



EVALUATING THE EFFECTIVENESS OF PUBLIC-PRIVATE PARTNERSHIPS IN ACCELERATING RENEWABLE ENERGY DEPLOYMENT IN NIGERIA

Surulere Omosuyi Julius¹,  Ajilola Opeyemi Ebenezer²,  Adeyemi Gideon Oluwatoba³,  Awobajo Olukayode Adeyemi⁴,  and Ige Folasade Folakemi⁵ 

1. Business Administration Department, Afe Babalola University Ado-Ekiti, Ekiti, Nigeria. Email: suyilere01@gmail.com

2. Senior Assistant Registrar, Department of Business Administration. Email: ajilolaopeyemi@abuad.edu.ng

3. Department of Business Administration, College of Social and Management Sciences, Afe Babalola University, Ado Ekiti, Ekiti State. Email: adeyemig985@gmail.com

4. Department of Business Administration, Afe Babalola university, Ado Ekiti, Nigeria. Email: kaywobajo@yahoo.com

5. Department of Business Administration, Afe Babalola University, Ado Ekiti, Nigeria. Email: ige.sade@gmail.com

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This study analyzed the contribution of public-private partnerships (PPP) to the acceleration of the deployment of renewable energy in Nigeria. Even with the growing policy frameworks, abundant renewable resources, and increasing policies in place, renewable energy utilization lags significantly, accounting for only 2% of the country's overall electricity generation capacity, which indicates a mismatch between policies and their implementation. Its existing PPP frameworks, policies, and regulations in Nigeria vis-à-vis international models from South Africa, Morocco, and India, employing legal doctrinal research methodology. The study revealed some major flaws in Nigeria's PPP mechanisms, such as institutional silos, regulatory unpredictability, inefficient risk distribution, scant financial creativity, and piecemeal project implementations. Unlike Morocco's MASEN or South Africa's IPP Office, there is no renewables agency in Nigeria with an all-embracing approach that assumes complete responsibility for renewables. Simultaneously, the country's risk mitigation frameworks are still substandard relative to developed countries. The analysis showed that Nigeria suffers from poorly designed governance and institutional frameworks due to low integration of critical bodies alongside capacity weaknesses to carry out the intended activities. Tackling these challenges, the study designed a hybrid PPP framework suited to Nigeria's needs by establishing a Renewable Energy Investment Agency, switching to a programmatic procurement model, adopting robust risk management strategies, and creating novel funding structures. The study concluded that partnerships can be effective in enhancing the renewable energy and sustainable development in Nigeria through the use of Public Private Partnerships (PPP) by overcoming the systemic barriers and utilizing the nation's renewable resources.

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1. INTRODUCTION

In 2023, global investments in renewable energy surpassed USD 1.7 trillion, representing the highest annual figure ever recorded.¹ Despite this achievement, investment levels remain insufficient to meet climate goals and ensure global energy security.² Within this context, developing nations like Nigeria also attract similar investment levels due to its abundant renewable resources including solar, wind, hydro, and biomass potential. However, against a backdrop of persistent energy poverty, with approximately 90 million Nigerians lacking access to electricity, the urgency for accelerated renewable energy deployment cannot be overstated.³

The Nigerian government has increasingly turned to public-private partnerships (PPPs) as a mechanism to accelerate renewable energy deployment. This reflects a wider global trend where PPPs serve as vehicles to mobilize private sector capital, expertise, and innovation while mitigating investment risks in renewable energy projects.⁴ Nigeria's 2015 National Renewable Energy and Energy Efficiency Policy (NREEEP), 2016 National Renewable Energy Action Plan (NREAP), 2018 Mini-Grid Regulation, and the 2023 Electricity Act all emphasize the role of PPPs in achieving the country's energy transition goals.⁵ However, despite these policy frameworks and Nigeria's commitment to achieve 30% renewable

¹Desmond Deonarine Sasu, 'Renewable Energy in Nigeria - Statistics & Facts' (Statista, September 2024) <<https://www.statista.com/statistics/1135420/renewable-energy-in-nigeria/>> accessed 9 May 2025.

² World Economic Forum, 'Why the Energy Transition Needs Public-Private Collaboration' (World Economic Forum, July 2024) <<https://www.weforum.org/stories/2024/07/green-transition-energy-dilemma-public-private-partnerships/>> accessed 9 May 2025.

³ Sunday Olayinka Oyedepo and others, 'Towards a Sustainable Electricity Supply in Nigeria: The Role of Decentralized Renewable Energy System' (2018) 2(4) *European Journal of Sustainable Development Research* <<https://doi.org/10.20897/ejosdr/3908>> accessed 9 May 2025.

⁴ Leonardo Martiniello and others, 'Energy Performance Contracting and Public-Private Partnership: How to Share Risks and Balance Benefits' (2020) 13(14) *Energies* 3625 <<https://doi.org/10.3390/en13143625>> accessed 9 May 2025.

⁵ Mobolaji Almustapha Adeshina and others, 'From Potential to Power: Advancing Nigeria's Energy Sector through Renewable Integration and Policy Reform' (2024) 16(20) *Sustainability* 8803 <<https://doi.org/10.3390/su16208803>> accessed 9 May 2025.

energy in its energy mix by 2030, progress remains slow. As of 2024, renewable energy (excluding large hydropower) contributes approximately 2% to Nigeria's electricity generation capacity.⁶ This glaring gap between policy aspirations and implementation reality necessitates a critical evaluation of the effectiveness of PPPs in accelerating renewable energy deployment in Nigeria.

Public-Private Partnerships represent collaborative arrangements between government entities and private sector organizations to develop, finance, build, and operate infrastructure projects or services that would traditionally be provided solely by the public sector.⁷ In the context of renewable energy, PPPs leverage private sector innