to reduce their greenhouse gas emissions to an average of 5% below 1990 levels by 2012. The Kyoto treaty allotted emission allowances to countries, permitting low CO_2 producers to sell their allowances to high CO_2 producers, a practice termed 'carbon trading'.

However, the original version of the treaty was never fully put into effect due to inadequate consensus among countries. It wasn't until 2005 that a scaled-down version of the treaty was agreed upon by 120 countries, including industrialized nations such as the UK and Russia. Nonetheless, the USA, a significant emitter of greenhouse gases, did not join the agreement.

Critics, especially in the developed world, argue that the Kyoto agreement is no longer relevant to current needs. Therefore, they advocate for directing efforts towards finding alternatives to carbon-based fossil fuels. Some organizations, like the Intergovernmental Panel on Climate Change, argue that emission reductions should be even more substantial, advocating for a 60% reduction. However, others argue that such drastic cuts could have adverse effects on economic sustainability[76].

Johannesburg World Summit of 2002

A decade after the initial Earth Summit in Rio, a conference convened in Johannesburg to assess progress towards sustainable development. This gathering addressed social challenges, including poverty and inadequate sanitation, impacting an estimated 1.1 billion individuals worldwide. Additionally, it focused on global warming and climate change.

Key agreements reached at the Johannesburg conference included:

- Halving the number of people lacking access to safe drinking water and proper sanitation.

- Establishing a fund to alleviate poverty.

- Enhancing fairness in global trade.

- Affirming access to adequate healthcare as a human right.

- Committing to reduce species loss by 2015.

The conference aimed to improve living conditions for billions worldwide. Access to clean drinking water and sanitation would notably diminish diseases like cholera, which annually claim millions of lives, particularly among young children. Governments pledged to expand

access to affordable energy and increase the share derived from renewable sources. Furthermore, the Kyoto agreement received a boost with the Russian government's commitment to sign the Climate Change Protocol. However, the United States remained a non-participant in the treaty[77].

2.1.7.2 Energy and Sustainable Development

The close connection between economics and energy policy and planning underscores the significance of technical and economic analysis in the transition to renewable energy. Renewable energy has the potential to be strongly associated with sustainable development, as it can provide access to clean energy in remote areas, improving living standards and alleviating poverty. Moreover, affordable energy from renewable sources can create new income opportunities and services such as healthcare and clean drinking water. Additionally, clean energy reduces air pollution and mitigates the adverse health effects of conventional fuels like biomass. These benefits highlight the strong correlation between energy policy, planning, and sustainable development[78].

Energy has always been fundamental to development, and prior to the formulation of the 2030 Agenda and the Sustainable Development Goals, there was a focus on 'energy-based economic development.' This approach aimed to integrate efforts to enhance energy efficiency and security with initiatives to create and sustain jobs and economic growth. Various hypotheses were proposed to explain the relationship between energy and growth: the Growth Hypothesis suggesting a unidirectional causality from energy consumption to economic growth, the Conservation Hypothesis proposing that economic growth drives energy consumption, the Feedback Hypothesis suggesting a bidirectional causality between energy consumption and

economic growth, and the Neutrality Hypothesis proposing that energy consumption and economic growth are independent.

With the adoption of the 2030 Agenda for Sustainable Development, renewable energy, in particular, regained attention. Sustainable Development Goal 7 aims to ensure universal access to affordable, reliable, sustainable, and modern energy, aligning closely with other economic, social, and environmental goals within the agenda. The relationship between energy and the environment has gained prominence, with studies exploring the energy-environment-income nexus based on the Environmental Kuznets Curve hypothesis[79]. Some scholars emphasize energy as a significant source of CO2 emissions and an indicator of environmental pressure, while others analyze the impact of energy consumption on both the environment and the economy, viewing energy as an explanatory variable in econometric models.

In both cases, researchers have reported contradictory findings from different countries or regions and time-periods. The literature has not reached a consensus on the nature of the energy-environment income nexus; however, the key role of energy in development processes is widely acknowledged.

2.1.7.3 Clean Energy Access as a key part of the Paris Agreement and Agenda 2030

The Paris Agreement and the 2030 Agenda for Sustainable Development, both ratified in 2015, brought energy access and climate change to the forefront of development policy. Together, they commit nations worldwide to collaborate in eradicating poverty in all its forms, promoting sustainable development, and vigorously combating climate change. Achieving the goals of both agreements underscores the necessity for a global transition to clean energy to address energy poverty effectively and to mitigate climate change[80].

Presently, only about half of the population in the Economic Community of West African States (ECOWAS) has access to electricity, making it one of the regions with the lowest energy access globally. While only one country in Asia has less than 25% access to electricity, 13 West African nations have access rates below 25%. This significant energy access deficit is compounded by the widespread lack of access to clean cooking facilities, with only one-third of people in West Africa having access to clean cooking. Economic growth in the region is also relatively modest, estimated at 2.8% in 2018, compared to, for instance, 7.1% in South Asia[81].

The pressure on energy access is further exacerbated by rapid population growth. With a current population of 1 billion people, the sub-Saharan region is projected to double by 2050. Despite existing and planned policies aimed at addressing energy access, a study indicates that while the proportion of individuals in the region without access to electricity and clean cooking is expected to decrease by 2030, the absolute number of those lacking access will rise. Moreover, the global energy access challenge is increasingly concentrated in West Africa. By 2030, this region is expected to account for nearly 90% of the world's population without electricity access and 40% without access to clean cooking.

The chronic electricity shortage in West Africa carries a substantial economic burden, with opportunity costs estimated to be as high as 2% of the region's GDP. Achieving energy access through clean energy in West Africa is essential for economic transformation and aligns with the goals of the Paris Agreement and the 2030 Agenda for Sustainable Development. Clean energy can serve as a crucial driver of development, interconnecting various Sustainable Development Goals (SDGs) and facilitating sustainable economic growth while promoting gender equality, improving human health, and enhancing overall well-being[82].

Significantly, access to clean energy empowers women and children to lead more productive lives and contribute to the economy. Clean energy access has the potential to uplift millions from poverty and enhance the livelihoods of both urban and rural populations. Strategies for clean energy access will assist countries in meeting their long-term climate objectives outlined in their Nationally Determined Contributions (NDCs) and advancing the objectives of the Paris Agreement.

In addition to the immediate economic and social benefits, ensuring access to clean energy holds the potential to significantly enhance human security and fortify the resilience of both states and communities. By transitioning to clean energy sources, countries can reduce their dependence on unstable or finite resources, thereby decreasing vulnerability to energy-related conflicts and disruptions. This increased energy security fosters stability within nations, reducing the likelihood of internal conflicts and contributing to regional peace and security.

Moreover, the adoption of clean energy technologies facilitates the diversification of economies, creating new job opportunities and fostering sustainable development. This economic resilience

enables communities to withstand shocks and adapt to changing environmental and economic conditions, reducing the susceptibility to social unrest and displacement.

Furthermore, access to clean energy enhances environmental sustainability, mitigating the impact of climate change and natural disasters on communities. By reducing greenhouse gas emissions and promoting sustainable practices, clean energy helps to mitigate the frequency and severity of extreme weather events, such as droughts and floods, which often trigger large-scale displacement and migration[83].

2.1.8 Expanding Energy Access

Expanding access to affordable, reliable, sustainable, and modern electricity is crucial for strengthening the resilience of communities and advancing development goals across West African nations. The multiple benefits of universal energy access are essential for assisting countries in the Economic Community of West African States (ECOWAS) in addressing socioeconomic challenges and climate-related risks. Despite having some of the lowest access rates globally, achieving universal access to electricity and clean cooking by the end of the decade remains feasible in West Africa. However, this endeavor would demand unprecedented efforts and the implementation of a comprehensive approach. This approach would involve leveraging and integrating renewable energy generation, expanding grid infrastructure, investing in off-grid and standalone solutions, developing clean cooking supply chains, and prioritizing effective infrastructure and practices.

There are significant opportunities on the horizon as new technologies scale up, international markets and costs shift in favor of renewables, and the potential for economic integration expands. To attract the necessary investment for plan implementation, facilitate market

expansion, and secure long-term access benefits, each country will need clear policies, strategies, and robust legislation[84].

2.1.8.1 Status of Access to Energy and Recent Covid-19 Impacts

Currently, over 65 million individuals in the region lack access to electricity, while 90 million still depend on traditional biomass for cooking. Despite advancements in expanding access to energy, population growth continues to outpace progress made over the last decade, resulting in a rise in the number of people without energy access. The Covid-19 pandemic has exacerbated these challenges further. While the number of individuals without electricity in Africa had been decreasing steadily since 2013, recent progress has been reversed. In 2020, the continent saw an increase to 600 million people without electricity, with over 10 million more than in 2019. Additionally, 30 million individuals who previously had access are now unable to afford basic energy services. The pandemic's economic impact, through reduced disposable income and investment, risks pushing millions back into energy poverty across the Sahel and the wider African continent. In response, many governments implemented measures in 2020 to enhance energy affordability, including providing free or subsidized electricity and suspending bill payments. Some countries also included specific Covid-19 measures to support renewables, such as Nigeria facilitating relief fund provisions for renewable energy firms[85].

Access to energy serves as a catalyst for economic development and socio-economic well-being. The persistent lack of reliable and affordable energy undermines countries' abilities to address socio-economic challenges, inequalities, and climate-related threats. Moreover, the reliance on traditional biomass for cooking has dire consequences. In West Africa alone, nearly 500,000 premature deaths annually are linked to household air pollution resulting from the absence of

clean cooking facilities. Cooking with charcoal or wood leads to significant emissions of gases and black carbon, exacerbates forest degradation, and threatens ecosystem stability and climate resilience. Women and girls, primarily responsible for fuel collection and food preparation, bear the brunt of these impacts, experiencing the loss of productive time and bearing the burden disproportionately[86].

2.1.8.2 Providing Energy to displaced Communities in the ECOWAS Community

Rising violence and insecurity in West Africa have led to a displacement crisis, with displaced populations being among the most vulnerable in terms of achieving universal energy access by 2030. Internally displaced communities and cross-border refugees often experience extreme energy poverty, relying on basic sources for cooking and lighting, leading to food insecurity and gender-based violence during fuel gathering. The Covid-19 pandemic has underscored the critical role of energy in ensuring health and sanitation in overcrowded camps.

Displaced populations, especially those crossing borders, are typically excluded from national energy transition plans due to their insecure and remote conditions. However, since displacement is often prolonged, lasting an average of eighteen years, there are opportunities to address this exclusion. Moreover, displacement is driving urbanization in West Africa, particularly in "second cities," which presents both challenges and opportunities for increasing energy consumption levels[87].

Efforts to provide sustainable energy solutions in displacement settings are being intensified by humanitarian agencies, fostering collaboration with local and national governments. While refugee camps are traditionally the responsibility of organizations like the UNHCR or IOM, host country policies and donor interventions can create favorable conditions for energy projects.

When displaced populations are overlooked in national energy plans, opportunities to combine humanitarian aid and investment toward sustainable development goals are missed. ECOWAS countries are taking steps to address this through their engagement in the Comprehensive Refugee Response Framework. Some West African states have granted refugees legal rights and explored housing options, demonstrating commitment to refugee well-being[88].

Sustainable energy projects for refugees can benefit both displaced individuals and host communities. Examples include large-scale solar projects in Jordan and Kenya, which have increased power consumption for households, businesses, and health facilities. Humanitarian agencies are increasingly integrating energy access into broader infrastructure and services packages to better serve their objectives[89].

Cleaner cooking solutions and solar power can enhance affordability and safety for displaced populations. While market-based mechanisms for energy provision may not be feasible in all displacement settings, experiences in West Africa show that displaced populations are willing and able to pay for better energy services. However, challenges remain in securing long-term investments and contracts with the private sector, although new models are emerging with government support and financing tied to national SDGs and climate resilience. Recent analysis suggests that investing in better energy access for displaced populations yields significant economic, environmental, and social benefits[90].

2.1.8.3 Considerations for Energy Access in the ECOWAS going Forward

Achieving universal energy access in ECOWAS countries requires a multifaceted approach that integrates various components such as renewable energy development, grid extension, off-grid solutions, clean cooking, and efficient infrastructure. To attract investment, scale up markets, and

ensure sustainable access gains, clear policies, strategies, and robust regulation are essential for each country. Policy considerations to achieve SDG 7 during the clean energy transition in West African countries include:

Adopt a comprehensive approach to electrification planning: To meet ambitious energy access targets, countries must expand and enhance their electricity grids while also leveraging mini-grids and off-grid technologies. This involves:

- Developing and continually improving national electrification strategies addressing institutional, technical, and financial aspects.

- Enhancing data collection on national consumption and costs.

- Focusing on densification to extend grid access.

- Improving revenue collection and affordability through innovative models.

- Providing clarity on grid extension plans and incentives to boost investor confidence.

Address the "clean-cooking" challenge: Understand local practices, fuel sources, costs, and necessary supply chains to transition to cleaner cooking solutions[91].

Promote productive uses of energy: Enable populations to use electricity to enhance existing economic activities and start new ones, improving their ability to pay and ensuring sustainable demand.

Optimize on-grid renewable energy: Invest in national grids, including transmission, distribution, and regional interconnections, and establish progressive incentives to increase renewable energy integration.

e. Support and regulate off-grid industries: Provide support and regulation for off-grid sectors, particularly in post-pandemic recovery, learning from experiences in mini-grid development.

Address energy access in displaced communities: Consider long-term energy needs and solutions in displacement settings, integrating them into broader energy access plans and regulations. Encourage energy access organizations and businesses to serve humanitarian settings, provide data and incentives, and leverage SDG and climate financing for sustainable solutions[92].

2.1.8.4 Accelerating Deployment of Renewable (SDG 7.2)

Renewable energy sources, particularly wind and solar, hold significant potential in ECOWAS, and governments in the region are increasingly incorporating them into their energy transition strategies. With the right combination of policy measures and financial backing, the renewable energy sector can drive transformative change, necessitating a new level of progress on SDG 7.2. Achieving energy access targets requires an integrated approach, combining renewable energy generation, grid expansion and interconnections, and investment in on-grid, off-grid, and standalone solutions.

Renewables will be central to the future energy systems of West African countries and are crucial for realizing SDG 7. The region boasts abundant renewable energy resources, with some of the highest solar irradiation globally and significant potential for solar PV power. Additionally, there is considerable scope for wind, hydro, and sustainable biomass development. While hydropower remains a primary renewable energy source, constituting 12% of the region's electricity, all countries aim to harness diverse sources and increase their share in the energy mix.

Advancements in technology, shifting international markets, and declining costs are favoring renewables, while opportunities for economic integration are growing[93].

To attract investment, facilitate market expansion, and ensure sustainable access gains, each country needs clear policies, strategies, and robust regulations. All six countries are seeking renewable energy solutions to diversify their energy mix away from fossil fuels reliance and achieve energy access targets. Renewable energy offers West African countries a chance to pursue development models that steer clear of high-carbon choices made by other economies in the past. With SDG 7 in focus, numerous new renewable energy projects have been initiated in recent years, with several coming to fruition.

2.1.8.5 Interconnections are Pivotal in Maximizing Productivity in the Energy Sector

Enhancing regional interconnections is essential for optimizing generation capacity, improving reliability, and unlocking the full potential of renewable energy. However, effective regional coordination and integration among ECOWAS states are not always fully reflected in regional energy regulations or markets. This poses a challenge when determining whether investment would be more beneficial in regional programs or through a country-by-country approach. Nevertheless, regional power sharing is critical for the region, with all countries emphasizing the importance of enhancing existing interconnections. For instance, Nigeria and Ghana are eager to bolster their energy import capabilities, particularly to meet the demands of major consumption centers. Meanwhile, Benin Republic aims to develop its natural gas resources and renewable energy capacity to position itself as an energy hub for both electricity and natural gas[94].

2.1.8.6 Considerations for Energy in the ECOWAS going Forward

To fully leverage the benefits of energy for the ECOWAS countries, decision-makers need to implement a combination of regulatory, informational, and incentive measures. As experience accumulates, there is room for more ambitious efforts to achieve each country's renewable energy objectives in the region. Continual policy development, coupled with increasing ambition, can position the region as a global center for accelerated renewable energy growth if certain challenges are addressed[95].

Addressing key bottlenecks for large-scale deployment of renewables: Overcoming barriers requires the introduction of regulatory and policy frameworks that can facilitate bankable projects for subsequent investments. Improved regulatory frameworks and effective policy design can accelerate growth.

Enhancing access to affordable financing for renewable energy projects: Access to affordable financing and risk reduction measures at scale are needed for both large- and small-scale deployment. Learning from multi-stakeholder initiatives addressing the capital investment gap is crucial, and the participation of international public institutions and development banks remains essential for developing the market and attracting private sector financing[96].

Investing in grids and networks: West African countries should focus on enhancing the capacity of national grids to accommodate larger amounts of variable renewable energy. Improving regional coordination through interconnections and trade is also vital.

2.1.8.7 Opportunities for Energy Efficiency Improvement in the ECOWAS Region

Energy efficiency is fundamental to all energy development and transition pathways. Known as the “first fuel,” energy efficiency represents unused fuel and brings various benefits. Increased energy efficiency of products and services provides economies, communities, and businesses with less energy-intensive and more cost-effective options. Enhanced energy efficiency can alleviate pressures on national energy supplies amid growing demand while reducing strain on public budgets.

Demand-side management frees up production capacity, ensuring a more stable energy supply. The drive for efficiency creates quality jobs and enhances the resilience of national climate change targets and strategies. Regulating and enforcing efficiency standards and progressively increasing them over time are necessary. Setting targets can reduce transmission losses. "Product dumping" poses a challenge, as sub-standard or used energy-consuming goods flood the market, including lighting, air conditioners, white goods, and vehicles[97].

The ECOWAS region, covering four focus countries, has a Regional Energy Efficiency Policy targeting a 4% annual reduction in energy intensity and providing support for country policy and capacity building. Initiatives focus on replacing inefficient lighting, cooling, reducing losses in electricity distribution systems, ensuring access to clean, efficient stoves for all, implementing equipment standards and labeling, and developing region-wide efficiency standards for buildings.

ECOWAS is also coordinating the first-ever African regional fuel efficiency roadmap—a significant step for the 15 member countries. Numerous opportunities exist for enhancing energy efficiency in sectors with growing energy demand, offsetting increased energy use. Low-hanging fruit opportunities and practices, particularly in product efficiency, cooling, and transport, are evident in the region[97].

2.1.8.8 Considerations for Energy Efficiency in the ECOWAS going Forward

To harness the benefits of energy efficiency, decision-makers must implement a comprehensive strategy encompassing regulatory, informational, and incentive measures. Policy packages based on proven effective measures and best practices from other countries can rapidly unlock energy efficiency opportunities in the ECOWAS region, yielding both immediate and long-term positive outcomes. Across multiple sectors such as appliances, buildings, and transport, tried and tested measures and opportunities abound.

At the national level, enhancing energy efficiency entails several key actions:

Further progress on product efficiency: Combining Minimum Energy Performance Standards (MEPS), energy efficiency ratings, standards and labeling (S&L) programs, and incentives has proven effective globally. West African countries can expand performance indicators and labels for energy-intensive products like air conditioners and refrigerators. Promoting proper maintenance of equipment and setting efficiency standards for appliances and industrial equipment can maximize energy savings[98].

Fuel efficiency standards: Implementing appropriate policies can ensure that the growing personal transport sector in ECOWAS countries shifts towards less energy-intensive modes. This can be achieved by establishing standards and regulations to encourage vehicles that consume less fuel. Mandatory fuel economy standards, as seen in other regions, can significantly boost the efficiency of road vehicles in West African countries.

Energy efficiency in buildings: A coordinated approach can lead to the development of next-generation efficient buildings and improve the efficiency of existing ones through building codes, retrofitting incentives, and user awareness programs. ECOWAS countries can adopt innovative solutions and policies that support local industries and employment. Building energy performance codes set minimum performance standards for new and existing buildings, promoting better energy services and reduced energy bills over time. Encouraging energy services to prioritize efficiency, including performance contracting for large urban buildings, can further enhance efficiency.

Coordinated approaches: Regional collaboration and sharing of lessons learned among countries and regions can accelerate energy efficiency efforts. Existing regional organizations focusing on renewable energy and energy efficiency can facilitate interregional collaboration, amplifying the impact of energy efficiency measures[99].

By implementing these measures, ECOWAS countries can unlock the full potential of energy efficiency, contributing to sustainable development and energy security in the region.

2.1.9 Spotlights on ECOWAS Countries Energy Flow

2.1.9.1 Spotlight on the Republic of Benin

In the Republic of Benin, there is a well-defined strategy for the deployment of Renewable Energy (RE), backed by various donors. Several policy measures are currently in the works to advance this strategy. With support from the second component of the Millennium Challenge Corporation, Benin is taking steps to modernize its power sector. Three crucial documents have been drafted to promote decentralized clean energy generation: a master energy plan, regulatory

framework, and a strategic policy document. These documents aim to facilitate the implementation of the master plan[100].

Moreover, a project funded by the United Nations Development Program is focused on enhancing the regulatory framework and attracting private sector investments for biomass power plants. The Capacity Building in the Energy Sector in Benin (RECASEB), a collaborative initiative with the European Union, is implementing a comprehensive approach to strengthen capacities in the power sector, including enhancing the operations of the regulatory authority for electricity.

Additionally, The Republic of Benin is developing other sustainable energy frameworks through collaboration with the ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE). With technical support from ECREEE and the German Agency for International Cooperation, a renewable energy law is being formulated. Furthermore, both the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP) have been endorsed[100].

As of now, photovoltaic (PV) energy in Benin has an installed capacity of 95 MW, with 40 MW developed by independent power producers (IPPs). The target for PV capacity by 2020 is 150 MW. The primary challenge lies in establishing the necessary regulatory framework to attract private investors for the successful installation, operation, and maintenance of these new renewable energy (RE) projects.

Project developers encounter difficulties in achieving effective power generation. Through partnership cooperation, Benin can enhance its capacities and receive support for drafting

feasibility studies to develop viable projects. Technical expertise is required not only during project development but also throughout the construction, operation, and maintenance of power plants. Strategic partnerships would enable Benin to effectively address its National Determined Contributions (NDC) implementation challenges, including:

- Providing project developers with a wind resource atlas to reduce project development costs. Benin is actively seeking partners to assist with this initiative.

- Welcoming capacity-building partnerships to address the new topic of adaptation, a critical component of Benin's NDC.

- Improving access to finance by leveraging climate finance through the implementation of de-risking mechanisms for RE investments.

Benin submitted its NDC to the United Nations Framework Convention on Climate Change (UNFCCC) in October 2017. Table 1 provides an overview of Benin's unconditional commitments, including renewable power plants, household energy efficiency, and access to clean electricity.

Table 2.3: Renewable energy and Efficiency Commitments

Renewable Energy Commitments	**Energy Efficiency Commitments**
Promote the construction of 95 MW solar power plants.	Extend household access to electric lighting to replace kerosene lighting.
Construction of 335 MW hydropower.	Strengthen the actions of efficient consumption of electric energy in all sectors.
Construction of 15 MW biomass power	

plant.	Promote low firewood consuming technologies. Promote the partial substitution of firewood fuel consumption by butane.

Source: [95]

2.1.9.2 Spotlight on Burkina Faso

Another author acknowledging the significance of fostering sustainable economic development and reducing greenhouse gas emissions (GHG), Burkina Faso is dedicated to expanding its deployment of renewable energy (RE). The nation has established targets to contribute 30% of RE to its electricity mix by 2030 and aims to reach 50% by 2050. To realize these objectives, new policies are being formulated, including the establishment of two new directorates focused on RE and energy efficiency (EE). Additionally, a specialized agency for RE and EE has been established to directly engage in project development.

In April 2017, Burkina Faso enacted an energy sector law aligned with ECOWAS Directives, introducing a new regulatory framework for independent power producers (IPPs) in the RE sector. This legislation liberalized electricity distribution and generation, allowing third-party access to the networks. It also introduced concepts such as EE, clean energy mini-grids, and solar home systems for the first time in Burkina Faso[101].

Presently, the government is working on crafting the necessary legislation and technical regulations for large-scale RE projects. Consequently, Burkina Faso is poised to witness the launch of the largest utility-scale PV project in the ECOWAS region.

In addition to the revamped regulatory and institutional framework, Burkina Faso is actively implementing programs to enhance efficient public lighting and encourage the adoption of RE in health centers.

Challenges:

Burkina Faso faces three primary challenges in achieving its ambitious RE deployment goals:

1. Integrating significant proportions of variable electricity into the grid.

2. Ensuring the availability of skilled professionals for the construction, operation, and maintenance of RE projects, particularly in remote areas.

3. Designing effective subsidies to attract private investments for rural electrification.

Partnerships and Support:

Partnerships can assist Burkina Faso in achieving its energy sector objectives through various means. Expectations are high for support from the Green Climate Fund (GCF) to aid in modernizing Burkina Faso's energy sector, although the country has yet to fully leverage this resource. Facilitating access to these funds can be achieved through local capacity-building sessions to educate relevant stakeholders on maximizing the GCF's resources. Technical assistance is also required to enhance citizen participation, ensure project sustainability, and maximize the socioeconomic benefits of Re-deployment[102].

Lastly, support is needed to develop the necessary rules and procedures for implementing laws, attracting private investments, and ensuring the successful operation and maintenance of power plants over their lifecycle[54].

Renewable Energy Commitments	Energy Efficiency Commitments
• The country aims to double the contribution of renewable energy sources to it entire energy mix.	• The country also aims to provide all citizens and residents with highest quality energy services. • The country also aims to achieve faster rate of progress in its drive towards energy efficiency. • The country has produced and distributed 540,000 cooking stoves to people in urban and semi-urban areas to stop the use of firewood.

Source: [54]

2.1.9.3 Spotlight on the Republic of the Gambia

Sustainable Energy to Address Climate Change

The Paris Climate Agreement is of great significance for the country's energy sector, as it offers an opportunity for the government to adjust its strategy in order to get the required energy supply, with a more pronounced emphasis on renewable energies and energy efficiency. The Gambia acknowledges that investing in sustainable and efficient technology in the energy industry is crucial for decreasing emissions and addressing climate change, which is in line with sustainable development goals. The energy sector's Nationally Determined Contributions (NDC) objectives have had a positive impact on planning, and there is a promising potential for achieving these objectives. This is because of the new government's strong commitment to realising their NDC

ambitions and the renewed interest from donors after the successful democratic change of government.

The proposed NDC objectives include of achieving a capacity of 30 MW for wind power and 75 MW for solar photovoltaic (PV) electricity. Additionally, the plan involves the installation of 1,000 solar hot water systems, the replacement of 300,000 incandescent lights with Light-Emitting Diode (LED) bulbs, and the production and distribution of 200,000 efficient cookstoves. Progress has already been achieved with the building of a 10 MW grid-connected solar power plant, and currently, The Gambia is in the midst of developing a 30 MW solar PV plant and a 6 MW wind farm by independent power producers (IPPs)[103].

The Gambia aspires to reduce its reliance on imported fossil fuels, provide sustainable job opportunities for its citizens, and support the Sustainable Energy for All (SE4All) goal of achieving universal power access in the country by 2030 through the development of renewable energy (RE). Currently, the percentage of urban inhabitants with access to electricity stands at 50%, while for rural people it is 35%. Advocating for the use of clean energy sources could result in enhanced public health conditions, as the prevalent use of kerosene lamps and biomass stoves in the country contributes to indoor pollution and related health hazards. Directly enhancing individuals' health can be achieved by investing in more efficient and cost-effective alternatives, such as improved cookstoves.

Challenges

The Gambia continues to struggle with substantial obstacles in achieving its NDC energy sector objectives. A significant impediment is the insufficient financial resources, as communities are

unable to bear the substantial initial expenses of renewable energy technology, and private enterprises are not fulfilling their anticipated role in investing in or engaging with these initiatives. To boost private sector involvement, The Gambia is partnering with the African Development Bank on building a legislative framework that would enable IPPs with power purchase agreements for both utility-scale and off-grid projects. Another concern is the absence of financial assurances for the private sector, as the public utility lacks creditworthiness. The Gambian government is considering possibilities to give financial assurances to support contracts with IPPs.

Partnerships and Support:

The Gambia has institutional structures in place that have been handling the mobilization as well as execution of NDC projects efficiently for decades. The country's experience in program execution and resource mobilization, paired with its human resources, could be beneficial to the success of these programmes. The National Climate Committee of The Gambia manages the execution of climate change programs at the national level, while the Donor Coordination Unit of the Ministry of Finance and Economic Affairs coordinates development partners and supports interagency coordination. The Meteorological Unit of the Department of Water Resources interacts with other departments to create an energy infrastructure capable of coping with extreme climate change events. The Gambia requires support to grow renewable energy and energy efficiency in the country, notably through collaborations with private stakeholders, and there is a clear need for technical assistance to fulfil its energy sector goals[104].

Table 2.4: Interagency Coordination of Energy Sources

Renewable Energy Commitments	Energy Efficiency Commitments
The country has committed to the following renewable energy targets: • It aims to achieve a 78.5 Gg CO2 reduction in carbon emission by 2025. • Increase renewable energy usage through the installation of solar, wind, and hydro-electric power plants. • Ensuring that public buildings and facilities are powered by solar energy • By encouraging the private sector to also power their buildings or facilities through solar energy.	The country aims to • Phase away the use of incandescent light bulbs and encourage the use of energy-efficient bulbs in commercial and residential areas. • Take steps to discourage the use of firewood and charcoal in cooking. • Educate the populace toward achieving a reduction in fuel consumption by setting efficiency standards.

Source: [78]

2.1.9.4 Spotlight on the Republic of Guinea

Sustainable Energy to Address Climate Change

The Republic of Guinea is steadfast in its commitment to combatting climate change and achieving its sustainable energy objectives. Within the Sustainable Energy for All (SE4All) framework, Guinea aims to increase the share of renewable energy (RE) in its energy mix to 50%. Additionally, Guinea seeks to achieve universal energy access by 2030, considering that only 20% of the population currently has access to electricity, with a more feasible target being 65-80% energy access. To reach these objectives, a decentralized renewable energy system must be established.

These aspirations must remain adaptable as energy demand continues to grow across Guinea. In 2017, the domestic and mining sectors alone demanded approximately 700 MW of power. Within three years, due to industrial expansion, this demand is expected to exceed 1,000 MW. Solar energy holds significant potential to meet a substantial portion of Guinea's energy needs, while hydroelectric generation remains a priority given its enormous potential. The Guinea Hydroelectric Atlas identifies available sites and areas where feasibility studies have been conducted, revealing the potential to develop 6,000 MW from hydroelectric projects[105].

Wind power also has the potential to contribute to Guinea's energy requirements, particularly in coastal and mountainous regions. A wind atlas is currently under development and will be made publicly available to encourage investments in the sector. The introduction of RE into the energy mix has already yielded economic benefits. Prior to the completion of the 240 MW Kaléta hydroelectric project, insufficient power supply hindered companies' ability to establish operations in Guinea. Since the dam's completion in 2015, employment opportunities have increased, demonstrating the positive impact of state support for the private sector on job creation[106].

The deployment of rural electricity through PV street lamps has also had a transformative effect on rural communities, improving living conditions by enabling safer nighttime travel and facilitating business and educational activities after daylight hours, thereby enhancing overall quality of life.

Challenges:

The increasing frequency of droughts due to climate change poses a significant challenge, limiting the potential of hydropower generation. In reaction to this, Guinea is partnering with private sector entities to set up solar power facilities to counterbalance the decrease in hydroelectric power generation during droughts. Acknowledging that the current regulatory framework lacks the capacity to draw private investments in the renewable energy sector, the Guinean government is crafting a new framework centered on Public Private Partnerships (PPP) and Build, Operate, Transfer Agreements (BOT).

Partnerships and Support:

The President of Guinea has been appointed as the Chairperson of the African Renewable Energy Initiative (AREI), a collective effort supported by donors such as the French and German governments, and the European Union, aimed at assisting African countries in the deployment of RE. Under the AREI, the French government has provided assistance to Guinea in financing feasibility studies and implementing projects[107].

Table 2.5: African Renewable Energy

Renewable Energy Commitments	**Energy Efficiency Commitments**
Guinea has made the following commitments • The country is aiming to raise renewable energy production to 30% of its total energy consumption.	• Guinea has also committed to providing all its citizens access to stable electricity by the year 2030. • The country also hopes to see a doubling in the ratio of "used energy/gross energy consumption" by 2030.

Source: [30]

2.1.9.5 Spotlight on Republic of Guinea-Bissau

Sustainable energy to address climate change

Currently, the Guinea-Bissau government is making substantial efforts to design a strategy plan for the growth of energy efficiency (EE) and renewable energy (RE). This plan offers a strategy for an energy transition that intends to replace 80% of traditional energy sources with sustainable energies in the national energy mix by 2030.

Guinea-Bissau believes that accomplishing this aim rests on enhancing EE. Strategic planning is centred on three major areas: minimising losses in transmission and distribution networks, large-scale deployment of efficient cookstoves, and executing end-user programs. The strategy plan is awaiting approval by the Minister of Energy[108].

As part of the plan, the government will write a new electricity law to establish a legislative and institutional framework to stimulate future investments in renewable energy. Additionally, emphasis is being given to the necessity for new laws addressing the certification and standardization of RE projects. A workshop was arranged to receive input and comments from academia, private sector representatives, and civil society for the preparation of the strategic plan. There is also strong cooperation among other ministries involved in energy sector development to facilitate day-to-day operations. To fulfil their objectives, Guinea-Bissau will require technical and financial help, as well as enhanced capacity to access climate money. Efforts are underway to build a new institutional structure and design a comprehensive strategy for engaging global and bilateral funders in a coordinated manner. Given that 95% of power output in Guinea-Bissau now originates from heavy fuel-powered facilities, the large-scale deployment of RE is predicted to drastically cut CO_2 emissions[109].

Challenges

Guinea-Bissau confronts a significant energy access challenge, especially in rural regions, where only two percent of the population, largely composed of individuals living on less than one dollar per day, have access to energy. The predominant reliance on firewood, accounting for 95% of primary energy consumption in rural areas, exacerbates deforestation and elevates greenhouse gas emissions.

To address these issues, the government is initiating efforts to implement mini-grids, solar lamps, and efficient gas-powered cookstoves. Furthermore, there are plans in progress to inaugurate three new hybrid power generation plants with a combined capacity of 22 MW. Nevertheless, political instability has impeded international investments in Guinea-Bissau's economy across all sectors.

Partnerships and Support

The underrepresentation of energy experts at the Conference of the Parties (COP) poses a significant challenge to effectively promoting renewable energy within the framework of the Paris Agreement. Currently, sponsored delegates predominantly originate from fields outside the energy sector, which limits the depth of expertise and insight available to address renewable energy issues at the COP. This gap in representation inhibits the comprehensive consideration of renewable energy initiatives and strategies within climate change discussions. Without adequate representation, key aspects such as the advancement of renewable energy technologies, policy frameworks to support renewables, and financing mechanisms for clean energy projects may not receive the attention they deserve[110].

To address this issue and encourage greater emphasis on renewable energy at COP sessions, it is essential to ensure the presence of renewable energy experts among the delegates. These experts can offer valuable perspectives, insights, and recommendations to inform discussions, shape policies, and drive initiatives aimed at advancing renewable energy adoption globally.

Moreover, having renewable energy experts at the COP can help bridge the gap between the overarching climate change agenda of the UNFCCC and the specific goals and objectives related to clean energy. By serving as advocates for renewable energy, these experts can facilitate dialogue, collaboration, and partnerships to accelerate the transition to a low-carbon energy future. Overall, increasing the representation of renewable energy experts at the COP is crucial for effectively integrating renewable energy considerations into climate change mitigation efforts and ensuring a more holistic approach to addressing the challenges of climate change[111].

Renewable Energy Commitments	Energy Efficiency Commitments
• The country has committed certain renewable energy development efforts; • It aims to make renewable energy its major source of energy by ensuring that 80% of energy consumed in the country by 2030 come from renewable energy sources	• It also aims to reduce energy losses to 10% by the year 2030. • The country also aims to provide electricity to up to 80% of citizens by 2030.

Source: [111]

2.1.9.6 Spotlight on the Republic of Liberia

Sustainable Energy to Address Climate Change

Energy security is one of the main focuses for the Liberian political class with the issue of energy sufficiency topping the agenda of subsequent administration in the country since the end of the civil war. In line with global best practices, the country has also been striving to expand energy access through the execution of renewable energy projects. To achieve the aim of boosting sustainable energy, a new regulatory framework has been established under the newly created Rural and Renewable Energy Agency. This framework, initiated with the development of the RE law in 2009 and the endorsement of the electricity policy document in 2016, aims to encourage the installation of new energy capacity. In the immediate term, a critical focus lies on enhancing the Mount Coffee hydropower plant's capacity from 64 to 88 MW, with an emphasis on large-scale grid-connected renewables[112].

Liberia demonstrates entrepreneurial initiative by nurturing a retail market focused on renewable energy (RE), particularly standalone photovoltaic (PV) systems and solar lanterns. This approach, backed by the Liberian government, has the potential to spur economic growth. To tackle the challenge of extending electricity access nationwide, the government collaborates with the West African Power Pool to integrate Liberia's energy system with neighboring countries. This entails implementing interconnections and establishing new transmission infrastructure to facilitate rural electrification along transmission lines[113].

Challenges:

A primary barrier to the development of RE projects is the significant initial investment cost. Securing financing for these new technologies proves expensive, and commercial financial institutions often lack familiarity with these business opportunities and technologies, hampering access to financial resources. Awareness-raising efforts are essential to acquaint locals and investors with the promising prospects offered by renewable energies in Liberia.

Liberia recognizes the need for a unified regional fiscal policy for RE equipment, especially for compact RE systems. Current tax structures hinder entrepreneurial potential and impede access to the energy market, thereby inflating equipment costs.

Partnerships and Support:

To bolster local entrepreneurship, Liberia seeks assistance in training professionals across all aspects of the project cycle, including technical and managerial skills. Electricians, in particular, require training in solar energy and inverter operation and maintenance. The Rural and Renewable Energy Agency would benefit from technical support in designing and implementing support schemes for renewables, as well as in tendering processes.

Regarding climate finance resources, officials emphasized Liberia's ongoing efforts to efficiently utilize existing financial support to inspire investor confidence. Once trust is established, he anticipates that more financial assistance will be forthcoming to further advance their energy development goals[114].

Renewable Energy Commitments	**Energy Efficiency Commitments**
Liberia is committed to raising the level of renewable energy production to a minimum of thirty percent of electricity production and ten percent of overall energy consumption in the	The country also aims to boost energy efficiency by a minimum of 20% by the year 2030.

country by 2030.	Efforts are ongoing to replace low thermal efficiency cooking stoves with higher-efficiency stoves to improve energy efficiency.

Source: [114]

2.1.9.7 Spotlight on the Republic of Mali

Sustainable Energy to Address Climate Change

The Paris Agreement holds significant importance for Mali and its energy sector due to the country's vulnerability to climate risks, which heavily impact its economy. Consequently, climate action is central to Mali's Nationally Determined Contributions (NDCs), which aim to address both mitigation and adaptation objectives for climate change.

The government of Mali has adopted an ambitious strategy to increase the proportion of renewable energy (RE) in the country's energy mix. The Renewable Energy Development Strategy involves implementing programs and projects to promote RE adoption. Embracing sustainable energy sources will help Mali adapt to climate change, reduce greenhouse gas (GHG) emissions, and stimulate economic growth. This transition towards low-carbon resilience not only addresses energy deficits but also alleviates poverty by creating employment opportunities. Sustainable energy initiatives are crucial for Mali to achieve its national target of providing electricity access to 90% of its population by 2030[115].

Partnerships and Support:

Mali's government has intensified efforts to develop clean energy projects, resulting in significant progress across various programs and projects. To advance their energy objectives, Mali has developed an attractive regulatory and fiscal framework to attract investors, including:

- Implementation of a National Energy Efficiency Action Plan (NEEAP).

- Rural Electrification Plan focusing on mini-grid development.

In this context, advancements are being made through the implementation of solar power plant projects in rural areas. Mali currently boasts a total installed capacity of 200 MW of renewable energy. The Environment and Sustainable Development Agency of the Ministry of Environment, Sanitation, and Sustainable Development is responsible for overseeing the preparation and monitoring of the Nationally Determined Contributions (NDC), ensuring the seamless integration of cross-sectoral initiatives into a comprehensive climate change strategy with a clearly defined roadmap outlining priorities for sustainable economic growth[116].

Challenges:

The primary challenges revolve around securing funding for renewable energy projects and providing assurances for Independent Power Producers (IPPs). Despite having conducted feasibility studies for mini-hydro projects that address climate risks, the Malian government has yet to make any meaningful progress on these projects due to a lack of financial resources[117]. In addition, independent service providers are concerned by current energy pricing regime which is considered too low for them to recoup their investment on time.

Renewable Energy Commitments	Energy Efficiency Commitments
Mali is committed to deploying renewable energy on a large scale given its natural resources. The country hope to leverage its climate to generate more than 100 MW of renewable energy. The country also aims to achieve the recommended 10% target for renewable energy component of its energy mix by 2020,	The country has committed to achieving energy efficiency by installing modular solar power plants in remote rural areas.

Source: [117]

2.1.9.8 Spotlight on the Republic of Niger

Sustainable energy to address climate change

During COP21, the Republic of Niger submitted its plan for achieving its Nationally Determined Contributions (NDCs) and reaffirmed its commitment to the Sustainable Energy for All (SE4All) Agenda. The target is to cut greenhouse gas (GHG) emissions by 38% by 2030. To reach this ambition, the country seeks to raise the share of sustainable renewable energy (RE) in its energy mix to 30% by 2030. Niger has developed the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP) with support from the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), which will be instrumental in establishing procedures to ensure the successful development of RE projects[118].

Niger advantages from vast solar resources and well-designed rules that have been attracting investors. However, before initiating projects, the government intends to establish clear open

procurement processes to ensure project success. Additionally, the National Center of Solar Energy is now constructing a solar resource atlas to aid in future project development.

Niger remains driven to continue expanding rural electrification initiatives, having observed personally the positive consequences of illuminating rural communities. For instance, in the rural village of Safo, a 30-kW solar energy facility was created, bringing electricity to the health center for the first time and raising electrification rates in the area from 2% to 19%. The goal is to replicate similar projects around the country to expand power access, which currently stands at only 10% countrywide and less than 1% in most rural areas. However, Niger has hurdles in extending these programmes due to limited financial resources.

Another project targeting rural populations subsidizes ninety percent of the expenses resulting from exchanging firewood cook stoves with gas stoves. This effort decreases pollution in homes, protects communities from adverse health impacts, and minimises deforestation arising from wood gathering. These programmes, focused on rural people, reduce poverty, raise education rates, preserve public health, and better general living circumstances. For these reasons, Niger is completely committed to developing these efforts[119].

Challenges

One of the biggest problems in extending energy availability in Niger is the high rate of population increase, one of the highest in the world. Demographic pressure can hinder initiatives, particularly in terms of investments. Investing in rural electrification will promote local economies, create jobs, improve public health, and encourage continuing education. Another

important problem is securing reasonable finance. Despite advances in deploying renewable energies, mobilizing financing remains a tough process.

Partnerships and Support

The Ministry of Energy is seeking additional financial partners to build finance mechanisms supporting market deployment and private sector activities for sustainable, dependable, and cheap energy solutions. The Ministry of Energy of the Republic of Niger wants professional assistance in many areas, including the creation of bidding documents, feasibility studies, and energy planning, to help accomplish its sustainable development objectives.

Renewable Energy Commitments	**Energy Efficiency Commitments**
The country has committed to increase current installed capacity from 4 MW to 250 MW by the year 2030 mainly through hydro and wind power. The country aims to double it renewable energy sources to make renewable constitute 30% of all electricity generated in the country.	25% decrease in the energy intensity of GDP (modern and traditional energy). Improvement of energy efficiency in industries, households through policy and regulations Transmission and distribution of

	electricity (by reducing losses, from 12% to less than 10% in 2020). Construction of low-carbon residential buildings. Increase the access to electricity (in total, from 10% to 60% in 2030, from 47% to 100% in urban areas and from 0.4% 30% in rural areas in 2030).

Source: [119]

2.1.9.9 Spotlight on the Federal Republic of Nigeria

Sustainable Energy to address Climate Change

Nigeria has formulated an Energy Master Plan to delineate its energy policies, duly approved by the Nigerian Government. In 2015, the Ministry of Power endorsed the National Renewable Energy and Energy Efficiency Policy, which sets forth targets for the government to meet the regional policy benchmarks for renewable electricity generation and efficiency by 2020 as per ECOWAS directives[120].

Under the National Renewable Energy Policy, the Inter-Ministerial Committee on Renewable Energy and Energy Efficiency adopted the SE4All Action Agenda, sanctioned by the National Council on Power in 2016. This agenda aims at achieving universal access to energy services by enhancing energy efficiency and integrating renewable energy into Nigeria's energy mix. Nigeria is not only committed to national and regional energy policies but also to international climate policy negotiations. The Nigerian government sees energy objectives as intertwined with economic growth, societal advancements, and fostering an environment conducive to increased stakeholder engagement[121].

Nigeria is resolute in adhering to the Paris Agreement and its Nationally Determined Contributions (NDCs), which outline necessary actions and mitigations in response to climate change and advocate for sustainable energy for all. With domestic policies in place and active participation in global and regional dialogues on energy and climate change, Nigeria recognizes the importance of sharing lessons learned to inform decisions for the welfare of Nigerians and humanity at large[122].

Challenges:

Traditionally, Nigeria's energy sector has heavily relied on oil and gas consumption. To bolster energy supply and extend access to all Nigerians, the government is diversifying the energy mix. Hydro, biomass, solar, and wind energy sources are gaining prominence, with hydro-power contributing 26% of the total installed grid-connected capacity. A robust policy framework is imperative to upscale renewable energy services and ensure all sectors are engaged. Bridging the gap in connecting the majority of rural areas to the grid remains a key priority on the political agenda. This objective aligns with the SE4All Action agenda aimed at fostering nationwide grid-based electricity access.

Partnerships and Support

Considerable strides have been made towards Nigeria's objectives, partly facilitated by an extensive network and support from the region. For instance, in September 2017, the National Congress of Power convened relevant stakeholders and national policymakers to deliberate on

essential policies for achieving renewable energy goals. However, enhanced coordination is imperative to adhere to the country's timeline and objectives. Leveraging partnerships can facilitate the dissemination of knowledge on best practices and lessons learned. Furthermore, adopting the best available technologies and leveraging big data technology for monitoring activities can ensure sustained success, especially considering Nigeria's outdated data management systems[123].

Renewable Energy Commitments	Energy Efficiency Commitments
The country aims to achieve 31 million tons GHG reductions yearly through the implementation of renewable energy	• Energy efficiency is targeted to improve by 2.5% annually, • aiming for a 30% enhancement by 2030. There is also a goal to achieve a 40% improvement in energy efficiency. • By implementing economy-wide energy efficiency measures, there is potential to reduce greenhouse gas emissions by 179 million tons per year by 2030.

Source: [123]

2.1.9.10 Spotlight on the Republic of Senegal

Sustainable energy to address climate change

At the conclusion of COP21, Senegal vowed to minimise greenhouse gas emissions, which is reflected in the gradual integration of renewable energy (RE) into Senegal's energy plan. The

target is to increase the share of RE to 20% by 2018 and 30% by 2025. In response to these aims, the government has sponsored the creation of three solar power plants, each with a capacity of 20 MW, in the past 16 months[124].

The National Agency for Renewable Energies (ANER), tasked with encouraging the adoption of new energy in all sectors, is pushing programs to facilitate the energy transition. Senegal has already observed an uptick in income-generating activities related with the implementation of these RE schemes. Moreover, as energy costs decline, the sector becomes more competitive, boosting economic development and lowering reliance on fuel oil, so protecting the Senegalese economy from energy price swings[125].

In conformity with the Paris Agreement, ANER has created a scheme to deploy renewables in public buildings. Feasibility studies are already underway, and the government is seeking partners to support the technical and financial parts of the initiative.

In Dakar, a pilot effort is ongoing to incorporate solar systems into houses, aiming to improve public knowledge about the multiple benefits of sustainable energy solutions. These programmes not only cut electricity expenses but also empower households and boost their quality of life. The next phase is to extend the project across Senegal. As for access to modern energy services, the current target is to improve availability to 60% in rural regions by 2019[126].

The Senegalese Rural Electrification Agency is attempting to electrify communities utilising RE technology, leading to an increase in electrification rates from 24% to 36% during the last two years. Efficient coordination among several government organisations through the Agency for

Energy and Energy Management has positioned Senegal as the country with the highest number of solar PV projects under construction in the ECOWAS region[127].

Challenges

To hasten RE deployment, Senegal is finalizing the adjustment of a tariff structure for RE power providers and designing a net metering plan to motivate individuals and companies to cut their electrical consumption while boosting renewables. Additionally, a comprehensive economic policy to exempt renewables from import duties is being prepared. Structural investments are also needed for the upgrade of distribution networks to ensure the proper absorption of fluctuating power.

Partnerships and Support

Access to affordable finance remains a critical hurdle for large-scale RE implementation in Senegal. Successful cooperation is underway through the Scaling Solar initiative, which entails tendering PV utility-scale grid-connected projects and giving successful bidders with a package of de-risking instruments, including financial guarantees[128].

Renewable Energy Commitments	Energy Efficiency Commitments
The country has made significant investment in Solar PV, Wind power, and Hydropower.	Production and promotion of isolating materials for structures using local resources.

It has also built 392 hybrid mini-grids and 27,500 biodigester to boost renewable energy. In addition, 4.6 million of firewood improved cook stoves and 3.8 million of charcoal improved cookstoves have been distributed among the citizens.	Pilot phase for the marketing of efficient refrigeration equipment in the food business. Mandatory energy audits for major firms. Energy valorisation of trash in the agro-food business.

Source:[128]

2.1.9.11 Spotlight on the Republic of Sierra Leone

Sustainable Energy to address Climate Change

Sierra Leone's vision is to create an enabling environment for the provision of modern energy services, aiming to boost productivity, generate wealth, and enhance the quality of life for all citizens. To achieve this vision, the Ministry of Energy's primary mission is to formulate policies and programs that ensure the availability of energy to the entire population in a sufficient, affordable, and sustainable manner. The policy framework, including the National Energy Strategic Plan, the National Renewable Energy Policy, and the National Energy Efficiency Policy, has already been established, with the latter two adopted in May 2016. Since 2011, Sierra Leone has operated an unbundled electricity system following the approval of the Electricity Act. Furthermore, the government has initiated incentives for sustainable energy and developed guidelines for sustainable agricultural and bioenergy investments. Sierra Leone has also signed onto the Millennium Challenge Corporation, paving the way for the transformation of the electricity network into a smart grid. In order to make informed decisions, the Ministry of Energy has launched a project to develop energy-related databases to monitor progress[129].

A participatory bottom-up approach involving local and regional governments, local chiefs, academia, civil society, and relevant ministries is employed to process new policies effectively. These collaborative efforts are crucial for Sierra Leone to achieve its goal of becoming an inclusive, moderately green country.

Challenges

The deployment of renewable energy (RE) technologies in Sierra Leone is primarily associated with off-grid solutions and the deployment of hybrid mini-grids. While there is potential for grid-connected projects, there is a need to raise awareness about the benefits and reliability of wind and PV systems. Local capacity building on integrating variable electricity into the grid is also essential. Access to finance is complex and expensive in Sierra Leone, with limited financial resources available and commercial banks requiring stringent financial guarantees for loans. Additionally, the brain drains of skilled professionals leaving the public sector for the private sector hampers the development and implementation of new policies.

Partnerships and Support

Efforts to attract qualified professionals, particularly in public administration, are crucial. Implementing a program to repatriate expatriate experts in the field could be more effective than solely training new professionals lacking experience. Increasing awareness about the benefits and opportunities of RE resources across all levels of society could mainstream their use and exert pressure on ministries to advance policies. It is unlikely that funds from the Green Climate Fund will be available to Sierra Leone in the short term, as these funds primarily target well-

developed projects ready for implementation. Therefore, technical assistance will be necessary to strengthen project development in the private sector[130].

Renewable Energy Commitments	Energy Efficiency Commitments
The country has committed to the promotion of clean energy consumption among the population. It is also developing alternative energy sources from plant such as sugarcane, corn, rice husk, etc. Developing agricultural and urban waste incineration programmes for energy production.	Development of energy efficiency projects through sensitization and awareness building efforts. Sustainable manufacture of charcoal a minimise dependence on fuel. Development and implementation of regulations on regular maintenance of automobiles. Improved and boosting use of public transport.

Source:[130]

2.1.9.12 Spotlight on the Togolese Republic
Sustainable Energy to Address Climate Change

With assistance from ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), the Togolese Republic has formulated its National Renewable Energy Action Plan (NREAP) and National Energy Efficiency Action Plan (NEEAP). Furthermore, as part of the Sustainable Energy for All (SE4All) initiative, a comprehensive master plan for renewable energy investments has been developed. Currently, thermal plants predominantly supply electricity in the Togolese Republic, with a national electrification rate of 35% in urban areas and 2% in rural areas. Like other nations in the region, Togo has significant potential to harness renewable resources such as solar and wind to contribute to a larger portion of the energy mix. The Togolese Republic has chosen to prioritize the expansion of energy access by enhancing the extension of the national grid and deploying solar mini-grids in remote areas. These options have

been favored over investing in diesel mini-grids due to the high cost and logistical challenges associated with supplying diesel fuel to isolated regions[131].

All energy-related policies and programs in the Togolese Republic undergo an inclusive consultative process. Local and regional government representatives, including village chiefs, non-governmental organizations, and other relevant stakeholders, are consulted to discuss, refine, and validate energy policies[132].

Challenges

The primary barrier to renewable energy deployment in the Togolese Republic is access to affordable financing. The demand for investments is substantial, making the cost of financing prohibitively high and rendering many projects infeasible. Additionally, due to the low purchasing power of the population, tariffs are subsidized, not reflecting the true cost of generation. This situation makes the business model impractical for Independent Power Producers (IPPs) and puts the public utility in a precarious financial position.

Partnerships and Support

New de-risking mechanisms need to be developed to channel climate funding into renewables in countries like the Togolese Republic. The requirement by donors to secure concessional loans with national guarantees is often challenging for countries. There is also a need to enhance existing structures and human capacities within governments to increase readiness to access and efficiently utilize climate funds. Lastly, discussions on climate change must involve energy sector stakeholders, as their engagement in expanding clean energy is contingent upon their understanding of the current climate change situation[133].

Renewable Energy Commitments	Energy Efficiency Commitments
The promotion of efficient equipment for sustainable biomass in households and solar-based electricity. Development of RE (to 4% of the energy mix).	Implement a proactive programme to encourage the use of cookstoves which allows a saving of wood and charcoal of 50 to 60%. Constructing new and improving road network for quicker traveling, cutting 20% fossil fuel consumption during the time.

Source:[133]

2.2 Theoretical Framework

2.2.1 Energy in Production: Physical Theory and Economic Models

Reproducibility holds significant importance in production economics, where certain inputs can be replicated while others cannot, or only at high costs within an efficient production system[134]. Primary factors of production, such as capital, labor, and land, are inputs existing at the start of the production period and are not directly consumed but can be increased or decreased. Intermediate consumption occurs during production and involves inputs that are completely consumed. Typically, mainstream economists consider capital, labor, and land as primary factors, and commodities like fuels and materials as intermediate factors. The price paid for these inputs is seen as payment for the services provided directly or included in the intermediate inputs.

In growth theory, the focus on main inputs like capital and land has led to a somewhat indirect treatment of energy's role in the growth process. Although energy, particularly from reserves like petroleum deposits, is a significant input, it is not clearly defined in standard growth theory, which primarily focuses on labor and capital. However, energy is non-repeatable in production, whereas energy carriers like fuels are repeatable. Therefore, natural scientists and some

economists emphasize the importance of energy and its availability in economic production and growth[135].

The laws of thermodynamics, particularly the principles of mass balance and efficiency, underscore the importance of energy in production processes. All production involves the transformation or movement of matter, which requires energy. As a result, there are limits to substituting other factors of production for energy. Moreover, energy is essential for economic processes, although some service activities may not require direct material processing. However, at the macroeconomic level, all economic processes indirectly use materials, either in labor maintenance or capital goods production.

Additionally, information, like energy, is considered non-reproducible and necessary for economic production. Information extraction from the environment requires energy, and knowledge accumulation depends on information. While capital and labor are relatively easier to measure compared to information and knowledge, all these factors must be incorporated into machines, workers, and materials to be useful[136].

Mainstream neoclassical economics treats the quantity of energy available to the economy as endogenous, constrained by both biophysical and economic factors. However, this approach tends to downplay the role of energy in driving economic growth and production. Some alternative biophysical models argue that energy is the primary factor of production, with capital and labor treated as flows rather than stocks. In these models, the entire value added in the economy is seen as the rent accruing to the energy used. The surplus generated in production is distributed based on the bargaining power of different social classes and foreign fuel suppliers[137].

Ecological economists highlight that the energy used to produce intermediate resource inputs increases as the quality of resources declines, representing negative productivity growth. Resource quality changes are reflected in changes in the embodied energy of resources rather than in input-output coefficients. While thermodynamics imposes constraints on substitution between factors of production, the degree of substitutability among capital stocks embodying knowledge and energy remains an empirical question. Neither the Leontief nor the neo-Ricardian model allows substitution between inputs, although both models can account for biophysical constraints like mass balance and energy conservation.

2.2.2 Real Options Theory

Real options theory is a financial theory that extends the concept of financial options to real assets and projects. It applies the principles of financial options, which give the holder the right, but not the obligation, to buy or sell an asset at a predetermined price within a specified period, to decision-making in capital investment and project management. In the context of real options theory, "real options" refer to the opportunities or flexibility available to managers or investors to take specific actions regarding a project or investment in response to changes in market conditions, technological advancements, or other external factors. These options could include the option to expand, defer, abandon, switch, or alter the course of a project based on future developments[138].

Real options theory recognizes that investment decisions involve uncertainty and irreversibility and seeks to quantify the value of managerial flexibility in decision-making. It provides a framework for assessing the value of investment opportunities beyond traditional discounted cash flow (DCF) analysis by considering the strategic value of managerial choices and the ability

to adapt to changing circumstances. Real options (RO) theory is based on the premise that projects contain options that, if identified and effectively utilized, can increase the projected value of the projects and reduce their risks. This theory offers significant benefits for evaluating investment projects. However, it also has limitations and constraints that need to be recognized before its application[139].

RO theory can be defined as the application of the principles underlying the valuation of financial options to the evaluation of real assets. According to RO theory, projects facing uncertainty may possess options, known as real options, which, if identified and appropriately exercised, can enhance the expected value and mitigate the risks of projects by providing them with flexibility.

To understand RO theory, it is essential to grasp the concept of a real option, flexibility, and the reasons why flexibility is considered valuable, as well as how this value can be assessed based on financial options theory. Real options can take various forms but generally refer to the right, without obligation, to alter a project in response to evolving uncertainties. These options could include delaying project construction, changing operational strategies, or selling the project, among other possibilities. It's important to note that real options are not obligations, meaning they don't have to be utilized even if they are available[140].

Flexibility, on the other hand, refers to the ability of project managers to exercise real options. A project is considered flexible if it can be postponed, its operations altered, sold, or subjected to other actions. Without flexibility, there would be no practical means to adjust the project, rendering RO theory inapplicable.

While Real Option theory may appear complex initially, its underlying principles are straightforward. It is based on the idea that options exist in most projects and that these options can add value. To illustrate this concept, consider two hypothetical power generation projects. The first project must be built immediately and has a present value of £10 M, while the second project, also valued at £10 M, offers additional options such as fuel flexibility and delayed development. Despite having the same value, the second project is considered more favorable due to the extra options it provides[141].

However, as the value of the second project decreases relative to the first, questions arise about its feasibility. Real Option theory addresses these concerns by drawing on concepts and methods developed for the analysis of financial options. Financial options, such as call and put options, allow parties to hedge risks by granting the right, without obligation, to buy or sell assets at predetermined prices and times. These options are evaluated using methods such as decision trees, simulations, and partial differential equations[142].

While financial options and real options share similarities, there are also differences. Real options are not explicitly specified in contracts and may involve actions rather than transactions in a market. Therefore, the principles and strategies used to address financial options must be adapted to apply to real options, forming the foundation of Real Option theory.

Today, Real Option theory has evolved beyond a mere modification of financial options theory to a framework that recognizes the value of flexibility in projects and encourages active exploration of flexibility in project planning and implementation. By incorporating flexibility at all stages of projects, Real Option theory enables the discovery and realization of more valuable initiatives, transforming project management practices.

Real options theory, while offering valuable insights into project valuation and risk management, also comes with certain limitations. Firstly, it can be quite complex, requiring a deep understanding of financial options theory, which may limit its applicability to those unfamiliar with financial concepts. Additionally, the identification and valuation of real options are often subjective, relying heavily on assumptions and estimates, which can introduce uncertainty and reduce the reliability of the analysis. Moreover, conducting real options analysis requires comprehensive data on project variables, market conditions, and potential future scenarios, making it time-consuming and costly, especially for projects in uncertain or rapidly changing environments[143].

Furthermore, the lack of standardized methodology for conducting real options analysis leads to inconsistencies in approach and results across different studies and practitioners, making it challenging to compare and interpret findings. Real options analysis may sometimes overestimate the value of projects by assuming optimal exercise of all options, while in reality, the timing and success of option exercises may be uncertain or influenced by external factors[144]. Incorporating real options into project decision-making processes can also be challenging, particularly in organizations with rigid decision-making structures or risk-averse cultures, requiring changes in organizational mindset and decision-making processes. Other conditions which limit the application of real option theory to all manner of projects include:

- The Project must be Influenced by Uncertainty: If a project remains unaffected by uncertainty, there is no value in having options to adjust the project in response to such uncertainty. In the absence of uncertainty, project decisions become deterministic and can be analyzed in a fixed scenario.

- The Project must Possess Flexibility: RO theory hinges on identifying or formulating options to exploit project flexibility under uncertainty. However, even if a project is affected by uncertainty, RO theory cannot be applied if project managers lack means to adjust the project. It's imperative for all parties involved to brainstorm and identify sources of flexibility and viable options, which can then be assessed using RO tools.

- The Project's Value must be Assessable: RO implementation aims to increase the expected value of projects and reduce risks, necessitating measurable project value and risks. Mathematical models must be available to assess projects for RO theory to evaluate options effectively.

Apart from circumstances where RO theory cannot be applied, there are several barriers and misconceptions it must overcome:

- Complexity and Lack of Understanding: Initially rooted in finance options valuation, RO theory was laden with finance jargon and relied on specialized mathematical equations, making it inaccessible to those without a financial background. Efforts have been made to simplify RO theory for wider accessibility, including the development of user-friendly tools and software.

- Misinterpretation as Inflating Project Value: RO theory is sometimes viewed as inflating project value, whereas it actually enhances the value of project flexibility. Neglecting project flexibility may undervalue projects, while non-flexible projects won't benefit from RO theory.

- Misconception of Favoring Risky Projects: Flexibility's value is tied to uncertainty, leading to the misconception that RO favors risky investments. In reality, flexibility becomes more valuable under high uncertainty scenarios to mitigate losses and maximize profits.

- Misbelief that it's only Applicable for Tradable Assets: While some believe RO theory is only relevant for tradable assets like stocks, it can be applied to any option with characterizable uncertainty.

- Perceived Ineffectiveness in Practice: RO theory relies on project managers exercising options, but if they fail to do so, its effectiveness diminishes. This can only be addressed by ensuring project managers understand and commit to applying RO theory[145].

2.2.2.1 Real Options Theory for Electricity Generation Projects

Since the deregulation of the electricity sector in the mid-1980s, Electricity Generating Projects (EGPs) have grappled with uncertainties surrounding electricity prices. Additionally, growing environmental awareness has led to the implementation of policies favoring Renewable Energy Sources (RESs), prompting adjustments in the power sector to accommodate these sources. Consequently, EGPs have faced additional uncertainties arising from policy changes and adaptations in the power sector due to the increasing presence of intermittent RESs and consumers equipped with Demand Response (DR) capabilities. In this dynamic environment, the use of tools capable of effectively addressing uncertainty, such as those based on Real Options (RO) theory, becomes both attractive and necessary[146].

Despite the significance of applying RO theory to EGPs, the literature on this subject remains diverse and sparse. This diversity is expected given that a real option can encompass any action to adjust projects. The limited number of publications in this area can be attributed to the challenges associated with RO theory, particularly the fact that it only became widely accessible to most people in the mid-1990s.

Considering the diversity and limitations of existing RO literature concerning EGPs, it can be concluded that most new research in this field holds value. However, research based on the latest advancements in RO theory, coupled with an understanding of the current characteristics and requirements of the power sector, is especially valuable. This section aims to critically review existing RO literature pertaining to EGPs. The objective is to identify various applications of the theory, current focuses within the literature, and existing gaps in knowledge, thereby pinpointing research opportunities in this domain. This information is crucial for leveraging RO theory to enhance the value of different types of EGPs amidst the evolving conditions of the power sector.

The literature survey begins by examining the diverse applications of RO theory stemming from power sector deregulation. This includes investigating how the theory is applied at different project stages, the effects of various sources and models of uncertainty, and considerations related to competition. Subsequently, the survey delves into the influence of environmental concerns on EGPs, particularly exploring the impact of RESs support policies, the growing significance of different Renewable Energy Projects (REPs), and the emergence of consumers with DR capabilities[147].

2.2.2 Theory of Inter-Governmentalism

The theory of intergovernmentalism is a concept in political science that focuses on the relationships and interactions between different levels of government within a multilevel governance system. Intergovernmentalism emphasizes the importance of sovereign states and their governments in decision-making processes, particularly in international or supranational institutions. According to this theory, national governments maintain their autonomy and

authority while engaging in cooperative efforts with other governments to address common challenges or pursue shared objectives.

Intergovernmentalism is often contrasted with other theories of governance, such as federalism and supranationalism. Unlike federalism, which emphasizes the division of powers between central and regional governments within a single country, intergovernmentalism applies to interactions between separate sovereign states. Additionally, intergovernmentalism differs from supranationalism, which involves the delegation of authority to higher-level institutions that have authority over member states[148].

In the context of energy cooperation in Africa, the theory of intergovernmentalism plays a significant role in understanding how different African nations interact and collaborate on energy-related matters. Intergovernmentalism highlights the importance of sovereign states in negotiating and implementing agreements to address common energy challenges and achieve shared goals.

Within Africa, energy cooperation often involves initiatives aimed at improving access to electricity, promoting renewable energy development, and enhancing energy security across the continent. Intergovernmental organizations such as the African Union (AU) and regional economic communities (RECs) serve as platforms for African countries to engage in dialogue, negotiate agreements, and coordinate efforts to tackle energy-related issues collectively[149].

At the core of intergovernmental cooperation on energy in Africa are principles of mutual benefit, sovereignty, and national interest. African nations work together to leverage their resources,

expertise, and infrastructure to develop cross-border energy projects, establish regional energy markets, and enhance energy trade among neighboring countries.

Intergovernmentalism in energy cooperation also involves navigating political, economic, and regulatory differences among African nations. Negotiations may involve trade-offs, compromises, and consensus-building to overcome challenges and move forward with collaborative energy initiatives. Overall, the theory of intergovernmentalism provides a framework for understanding how African countries collaborate on energy matters, emphasizing the central role of sovereign states in shaping energy policies, projects, and partnerships across the continent.

2.3 Review of Empirical Studies

This section presents review of related literature from past studies on economic Integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS). These are essential for us to understand the impact of the integration activities that help the countries under ECOWAS in provision of clean and affordable energy for their citizenry.

This research paper aims to determine the fact that nearly half of Africans still have no access to electricity in their homes. Efforts to achieve universal access to affordable, reliable and sustainable electricity by 2030 must therefore be at the forefront of energy transition strategies to effectively fight poverty, enable new economic opportunities and promote equality. The speed with which modern, renewable-based solutions can be deployed will depend on a balanced combination of on-mini- and off-grid approaches for unserved and under-served populations, and must also address the security of supply challenges, overall economic viability and affordable access[150].

This paper aims to understand the effects of the investments required to meet West Africa´s growing demand for renewable energy are far greater than the funds available from public sources. By building stable, predictable enabling frameworks, identifying a pipeline of viable projects and offering targeted de-risking instruments, West African governments and their development partners can facilitate the private sector investments necessary to bridge this gap.

The study was intended to survey the potential of renewable energy and identify that a systemic approach is required. Innovative power generating technologies, such as renewable power systems combining two or more technologies (e.g., floating solar photovoltaic and pumped hydrostorage) as well as off-grid renewable energy systems, combined with innovative enabling technologies (such as green hydrogen, Internet-of-Things and renewable energy mini-grids), as well as new business models, improved regulatory frameworks and system operation procedures should be adopted at scale. Innovative financing approaches – such as local currency lending, results-based financing schemes or tailor-made challenge funds – can also facilitate the energy transition, propelling economic growth and turning African countries into frontrunners in the global clean energy transition. Investments in innovative technologies such as green hydrogen can also create economic opportunities along the value chain[151].

This study focuses on the impact of African Union's Agenda 2063 which is "to eradicate poverty in one generation and build shared prosperity through social and economic transformation of the continent". Energy is essential to these goals. Development partners, including the European Union and its Member States, are already supporting numerous programmes and initiatives to make universal access to electricity and low-carbon power sectors a reality in Africa. Effectively

contributing to the required momentum for a comprehensive renewable energy transition on the continent, however, requires a broader, more concerted initiative[152].

Another study investigates the influence of Nigeria's involvement in the Paris agreement on climate change, a worldwide issue with intricate global policy implications. The study utilises secondary sources from government agencies, data provided by Nigeria to the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC), academic research, and recent submissions on adaptation and mitigation as part of Nigeria's Nationally Determined Contribution (NDC) to analyse the effects of Nigeria's involvement in the Paris Agreement. The research utilised liberalism as its theoretical framework since it posits that nations gain from collaboration in a peaceful and harmonious environment. The study held that Nigeria will profit from the Paris agreement by attaining a low-carbon economy and increasing agricultural productivity, enabling the country to participate in global climate efforts. Recommendations were proposed to enhance the national capacity at the Federal, State, and Local Government levels to effectively plan and respond to climate change policies[153].

A similar study reported that countries, including Nigeria, were required to submit their Intended Nationally Determined Contributions (INDCs) as part of the 2015 Paris Agreement (COP21). The Nigerian NDC identifies increased adoption of renewable energy, enhanced energy efficiency, and fuel switching as critical mitigation initiatives. Our findings point to a significant reorganisation of the Nigerian energy system, with modifications to the supply mix that primarily support the installation of solar PV. According to our analysis, the power sector should be the primary emphasis for mitigating CO2 emissions, but the residential sector has the greatest potential for reducing energy demand. We also investigate how the carbon tax affects the energy

sector. According to the study findings, mitigation measures have significantly improved energy security[154].

Another study focused on the challenges Nigeria faced when implementing the Intended Nationally Determined Contributions (INDC) that it proposed to the COP21 conference. Nigeria's INDC aims to lower greenhouse gas emissions on a national level, however it conflicts with Nigeria's Vision 20: 2020, which uses fossil fuels to propel the country to the rank of 20th most developed by 2020. While more than 70% of the population uses biomass as their main source of energy for household needs. Trade-offs between ecological sustainability and economic growth are necessary to overcome this complexity. Utilising modelling tools from Nigeria Energy Calculator, we analysed the country's energy supply and demand to arrive at our conclusions using quantitative data[155].

According to the study, in a scenario where everything proceeds as usual, structural crises of various sizes will make it difficult to effectively monitor, report, and verify carbon emissions, which will result in high GHG emissions. That while market mechanisms have the potential to bring about a new era of environmentally friendly development, they are unable to fully handle externality issues in an economy where institutional weaknesses, rapid population growth, falling crude oil revenue, biomass usage, and inadequate data are all major obstacles[156]. This puts a significant burden on the government's plan to turn the Paris Climate Agreement into concrete climate action. The conclusion is that a zero carbon economy will be ushered in by a new design known as the Food Sufficiency Economy (FSE). According to Africa's ecobiocommunitarianism viewpoint, FSE is the convergence of food sovereignty and sufficiency economy, with a bias towards Climate-Smart Agriculture as a foundational element for a future low-carbon and climate resilient[157].

The activities of other countries can also influence climate and environmental policy making in Nigeria. scholars analysed the impact of American president, Donald Trump on climate change policies among countries such as Nigeria. The study analyse Trump's policy plan regarding the climate change agreement, with an emphasis on the repercussions of his withdrawal and its impact on sustainable development in Nigeria[158]. Trump's strategy demonstrates the importance of state sovereignty in the context of the international arena, where nations are seen as the primary actors who compete for power and act to achieve their national goals. The departure from the pact signifies a restoration of America's sovereignty. An analysis is conducted on potential measures to counter withdrawal and its implications on Nigeria using secondary sources like journals, books, and the internet. The study also discusses the next steps for both countries regarding climate change, highlighting that while Trump's policy may offer immediate benefits, it could lead to future damages[159]. It suggests that Nigeria should establish robust governance policies and work closely with neighbouring countries.

The Nigerian economy is developing, but complying with the Paris Agreement would be challenging due to the substantial investment, educational awareness, and robust climate change policies it demands. The country is burdened with domestic challenges including governance issues, corruption, lack of rule of law, insufficient infrastructure in education and research, and the ongoing Covid-19 pandemic affecting even developed nations[160]. Additionally, the climate change bill HB.357 has not passed the first reading in the 9th parliament. If the United States, an industrialised powerhouse, has pulled out of the Paris Agreement due to financial concerns, Nigeria should likewise be concerned about both present and future risks. Efforts should be made to find ways to work together on climate change to facilitate funding, by establishing a regional

coalition across Africa (Egypt, Kenya, Nigeria, and South Africa) focused on transitioning to a clean solar energy society[161].

Studies also shows that following international directives by the nation's authorities also trickle down to the masses. This is demonstrated in research which focuses on investigating the behavior of a sample of 300 Generation Y green consumers aged between 18 and 32 residing in the urban area of the Federal Capital Territory (FCT)-Abuja, Nigeria. A quantitative research approach is employed to design the research model, and the data is collected through surveys. The collected data is then analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 3.0 software[162].

The empirical findings obtained from the path model confirm that both the extended TPB and GCF have a positive and significant influence on Generation Y's green behavior, indicated by p-values below 0.05 and t-values exceeding 1.96. Factors such as green price sensitivity exert a stronger influence on Generation Y's green behavior, followed by green behavioral control. The inclusion of an additional construct in the path model contributes as a significant mainstream variable[163]. The research outcomes demonstrate that Generation Y green consumers are inclined to actively contribute to sustainable practices in society. These findings provide valuable insights for policymakers and managers in the green industry, enabling them to formulate appropriate green strategies and effective policies that align with the preferences and behaviors of Generation Y consumers[164].

2.4 Conceptual Framework

This model shows the relationship between the independent and the dependent variables. In this study, economic Integration is the independent variable while affordable and clean energy is the dependent variable. The relationship is presented in Figure 2.4

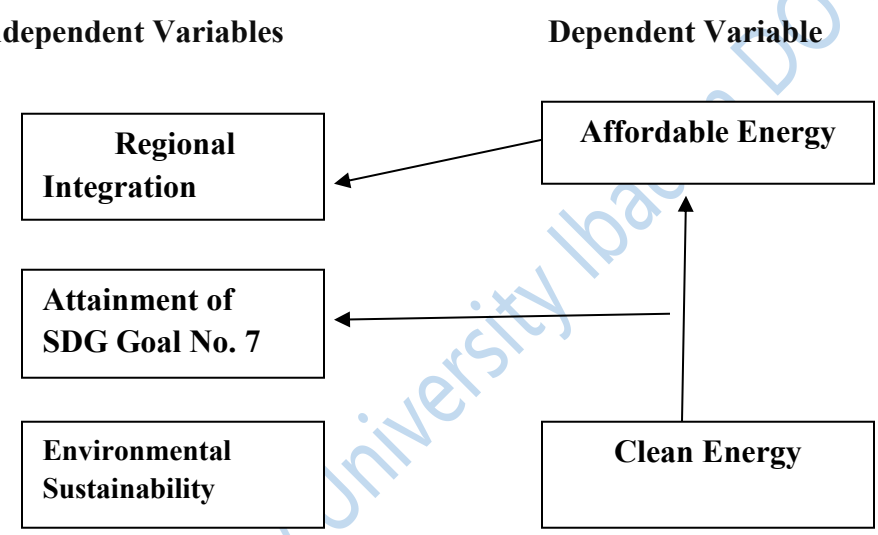

Fig 2.4 Regional Integration and Affordable Energy

Source: Author's Fieldwork

2.5 Summary of Gap in Literature Reviewed

In clear consideration of the highlighted points, some vital identified knowledge gaps in current literature in relation to provision of clean and affordable energy to strengthen economic integration in ECOWAS states.

Few studies have used a combination of different theories in addressing energy supply infrastructure issues. Theoretical pragmatism is rarely used. Theoretical pragmatism is important so that all of the insights gained can be used to actively shape the problem definition. Most energy supply studies have emphasized the use of the Multi-Level Perspective (MLP) particularly in areas where they are not useful. Little research has focused on theoretical pragmatism[165].

Little research has focused on the relationship between energy supply and policy making. Most studies have focused more on developed countries. Not many researches have focused on developing country context. Considering that little research has been done focusing on developing countries, very few studies have focused on the African context. Studies on the institutional dimensions of energy infrastructure provision are emerging. The dominant perspectives studied by researchers today are more individualistic. As such, any further research that supports the application of the institutional dimensions of energy – particularly within structural contexts – will contribute to knowledge.

Little research has been done on the role of technology and institutions - over time - in connection with energy infrastructure provisions. Most of what have been done employ mainly snapshots of technology and institutional dimensions. Research has focused more on theoretical discussions rather than case study research. For those who have attempted case study research, there have not been many case studies on developing African countries.

Endnotes

1. H. Phong Le, & D. T. Bach Van. *The Energy Consumption Structure and African EMDEs' Sustainable Development.* **Heliyon,** 6 (4), 2020.

2. D. Abdullahi., S. Renukappa., S. Suresh, & D. Oloke. *Barriers for Implementing Solar Energy Initiatives in Nigeria: An Empirical Study.* **Emerald Insight - Smart and Sustainable Built Environment**, vol. 11, issue 3, 2022. Pp. 647-660.

3. N. E. Attah. *British Colonial Economic Policies and Oil Palm Plantations in Nigeria.* Economic History Society Conference, Queen's University Belfast, 2019.

4. T. Marcinkowski, & A. Reid. *Reviews of Research on the Attitude-Behaviour Relationship and their Implications for Future Environmental Education Research.* **Environmental Education Research**, 25 (4), 2019. Pp. 456-471.

5. M. Farghali., A. I. Osman., Z. Chen., A. Abdelhaleem., I. Ihara., I. M. A Mohamed., Y. Pow-Seng, & D. W. Rooney. *Social, Environmental, and Economic Consequences of Integrating Renewable Energies in the Electricity Sector: A Review.* **Environmental Chemistry Letters**, vol. 21, 2023. Pp. 1381–1418.

6. S. Rahim., M. Murshed., S. Umarbeyli., D. Kirikkaleli., M. Ahmad., M. Tufail, & S. Wahab. *Do Natural Resources Abundance and Human Capital Development Promote Economic Growth? A Study on the Resource Curse Hypothesis in Next Eleven Countries.* **Resources, Environment and Sustainability,** 4, 2021.

7. Alberta Energy Regulator. *Stakeholder Engagement Framework*. Alberta Energy Regulator, 2013-2020. Available at: https://uat.aer.ca/protecting-what-matters/giving-albertans-a-voice/aer-in-your-community/stakeholder-engagement-framework

8. R. L. Jepperson. *Institutional Theory: The Cultural Construction of Organisations, States, and Identities*. Cambridge University Press, 2021. Pp. 15–39.

9. American Chemistry Council. *US Chemical Industry Investment Linked to Shale Gas Tops $200 Billion.* American Chemistry Council, 2022. https://www.americanchemistry.com/chemistry-in-america/news-trends/press-release/2022/us-chemical-industry-investment-linked-to-shale-gas-tops-200-billion

10. E. A. Oghuvbu. *Political Corruption and Economic Development in Nigeria*. **Journal of Public Administration, Finance and Law**, issue 20/2021, 2021. Pp. 250-261

11. A. Onuoha. *Land Use and the Transportation of Oil & Gas in Nigeria: The Legal and Social Challenges of Pipelines.* **African Journal of Law and Criminology**, 9 (1), 2019. Pp. 84–95.

12. S. Ansari, & R. Garud. *Inter-Generational Transitions in Socio-Technical Systems: The Case of Mobile Communications.* **Research Policy**, 38 (2), 2009. Pp. 382–392. Available at: http://dx.doi.org/10.1016/j.respol.2008.11.009

13. ScienceDaily. *True Cost of the Planet's Energy and Transport Systems*. University of Sussex, 2021. https://www.sciencedaily.com/releases/2021/03/210301133829.htm

14. African Union. *Report on the Status of Regional Integration in Africa.* The Third Technical Committee on Finance, Monetary Affairs, Economic Planning and Integration Experts Meeting, African Union Commission Economic Affairs, Tralac Trade Law Centre. 2019. https://www.tralac.org/documents/resources/african-union/2649-report-on-the-status-of-regional-integration-in-africa-executive-summary-february-2019/file.html

15. F. Garba, & T. Yeboah. *Free Movement and Regional Integration in the ECOWAS Sub-Region.* In J. K. Teye (eds) Migration in West Africa. IMISCOE Research Series, Springer, Cham. 2022. Pp. 19-34

16. B. Balassa. *The Theory of Economic Integration (Routledge Revivals).* Routledge. 2013.

17. F. Onditi. *Dominatarian Theory on Regional Integration*. **Insight on Africa**, 13 (1), 2020.

18. B. Byiers & C. T. Dieye. *Regional Integration in West Africa: Wasteful Overlaps or Necessary Options.* Discussion Paper No. 322, ECDPM, Centre African Pour le Commerce L'integration et le Developement CACID, 2022.

19. I. U. Unya, *ECOWAS and Regional Integration in West Africa: Issues, Challenges and Prospects*. **International Journal of African Culture, Policies and Development**, 12 (2), 2019.

20. M. A. Bhuiyan., Q. Zhang., V. Khare., A. Mikhaylov., G. Pinter, & X. Huang. *Renewable Energy Consumption and Economic Growth Nexus – A Systematic Literature Review.* **Systematic Review Article Front Environ. Sci.**, 10, 2022.

21. M. Tsagkari., J. Roca, & P. Stephanides. *Sustainability of Local Renewable Energy Projects: A Comprehensive Framework and An Empirical Analysis on Two Islands.* **Sustainable Development**, vol. 30, issue 5, 2022. 1155-1168.

22. G. E. Halkos, & A. S. Tsirivis. *Electricity Production and Sustainable Development: The Role of Renewable Energy Sources and Specific Socioeconomic Factors*. **Energies**, 16 (2), 2023. 721.

23. P. Beça, & R., Santos. *Measuring Sustainable Welfare: A New Approach to the ISEW*, **Ecological Economics** 69 (4), 2010. 810-819.

24. APLANET. *Sustainability Indicators: Definition, Types of KPIs and their Use in the Sustainability Plan.* 2023. https://aplanet.org/resources/sustainability-indicators/

25. Q. Wang., X. Wang, & X. Jiang. *Reinvestigating the Environmental Kuznets Curve (EKC) of Carbon Emissions and Ecological Footprint in 147 Countries: A Matter of Trade Protectionism.* **Humanities and Social Sciences Communications**, 11 (160), 2024.

26. I. K. Ofori, & S. A. Asongu. *ICT Diffusion, Foreign Direct Investment and Inclusive Growth in Sub-Saharan Africa.* **Telematics and Informatics**, vol. 65, 2021.

27. World Bank. *Regional Integration Removes Barriers to Development in Africa*. Result Briefs, 2023. https://www.worldbank.org/en/results/2023/12/08/regional-integration-removes-barriers-to-development-in-africa

28. H. T. Mewenemesse, & Q. Yan. *Policy Analysis of the Challenges to an Effective Switch to Low-Carbon Energy in Economic Community of West African States*. **Energies**, 16 (5), 2023

29. I. U. Unya. *Regional Organisations as Strategies for Development: A Comparison of EU, OAS and ASEAN.* **Babcock University Journal of History and International Studies**, 4 (1), 2019.

30. H. P. Ishaku., H. Adun., M. Jazayeri, & M. Kusaf. *Decarbonisation Strategy for Renewable Energy Integration for Electrification of West African Nations: A Bottom-Up Energy Plan Modelling of West African Power Pool Targets*. **Sustainability**, vol. 14, issue 23, 2022.

31. O. Akinyemi-Babajide., U. R. Efobi., E. Osabuohien, & P. O. Alege. *Regional Integration and Energy Sustainability in Africa: Exploring the Challenges and Prospects for ECOWAS.* **African Development Review**, 31 (4), 2019. 517-528.

32. A. Medinilla., B. Byiers, & K. Karaki. *African Power Pools: Regional Energy, National Power.* ECDPM. Discussion Paper no. 244, 2019

33. M. Olapade., E. Selormey, & H. Gninafon. *Regional Integration in Africa: Could Stronger Public Support turn 'Rhetoric into Reality'?* Afrobarometer Round 6, Dispatch No. 91. 2016

34. A. Zakari, & H. O. Musibau. *Sustainable Economic Development Energy in OECD Countries: Does Energy Security Matter?* **Sustainable Development**, vol. 32, issue 1, 2023.

35. L. A. Edet. & A. P. Odey. *Africa and the Challenges of Globalisation: An Overview.* **Pinisi Journal of Art, Humanity and Social Studies**. Vol. 2, no. 3, 2022.124-132

36. P. Pierre-Oliver. *Electricity Sector Integration in West Africa.* **Energy Policy**, 36 (1), 2008. 210-223.

37. G. Mugwika. *The Impact of Regional Integration on SMEs Performance: A Survey of Manufacturing SMEs in the East African Community (EAC).* LAP LAMBERT Academic Publishing. Mauritius, 2020.

38. T. W. Oshikoya. & A. O. Salami. *Regional Integration for African Development.* African Development Bank Group. **Africa Economic Brief**, vol. 12, issue 12, 2021.

39. United Nations Economic Commission for Africa. *UNECA Report on 'Energy for Sustainable Development'.* Africa Regional Implementation Review for the 14th Session of the Commission on Sustainable Development (CSD-14). 2005

40. The World Bank. *Africa Regional Integration*. 2024. https://www.worldbank.org/en/programs/africa-regional-integration

41. A. Ogus. *The Importance of Legal Infrastructure for Regulation (and Deregulation) in Developing Countries*. Working Paper No. 65, Centre on Regulation and Competition, University of Manchester. 2004

42. Best Diplomats. *Role of Non-Governmental Organisations in International Relations.* Diplomatic Trainings and Conferences, 2023. https://www.linkedin.com/pulse/role-non-governmental-organisations-international-relations-mayqc

43. M. A. Qubeissi., A. El-kharouf & H. S. Soyhan (eds). *Renewable Energy – Resources, Challenges and Applications.* London, United Kingdom: IntechOpen. 2020

44. E. Bell., A. Bryman. & S. Kleinknecht. *Social Research Methods: Sixth Canadian Edition*. Oxford University Press. 2022

45. P. Chasek. & D. L. Downie. *Global Environmental Politics.* (8th Edition). Routledge: Taylor & Francis Group, 2020.

46. R. Mahajan., W. M. Lim., M. Sareen., S. Kumar. & R. Panwar. *Stakeholders Theory.* **Journal of Business Research**, vol. 166, 2023.

47. R. MusiAIEk. *The Renewable Energy Revolution: Shaping a Sustainable Future.* Management w SMA Solar Technology AG, 2023. https://www.linkedin.com/pulse/renewable-energy-revolution-shaping-sustainable-future-musialek-ojsee

48. Energy Information Administration. *Wind Explained: History of Wind Power.* 2023. http://www.eia.gov/energyexplained/wind/history-of-wind-power.php

49. L. N. Proskuryakova, & I. Loginova. *Energy and Environment: Sustainable Development Goals and Global Policy Landscape.* In: Asif, M. (eds) Energy and Environmental Security in Developing Countries. Advanced Sciences and Technologies for Security Applications. Springer, Cham. 2021. Pp. 355-374.

50. M. Kolagar., S. M. H. Hosseini., R. Felegari, & P. Fattahi. *Policy-Making for Renewable Energy Sources in Search of Sustainable Development: A Hybrid DEA-FBWM Approach*. **Environment Systems and Decisions**, vol. 40, 2020. Pp. 485-509.

51. A. Morse. *Can a Feed-in Tariff Help Increase Renewable Energy Capacity?* Rockefeller Institute of Government, 2021. https://rockinst.org/blog/can-a-feed-in-tarrif-help-increase-renewable-energy-capacity/

52. S. J. Kang, & S. Lee. *Impacts of Environmental Policies on Global Green Trade.* **Sustainability**, vol. 13, issue 3, 2021. 1517.

53. S. Patnaik. & S. C. Pandey. *Case Study Research*, Subudhi, R. N. & Mishra, S. (Ed.) Methodological Issues in Management Research: Advances, Challenges, and the Way Ahead, Emerald Publishing Limited, Bingley, 2019. Pp. 163-179

54. P. A. Appiah., R. Adongo, & A. R. Safo. *Sustainable Energy Systems and Green Hotel Practices in Hotels in Tamale Metropolis, Ghana.* **Journal of Environmental Management and Tourism,** vol. 14, no. 7, 2023. Pp. 2915–2934.

55. T. J. Foxon., G. P. Hammond. & P. J. G. Pearson. *Socio-Technical Transitions in UK Electricity: Part 1 – History, Actors and Pathways.* **Proceedings of the Institution of Civil Engineers – Energy**, vol. 173, no. 3, 2020. Pp. 109-122

56. D. Reay. *The More Things Change the More they Stay the Same: The Continuing Relevance of Bourdieu and Passeron's Reproduction in Education, Society and Culture.* **Spanish Journal of Sociology**, 31 (3), 2022

57. C. F. Voinea, & M. Neumann. *Political Culture: A Theory in Search for Methodology. An Editorial*. **Quality and Quantity**, vol. 54, 2020. Pp. 335-360

58. S. Bracken. *Discussing the Importance of Ontology and Epistemology Awareness in Practitioner Research.* **Worcester Journal of Learning and Teaching,** 4 (4), 2010. Pp. 1–9.

59. J. Ober. *Innovation Adoption: Empirical Analysis on the Example of Selected Factors of Organisational Culture in the IT Industry in Poland*. **Sustainability**, 12 (20), 2020. 10.3390/su12208630

60. J. Bray. *Navigating Corruption in Africa's Power Sector*. African Business Magazine. 2015. Available at: http://africanbusinessmagazine.com/sectors/energy/navigatingcorruption-in-africas-power-sector

61. A. Freedman. *First Look: The Business Roundtable's New Agenda.* Energy and Environment, 2022. https://www.axios.com/2022/04/19/business-roundtable-white-house-energy

62. K. Calvert., K. Greer, & M. Maddison-MacFadyen. *Theorizing Energy Landscape for Energy Transition Management: Insights from a Socioecological History of Energy Transitions in Bermuda.* **Geoforum,** vol. 102, 2019. Pp. 191–201.

63. J. Y. Campbell. *Utility Theory and Risk Aversion.* 2011. https://www.sribd.com/document/306640062/Risk-Aversion-and-Utility-Theory

64. Clean Energy Canada. *It's Time for a Vision for Electricity in Canada.* 2014. https://cleanenergycanada.org/time-vision-electricity-canada/?print=print

65. O. Mazandarani. *Philosophical Assumptions in ELT Research: A Systematic Review.* **Asia-Pacific Education Researcher**, vol. 31, 2022.

66. A. U. Adoghe., T. M. Adeyemi-Kayode., V. Oguntosin, & I. I. Amahia. *Performance Evaluation of the Prospects and Challenges of Effective Power Generation and Distribution in Nigeria.* **Heliyon**, vol. 9, issue 3, 2023.

67. A. Abuzeinab., M. Arif, & M. A. Qadri. *Barriers to MNEs Green Business Models in the UK Construction Sector: An ISM Analysis.* **Journal of Cleaner Production,** vol. 160, 2017. Pp. 27-37.

68. M. S. Adaramola, & S. S. Paul. *Economic Analysis and Potential Feed-in Tariff of Grid-Connected PV Systems in Nigeria.* **Environmental Progress & Sustainable Energy**, vol. 36, no. 1, 2017. Pp. 305-314.

69. A. V. Adebayo., P. K. Ainah, & O. Apata. *The Insight and Foresight of The Nigerian Power Transmission System: An Overview.* IEEE PES/IAS PowerAfrica, Nairobi, Kenya, 2020. Pp. 1-5.

70. A. Adedokun. *Can Electricity Consumption be Useful in Predicting Nigerian Economic Growth? Evidence for Error Correction Model*. **OPEC Energy Review**, 39 (2), 2015. Pp. 125-140.

71. A. A. Adesanya, & C. Schelly. *Solar PV-Diesel Hybrid Systems for the Nigerian Private Sector: An Impact Assessment.* **Energy Policy**, vol. 132, 2019. Pp. 196-207.

72. E. E. Eweka., E. Lopez-Arroyo., C. O. Medupin., A. Oladipo, & L. C. Campos. *Renewable Energy Resources in Nigeria.* Scholarly Community Encyclopedia, 2022. https://encyclopedia.pub/entry/26194

73. Y. O. Akinwale., I. O. Ogundari., O. E. Ilevbare, & A. O. Adepoju. *A Descriptive Analysis of Public Understanding and Attitudes of Renewable Energy Resources towards Energy Access and Development in Nigeria.* **International Journal of Energy Economics and Policy,** 4 (4), 2014. Pp. 636-646.

74. D. O. Akinyele., R. K. Rayudu, & N. K. C. Nair. *Global Progress in Photovoltaic Technologies and the Scenario of Development of Solar Panel Plant and Module Performance Estimation − Application in Nigeria.* **Renewable & Sustainable Energy Reviews**, vol. 48, 2015. Pp. 112-139.

75. E. S. Nwokoye., A. A. Uzodigwe, & N. Geraldine. *Economic Structure of West Africa.* In Economics Study Material. August, 2018. Available at https://www.researchgate.net/publication/326841734_Economic_Structure_of_West_Africa

76. J. K. Teye. *Migrations in West Africa: An Introduction.* In Book: Migration in West Africa, IMISCOE Regional Reader, IMISCOE Research Series. Springer, 2022.

77. A. Salaudeen. *West African Countries Choose New 'ECO' Single Trade Currency.* CNN International. 9 July, 2019. Available at https://edition.cnn.com/2019/07/01/africa/single-trade-currency-ecowas/index.html

78. International Monetary Fund (IMF). *World Economic Outlook Update, July 2023: Near-Term Resilience, Persistence Challenges*. Washington, DC. 2023. https:// www.imf.org/en/Publications/WEO/Issues?2023/07/10/world-economic-outlook-update-july-2023

79. J. Karaganis. *Media Piracy in Emerging Economies*. New York: Social Science Research Council. 2011. http://www.ssrc.org/publications/media-piracy-in-emerging-economies/

80. D. Kawooya. *A New Course for the Pan African Intellectual Property Organization is Urgently Needed.* Letter to the 5th African Union Ministerial Conference on Science & Technology. 18th October, 2012. https://www.change.org/p/a-new-course-for-the-pan-african- intellectual-property-organization-is-urgently- needed

81. Open Air African Innovation Research. *2022 Annual Report: A Cross-Regional Network of Networks*. August, 2023. https://openair.africa/annual-report-2022/

82. N. Rizk. *From De Facto Commons to Digital Commons? The Case of Egypt's Independent Music Industry.* In J. de Beer, C. Armstrong, C. Oguamanam & T. Schonwetter (editors), Innovation & Intellectual Property. Claremont, South Africa: UCT Press. 2014

83. P. Roffe, & X. Seuba. *The ACTA and the Plurilateral Enforcement Agenda: Genesis and Aftermath.* Cambridge, UK: Cambridge University Press. 2014

84. X. Wei., X. Liu., Y. Fan., L. Tan, & Q. Liu. *A Unified Test for the AR Error Structure of an Autoregressive Model.* **Axioms**, 11 (12), 2022. Pp. 690.

85. B. V. Mierlo. *Users Empowered in Smart Grid Development? Assumptions and Up-To-Date Knowledge*. **Applied Sciences**, vol. 9, issue 5, 2019. Pp. 815.

86. S. Wurster, & C. Hagemann. *Expansion of Renewable Energy in Federal Settings: Austria, Belgium, and Germany in Comparison.* **The Journal of Environment and Development**, vol. 29, issue 1, 2019.

87. R. Rechsteiner. *German Energy Transition (Energiewende) and What Politicians can Learn for Environmental and Climate Policy.* **Clean Technologies and Environmental Policy**, vol. 23, 2021. Pp. 305–342.

88. P. Hamman. *Local Governance of Energy Transition: Sustainability, Transactions and Social Ties. A Case Study in Northeast France*. **International Journal of Sustainable Development & World Ecology,** 26 (1): 2019. Pp. 1–10.

89. E. G. Hansen., F. L¨udeke-Freund., X. I. Quan, & J. West. *Cross-National Complementarity of Technology Push, Demand Pull, and Manufacturing Push Policies: The Case of Photovoltaics.* **IEEE Transactions on Engineering Management**, vol. 66, no. 3, 2019. Pp. 381-397

90. J. Huang., Y. Zhong, & Y. Zhang. *Does Environmental Regulation of Cleaner Production Affect the Position of Enterprises in Global Value Chains? A Quasi–Natural Experiment Based on the Implementation of Cleaner Production*. **Sustainability**, vol. 15, issue 13, 2023. 10492.

91. B. Ugwoke., S. Sulemanu., S. P. Corgnati., P. Leone, & J. M. Pearce. *The Integrated Rural Renewable and Sustainable Energy Planning Framework for Low*-Income *Countries: Case Studies of Rural Communities in Nigeria.* **Renewable and Sustainable Energy Reviews**, 144, 2021.

92. S. Hilpert., C. Kaldemeyer., U. Krien., S. G¨unther., C. Wingenbach, & G. Plessmann. *The Open Energy Modelling Framework (oemof) - A New Approach to Facilitate Open Science in Energy System Modelling*. **Energy Strategy Reviews**, 22: 2018. 16– 25.

93. R. H¨olsgens., S. L¨ubke, & M. Hasselkuß. *Social Innovations in the German Energy Transition: An Attempt to use the Heuristics of the Multi–Level Perspective of Transitions to Analyze the Diffusion Process of Social Innovations.* **Energy, Sustainability and Society**, 8 (1): 8, 2018.

94. D. Howard., R. Soria., J. The., R. Schaeffer, & J. D. Saphores. *The Energy Climate- Health Nexus in Energy Planning: A Case Study in Brazil.* **Renewable and Sustainable Energy Reviews**, 132, 2020. 110016.

95. M. Howells., H. Rogner., N. Strachan., C. Heaps., H. Huntington., S. Kypreos., A. Hughes., S. Silveira., J. DeCarolis., M. Bazillian, & A. Roehrl. *Osemosys: The Open Source Energy Modeling System: An Introduction to its Ethos, Structure and Development.* **Energy Policy**, 39 (10): 5, 2011. 5850–5870.

96. United Nations Industrial Development Organisation - UNIDO. *Independent Terminal Evaluation: Start-up and First Operational Phase of the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) – A Centre of excellence to Promote Inclusive and Sustainable Energy Industries*, Independent Evaluation Unit Office of Evaluation and Internal Oversight, 2023. https://downloadsunido.org/ot/31/33/31336167/Evaluation%20report%20on%20Start-up%20and%20first%20operational%20phase%20of%20the%20Caribbean%20Centre%20for%20Renewable%20Energy%20and%20Energy%20Efficiency%20(CCREEE).pdf

97. M. A. E. Elabbas., L. D. Vries, & A. Correlje. *African Power Pools and Regional Electricity Markets Design: Taking Stock of Regional Integration in Energy Sectors*. **Energy Research and Social Science**, vol. 105, 2023. 103291

98. D. Traore. *Regional Integration Strategy and Scientific Research: The West Africa Institute's Support Proposal to the Implementation of ECOWAS Vision 2050.* The West Africa Institute, WAI. 2021. https://www.yourdictionary.com/regional-integration

99. T. Gillet., T. Vasse, & B. Marly. *Africa's Electricity Challenge: Rising Oil, Gas Prices to Weigh on Growth and Fiscal Outlooks.* 2022. https://www.scoperatings.com/ratings-and-research/research/EN/170861

100. T. Sarker., S. Hossain, & K. M. Nazmul Islam. *Role of Regional Cooperation and Integration in Improving Energy Insecurity in South Asia.* Asian Development Bank Institute, ADBI Working Paper Series, No. 1120, 2020.

101. A. B. Akoutou., R. Sohn., M. Vogl, & D. Yeboah (eds). *Understanding Regional Integration in West Africa: A Multi-Thematic and Comparative Analysis.* WA-ZEI Paper No. 17. Centre for European Integration Studies, 2014.

102. M. A. Adam. *United States Power Africa Initiative, the EU and China: Investment or International Politics?* Africa Centre for Energy Policy, **JSTOR**, no. 28, 2019

103. A. Dertinger, & L. Hirth. *Reforming the Electric Power Industry in Developing Economies Evidence on Efficiency and Electricity Access Outcomes.* **Energy Policy**, vol. 139, 2020. 111348.

104. H. Dikko. *The Rationale of Economic Regulations: Theoretical Review, Advances in African Economic, Social and Political Development.* In: Ishmael Ackah & Charly Gatete (ed.). Energy Regulation in Africa, Springer, 2024. Pp. 169-183

105. V. Chambers., M. Foresti, & D. Harris. *Final Report: Political Economy of Regionalism in West Africa.* Scoping Study and Prioritisation. London: Overseas Development Institute, 2012

106. R. Tehero. *Determinants of the Access to Electricity: The Case of West African Power Pool Counties*. **Open Access Library Journal**, vol. 8, 2021. e7223

107. A. Diallo. *Lighting Up West Africa*. Economic Community of West African State, West African Power Pool. 2021. Retrieved from https://www.esi-africa.com/wp-content/uploads/Amadou_Diallo.pdf

108. A. Eberhard., O. Rosnes., M. Shkaratan, & H. Vennemo. *Africa's Power Infrastructure: Investment, Integration, Efficiency (English).* Directions in Development; Infrastructure Washington, D. C.: World Bank Group, 2011. https://documents.worldbank.org/curated/en/545641468004456928/Africas-power-infrastructure-investment-integration-efficiency

109. ECOWAS. *Ecowas Energy Protocol A/P4/1/03.* Economic Community of West African States. 2003. Retrieved from http://www.erera.arrec.org/en/ecowas-energy-protocol-ap4103/

110. ECREEE. *The ECREEE Business Plan 2011–2016*. Presented to the Executive Board of ECREEE in April 2012. Praia: ECOWAS Regional Centre for Renewable Energy and Energy Efficiency. https://www.ecowrex.org/document/ecreee-business-plan-2011-2016-0

111. ECREEE. *Baseline Report for the ECOWAS Renewable Energy Policy (EREP).* Vienna: United Nations Industrial Development Organization, 2012. https://www.ecowrex.org/document/baseline-report-ecowas-renewable-energy-policy-erep

112. REN21. *ECOWAS Renewable Energy and Energy Efficiency Status Report 2014.* Paris: REN21 Secretariat, 2019. https://www.ren21.net/2014-ecowas-renewable-energy-and-energy-efficiency-status-report/

113. A. Adeniran, & C. Onyekwena. *Accelerating Green Energy Transition in Africa through Regional Integration*. South African Institute of International Affairs (SAIIA) Policy Briefing, no. 216, 2020. https://saiia.org.za/research/accelerating-green-energy-transition-in-africa-through-regional-integration/

114. ECOWAS Regional Electricity Regulatory Authority (ERERA). *RESOLUTION No. 006-ERERA/15 – Adoption of the Tariff Methodology for Regional Transmission Cost and Tariff.* 2015. https://www.erera.errec.org/en/adoption-of-the-tariff-methodology-for-regional-transmission-cost-and-tariff/

115. E. K. Eyita. *Energy Security through Transboundary Cooperation: Case Studies of the Southern African Power Pool (SAPP) and the West African Pool (WAPP).* University of the Witwatersrand, Johannesburg Doctoral Dissertation. 2014

116. I. El-Anis. *Transport Infrastructure and Regional Integration in the Middle East.* **The Muslim World**, vol. 111, issue 1, 2021. Pp. 27-53.

117. A. M. Bissiri., P. S. Moura., N. Figueiredo, & P. P. Da-Silva. *Towards a Renewables-Based Future for West African States: A Review of Power Systems Planning Approaches.* **Renewable and Sustainable Energy Reviews**, vol. 134, 2020. 110019

118. O. Adeoye, & C. Spataru. *Quantifying the Integration of Renewable Energy Sources in West Africa's Interconnected Electricity Network.* **Renewable and Sustainable Energy Reviews**, Elsevier, vol. 120, 2020.

119. K. Hancock. *Energy Regionalism and Diffusion in Africa: How Political Actors created the ECOWAS Center for Renewable Energy and Energy Efficiency*. **Energy Research & Social Science**, vol. 5, 2015. Pp. 105-115.

120. I. T. Tambari., M. O. Dioha, & P. Failler. *Renewable Energy Scenarios for Sustainable Electricity Supply in Nigeria.* **Energy and Climate Change**, vol. 1, 2020. 100017

121. International Renewable Energy Agency (IRENA). *West African Power Pool: Planning and Prospects for Renewable Energy*. International Renewable Energy Agency, 2013.

https;//www.irena.org/Publication/2013/Jun/West-African-Power-Pool-Planning-and-Prospects-for-Renewable-Energy

122. M. Agoundedemba., C. K. Kim, & H. G. Kim. *Energy Status in Africa: Challenges, Progress and Sustainable Pathways*. **Energies**, Vol. 16, issue 23, 2023. 7708.

123. ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). *Towards a Viable and Robust Energy Market in the ECOWAS Region*. ECOWAS Sustainable Energy Week, Accra, Oct. 17, 2016. https://www.se4all-africa.org/news-resources/events/ecowas-sustainable-energy-week-135/

124. A. A. ElGanainy., S. Hakobyan., F. Liu., H. Weisfeld., A. Abbas., C. Allard., H. W. Balima., C. Bteish., R. Giri., D. S. Kanda., S. Meleshchuk., G. Ramirez., R. Zymek., V. B. Arora., S. Lall., B. R. Kett, & M. M. Pohl. *Trade Integration in Africa: Unleashing the Continent's Potential in a Changing World.* International Monetary Fund. Departmental Paper No. 2023/003, 2023. https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2023/05/03/Trade-Integration-in-Africa-Unleashing-the-Continent-s-Potential-in-a-Changing-World-529215

125. International Energy Agency (IEA). *Africa Energy Outlook: A Focus on Energy Prospects in Sub-Saharan Africa.* World Energy Outlook Special Report. Paris: International Energy Agency, 2014. https://www.icafrica.org/en/knowledge-hub/article/africa-energy-oulook-a-focus-on-energy-prospects-in-sub-saharan-africa-263/

126. Insights. *Power Reforms in West Africa: Challenges, Prospects and Opportunities.* Africa Connected: Issue 3. 2019. https://www.dlapiperafrica.com/en/africa-wide/insights/africa-connected/issue-03/power-reforms-in-west-africa.html

127. J. O. Piette, & C. R. Di Schio. *Bridging the Gap Between Transport and Energy to Achieve Sustainable Mobility*. World Bank Blogs, Transport for Development, 2021. https://blogs.worldbank.org/en/transport/bridging-gap-between-transport-and-energy-achieve-sustainable-mobility

128. Y. Mulugetta, & L. Agemabiese. *Sustainable Energy Systems in Africa.* In: Transformational Infrastructure for Development of a Wellbeing Economy in Africa. African Sun Media, 2019. Pp. 73-114.

129. Economic Community of West African States (ECOWAS). *Treaty of the Economic Community of West African States.* (ECOWAS), 1975. https://www.refworld.org/legal/constinctr/ecowas/1975/en/63881

130. K. Reiss. *Developing Renewable Energy Sectors and Technologies in West Africa*. United Nations Chronicle, LII (3). Sustainable Energy, 2015. Retrieved from

https://unchronicle.un.org/article/developing-renewable-energy-sectors-and- technologies-west-africa

131. E. Ojomo. *International Law and Regional Electricity Infrastructure: The West African Power Pool (WAPP)*. **American Journal of International Law**, vol. 117, 2023. Pp. 16-20.

132. V. F. David. *Disclosable Restructuring Paper - Ghana: Energy Development and Access Project – P074191 (English).* Washington, D. C.: World Bank Group. (Project Paper, Report No. RES39243). Vol. 1 2020. http://documents.worldbank.org/curated/en/781911580338209282/Disclosable-Restructuring-Paper-Ghana-Energy-Development-and-Access-Project-P074191

133. World Bank. *Building Integrated Markets within the East African Community EAC Opportunities in Public-Private Partnership Approaches to the Region's Infrastructure Needs.* Washington, D.C.: International Bank for Reconstruction and Development/The World Bank, 2014.

134. J. McCormick. *Comparative Government and Politics: An Introduction.* 12th Edition, Bloomsbury Academic, 2022.

135. F. Söderbaum. *Comparative Regionalisms.* In: International Relations – Oxford Bibliographies. 2021

136. R. Acharyya. *Multilateralism and Regionalism*. In: International Economics: An Introduction to Theory and Policy (2nd edition), Oxford Academic, 2023

137. G. W. Brown., I. McLean, & A. McMillan. *A Concise Oxford Dictionary of Politics and International Relations.* 4th Edition. Oxford University Press, 2018.

138. F. Aggad. *New Regionalism as an Approach to Cooperation in Africa: With Reference to the New Partnership for Africa's Development (NEPAD)*. CODESRIA Books Publication System, CODESRIA, 2023.

139. E. Ostrom. *Institutional Rational Choice - An Assessment of the Institutional Analysis and Development Framework.* In Sabatier, Paul (2nd Edition.), Theories of the Policy Process. Routledge, eBook, 2019.

140. S. Bulmer., O. Parker., I. Bache., S. George, & C. Burns. *Theories of European Integration.* In Politics in the European Union, Oxford University Press, 2020.

141. C. M. Weible (Ed.). *Theories of the Policy Process*. 5th Edition, Routledge, 2023.

142. K. Doll. *Development as Freedom by Amartya Sen: Overview.* Shortform, 2022. https://www.shortform.com/blog/development-as-freedom-amartya-sen/

143. F. Söderbaum, & S. Staple. *Regionalism in Africa*. In Handbook on Global Governance and Regionalism, J. Ruland & A. Carrapatoso (eds). Edgaronline, 2022.

144. C. R. Schenk. *International Economic Relations since 1945.* 2nd Edition. Routledge, 2021.

145. F. Söderbaum. *The Role of the Regional Factor in West Africa.* In Hettne, B., Inotai, A. & Sunkel, O. (eds), The New Regionalism and the Future of Security and Development. The New Regionalism. Palgrave Macmillan London, 2000.

146. M. L. Lode. *Socio-Technical Transformations for Decentralized Energy Systems: A Transition Perspective on Energy Communities.* VUBPRESS (Academic and Scientific Publishers nv), Brussels, 2023.

147. D. Akinyele., J. Belikov, & Y. Levron. *Challenges of Microgrids in Remote Communities: A STEEP Model Application.* **Energies**, 11 (2), 2018. Pp. 1–35. https://doi.org/10.3390/en11020432

148. F. R. M. Arroyo, & L. J. Miguel. *The Role of Renewable Energies for the Sustainable Energy Governance and Environmental Policies for the Mitigation of Climate Change in Ecuador.* **Energies**, 13 (15), 2020. https://doi.org/10.3390/en13153883

149. M. Antony., M. P. Bertone, & O. Barthes. *Exploring Implementation Practices in Results-Based Financing: The Case of the Verification in Benin.* **BMC Health Services Research**, 17 (1), 2017. https://doi.org/10.1186/s12913-017-2148-9

150. A. S. Oyewo., S. Sterl., S. Khalili, & C. Breyer. *Highly Renewable Energy Systems in Africa: Rationale, and Recommendations.* **Joule**, vol. 7, issue 7, 2023. Pp. 1437–1470.

151. J. Butchers., S. Williamson, & J. Booker. *Micro Hydropower in Nepal: Analysing the Project Process to Understand Drivers that Strengthen and Weaken Sustainability.* **Sustainability**, 13 (3), 2021. 1582

152. Y. Mulugetta., E. B. Hagan, & D. Kammen. *Energy Access for Sustainable Development.* **Environmental Research Letters**, Vol. 14, No. 2, 2019. 020201.

153. J. Black. *Critical Reflections on Regulation.* **Australian Journal of Legal Philosophy**, vol. 27, 2002. Pp. 2-36

154. M. P. Blimpo, & M. Cosgrove-Davies. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact.* Africa Development Forum;. Washington, D. C.: World Bank Group. © World Bank, 2019. https://documents.worldbank.org/curated/en/837061552325989473/Electicity-Access-in-Sub-Saharan-Africa-Uptake-Reliability-and-Complementary-factors-for-Economic-Impact

155. F. Varone., K. Ingold, & M. Fischer. *Policy Networks and the Roles of Public Administrations: Making the State Work Successfully.* In: A. Ladner et al. (eds), Swiss Public Administration, Governance and Public Management. 2019. Pp. 339–353.

156. N. Mohlakoana., T. Bamighausen., F. Tediosi., D. Evans., D. McIntyre., H. T. A. Bressers, & M. Tanner. *Testing the Contextual Interaction Theory in a UHC Pilot District in South Africa.* **BMC Health Services Research**, 22, 343, 2022.

157. U. Stein., B. Bueb., C. Knieper., J. Troltzsch., R. Vidaurre, & F. Favero. *The Diagnostic Water Governance Tool – Supporting Cross-Sectoral Cooperation in Water Resources Management*. **Environmental Science Policy**, vol. 140, 2023. Pp. 111-121

158. H. Bressers., N. Bressers, & C. Larrue. *Governance for Drought Resilience: Land and Water Drought Management in Europe*. Spinger, 2016. Pp. 1-256. https://doi.org/10.1007/978-3-319-29671-5

159. C. Hervas-Gamez, & F. Delgado-Ramos. *Drought Management Planning Policy: From Europe to Spain*. **Sustainability**, 11 (7), 2019. 10.3390/su11071862

160. M. C. Brisbois. *Decentralised Energy, Decentralised Accountability? Lessons on How to Govern Decentralised Electricity Transitions from Multi-Level Natural Resource Governance.* **Global Transitions**, vol. 2, 2020. Pp. 16–25. https://doi.org/10.1016/j.glt.2020.01.001

161. A. Chaurey., M. Ranganathan, & P. Mohanty. *Electricity Access for Geographically Disadvantaged Rural Communities-Technology and Policy Insights.* **Energy Policy**, 32 (15), 2004. Pp. 1693–1705. https://doi.org/10.1016/S0301-4215(03)00160-5

162. Women Engage for Common Future (WECF). *Women's Empowerment in the Energy Sector – Manual with Concepts, Ideas, Projects and Initiatives for Decentralised, Renewable and Gender-Just Solutions.* 2022. https://www.wecf.org/womens-empowerment-in-the-energy-sector-manual/

163. E. I. Come Zebra., H. J. Van der Windt., G. Nhumaio, & A.P.C., Faaij. *A Review of Hybrid Renewable Energy Systems in Mini-Grids for Off-Grid Electrification in Developing Countries.* **Renewable and Sustainable Energy Reviews**, 144, 2021. 111036.

164. P. M. Dauenhauer., D. Frame., A. Eales., S. Strachan., S. Galloway, & H. Buckland. *Sustainability Evaluation of Community-Based, Solar Photovoltaic Projects in Malawi*. **Energy, Sustainability and Society**, 10 (12), 2020. https://doi.org/10.1186/s13705-020-0241-0

165. J. Winklmaier., S. A. Bazan Santos, & T. Trenkle. *Economic Development of Rural Communities in Sub-Saharan Africa through Decentralized Energy-Water-Food Systems.* In Regional Development in Africa, IntechOpen, 2020.

Chapter Three

Methodology

This chapter discussed the systematic method that should be used to solve the challenge. In addition, the tools and strategies utilized to try to find a solution to the research topic are also highlighted. This study aimed to find out how economic integration can serve as a strategy for affordable and clean energy in the Economic Community of West African States (ECOWAS).

A theoretical and methodical examination of the various research methodologies is known as methodology. In the realm of study, this is a concept that the researcher employs. As a result, the whole scope of the investigation is covered. Questionnaire was utilized as the survey method due to the huge population. The questionnaire handed out to a diverse group of local company

owners and entrepreneurs. As a result, the method of data collection used distribute research devices via direct observation.

3.1 Research Design

This study was carried out using descriptive survey research design method because of its capacity and usefulness in collecting large and standardized data. The survey research method worked by selecting samples chosen from the population of the study in order to reveal the relative distribution and relationship between its variables. Survey research design was widely used in social sciences to address social, financial, psychological and environmental issues. The survey research investigated globally the existing characteristics of the population in order to describe them. Since some country representatives in the ECOWAS states totaling 30 respondents were selected and used to make generalization over the population. The standardized data provided the information used in answering the research questions. It is necessary to collect data from sufficient participants to mitigate the likelihood of bias based on a few individual perceptions. The primary source of data was through the use of questionnaire as it was generally believed that the questionnaire is one of the best methods of collecting data in this type of research. A four-point set of likert-type structured questionnaire was constructed and administered on the respondents to elicit information.

3.2 Population of the Study

The target populations were diplomats, policy experts, clean energy companies, and senior bureaucrats at ECOWAS secretariat. With regard to the targeted population, five (5) member states of ECOWAS which are; Nigeria, Ghana, Liberia, Togo and Benin were selected for this study with different classes of country representatives used as the study population. The

population for this study contained five hundred diplomats, policy experts, clean energy companies and senior bureaucrats at ECOWAS secretariat of the five (5) member states selected for this study.

3.3 Sample and Sampling Technique

A simple random sampling technique was employed because it enabled each member of the population to have an equal chance of being selected[1]. Five hundred respondents were randomly selected for this study, one hundred (100) people each from the five (5) ECOWAS states selected for this study. The study sample respondents were diplomats, policy experts, clean energy companies and senior bureaucrats at ECOWAS secretariat of the five (5) member states selected for this study. The study instrument used was to survey the regional body's workforce. The total sample size for this research is 449 people. The Taro Yamane statistical formula was used to determine it[1]. As seen below, this formula links the population size to the degree of significance:

$$n = \frac{N}{1+ N(e)^2}$$

Where:

n = Sample Size Required

N = Overall Population

e = Tolerated/assumed error limit 0.05 on the basis of 95% confidence level

Therefore,

$$n = \frac{500}{1 + 500(0.05)^2}$$

$$= \frac{500}{1 + 500(0.0025)}$$

$$= \frac{500}{1 + 6.25}$$

$$= \frac{500}{7.25}$$

$$= 345$$

= 345 + 30% of calculated sample size allowed for non-response and wrongly filled questionnaire.

= 449

3.4 Description of the Research Instrument

The researcher created a structured questionnaire and utilized it to collect data from a sample of 449 people, all of whom were diplomats, policy experts, clean energy companies and senior bureaucrats at ECOWAS secretariat of the five (5) member states selected for this study. In each country, a research assistant was trained in administering the questionnaire to help with the study. On the other hand, the researcher oversaw the distribution of questionnaires and provided explanations to participants as necessary to extract proper and accurate data from participants within a two-month time frame.

3.5 Validity of the Research Instrument

A research instrument is said to have validity if when administered under similar conditions, it consistently measures the concept it purports to measure. Content validity defines how representative and comprehensive the items were in presenting the hypothesis. It is assessed by examining the process that was used in generating scale items. Content validity is the extent to which an instrument actually measured or is related to the traits for which it is designed to measure. Therefore, to ascertain the validity of the research instrument, content validity was used to measure the appropriateness of the wording and objectives of the study while the face

validity ensured that the instrument measured what it was supposed to measure, and that it appropriately covered the content area of the study. It shows how adequately the instrument covered the knowledge and skills that a respondent is expected to know. The items in the research instrument were adapted from current but relevant studies. To confirm the content and face validity, the instrument was given to the researcher's supervisor. This was used to ensure the validity and reliability of the data collected. There is no known numerical procedure or quantifiable coefficient for describing content validity. Therefore, content validity is ascertained or judged by comments, corrections and judgments of a panel of experts in the field or area being addressed by the instrument. The panel of experts would include all those whose comments and views are sacrosanct to producing an acceptable valid instrument. All comments and suggestions given were incorporated and used in modifying the instrument. The experts also confirmed that the format used in designing the instrument was appropriate for obtaining the information required form the respondants[2].

3.6 Reliability of the Research Instrument

Reliability is a way of assessing the internal consistency of the measurement instrument. It measured the degree of homogeneity of the measurement items in a given construct. Reliability is the assessment of whether the study instrument would give similar result s when applied in different situations or under similar circumstances but a different time such that the results remain consistent over repeated testing[2]. Reliability of an instrument is its measure of consistency, stability, dependability, precision and accuracy. The reliability of the instrument was ascertained using the split-half method. This implies that the entire items of the test are divided into two halves with the sample size remaining the same. The scores on these half-tests

are then correlated to obtain the split-half reliability coefficient. The questionnaire was administered on 10 staff of ECOWAS in Nigeria. The scores obtained an even and odd items and were subjected to statistical analysis using the Pearson Product Moment Correlation at 0.05 level of significance. A split half reliability coefficient of 0.72 was obtained which conformed with nunally's suggestion of 0.50 or above criterion. Therefore, the instrument was adjudged to be reliable.

3.7 Administration and Method of Data Collection

It's a good idea to do pilot studies before moving on with a larger, more comprehensive research, such as a randomized controlled trial (RCT). Using them, for example, may help forecast the right sample size for the entire project and/or enhance the research design in numerous ways. Therefore, a pilot study was performed to test the hypothesis to determine whether the full-scale research can be carried out as planned. For pilot testing, 10% of the questionnaires, or 50 copies, were sent to participants outside the research region.

3.8 Methods of Data Analysis

The statistical program for social sciences (SPSS) was utilized for data analysis. Statistical Package for Social Sciences (SPSS) were used to acquire, sort, and analyse the data. The following were some of the statistical tools used to examine the data: an explanation of the data using frequency tables and percentages. In addition, basic linear and multiple regression analyses were performed to assess the strength of the influence of independent factors on the study's hypothesized outcome variables. Also, a statistical tool known as R-square was utilized to determine how much of a difference there is between groups when it comes to a dependent

variable. The data was validated through the use of regression analysis and descriptive statistics. Data interpretation also made use of distribution tables, frequency, and percentages.

Endnotes

1. J.W Creswell, Research Design: Qualitative, Quantitative and Mixed Method, SAGE Press, Los Angeles, London. 2012

2. J. Rose, & C.W. Johnson, *Contextualizing Reliability and Validity in Qualitative Research: Toward more Rigorous and Trustworthy Qualitative Social Science in Leisure Research*. **Journal of Leisure Research,** 51(4), 2020. pp.432-451.

3. Yamane, Taro. *Statistics, An Introductory Analysis*, 2nd Ed., New York: Harper and Row (1967).

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Chapter Four

Results and Discussion of Findings

This part focuses on the study's findings analysis and reporting. The demographics of the respondents are discussed, as well as data presentation in the form of distribution tables,

percentages, and frequency to meet the study's goals. During the survey, four hundred and six copies of the questionnaires were administered to the study respondents.

4.1. Demographic Data

Table 4.1 Respondents by Age

Age in Years	Frequency	Percent
Less than 30 years	43	10.6
30 - 40 years	170	41.9
41 – 50 years	166	40.9
51 years and above	27	6.7
Total	**406**	**100**

Source: Researcher's Field Survey, 2022

Table 4.1 shows that 43 (10.6%) of the respondents are less than 30 years of age, 170 (41.9%) are within 30-40 years of age category, while 166 (40.9%) are within 41-50 years category. Also, 27 (6.7%) of the respondents are 51 years and above. Findings revealed that majority of the respondents are young and middle-aged men and women.

Table 4.2 Respondents by Gender

Gender	Frequency	Percent
Male	304	74.9
Female	102	25.1
Total	**406**	**100.0**

Source: Researcher's Field Survey, 2022

Table 4.2 above shows that 304 (74.9%) of the respondents are male, while 102 (25.1%) of the respondents are female. From the above table, it is evident that the male counterpart participated more in this study than the female counterpart.

Table 4.3 Respondents by Marital Status

Marital Status	Frequency	Percent
Single	27	6.7
Married	316	77.8
Divorced	63	15.5
Total	**406**	**100**

Source: Researcher's Field Survey, 2022

Table 4.3 above shows the marital status of the respondents, from the table; 27 (6.7%) of the respondents are single, 316 (77.8%) are married, while 63 (15.5%) of the respondents are divorced. It is then concluded that in this study, majority of the respondents are married (77.8%).

Table 4.4 Respondents by Educational Qualifications

Qualification	Frequency	Percent
OND/NCE	19	4.7
HND/BSC	25	6.2
MSC	196	48.3
PhD	166	40.9

Total	**406**	**100**

Source: Researcher's Field, 2022

Table 4.4 above shows that 19 (4.7%) of the respondents are OND/NCE holder, 25 (6.2%) are HND/BSC degree holder, 196 (48.3%) are MSC degree holder, while 166 (40.9%) of the respondents are PhD degree holder. It is evident from the table that majority of the respondents who participated in this study are MSC degree holder (48.3%).

Table 4.5 Respondents by Years of Service on the Job

Years	Frequency	Percent
Less than 5 years	57	14
5 – 10 years	176	43.4
11 years and above	173	42.6
Total	**406**	**100.0**

Source: Researcher's Field Survey, 2022

Table 4.5 above shows that 57 (14%) of the respondents have less than 5 years working experience in their service on the job, 176 (43.4%) of the respondents have 5−10 years working experience, while 173 (42.6%) of the respondents have 11 years and above working experience in their job.

Table 4.6 Respondents by Position/Status

Position/Status	Frequency	Percent
Senior Level Management	129	31.8

Middle Level Management	211	52
Lower Level Management	66	16.3
Total	**406**	**100.0**

Source: Researcher's Field Survey, 2022

Table 4.6 shows the respondents Position/Status in their working place; 129 (31.8%) of the respondents are in the senior level management, 211 (52%) are in the middle level management, while 66 (16.3%) are in the lower level management. From the table above, it is evident that majority of the respondents are in the middle level management in their place of work (52%).

Table 4.7 Respondents by Religious Affiliation

Religious Affiliation	Frequency	Percent
Muslim	72	17.7
Christianity	280	69
Others	54	13.3
Total	**406**	**100**

Source: Researcher's Field Survey, 2022

Table 4.7 above shows religious affiliation of the respondents, from the table, 72 (17.7%) of the respondents are Muslim, 280 (69%) of the respondents are Christians, while 54 (13.3%) of the respondents are in others religious affiliation. It is evident from the table that majority of the respondents in this study are Christians.

4.2 Presentation of Research Questions

Research Question One: Would the present environmental state make room for affordable and clean energy in the Economic Community of West African States (ECOWAS)?

Table 4.8: Present environmental state for affordable and clean energy in the Economic Community of West African States (ECOWAS)

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Deviation
1	Climate change often-times helps with provision of affordable and clean energy.	312 (76.8)	83 (20.4)	11 (2.7)	-	3.74	.497
2	Water pollution is a major problem for providers of clean and affordable energy.	56 (13.8)	339 (83.5)	11 (2.7)	-	3.11	.391
3	Thermal pollution also affects the provision of clean and affordable energy.	57 (14)	205 (50.5)	140 (34.5)	4 (1)	2.78	.690
4	Solid waste disposal also disturbs the plan and process of providing clean and affordable energy.	173 (42.6)	198 (48.8)	35 (8.6)	-	3.34	.631
5	The probability of spilling oil either on the earth or in a body of water also affects the provision of clean and affordable energy.	195 (48)	190 (46.8)	21 (5.2)	-	3.43	.591
			Grand mean: 3.28				

Source: Researcher's Field Report, 2022

According to data in Table 4.8. 76.8 percent of respondents strongly agree that climate change often-times helps with provision of affordable and clean energy, 20.4 percent agree, 2.7 percent disagree, and none of the respondents strongly disagree. On average, the respondents stated that climate change often-times helps with provision of affordable and

clean energy with a mean of 3.74. Results also revealed that 13.8 percent of respondents strongly believe that water pollution is a major problem for providers of clean and affordable energy, 83.5 percent agree, 2.7 percent disagree. On average, the respondents responded that water pollution is a major problem in provision of clean and affordable energy with a mean of 3.11. Results also revealed that 57 percent of the respondents strongly believe that thermal pollution also affects the provision of clean and affordable energy, 50.5 percent agree, 34.5 percent disagree, and 1 percent disagree.

On average, the respondents stated that thermal pollution also affects the provision of clean and affordable energy, and has a mean value of 2.78. Results also revealed that 42.6 percent of the respondents strongly agree that solid waste disposal also disturbs the plan and process of providing clean and affordable energy, 48.8 percent agree, and 8.6 percent disagree. On average, the respondents reported that solid waste disposal also disturbs the plan and process of providing clean and affordable energy. Results also showed that 48 percent of the respondents strongly believe that the probability of spilling oil either on the earth or in a body of water also affects the provision of clean and affordable energy, 46.8 percent agree, while 5.2 percent disagree. On average, the respondents stated that the probability of spilling oil either on the earth or in a body of water also affects the provision of clean and affordable energy has a mean value of 3.43.

Research Question Two: What are the existing political, socio-economic, ethical, cultural and legal frameworks allowing for the implementation of economic integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS)?

Table 4.9 Existing political, socio-economic, ethical, cultural and legal frameworks for the implementation of economic integration as a Strategy for Affordable and Clean energy in the Economic Community of West African States (ECOWAS)

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Deviation
1	Removing the Restriction in trade across the whole region will aid integration which will lead ultimately to provision of energy.	207 (51)	146 (36)	43 (10.6)	10 (2.5)	3.35	.768
2	Allowing the economy to grow at a higher rate will also help provide clean and affordable energy.	166 (40.9)	187 (46.1)	43 (10.6)	10 (2.5)	3.25	.742
3	Government policies which create employment opportunities also afford ECOWAS countries more hands to provide energy	203 (50)	142 (35)	51 (12.6)	10 (2.5)	3.33	7.787
4	Economic integration policies reduces the costs of trade which in turn allows labour to move freely within the region	164 (40.4)	142 (35)	90 (22.2)	10 (2.5)	3.13	.842
5	Socio-cultural frameworks help processes mediate the development outcomes of energy access projects.	293 (72.2)	13 (3.2)	90 (22.2)	10 (2.5)	3.45	.917

Grand Mean: 3.30

Source: Researcher's Field Report, 2022

According to data in Table 4.9. 51 percent of respondents strongly agree that removing the restriction in trade across the whole region will aid integration which will lead ultimately to provision of energy, 36 percent agree, 10.6 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that removing the restriction in trade across the whole region will aid integration which will lead ultimately to provision of energy with a mean of 3.35. Results also revealed that 40.9 percent of respondents strongly believe that allowing the economy to grow at a higher rate will also help provide clean and affordable energy, 46.1 percent agree, 10.6 percent disagree, while 2.5 percent strongly disagree. On average, the respondents responded that allowing the economy to grow at a higher rate will also help provide clean and affordable energy with a mean of 3.25.

Results also revealed that 50 percent of the respondents strongly believe that Government policies which create employment opportunities also afford ECOWAS countries more hands to provide energy, 35 percent agree, 12.6 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that Government policies which create employment opportunities also afford ECOWAS countries more hands to provide energy, and has a mean value of 3.33. Results also revealed that 40.4 percent of the respondents strongly agree that Economic integration policies reduces the costs of trade which in turn allows labour to move freely within the region, 35 percent agree, and 22.2 percent disagree, while 2.5 percent strongly disagree. On average, the respondents reported that Economic integration policies reduces the costs of trade in turn allows labour to move freely within the region, and has a mean value of 3.13. Results also showed that 72.2 percent of the respondents strongly believe that socio-cultural frameworks help

processes mediate the development outcomes of energy access projects, 3.2 percent agree, 22.2 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that socio-cultural frameworks help processes mediate the development outcomes of energy access projects, with a mean value of 3.45.

Research Question Three: What are the various action plans for the sustainable development of energy in the ECOWAS region and their levels of implementation?

Table 4.10 Various action plans for the suitable development of energy in the ECOWAS region and their levels of implementation.

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Deviation
1	ECREEE is currently assisting the ECOWAS member states to develop their respective National Action Plans and it is aiding the goals of proving energy across the region.	267 (65.8)	33 (8.1)	82 (20.2)	24 (5.9)	3.34	.992
2	ECREEE has engaged national consultants in each ECOWAS country as well as a pool of international experts to support the development of the three action plans which will comprise capacity development, awareness campaigns, advocacy, and lobbying of key national actors as well as the development of an investment prospectus for the action plans developed.	37 (9.1)	277 (68.2)	82 (20.2)	10 (2.5)	2.84	.606
3	United Nations Sustainable Energy for All Initiative (SEEALL) access to mechanical	138 (34)	164 (40.4)	80 (19.7)	24 (5.9)	3.02	.880

	power for heating and productive uses for all communities, as well as for pumping and milling.						
4	ECREE Universal access to electricity services for the Urban and Peri-urban poor is working perfectly.	46 (11.3)	55 (13.5)	168 (41.4)	137 (33.7)	2.02	.963
5	ECOWAS has created access to modern energy services for all schools, clinics, hospitals and community centres.	46 (11.3)	31 (7.6)	63 (15.5)	266 (65.5)	1.65	1.031
	Grand Mean: 2.57						

Source: Researcher's Field Report, 2022

According to data in Table 4.10. 65.8 percent of respondents strongly agree that ECREEE is currently assisting the ECOWAS Member States to develop their respective National Action Plans and it is aiding the goals of providing energy across the region, 8.1 percent agree, 20.2 percent disagree, and 5.9 percent strongly disagree. On average, the respondents stated that ECREEE is currently assisting the ECOWAS Member States to develop their respective National Action Plans and it is aiding the goals of providing energy across the region with a mean of 3.34. Results also revealed that 9.1 percent of respondents strongly believe that ECREEE has engaged National Consultants in each ECOWAS country as well as a pool of international experts to support the development of the three Action Plans which will comprise capacity development, awareness campaigns, advocacy, and lobbying of key National Actors as well as the development of an investment prospectus for the action plans developed, 68.2 percent agree, 20.2 percent disagree, while 2.5 percent strongly disagree. On average, the respondents believed that ECREEE has engaged National Consultants in each ECOWAS country as well as a pool of

international experts to support the development of the three Action Plans which will comprise capacity development, awareness campaigns, advocacy, and lobbying of key National Actors as well as the development of an investment prospectus for the action plans developed with a mean of 2.84. Results also revealed that 34 percent of the respondents strongly agree that United Nations Sustainable Energy for All Initiative (SEEALL) access to Mechanical Power for heating and productive uses for all communities, as well as for pumping and milling, 40.4 percent agree, 19.7 percent disagree, and 5.9 percent strongly disagree. On average, the respondents stated that United Nations Sustainable Energy for All Initiative (SEEALL) access to mechanical power for heating and productive uses for all communities, as well as for pumping and milling, and has a mean value of 3.02.

Results also revealed that 11.3 percent of the respondents strongly agree that ECREE Universal access to electricity services for the urban and peri-urban poor is working perfectly, 13.5 percent agree, and 41.4 percent disagree, while 33.7 percent strongly disagree. On average, the respondents reported that ECREE Universal access to electricity services for the urban and peri-urban poor is working perfectly, and has a mean value of 2.02. Results also showed that 11.3 percent of the respondents strongly believe that ECOWAS has created access to modern energy services for all schools, clinics, hospitals and community centres, 7.6 percent agree, 15.5 percent disagree, and 65.5 percent strongly disagree. On average, the respondents stated that ECOWAS has created access to modern energy services for all schools, clinics, hospitals and community centres, with a mean value of 1.65.

Research Question Four: Could ECOWAS' progress in environmental sustainability allow for the attainment of the SDGs target of affordable and clean energy?

Table 4.11 Environmental sustainability for the attainment of the SDGs target of affordable and clean energy.

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Deviation
1	Environmental Sustainability in ECOWAS states becomes essential in view of the polluting nature of some energy sources which then makes it necessary to ensure that energy production, transmission and distribution follows a low-carbon path.	64 (15.8)	205 (50.5)	127 (31.3)	10 (2.5)	2.80	.727
2	Manufacturing export is relatively lower in the sub-region.	88 (21.7)	142 (35)	166 (40.9)	10 (2.5)	2.76	.817
3	There is still substantial opportunity for countries in the ECOWAS sub-region to experience increasing benefit from economic integration, in terms of manufacturing export.	88 (21.7)	269 (66.3)	39 (9.6)	10 (2.5)	3.07	.638
4	The importance of pursuing the use of renewable energy for energy generation is such that there could be sustainable development that reduces the likelihood of environmental pollution, which is an emerging issue in	181 (44.6)	170 (41.9)	45 (11.1)	10 (2.5)	3.29	.758

	the sub-region.						
5	The use of renewable energy could be an important policy option for ECOWA countries to boost energy supply for manufacturing and industrial sector.	186 (45.8)	140 (34.5)	47 (11.6)	33 (8.1)	3.18	.932
				Grand Mean: 3.02			

Source: Researcher's Field Report, 2022

According to data in Table 4.11. 15.8 percent of respondents strongly agree that Environmental Sustainability in ECOWAS states becomes essential in view of the polluting nature of some energy sources which then makes it necessary to ensure that energy production, transmission and distribution follows a low-carbon path, 50.5 percent agree, 31.3 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that Environmental sustainability in ECOWAS States becomes essential in view of the polluting nature of some energy sources which then makes it necessary to ensure that energy production, transmission and distribution follows a low-carbon path, with a mean value of 2.80. Results also revealed that 21.7 percent of respondents strongly believe that Manufacturing export is relatively lower in the sub-region, 35 percent agree, 40.9 percent disagree, while 2.5 percent strongly disagree. On average, the respondents believed that manufacturing export is relatively lower in the sub-region with a mean value of 2.76. Results also revealed that 21.7 percent of the respondents strongly agree that there is still substantial opportunity for countries in the ECOWAS sub-region to experience increasing benefit from economic integration, in terms of manufacturing export, 66.3 percent agree, 9.6 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that there

is still substantial opportunity for countries in the ECOWAS sub-region to experience increasing benefit from economic integration, in terms of manufacturing export, and has a mean value of 3.07. Results also revealed that 44.6 percent of the respondents strongly agree that the importance of pursuing the use of renewable energy for energy generation is such that there could be sustainable development that reduces the likelihood of environmental pollution, which is an emerging issue in the sub-region, 41.9 percent agree, 11.1 percent disagree, while 2.5 percent strongly disagree. On average, the respondents believe that pursuing the use of renewable energy for energy generation is important, and has a mean value of 3.29. Results also showed that 45.8 percent of the respondents strongly believe that the use of renewable energy could be an important policy option for ECOWAS countries to boost energy supply for manufacturing and industrial sector, 34.5 percent agree, 11.6 percent disagree, and 8.1 percent strongly disagree. On average, the respondents stated that the use of renewable energy could be an important policy option for ECOWAS countries to boost energy supply for manufacturing and industrial sector, with a mean value of 3.18.

Research Question Five: What are the current and future priorities for clean and affordable energy in Economic Community of West African States (ECOWAS)?

Here, findings showed that ECOWAS countries are increasingly adopting solar and wind energy solutions, driven by the region's abundant natural resources. Future priorities include expanding renewable energy infrastructure to meet growing demand and reduce reliance on fossil fuels. There are significant disparities in energy access between rural and urban areas in ECOWAS. To address this, future initiatives aim for universal energy access, particularly targeting underserved rural communities. Currently, the implementation of energy efficiency measures in ECOWAS is

limited. Future priorities involve strengthening policies and programs to promote energy efficiency across various sectors. Policy and Regulatory Framework: ECOWAS has been developing regional energy policies, but there is a need for harmonization and enforcement across member states to ensure effective implementation and compliance.

Insufficient funding and investment pose challenges to the clean energy sector in ECOWAS. Future priorities focus on increasing investment in clean energy projects through public-private partnerships and international support. There is emerging interest in modern clean energy technologies within ECOWAS. Future directions involve adopting advanced technologies such as smart grids and energy storage solutions to enhance energy reliability and efficiency. Limited technical expertise in renewable energy is a challenge for ECOWAS. Future priorities include enhancing training and capacity-building programs to develop a skilled workforce capable of supporting the clean energy transition.

Existing cooperative frameworks in ECOWAS support energy initiatives, but there is room for improvement. Strengthening regional collaboration and partnerships will be crucial for achieving energy goals. ECOWAS countries recognize the impacts of climate change on their energy systems. Future priorities include developing comprehensive climate action plans that integrate clean energy strategies to mitigate these impacts. Dependence on traditional energy sources like oil and gas poses risks to energy security in ECOWAS. Diversifying energy sources by increasing the share of renewables will be a key priority for ensuring long-term energy security.

4.3 Discussion of Findings

Based on the results of demographic factors, gender indicated that 304 respondents representing 74.9% were male while 102 respondents representing 25.1% were female, indicating that most of the respondents were male. Demographic and personal profile of respondents by age revealed that 43 respondents representing 10.6% were between the ages of less than 30 years, 170 respondents representing 41.9% were between 30-40 years, 166 respondents representing 40.9% were between 41-50 years, and 27 respondents representing 6.7% were between 51 years and above, indicating that most of the respondents were between 30-40 years. Meanwhile, 27 respondents representing 6.7% are single, 316 respondents representing 77.8% are married, 63 respondents representing 15.5% are divorced. Also, 19 respondents representing 4.7% had OND/NCE, 25 respondents representing 6.2% had HND/BSc, 196 respondents representing 48.3% had Masters, and 166 respondents representing 40.9% had PhD. Meanwhile, 57 respondents representing 14.0% had less than 5 years' service on the job, 176 respondents representing 43.3% had 5-10 years' service on the job, 173 respondents representing 42.6% had 11years and above years of service on the job. Also, 129 respondents representing 31.8% are in the senior level management position in the organisation, 211 respondents representing 52% are in the middle level management in the organisation, and, 66 respondents representing 16.3% are in the lower level management position in the organisation. While, 72 respondents representing 17.7% are Muslim by religion, 280 respondents representing 69.0% are Christians by religion, and, 54 respondents representing 13.3% are in the other form of religious affiliation.

Considering whether the present environmental stake would make room for affordable and clean energy in the Economic Community of West African States (ECOWAS), 76.8 percent of respondents strongly agree that climate change often-times helps with provision of affordable and clean energy, 20.4 percent agree, 2.7 percent disagree, and none of the respondents strongly

disagree. On average, the respondents stated that climate change often-times helps with provision of affordable and clean energy with a mean of 3.74.

Results also revealed that 13.8 percent of respondents strongly believe that water pollution is a major problem for providers of clean and affordable energy, 83.5 percent agree, 2.7 percent disagree. On average, the respondents responded that water pollution is a major problem in provision of clean and affordable energy with a mean of 3.11. Results also revealed that 57 percent of the respondents strongly believe that thermal pollution also affects the provision of clean and affordable energy, 50.5 percent agree, 34.5 percent disagree, and 1 percent disagree. On average, the respondents stated that thermal pollution also affects the provision of clean and affordable energy, and has a mean value of 2.78.

Results also revealed that 42.6 percent of the respondents strongly agree that solid waste disposal also disturbs the plan and process of providing clean and affordable energy, 48.8 percent agree, and 8.6 percent disagree. On average, the respondents reported that solid waste disposal also disturbs the plan and process of providing clean and affordable energy. Results also showed that 48 percent of the respondents strongly believe that the probability of spilling oil either on the earth or in a body of water also affects the provision of clean and affordable energy, 46.8 percent agree, while 5.2 percent disagree. On average, the respondents stated that the probability of spilling oil either on the earth or in a body of water also affects the provision of clean and affordable energy has a mean value of 3.43, this is supported by the findings of some scholars[1].

The result of the extent to which the existing political, socio-economic, ethical, cultural and legal frameworks allow for the implementation of economic integration as a strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS), 51 percent

of respondents strongly agree that removing the restriction in trade across the whole region will aid integration which will lead ultimately to provision of energy, 36 percent agree, 10.6 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that removing the restriction in trade across the whole region will aid integration which will lead ultimately to provision of energy with a mean of 3.35. Results also revealed that 40.9 percent of respondents strongly believe that allowing the economy to grow at a higher rate will also help provide clean and affordable energy, 46.1 percent agree, 10.6 percent disagree, while 2.5 percent strongly disagree. On average, the respondents responded that allowing the economy to grow at a higher rate will also help provide clean and affordable energy with a mean of 3.25.

Results also revealed that 50 percent of the respondents strongly believe that Government policies which create employment opportunities also afford ECOWAS countries more hands to provide energy, 35 percent agree, 12.6 percent disagree, and 2.5 percent strongly disagree[2]. On average, the respondents stated that Government policies which create employment opportunities also afford ECOWAS countries more hands to provide energy, and has a mean value of 3.33. Results also revealed that 40.4 percent of the respondents strongly agree that Economic integration policies reduces the costs of trade which in turn allows labour to move freely within the region, 35 percent agree, and 22.2 percent disagree, while 2.5 percent strongly disagree. On average, the respondents reported that Economic integration policies reduces the costs of trade in turn allows labour to move freely within the region, and has a mean value of 3.13. Results also showed that 72.2 percent of the respondents strongly believe that socio-cultural frameworks help processes mediate the development outcomes of energy access projects, 3.2 percent agree, 22.2 percent disagree, and 2.5 percent strongly disagree. On average, the respondents stated that socio-cultural frameworks help processes mediate the development outcomes of energy access

projects, with a mean value of 3.45. Findings revealed that existing political, socio-economic, ethical, cultural and legal frameworks allow for the implementation of economic integration as a strategy for affordable and clean energy in the ECOWAS is on a high extent[3].

Findings regarding the different energy sustainability plans in the ECOWAS area and how far along the implementation curve each one is, 65.8% of people who took the survey feel very strongly that ECREEE is helping the member states of the organisation with their national action plans and achieving their energy provisioning objectives. 8.1% are in agreement, 20.2% are opposed, and 5.9% are very much in disagreement. Respondents gave ECREEE an average rating of 3.34 out of 5, saying that it is helping the ECOWAS Member States with the development of their National Action Plans and the region's energy provision goals[4].

Additionally, the results showed that 9.1% of respondents are firm believers that ECREEE has enlisted the help of national consultants in every ECOWAS country and an international expert pool to bolster the creation of three action plans. These plans will include capacity building, awareness campaigns, advocacy, and lobbying of important national actors, along with the creation of an investment prospectus for these plans[5]. The remaining 68.2% are in agreement, 20.2% are in disagreement, and 2.5%. With a mean score of 2.84, respondents believed that ECREEE has enlisted the help of national consultants in each ECOWAS country and a group of international experts to create three plans to build capacity, raise awareness, advocate for important national actors, and create an investment prospectus for these plans[6]. Additionally, the results showed that 34% of people are in full agreement that all communities should have access to mechanical power for heating, productive uses, pumping, and milling through the United Nations Sustainable Energy for All Initiative (SEEALL), while 40.4% are in agreement, 19.7%

are in disagreement, and 5.9% are highly opposed. With a mean score of 3.02 out of 5, respondents generally agreed that the United Nations Sustainable Energy for All Initiative (SEEALL) should ensure that all communities have access to mechanical power for heating, productive applications, pumping, and milling[7]. According to the results, 11.3% of people think that ECREE is doing a great job of providing the urban and peri-urban poor with access to electricity, 13.5% agree, 41.4% disagree, and 33.7% are very opposed. A mean score of 2.02 indicates that, according to respondents, ECREE is effectively providing the urban and peri-urban poor with access to electrical services. The results also showed that 11.3% of people are quite sure that all schools, clinics, hospitals, and community centres now have access to modern energy services thanks to ECOWAS; 7.6% are in agreement; 15.5% are not in agreement; and 65.5% are very much in disagreement. With a mean score of 1.65, respondents generally agreed that ECOWAS has ensured that all community centres, hospitals, clinics, and schools have access to modern energy services[8].

Additionally, results showed that 15.8% of respondents are in complete agreement that ECOWAS states must prioritised environmental sustainability due to the polluting nature of certain energy sources; this is because it is critical to guarantee that the production, transmission, and distribution of energy all adhere to low-carbon pathways. The percentages are as follows: 50.5% agree, 31.3% disagree, and 2.5% very disagree. With a mean score of 2.80, respondents generally agreed that, due to the polluting nature of certain energy sources, it is essential to guarantee that energy production, transmission, and distribution adhere to a low-carbon path; consequently, environmental sustainability in ECOWAS States becomes essential[9]. The results also showed that 21.7% of people in the sub-region are firm believers in the idea that manufacturing exports are lower than average, while 35% agree, 40.9% disagree, and 2.5%

really disagree. With a mean score of 2.76, respondents generally agreed that the sub-region's manufacturing export is lower than average. Also, in terms of manufacturing export, the results showed that 21.7% of respondents are in full agreement that the ECOWAS sub-region has a lot of room to grow economically through integration, while 66.3% are in agreement, 9.6% are opposed, and 2.5% are very opposed. With a mean score of 3.07, respondents generally agreed that ECOWAS member states have a lot of room to grow economically through closer cooperation in the export of manufactured goods[10]. Additionally, results showed that 44.6% of respondents are in full agreement that reducing the possibility of environmental pollution—a growing problem in the sub-region—is a major reason to pursue the use of renewable energy for power generation. The percentages are as follows: 41.9% are in agreement, 11.1% are opposed, and 2.5% are extremely opposed. A mean value of 3.29 indicates that most respondents think it is necessary to work towards using renewable energy sources to generate power.

In addition, the results demonstrated that 45.8% of the participants are firm believers that ECOWAS nations could greatly benefit from increasing their energy supply to the industrial and manufacturing sectors by utilising renewable energy sources; 34.5 percent agree, 11.6 percent disagree, and 8.1 percent extremely disagree[11]. A mean score of 3.18 indicates that most respondents think renewable energy sources could be a good policy choice for ECOWAS nations looking to increase their energy supply to the industrial and manufacturing sectors.

Lastly, the findings highlight the current status and future priorities for clean and affordable energy in ECOWAS, emphasizing the need for continued efforts in policy development, investment, and regional cooperation to achieve sustainable energy goals.

Endnotes

1. T.M., Shaw, F. Soderbaum, J.E. Nyang'oro & A. Grant. *"The Future of New Regionalism in Africa: Regional Governance, Human Security/Development and Beyond*" in J.A. Grant, & F. Söderbaum, (eds), The New Regionalism in Africa. Aldershot: Ashgate, 2017.

2. F., Söderbaum. *"The Role of the Regional Factor in West Africa"* in B. Hettne, A. Inotai & O. Sunkel (eds), The New Regionalism and the Future of Security and Development. Houndmills: Macmillan Press Ltd, 2019.

3. M., Ali Adil, & K., Yekang. *Socio-Technical Evolution of Decentralized Energy Systems: A Critical Review and Implications for Urban Planning and Policy Renew.* Sustain. Energy Rev. 57 1025e1037, 2016.

4. D., Akinyele, J., Belikov, & Y., Levron. *Challenges of Microgrids in Remote Communities: A STEEP Model Application.* Energies, 11(2), 1–35. https://doi.org/10.3390/en11020432, 2018.

5. F.R.M., Arroyo, & L.J., Miguel. *The Role of Renewable Energies for the Sustainable Energy Governance and Environmental Policies for the Mitigation of Climate Change in Ecuador.* Energies, 13(15). https://doi.org/10.3390/en13153883, 2020.

6. M., Antony, M.P., Bertone, & O., Barthes. *Exploring Implementation Practices in Results-Based Financing: The Case of the Verification in Benin.* BMC Health Serv Res 17, 204 https://doi.org/10.1186/s12913-017-2148-9, 2917.

7. P., Bertheau, A.S., Oyewo, C., Cader, C., Breyer, & P., Blechinger. *Visualizing National Electrification Scenarios for Sub-Saharan African Countries Energies*, 10(11), 1–20. https://doi.org/10.3390/en10111899, 2017.

8. R., Bhandari, L.G., Saptalena, & W., Kusch. *Sustainability Assessment of a Micro Hydropower Plant in Nepal.* Energy, Sustainability and Society, 8(3). https://doi.org/10.1186/s13705-018-0147-2, 2018.

9. S.C., Bhattacharyya. *Energy Access Programmes and Sustainable Development: A Critical Review and Analysis.* Energy for Sustainable Development, 16(3), 260–271. https://doi.org/10.1016/j.esd.2012.05.002, 2021

10. H., Bressers. *Contextual Interaction Theory and the issue of Boundary Definition: Governance and the Motivation, Cognitions and Resources of Actors Governance.* **An International Journal of Policy and Administration,** January, 1–31. 2017.

11. H., Bressers, C., Boer de, S., Kuks, G., Özerol, & J., Kruijf. *Water Governance Assessment Tool - Summary*. 1–42. 2019

Chapter Five

Conclusion

This chapter presents the summary of the study, findings, conclusion and recommendations based on the findings. The chapter equally contains area suggested for further studies.

5.1 Summary of Findings

As global awareness of the environmental impact of traditional energy sources grew, so did the recognition of the need for cleaner, more sustainable alternatives. For West Africa, the adoption of clean energy is not just an environmental necessity but also an economic opportunity. The region's abundant renewable energy resources—ranging from solar and wind to hydroelectric power—offer the potential to reduce energy poverty, enhance energy security, and support economic growth.

In response to these challenges and opportunities, ECOWAS developed several policy frameworks and strategic initiatives aimed at promoting clean energy. One of the most significant of these was the adoption of the ECOWAS Renewable Energy Policy (EREP) in 2012. This policy set ambitious targets for the region, including increasing the share of renewable energy in the electricity mix to 48% by 2030. The policy also emphasized the importance of regional cooperation in achieving these goals, recognizing that the integration of energy markets and infrastructure was essential for the successful implementation of clean energy projects.

The West African Power Pool (WAPP), another key initiative, played a crucial role in promoting energy integration across the region. Established with the goal of ensuring stable and reliable electricity supply across West Africa, WAPP has been instrumental in facilitating cross-border energy projects and the sharing of resources among member states. By creating a regional electricity market, WAPP has enabled economies of scale and attracted investment in large-scale clean energy projects that would have been unfeasible for individual countries to undertake alone.

During the 2012-2022 period, several significant clean energy projects were launched under the auspices of ECOWAS. For instance, the development of solar power projects in countries like Burkina Faso and Mali highlighted the region's potential for harnessing its abundant solar resources. Similarly, hydroelectric projects in Guinea and Côte d'Ivoire demonstrated the viability of renewable energy as a key component of the region's energy mix. Public-private partnerships also emerged as a critical mechanism for financing these projects, with international donors and private investors playing a pivotal role in providing the necessary capital and technical expertise.

The interrelationship between economic integration and clean energy in ECOWAS has been both complex and multifaceted. On the one hand, economic integration has provided a platform for the harmonization of energy policies across the region. By creating a unified regulatory framework, ECOWAS has facilitated the deployment of clean energy technologies and enabled the development of regional energy infrastructure. The establishment of the WAPP, for example, has allowed for the pooling of resources and the coordination of cross-border energy projects, which has been essential for the scaling up of clean energy initiatives.

On the other hand, the process of economic integration has also presented significant challenges. Political instability, economic disparities, and infrastructural deficits have often hindered the implementation of clean energy projects. In many ECOWAS member states, the lack of adequate transmission infrastructure has been a major barrier to the expansion of renewable energy. Additionally, the differing levels of economic development among member states have made it difficult to achieve a coordinated approach to energy policy. Countries with more developed energy sectors, such as Nigeria and Ghana, have sometimes pursued national interests at the expense of regional integration efforts.

Despite these challenges, economic integration has also created numerous opportunities for advancing clean energy in West Africa. The creation of a regional energy market has attracted investment in large-scale renewable energy projects, which has, in turn, stimulated economic growth and job creation. Moreover, the integration of energy markets has enabled the sharing of resources among member states, reducing the reliance on fossil fuels and enhancing energy security. For instance, the cross-border transmission lines developed under WAPP have allowed countries with surplus renewable energy capacity to export electricity to neighboring countries, thereby optimizing the use of the region's renewable resources.

On the positive side, there has been significant progress in increasing the share of renewable energy in the region's electricity mix. Several member states have made notable strides in expanding their renewable energy capacity, particularly in the areas of solar and hydroelectric power. For example, the Zagtouli Solar Power Station in Burkina Faso, commissioned in 2017, is one of the largest solar power plants in West Africa and has significantly contributed to the country's energy needs.

However, the overall effectiveness of the clean energy strategy has been limited by several factors. One of the main shortcomings has been the slow pace of policy implementation. While ECOWAS has developed comprehensive policy frameworks, the translation of these policies into tangible projects has often been hindered by bureaucratic delays, lack of funding, and inadequate institutional capacity. Additionally, the region's heavy reliance on fossil fuels, particularly in countries like Nigeria, has slowed the transition to clean energy. Despite the availability of abundant renewable resources, fossil fuels continue to dominate the energy mix in many ECOWAS member states, largely due to their lower upfront costs and existing infrastructure.

Another area of concern has been the uneven distribution of clean energy projects across the region. While some countries have made significant progress in adopting renewable energy, others have lagged behind due to political instability, lack of investment, and infrastructural challenges. This disparity has created a situation where the benefits of clean energy are not evenly distributed, undermining the overall effectiveness of the strategy.

5.2 Conclusion

The preceding discussion highlights the current environmental challenges facing affordable and clean energy in the Economic Community of West African States (ECOWAS), indicating a need for improvement. Addressing climate change, water and thermal pollution, solid waste disposal, and the risk of oil spills is essential to enhance the environmental state of affordable and clean energy in the region. Energy sustainability is a key aspect of sustainable development and vital for infrastructural growth to foster stronger economic integration. It is assessed through three dimensions: energy security, energy equity, and environmental sustainability.

Energy security pertains to ensuring a reliable electricity supply to meet the needs of households, businesses, and industries. Energy equity focuses on ensuring that a significant portion of the population has access to affordable modern energy sources, particularly in both urban and rural areas. Environmental sustainability is crucial due to the polluting nature of certain energy sources, necessitating a shift towards low-carbon energy production, transmission, and distribution.

These three factors are interconnected, and economic integration can serve as a viable policy tool to improve their performance by better integrating the energy resources of member countries. Economic integration can strengthen the energy sector through three main channels: investment in human capital development, establishment of common infrastructure networks and institutions, and harmonization of policy and regulatory frameworks across member countries.

Using the West African Power Pool (WAPP) within ECOWAS as a case study, it is evident that while some progress has been made in these areas for enhanced energy sustainability, there is still room for improvement in meeting the targets outlined in the WAPP master plan. Evaluating the extent of economic integration for energy sustainability is crucial for supporting firm productivity in a green or low-carbon model and increasing intraregional trade flows. Insufficient energy supply continues to hamper manufacturing and industrial output in the region, impacting international trade volumes and influencing trade and energy policies.

Therefore, effective collaboration, mutual trust, investment in human capital and technical expertise, and the establishment of international frameworks to govern technical and legal issues related to energy interconnections are vital components for the success of economic integration in ensuring regional energy sustainability.

5.3 Recommendations

Based on the findings of this study, the following recommendations are made:

1. Most respondents think renewable energy sources could be a good policy choice for ECOWAS nations looking to increase their energy supply to the industrial and manufacturing sectors.

2. To achieve Goal 7 of the United Nations Sustainable Development Goals, the region must develop a feasible energy integration model that enhances energy security to foster economic growth and development. This approach is seen as a promising avenue for accelerating progress within the region and across the continent. Despite efforts and initiatives aimed at improving the integration of energy systems and resources, various barriers, ranging from political to economic, continue to hinder implementation.

3. Utilizing three measures of energy sustainability—energy security, energy equity, and environmental sustainability—the study evaluated the region's performance in ensuring energy sustainability through a comprehensive analytical method. The findings revealed promising prospects and benefits for energy integration in the region.

4. It is also recommended to prioritize the political economy surrounding regional energy integration among member states to ensure positive political will for the timely achievement of set goals. Additionally, investment in human capital to manage numerous projects and resources, and maintain facilities, cannot be overstated.

5.4 Contribution to Knowledge

The study provides an empirical examination of the relationship between economic integration and clean energy strategy in ECOWAS, filling a gap in existing literature. The research concentrates on ECOWAS, offering insights into the regional dynamics and context-specific factors influencing clean energy strategy and economic integration. The study covers a decade (2012-2022), enabling a longitudinal analysis of the evolution of clean energy strategies and economic integration in ECOWAS.

The research integrates concepts and methods from economics, energy studies, and international relations, providing a comprehensive understanding of the complex relationships between economic integration and clean energy strategy. The findings can inform policy decisions and strategies for promoting clean energy and economic integration in ECOWAS, contributing to sustainable development and regional cooperation.

The study contributes to theoretical debates on regional integration, energy transition, and sustainable development, offering new perspectives and frameworks for understanding these complex issues. The study adds to our understanding of the phenomenon by revealing statistical data that is useful for our understanding. Other researchers can make use of this model. This study adds to the body of knowledge by examining what impact the economic integration as a strategy for affordable and clean energy has in the Economic Community of West African States (ECOWAS).

5.5 Suggestion for Further Studies

Future study could look at the effect of Economic Integration and Energy Sustainability in the Economic Community of West African States (ECOWAS). Further research might also establish

a location outside of ECOWAS, for example; "Africa Countries" to gather findings more broadly. As a result, further research should focus on examining the Impact of Economic Integration as a Strategy for Affordable and Clean Energy in Africa Countries.

Bibliography

Book

Acharyya, R. *Multilateralism and Regionalism*. In International Economics: An Introduction to Theory and Policy (2nd edition), Oxford Academic, 2023

Adebayo, A. V., Ainah, P. K. & Apata, O. *The Insight and Foresight of the Nigerian Power Transmission System: An Overview.* IEEE PES/IAS Power Africa, Nairobi, Kenya, 2020. Pp. 1-5.

Aggad, F. *New Regionalism as an Approach to Cooperation in Africa: With Reference to the New Partnership for Africa's Development (NEPAD)*. CODESRIA Books Publication System, CODESRIA, 2023.

Balassa, B. *The Theory of Economic Integration (Routledge Revivals).* Routledge. 2013

Bell, E., Bryman, A. & Kleinknecht, S. *Social Research Methods: Sixth Canadian Edition*. Oxford University Press. 2022

Bourenane, N. *Theoretical and Strategic Approaches.* In: Regional Integration and Cooperation in West Africa, Real Lavergne (ed*)* Integration and Cooperation in West Africa*,* Canada, IDRC. 1997.

Bressers, H., Bressers, N. & Larrue, C. *Governance for Drought Resilience: Land and Water Drought Management in Europe*. Spinger, 2016. Pp. 1-256. https://doi.org/10.1007/978-3-319-29671-5

Brown, G. W., McLean, I. & McMillan, A. *A Concise Oxford Dictionary of Politics and International Relations.* 4th Edition. Oxford University Press, 2018.

Bulmer, S., Parker, O., Bache, I., George, S. & Burns, C. *Theories of European Integration.* In Politics in the European Union, Oxford University Press, 2020.

Chasek, P. & Downie, D. L. *Global Environmental Politics.* Routledge: Taylor & Francis Group, 8th Edition. 2020.

Dikko, H. *The Rationale of Economic Regulations: Theoretical Review, Advances in African Economic, Social and Political Development.* In Ishmael Ackah & Charly Gatete (ed.). Energy Regulation in Africa, Springer, 2024. Pp. 169-183

Garba, F. & Yeboah, T. *Free Movement and Regional Integration in the ECOWAS Sub-Region.* In Teye, J. K. (Eds) Migration in West Africa. IMISCOE Research Series, Springer, Cham. 2022. Pp. 19-34

Hettne, B, Inotai A. & O. Sunkel (eds.) *Comparing Regionalisms; Implications for Global Development.* Houndmills: Palgrave, 2001. 52.50 hbk.

Jepperson, R. L. *Institutional Theory: The Cultural Construction of Organisations, States, and Identities*. Cambridge University Press, 2021. Pp. 15–39.

Lode, L. M. *Socio-Technical Transformations for Decentralized Energy Systems: A Transition Perspective on Energy Communities.* VUBPRESS (Academic and Scientific Publishers), Brussels, 2023.

McCormick, J. *Comparative Government and Politics: An Introduction.* 12th Edition, Bloomsbury Academic, 2022.

Mittelman, James in Grant, J.A. & Söderbaum, F. *The New Regionalism in Africa*. Aldershot: Ashgate, 2019.

Mugwika, G. *The Impact of Regional Integration on SMEs Performance: A Survey of Manufacturing SMEs in the East African Community (EAC).* LAP LAMBERT Academic Publishing. Mauritius, 2020

Mulugetta, Y. & Agemabiese, L. *Sustainable Energy Systems in Africa.* In Transformational Infrastructure for Development of a Wellbeing Economy in Africa. African Sun Media, 2019. Pp. 73-114.

Oloruntoba, S. O. *Pan-Africanism, Regional Integration and Development in Africa.* In Oloruntoba, S. O. (eds) Pan Africanism, Regional Integration and Development in Africa. Palgrave Macmillan, Cham, 2020.

Ostrom, E. *Institutional Rational Choice - An Assessment of the Institutional Analysis and Development Framework.* In Sabatier, Paul (2nd Edition.), Theories of the Policy Process. Routledge, eBook, 2019.

Patnaik, S. & Pandey, S. C. *Case Study Research*. Subudhi, R. N. & Mishra, S. (ed.) Methodological Issues in Management Research: Advances, Challenges, and the Way Ahead, Emerald Publishing Limited, Bingley, 2019. Pp. 163-179

Proskuryakova, L. N. & Loginova, I. *Energy and Environment: Sustainable Development Goals and Global Policy Landscape.* In: Asif, M. (eds) Energy and Environmental Security in Developing Countries. Advanced Sciences and Technologies for Security Applications. Springer, Cham. 2021. Pp. 355-374.

Qubeissi, M. A., El-kharouf, A. & Soyhan, H. S. (eds). *Renewable Energy – Resources, Challenges and Applications.* London, United Kingdom: IntechOpen. 2020

Rizk, N. *From De Facto Commons to Digital Commons? The Case of Egypt's Independent Music Industry.* In J. de Beer, C. Armstrong, C. Oguamanam and T. Schonwetter (editors), Innovation & Intellectual Property. Claremont, South Africa: UCT Press. 2014

Roffe, P. & Seuba, X. *The ACTA and the Plurilateral Enforcement Agenda: Genesis and Aftermath.* Cambridge, UK: Cambridge University Press. 2014

Schenk, C. R. *International Economic Relations since 1945.* 2nd Edition. Routledge, 2021.

Söderbaum, F. *Comparative Regionalisms.* In: International Relations – Oxford Bibliographies. 2021

Söderbaum, F. *The Role of the Regional Factor in West Africa.* In Hettne, B., Inotai, A. & Sunkel,
O. (eds), The New Regionalism and the Future of Security and Development. The New Regionalism. Palgrave Macmillan London, 2000.

Söderbaum, F. & Staple, S. *Regionalism in Africa*. In Handbook on Global Governance and Regionalism, Ruland, J. & Carrapatoso, A. (eds). Edgaronline, 2022.

Teye, J. K. *Migrations in West Africa: An Introduction.* In Book: Migration in West Africa, IMISCOE Regional Reader, IMISCOE Research Series. Springer, 2022.

Varone, F., Ingold, K. & Fischer, M. *Policy Networks and the Roles of Public Administrations: Making the State Work Successfully.* In: A. Ladner et al. (eds), Swiss Public Administration, Governance and Public Management. 2019. Pp. 339–353.

Vig, Norma & Faure, M. *Green Giants? Environmental Policies of the United States and the European Union.* Massachusetts Institute of Technology (MIT), 2019.

Weible, C. M. (Ed.). *Theories of the Policy Process*. 5th Edition, Routledge, 2023.

Winklmaier, J., Bazan Santos, S. A. & Trenkle, T. *Economic Development of Rural Communities in Sub-Saharan Africa through Decentralized Energy-Water-Food Systems.* In Regional Development in Africa, IntechOpen, 2020.

World Bank. *Building Integrated Markets within the East African Community EAC Opportunities in Public-Private Partnership Approaches to the Region's Infrastructure Needs.* Washington, D.C.: International Bank for Reconstruction and Development/The World Bank, 2014.

Conference Proceeding/Seminar/Paper

Akoutou, A. B., R. Sohn, M. Vogl, & D. Yeboah (eds). *Understanding Regional Integration in West Africa: A Multi-Thematic and Comparative Analysis.* WA-ZEI Paper No. 17. Centre for European Integration Studies, 2014.

Attah, N. E. *British Colonial Economic Policies and Oil Palm Plantations in Nigeria.* Economic History Society Conference, Queen's University Belfast, 2019.

Byiers, B. & Dieye, C. T. *Regional Integration in West Africa: Wasteful Overlaps or Necessary Options.* Discussion Paper No. 322, ECDPM, Centre African Pour le Commerce L'integration et le Development CACID, 2022.

Chambers, V., Foresti, M., & Harris, D. *Final Report: Political Economy of Regionalism in West Africa.* Scoping Study and Prioritisation. London: Overseas Development Institute, 2012

Medinilla, A., Byiers, B. & Karaki, K. *African Power Pools: Regional Energy, National Power.* ECDPM. Discussion Paper no. 244, 2019

Ogus, A. *The Importance of Legal Infrastructure for Regulation (and Deregulation) in Developing Countries*, Working Paper Series, No. 65, Centre on Regulation and Competition, University of Manchester, 2004.

Sarker, T., Hossain, S. & Nazmul-Islam, K. M. *Role of Regional Cooperation and Integration in Improving Energy Insecurity in South Asia.* Asian Development Bank Institute, ADBI Working Paper Series, No. 1120, 2020.

Internet

Adeniran, A. & Onyekwena, C. *Accelerating Green Energy Transition in Africa through Regional*

Integration. South African Institute of International Affairs (SAIIA) Policy Briefing, no. 216, 2020. https://saiia.org.za/research/accelerating-green-energy-transition-in-africa-through-regional-integration/

African Development Bank Group. *African Development Bank Group - Power - Deals and Alliances Profile*. Company Report, London: Global Data Ltd, 2016. http://prepod-internal.agm.net/reports/africans-development-bank-group-poer-deals-and-alliances-profile

African Union. *Report on the Status of Regional Integration in Africa.* The Third Technical Committee on Finance, Monetary Affairs, Economic Planning and Integration Experts Meeting, African Union Commission Economic Affairs, Tralac Trade Law Centre. 2019. https://www.tralac.org/documents/resources/african-union/2649-report-on-the-status-of-regional-integration-in-africa-executive-summary-february-2019/file.html

Alberta Energy Regulator. *Stakeholder Engagement Framework*. Alberta Energy Regulator, 2013-2020. Available at: https://uat.aer.ca/protecting-what-matters/giving-albertans-a-voice/aer-in-yoyr-community/stakeholder-engagement-framework

American Chemistry Council. *US Chemical Industry Investment Linked to Shale Gas Tops $200 Billion.* American Chemistry Council, 2018. https://www.americanchemistry.com/chemistry-in-america/news-trends/press-release/2018/us-chemical-industry-investment-linked-to-shale-gas-tops-200-billion

Aplanet. *Sustainability Indicators: Definition, Types of KPIs and their Use in the Sustainability Plan.* 2023. https://aplanet.org/resources/sustainability-indicators/

Best Diplomats. *Role of Non-Governmental Organisations in International Relations.* Diplomatic Trainings and Conferences, 2023. https://www.linkedin.com/pulse/role-non-governmental-organisations-international-relations-mayqc

Blimpo, M. P. & Cosgrove-Davies, M. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact.* Africa Development Forum; Washington, D. C.: World Bank Group. © World Bank, 2019. https://documents.worldbank.org/curated/en/837061552325989473/Electicity-Access-in-Sub-Saharan-Africa-Uptake-Reliability-and-Complementary-factors-for-Economic-Impact

Bray, J. *Navigating Corruption in Africa's Power Sector*. African Business Magazine. 2015. Available at: http://africanbusinessmagazine.com/sectors/energy/navigatingcorruption-in-africas-power-sector

Campbell, J. Y. *Utility Theory and Risk Aversion.* 2011.

https://www.sribd.com/document/306640062/Risk-Aversion-and-Utility-Theory

Clean Energy Canada. *It's Time for a Vision for Electricity in Canada.* 2014. https://cleanenergycanada.org/time-vision-electricity-canada/?print=print

David, V. F. *Disclosable Restructuring Paper - Ghana: Energy Development and Access Project – P074191 (English).* Washington, D. C.: World Bank Group. (Project Paper, Report No. RES39243). Vol. 1, 2020. http://documents.worldbank.org/curated/en/781911580338209282/Disclosable-Restructuring-Paper-Ghana-Energy-Development-and-Access-Project-P074191

Diallo, A. *Lighting Up West Africa*. Economic Community of West African State, West African Power Pool. 2021. https://www.esi-africa.com/wp-content/uploads/Amadou_Diallo.pdf

Doll, K. *Development as Freedom by Amartya Sen: Overview.* Shortform, 2022. https://www.shortform.com/blog/development-as-freedom-amartya-sen/

Eberhard, A., Rosnes, O., Shkaratan, M. & Vennemo, H. *Africa's Power Infrastructure: Investment, Integration, Efficiency (English).* Directions in Development; Infrastructure Washington, D. C.: World Bank Group, 2011. https://documents.worldbank.org/curated/en/545641468004456928/Africas-power-infrastructure-investment-integration-efficiency

ECOWAS. *Ecowas Energy Protocol A/P4/1/03.* Economic Community of West African States. 2003. Retrieved from http://www.erera.arrec.org/en/ecowas-energy-protocol-ap4103/

ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). *Towards a Viable and Robust Energy Market in the ECOWAS Region*. ECOWAS Sustainable Energy Week, Accra, Oct. 17, 2016. https://www.se4all-africa.org/news-resources/events/ecowas-sustainable-energy-week-135/

ECOWAS. Economic Community of West African States. *Treaty of the Economic Community of West African States.* (ECOWAS), 1975. https://www.refworld.org/legal/constinctr/ecowas/1975/en/63881

ECOWAS Regional Electricity Regulatory Authority (ERERA). *RESOLUTION No. 006-ERERA/15 – Adoption of the Tariff Methodology for Regional Transmission Cost and Tariff.* 2015. https://www.erera.errec.org/en/adoption-of-the-tariff-methodology-for-regional-transmission-cost-and-tariff/

ECREEE. *Baseline Report for the ECOWAS Renewable Energy Policy (EREP).* Vienna: United Nations Industrial Development Organization, 2012. https://www.ecowrex.org/document/baseline-report-ecowas-renewable-energy-policy-erep

ECREEE. *The ECREEE Business Plan 2011–2016*. Presented to the Executive Board of ECREEE in April 2012. Praia: ECOWAS Regional Centre for Renewable Energy and Energy Efficiency. https://www.ecowrex.org/document/ecreee-business-plan-2011-2016-0

ElGanainy, A. A., Hakobyan, S., Liu, F., Weisfeld, H., Abbas, A., Allard, C., Balima, H. W., Bteish, C., Giri, R., Kanda, D. S., Meleshchuk, S., Ramirez, G., Zymek, R., Arora, V. B., Lall, S., Kett, B. R. & Pohl, M. M. *Trade Integration in Africa: Unleashing the Continent's Potential in a Changing World.* International Monetary Fund. Departmental Paper No. 2023/003, 2023. https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2023/05/03/Trade-Integration-in-Africa-Unleashing-the-Continent-s-Potential-in-a-Changing-World-529215

Energy Information Administration. *Wind Explained: History of Wind Power.* 2023. http://www.eia.gov/energyexplained/wind/history-of-wind-power.php

Ericson, P. *Comparison of the EU and ASEAN Regional System Politics Essay.* 2015. Retrieved via www.ukessays.com

Eweka, E. E., Lopez-Arroyo, E., Medupin, C. O., Oladipo, A. & Campos, L. C. *Renewable Energy Resources in Nigeria.* Scholarly Community Encyclopedia, 2022. https://encyclopedia.pub/entry/26194

Freedman, A. *First Look: The Business Roundtable's New Agenda.* Energy and Environment, 2022. https://www.axios.com/2022/04/19/business-roundtable-white-house-energy

Gillet, T., Vasse, T & Marly, B. *Africa's Electricity Challenge: Rising Oil, Gas Prices to Weigh on Growth and Fiscal Outlooks.* 2022. https://www.scoperatings.com/ratings-and-research/research/EN/170861

Insights. *Power Reforms in West Africa: Challenges, Prospects and Opportunities.* Africa Connected: Issue 3. 2019. https://www.dlapiperafrica.com/en/africa-wide/insights/africa-connected/issue-03/power-reforms-in-west-africa.html

International Energy Agency (IEA). *Africa Energy Outlook: A Focus on Energy Prospects in Sub-Saharan Africa.* World Energy Outlook Special Report. Paris: International Energy Agency, 2014. https://www.icafrica.org/en/knowledge-hub/article/africa-energy-oulook-a-focus-on-energy-prospects-in-sub-saharan-africa-263/

International Monetary Fund (IMF). *World Economic Outlook Update, July 2023: Near-Term*

Resilience, Persistence Challenges. Washington, DC. 2023. https:// www.imf.org/en/Publications/WEO/Issues?2023/07/10/world-economic-outlook-update-july-2023

International Renewable Energy Agency (IRENA). *West African Power Pool: Planning and Prospects for Renewable Energy*. International Renewable Energy Agency, 2013. https;//www.irena.org/Publication/2013/Jun/West-African-Power-Pool-Planning-and-Prospects-for-Renewable-Energy

Karaganis, J. *Media Piracy in Emerging Economies*. New York: Social Science Research Council.
2011. http://www.ssrc.org/publications/media-piracy-in-emerging-economies/

Kawooya, D. *A New Course for the Pan African Intellectual Property Organization is Urgently Needed.* Letter to the 5th African Union Ministerial Conference on Science & Technology. 18th October, 2012. https://www.change.org/p/a-new-course-for-the-pan-african-intellectual-property-organization-is-urgently- needed

Morse, A. *Can a Feed-in Tariff Help Increase Renewable Energy Capacity?* Rockefeller Institute
of Government, 2021. https://rockinst.org/blog/can-a-feed-in-tarrif-help-increase-renewable-energy-capacity/

MusiAIEk, R. *The Renewable Energy Revolution: Shaping a Sustainable Future.* Management w SMA Solar Technology AG, 2023. https://www.linkedin.com/pulse/renewable-energy-revolution-shaping-sustainable-future-musialek-ojsee

Nwokoye, E., Uzodigwe, A. & Nzeribe, G. *'Economic Structure of West Africa.* In Economics Study Material. August, 2018. Available at https://www.researchgate.net/publication/326841734_Economic_Structure_of_West_Africa

Open Air African Innovation Research. *2022 Annual Report: A Cross-Regional Network of Networks*. August, 2023. https://openair.africa/annual-report-2022/

Piette, J. O. & Di Schio, C. R. *Bridging the Gap Between Transport and Energy to Achieve Sustainable Mobility*. World Bank Blogs, Transport for Development, 2021. https://blogs.worldbank.org/en/transport/bridging-gap-between-transport-and-energy-achieve-sustainable-mobility

Reiss, K. *Developing Renewable Energy Sectors and Technologies in West Africa*. United Nations
Chronicle, LII (3). Sustainable Energy, 2015. Retrieved from https://unchronicle.un.org/article/developing-renewable-energy-sectors-and-technologies-west-africa

REN21. *ECOWAS Renewable Energy and Energy Efficiency Status Report 2014.* Paris: REN21 Secretariat, 2019. https://www.ren21.net/2014-ecowas-renewable-energy-and-energy-efficiency-status-report/

Salaudeen A. *'West African Countries Choose New 'ECO' Single Trade Currency'. CNN International*, 9 July, 2019. Available at https://edition.cnn.com/2019/07/01/africa/single-trade-currency-ecowas/index.html

ScienceDaily. *True Cost of the Planet's Energy and Transport Systems*. University of Sussex, 2021. https://www.sciencedaily.com/releases/2021/03/210301133829.htm

The World Bank. *Africa Regional Integration*. 2024. https://www.worldbank.org/en/programs/africa-regional-integration

The World Bank. *Regional Integration Removes Barriers to Development in Africa.* Result Briefs, IBRD-IDA. 2023. https://www.worldbank.org/en/results/2023/12/08/regional-integration-removes-barriers-to-development-in-africa

Traore, D. *Regional Integration Strategy and Scientific Research: The West Africa Institute's Support Proposal to the Implementation of ECOWAS Vision 2050.* The West Africa Institute, WAI. 2021. https://www.yourdictionary.com/regional-integration

United Nations Industrial Development Organisation - UNIDO. *Independent Terminal Evaluation: Start-up and First Operational Phase of the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) – A Centre of excellence to Promote Inclusive and Sustainable Energy Industries*, Independent Evaluation Unit Office of Evaluation and Internal Oversight, 2023. https://downloadsunido.org/ot/31/33/31336167/Evaluation%20report%20on%20Start-up%20and%20first%20operational%20phase%20of%20the%20Caribbean%20Centre%20for%20Renewable%20Energy%20and%20Energy%20Efficiency%20(CCREEE).pdf

Women Engage for a Common Future (WECF). *Women's Empowerment in the Energy Sector – Manual with Concepts, Ideas, Projects and Initiatives for Decentralised, Renewable and Gender-Just Solutions.* 2022. https://www.wecf.org/womens-empowerment-in-the-energy-sector-manual/

World Bank. *Regional Integration Removes Barriers to Development in Africa*. Result Briefs, 2023. https://www.worldbank.org/en/results/2023/12/08/regional-integration-removes-barriers-to-development-in-africa

Journal/Article

Abdullahi, D., Renukappa. S., Suresh, S. & Oloke, S. *Barriers for Implementing Solar Energy Initiatives in Nigeria: An Empirical Study.* **Emerald Insight - Smart and Sustainable Built Environment**, Vol. 11, Issue 3, 2022. Pp. 647-660.

Abuzeinab, A., Arif, M. & Qadri, M.A., *Barriers to MNEs Green Business Models in the UK Construction Sector: An ISM Analysis.* **Journal of Cleaner Production,** vol. 160, 2017. Pp. 27-37.

Adam, M. A. *United States Power Africa Initiative, the EU and China: Investment or International Politics?* Africa Centre for Energy Policy, **JSTOR**, no. 28, 2019

Adaramola, M. S. & Paul, S. S. *Economic Analysis and Potential Feed-in Tariff of Grid-Connected PV Systems in Nigeria.* **Environmental Progress & Sustainable Energy**, vol. 36, no. 1, 2017. Pp. 305-314.

Adedokun, A. *Can Electricity Consumption be Useful in Predicting Nigerian Economic Growth? Evidence for Error Correction Model*. **OPEC Energy Review**, 39 (2), 2015. Pp. 125-140.

Adeoye, O. & Spataru, C. *Quantifying the Integration of Renewable Energy Sources in West Africa's Interconnected Electricity Network.* **Renewable and Sustainable Energy Reviews**, Elsevier, vol. 120, 2020.

Adesanya, A. A. & Schelly, C. *Solar PV-Diesel Hybrid Systems for the Nigerian Private Sector: An Impact Assessment.* **Energy Policy**, vol. 132, 2019. Pp. 196-207.

Adoghe, A. U., Adeyemi-Kayode, T. M., Oguntosin, V. & Amahia, I. I. *Performance Evaluation of the Prospects and Challenges of Effective Power Generation and Distribution in Nigeria.* **Heliyon**, vol. 9, issue 3, 2023.

Agoundedemba, M., Kim, C. K. & Kim, H. G. *Energy Status in Africa: Challenges, Progress and Sustainable Pathways*. **Energies**, Vol. 16, issue 23, 2023. 7708.

Akinwale, Y. O., Ogundari, I. O., Ilevbare, O. E. & Adepoju, A. O. *A Descriptive Analysis of Public Understanding and Attitudes of Renewable Energy Resources towards Energy Access and Development in Nigeria.* **International Journal of Energy Economics and Policy,** 4 (4), 2014, Pp. 636-646.

Akinyele, D., Belikov, J. & Levron, Y. *Challenges of Microgrids in Remote Communities: A STEEP Model Application.* **Energies**, 11 (2), 2018. Pp. 1–35. https://doi.org/10.3390/en11020432

Akinyele, D. O., Rayudu, R. K. & Nair, N. K. C. *Global Progress in Photovoltaic Technologies and the Scenario of Development of Solar Panel Plant and Module Performance Estimation − Application in Nigeria.* **Renewable & Sustainable Energy Reviews**, vol. 48, 2015. Pp. 112-139.

Akinyemi-Babajide, O., Efobi, U. R., Osabuohien, E. & Alege, P. O. *Regional Integration and Energy Sustainability in Africa: Exploring the Challenges and Prospects for ECOWAS.* **African Development Review**, 31 (4), 2019. 517-528.

Allyon, L. M. S. & Jenkins, K. E. H. *Energy Justice, Just Transitions and Scottish Energy Policy: A Re-grounding of Theory in Policy Practice.* **Energy Research and Social Science**, vol. 96, 2023. 102922.

Ansari, S. & Garud, R. *Inter-Generational Transitions in Socio-Technical Systems: The Case of Mobile Communications.* **Research Policy**, 38 (2), 2009. Pp. 382–392. http://dx.doi.org/10.1016/j.respol.2008.11.009

Antony, M., Bertone, M. P. & Barthes, O. *Exploring Implementation Practices in Results-Based Financing: The Case of the Verification in Benin.* **BMC Health Services Research**, 17 (1), 2017. https://doi.org/10.1186/s12913-017-2148-9

Appiah, P. A., Adongo, R. & Safo, A. R. *Sustainable Energy Systems and Green Hotel Practices in Hotels in Tamale Metropolis, Ghana.* **Journal of Environmental Management and Tourism,** vol. 14, no. 7, 2023. Pp. 2915–2934.

Arroyo, F. R. M., & Miguel, L. J. *The Role of Renewable Energies for the Sustainable Energy Governance and Environmental Policies for the Mitigation of Climate Change in Ecuador.* **Energies**, 13 (15), 2020. https://doi.org/10.3390/en13153883

Beça P & Santos R. *Measuring Sustainable Welfare: A New Approach to the ISEW*. **Ecological Economics**, 69 (4), 2010. 810-819.

Bhuiyan, M. A., Zhang, Q., Khare, V., Mikhaylov, A., Pinter, G. & Huang, X. *Renewable Energy*
Consumption and Economic Growth Nexus – A Systematic Literature Review. **Systematic Review Article Front Environ. Sci.**, 10, 2022.

Bissiri, A. M., Moura, P. S., Figueiredo, N. & Da-Silva, P. P. *Towards a Renewables-Based Future*
for West African States: A Review of Power Systems Planning Approaches. **Renewable and Sustainable Energy Reviews**, vol. 134, 2020. 110019

Black, J. *Critical Reflections on Regulation.* **Australian Journal of Legal Philosophy**, vol. 27, 2002. Pp. 2-36

Bourdieu, P. *The Market of Symbolic Goods*. **Poetics**, 14, issues 1-2, 1985. Pp.13–44. 1985.

Bracken, S. *Discussing the Importance of Ontology and Epistemology Awareness in Practitioner Research.* **Worcester Journal of Learning and Teaching,** 4(4), 2018, pp.1–9.

Brisbois, M. C. *Decentralised Energy, Decentralised Accountability? Lessons on How to Govern Decentralised Electricity Transitions from Multi-Level Natural Resource Governance.* **Global Transitions**, vol. 2, 2020. Pp. 16–25. https://doi.org/10.1016/j.glt.2020.01.001

Butchers, J., Williamson, S & Booker, J. *Micro Hydropower in Nepal: Analysing the Project*

Process to Understand Drivers that Strengthen and Weaken Sustainability. **Sustainability**, 13 (3), 2021. 1582

Calvert, K., Greer, K. & Maddison-MacFadyen, M. *Theorizing Energy Landscape for Energy Transition Management: Insights from a Socioecological History of Energy Transitions in Bermuda.* **Geoforum,** vol. 102, 2019. Pp. 191–201.

Chaurey, A., Ranganathan, M. & Mohanty, P. *Electricity Access for Geographically Disadvantaged Rural Communities-Technology and Policy Insights.* **Energy Policy**, 32 (15), 2004. Pp. 1693–1705. https://doi.org/10.1016/S0301-4215(03)00160-5

Come Zebra, E. I., Van der Windt, H. J., Nhumaio, G. & Faaij, A. P. C. *A Review of Hybrid Renewable Energy Systems in Mini-Grids for Off-Grid Electrification in Developing Countries.* **Renewable and Sustainable Energy Reviews**, 144, 2021. 111036.

Dauenhauer, P. M., Frame, D., Eales, A., Strachan, S., Galloway, S. & Buckland, H. *Sustainability*
Evaluation of Community-Based, Solar Photovoltaic Projects in Malawi. **Energy, Sustainability and Society**, 10 (12), 2020. https://doi.org/10.1186/s13705-020-0241-0

Dertinger, A. & Hirth, L. *Reforming the Electric Power Industry in Developing Economies Evidence on Efficiency and Electricity Access Outcomes.* **Energy Policy**, vol. 139, 2020. 111348.

Edet, L. A. & Odey, A. P. *Africa and the Challenges of Globalisation: An Overview.* **Pinisi Journal of Art, Humanity and Social Studies**. Vol. 2, no. 3, 2022.124-132

El-Anis, I. *Transport Infrastructure and Regional Integration in the Middle East.* **The Muslim World**, vol. 111, issue 1, 2021. Pp. 27-53.

Elabbas, M. A. E., Vries, L. D. & Correlje, A. *African Power Pools and Regional Electricity Markets Design: Taking Stock of Regional Integration in Energy Sectors*. **Energy Research and Social Science**, vol. 105, 2023. 103291

Farghali, M., Osman, A. I., Chen, Z., Abdelhaleem, A., Ihara, I., Mohamed, I. M. A., Pow-Seng, Y. & Rooney, D. W. *Social, Environmental, and Economic Consequences of Integrating Renewable Energies in the Electricity Sector: A Review.* **Environmental Chemistry Letters**, vol. 21, 2023. Pp. 1381–1418.

Foxon, T. J., Hammond, G. P. & Pearson, P. J. G. *Socio-Technical Transitions in UK Electricity: Part 1 – History, Actors and Pathways.* **Proceedings of the Institution of Civil Engineers – Energy**, vol. 173, no. 3, 2020. Pp. 109-122

H¨olsgens, R., L¨ubke, S., & Hasselkuß, M. *Social Innovations in the German Energy Transition: An Attempt to use the Heuristics of the Multi–Level Perspective of Transitions to Analyze*

the Diffusion Process of Social Innovations. **Energy, Sustainability and Society**, 8 (1): 8. 2018

Halkos, G. E. & Tsirivis, A. S. *Electricity Production and Sustainable Development: The Role of Renewable Energy Sources and Specific Socioeconomic Factors*. **Energies**, 16 (2), 2023. 721

Hamman, P. *Local Governance of Energy Transition: Sustainability, Transactions and Social Ties. A Case Study in Northeast France*. **International Journal of Sustainable Development & World Ecology,** 26 (1): 2019. Pp. 1–10.

Hancock. K. *Energy Regionalism and Diffusion in Africa: How Political Actors created the ECOWAS Center for Renewable Energy and Energy Efficiency*. **Energy Research & Social Science***,* vol. 5, 2015. Pp. 105-115.

Hansen, E. G., Ludeke-Freund, F., Quan, X. I., & West, J. *Cross-National Complementarity of Technology Push, Demand Pull, and Manufacturing Push Policies: The Case of Photovoltaics.* **IEEE Transactions on Engineering Management**, vol. 66, no. 3, 2019. Pp. 381-397.

Heldeweg, M. A. *Legal Regimes for Experimenting with Cleaner Production– Especially in Sustainable Energy*. **Journal of Cleaner Production**, 169: 2019, 48–60.

Hervas-Gamez, C. & Delgado-Ramos, F. *Drought Management Planning Policy: From Europe to*

Spain. **Sustainability**, 11 (7), 2019. 10.3390/su11071862

Hilpert, S., Kaldemeyer, C., Krien, U., G¨unther, S., Wingenbach, C., & Plessmann, G. *The Open Energy Modelling Framework (oemof) - A New Approach to Facilitate Open Science in Energy System Modelling*. **Energy Strategy Reviews**, 22: 2018. 16– 25.

Howard, D., Soria, R., The, J., Schaeffer, R., & Saphores, J. D. *The Energy Climate- Health Nexus in Energy Planning: A Case Study in Brazil.* **Renewable and Sustainable Energy Reviews**, 132, 2020.

Howells, M., Rogner, H., Strachan, N., Heaps, C., Huntington, H., Kypreos, S., Hughes, A., Silveira, S., DeCarolis, J., Bazillian, M, & Roehrl, A. *Osemosys: The Open Source Energy Modeling System: An Introduction to its Ethos, Structure and Development.* **Energy Policy**, 39 (10): 5 2011. 5850–5870.

Huang, J., Zhong, Y. & Zhang, Y. *Does Environmental Regulation of Cleaner Production Affect the Position of Enterprises in Global Value Chains? A Quasi–Natural Experiment Based on the Implementation of Cleaner Production*. **Sustainability**, vol. 15, issue 13, 2023. 10492.

Ishaku, H. P., Adun, H., Jazayeri, M. & Kusaf, M. *Decarbonisation Strategy for Renewable Energy Integration for Electrification of West African Nations: A Bottom-Up Energy Plan Modelling of West African Power Pool Targets*. **Sustainability**, vol. 14, issue 23, 2022.

Kang, S. J. & Lee, S. *Impacts of Environmental Policies on Global Green Trade.* **Sustainability**, vol. 13, issue 3, 2021. 1517

Kolagar, M., Hosseini, S. M. H., Felegari, R. & Fattahi, P. *Policy-Making for Renewable Energy Sources in Search of Sustainable Development: A Hybrid DEA-FBWM Approach*. **Environment Systems and Decisions**, vol. 40, 2020. Pp. 485-509.

Kuhn, T. *Grand Theories of European Integration Revisited: Does Identity Politics Shape the Course of European Integration?* **Journal of European Public Policy**, Vol. 26, Issue 8, 2019. Pp. 1213-1230

Mahajan, R., Lim, W. M., Sareen, M., Kumar, S. & Panwar, R. *Stakeholders Theory.* **Journal of Business Research**, vol. 166, 2023.

Marcinkowski, T. & Reid, A. *Reviews of Research on the Attitude-Behaviour Relationship and their Implications for Future Environmental Education Research.* **Environmental Education Research**, 25 (4), 2019. Pp. 459-471.

Mazandarani, O. *Philosophical Assumptions in ELT Research: A Systematic Review.* **Asia-Pacific Education Researcher**, vol. 31, 2022.

Mewenemesse, H. T. & Yan, Q. *Policy Analysis of the Challenges to an Effective Switch to Low-Carbon Energy in Economic Community of West African States*. **Energies**, 16 (5), 2023

Mierlo, B. V. *Users Empowered in Smart Grid Development? Assumptions and Up-To-Date Knowledge*. **Applied Sciences**, vol. 9, issue 5, 2019. Pp. 815.

Mohlakoana, N., Bamighausen, T., Tediosi, F., Evans, D., McIntyre, D., Bressers, H. T. A. & Tanner, M. *Testing the Contextual Interaction Theory in a UHC Pilot District in South Africa.* **BMC Health Services Research**, 22, 343, 2022.

Mulugetta,Y., Hagan, E. B. & Kammen, D. *Energy Access for Sustainable Development.* **Environmental Research Letters**, Vol. 14, No. 2, 2019. 020201.

Nurwahyudin, D. S., Trihastuti, N. & Utama, N. A. *Energy Planning in West Java Using Software*

LEAP (Long-range Energy Alternatives Planning). **E3S Web of Conferences**, vol. 359, 2022. 01001

Ober, J. *Innovation Adoption: Empirical Analysis on the Example of Selected Factors of Organisational Culture in the IT Industry in Poland*. **Sustainability**, 12 (20), 2020. 10.3390/su12208630

Ofori, K. & Asongu, S. A. *ICT Diffusion, Foreign Direct Investment and Inclusive Growth in Sub-Saharan Africa.* **Telematics and Informatics**, vol. 65, 2021.

Oghuvbu, E. A. *Political Corruption and Economic Development in Nigeria*. **Journal of Public Administration, Finance and Law**, issue 20/2021, 2021. Pp. 250-261

Ojomo, E. *International Law and Regional Electricity Infrastructure: The West African Power Pool (WAPP)*. **American Journal of International Law**, vol. 117, 2023. Pp. 16-20.

Olapade, M., Selormey, E. & Gninafon, H. *Regional Integration in Africa: Could Stronger Public Support turn 'Rhetoric into Reality'?* **Afrobarometer,** Round 6, Dispatch No. 91. 2016.

Onditi, F. *Dominatarian Theory on Regional Integration*. **Insight on Africa**, 13 (1), 2020.

Onuoha, A. *Land Use and the Transportation of Oil & Gas in Nigeria: The Legal and Social Challenges of Pipelines.* **African Journal of Law and Criminology**, 9 (1), 2019. Pp. 84–95.

Oshikoya, T. W. & Salami, A. O. *Regional Integration for African Development.* African Development Bank Group. **Africa Economic Brief**, vol. 12, issue 12, 2021.

Oyewo, A. S., Sterl, S., Khalili, S. & Breyer, C. *Highly Renewable Energy Systems in Africa: Rationale, and Recommendations.* **Joule**, vol. 7, issue 7, 2023. Pp. 1437–1470.

Phong Le, H. & Bach Van, D. T. *The Energy Consumption Structure and African EMDEs' Sustainable Development.* **Heliyon,** 6 (4), 2020.

Pierre-Oliver, P. *Electricity Sector Integration in West Africa.* **Energy Policy**, 36 (1), 2008. 210-223.

Rahim, S., Murshed, M., Umarbeyli, S., Kirikkaleli, D., Ahmad, M., Tufail, M. & Wahab, S. *Do Natural Resources Abundance and Human Capital Development Promote Economic Growth? A Study on the Resource Curse Hypothesis in Next Eleven Countries.* **Resources, Environment and Sustainability,** 4, 2021.

Reay, D. *The More Things Change the More they Stay the Same: The Continuing Relevance of Bourdieu and Passeron's Reproduction in Education, Society and Culture.* **Spanish Journal of Sociology**, 31 (3), 2022

Rechsteiner, R. *German Energy Transition (Energiewende) and What Politicians can Learn for Environmental and Climate Policy.* **Clean Technologies and Environmental Policy**, vol. 23, 2021. Pp. 305–342.

Stein, U., Bueb, B., Knieper, C., Troltzsch, J., Vidaurre, R & Favero, F. *The Diagnostic Water Governance Tool – Supporting Cross-Sectoral Cooperation in Water Resources Management*. **Environmental Science Policy**, vol. 140, 2023. Pp. 111-121

Tambari, I. T., Dioha, M. O. & Failler, P. *Renewable Energy Scenarios for Sustainable Electricity Supply in Nigeria.* **Energy and Climate Change**, vol. 1, 2020. 100017

Tehero, R. *Determinants of the Access to Electricity: The Case of West African Power Pool Counties*. **Open Access Library Journal**, vol. 8, 2021. e7223

Tsagkari, M., Roca, J. & Stephanides, P. *Sustainability of Local Renewable Energy Projects: A Comprehensive Framework and An Empirical Analysis on Two Islands.* **Sustainable Development**, vol. 30, issue 5, 2022. 1155-1168.

Ugwoke, B., Sulemanu, S., Corgnati, S. P., Leone, P. & Pearce, J. M. *The Integrated Rural Renewable and Sustainable Energy Planning Framework for Low-*Income *Countries: Case Studies of Rural Communities in Nigeria.* **Renewable and Sustainable Energy Reviews**, 144, 2021.

Unya, I. U. *ECOWAS and Regional Integration in West Africa: Issues, Challenges and Prospects*. **International Journal of African Culture, Policies and Development**, 12 (2), 2019

Unya, I. U. *Regional Organisations as Strategies for Development: A Comparison of EU, OAS and ASEAN.* **Babcock University Journal of History and International Studies**, 4 (1), 2019.

Voinea, C. F. & Neumann, M. *Political Culture: A Theory in Search for Methodology. An Editorial*. **Quality and Quantity**, vol. 54, 2020. Pp. 335-360

Wang, Q., Wang, X. & Jiang, X. *Reinvestigating the Environmental Kuznets Curve (EKC) of Carbon Emissions and Ecological Footprint in 147 Countries: A Matter of Trade Protectionism.* **Humanities and Social Sciences Communications**, 11 (160), 2024.

Wei, X., Liu, X., Fan, Y., Tan, L. & Liu, Q. *A Unified Test for the AR Error Structure of an Autoregressive Model.* **Axioms**, 11 (12), 2022. Pp. 690.

Wurster, S. & Hagemann, C. *Expansion of Renewable Energy in Federal Settings: Austria, Belgium, and Germany in Comparison.* **The Journal of Environment and Development**, vol. 29, issue 1, 2019.

Zakari, A. & Musibau, H. O. *Sustainable Economic Development Energy in OECD Countries: Does Energy Security Matter?* **Sustainable Development**, vol. 32, issue 1, 2023.

Unpublished Thesis/Dissertation

Eyita, E. K. *Energy Security through Transboundary Cooperation: Case Studies of the Southern African Power Pool (SAPP) and the West African Pool (WAPP).* University of the Witwatersrand, Johannesburg Doctoral Dissertation. 2014

Appendix I
Questionnaire

Department of Politics & International Relations

Topic: Economic Integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS)

Dear Respondent,

These questionnaires were designed for the above topic to elicit information on the impact of Economic Integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS). It is purely designed for academic research study. Please feel free to attend to this feat as all information supplied shall be treated with total and utmost confidentiality.

Thank you.

Section A

Demographic Information of Respondents

Instruction: Kindly indicated your response by ticking (√)

1. Age: 20-30 ( ) 30-40 ( ) 50-60 ( ) 61 above ( )
2. Gender: Male ( ) Female ( )
3. Marital Status: Single ( ) Married ( ) Divorced ( )
4. Educational Qualification: SSCE ( ) OND/NCE ( ) 1st Degree/HND ( )
5. Years of Service on the Job: 6months-1 year ( ) 1-2 years ( )
   2-4 years ( ) 4-5 years ( )
6. Position/ Status: Senior Level Management ( ) Middle Level Management ( ) Lower Level Management ( )
7. Religious affiliation: Muslim ( ) Christianity ( ) others ( )

Section B

Instruction: Please read each statement and tick (√) the box in the column which corresponds to the way you feel about the statements

SA = Strongly Agree, A= Agree, SD = Strongly Disagree, D =Disagree

Table 1: Would the present environmental state make room for affordable and clean energy in the Economic Community of West African States (ECOWAS)?

S/N	Items	SA	A	D	SD
1	Climate change often-times helps with provision of affordable and clean energy				
2	Water pollution is a major problem for providers of clean and affordable energy				
3	Thermal pollution also affects the provision of clean and affordable energy				
4	Solid waste disposal also disturbs the plan and process of providing clean and affordable energy				
5	The probability of spilling oil either on the earth or in a body of water also affects the provision of clean and affordable energy				

Table 2: To what extent would the existing political, socio-economic, ethical, cultural and legal frameworks allow for the implementation of economic integration as a Strategy for Affordable and Clean Energy in the Economic Community of West African States (ECOWAS)?

S/N	Items	SA	A	D	SD
1	Removing the restriction in trade across the whole region will aid integration which will lead ultimately to provision of energy				
2	Allowing the economy to grow at a higher rate will also help provide clean and affordable energy				
3	Government policies which create employment opportunities also afford ECOWAS countries more hands to provide energy				
4	Economic integration policies reduce the costs of trade which in turn allows labour to move freely within the region				
5	socio-cultural frameworks help processes mediate the development outcomes of energy access projects				

Table 3: What are the various action plans for the sustainable development of energy in the ECOWAS region and their levels of implementation?

S/N	Items	SA	A	D	SD
1	ECREEE is presently supporting the ECOWAS Member States in formulating their own National Action Plans, thereby facilitating the objective of ensuring energy accessibility throughout the region.				
2	ECREEE has enlisted local consultants in every ECOWAS nation, along with a group of global specialists, to assist in crafting three Action Plans. These plans will encompass capacity building, awareness campaigns, advocacy, and lobbying of influential national figures. Additionally, an investment prospectus will be created for the developed action plans.				
3	The United Nations Sustainable Energy for All Initiative (SE4ALL) aims to provide universal access to mechanical power for heating and productive purposes in all communities, including pumping and milling.				
4	The provision of power services to the urban and peri-urban poor is currently operating flawlessly, ensuring universal accessibility.				
5	ECOWAS has provided universal access to contemporary energy services for educational institutions, medical facilities, hospitals, and community centres.				

Table 4: Could ECOWAS' progress in environmental sustainability allow for the attainment of the SDGs target of affordable and clean energy?

S/N	Items	SA	A	D	SD
1	Given the polluting characteristics of certain energy sources, it is imperative to prioritise environmental sustainability in ECOWAS states. This entails ensuring that energy production, transmission, and distribution adhere to a low-carbon trajectory.				
2	The level of manufacturing exports in the sub-region is comparatively lower.				
3	There is still significant potential for countries in the ECOWAS sub-region to further gain from economic integration, particularly in terms of expanding their manufacturing exports.				
4	The significance of actively adopting renewable energy sources for power generation lies in its potential to promote sustainable development and mitigate the growing concern of environmental degradation in the sub-region.				
5	The utilisation of renewable energy could be a key policy choice for ECOWAS countries to enhance energy supply for manufacturing and industrial sector.				

Bio-data

A Personal Data

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B. Educational Background

PhD in Int' l Relations, Lead City University	In view
MSc in Industrial/Organisational Psychology, UNILAG	2004
BSc in Psychology, UNILAG	1999
SSCE, Oluponna Community High School	1991

C. Working Experience

MD/CEO Fresh Palm Global Services Ltd

MD/CEO Positive Energy Resources Ltd

MD/CEO Fresh Palm Mining & Dredging Ltd

Principal Partner DELKAY Enterprises Ltd.

D. Membership of Academic and Professional Bodies

Nil

E. Awards

Nil

F. Publication

In progress

G. Major Conferences Attended with Dates

Nil

H. Referees

Prof. Kabiru Adeyemo
Department of Management & Accounting
Lead City University, Ibadan

Dr Modupe Albert
Department of Politics & International Relations
Lead City University, Ibadan

_____ _____

Signature Date

The University Compliance Certification

This is to certify that, this thesis written by Olukayode ODETUNDE with Matriculation number LCU/PG/000315 in the Department of Politics and International Relations in the Faculty of Management and Social Sciences, Lead City University, Ibadan is in full compliance with the approved University format and style.

_____ _____

Signature Date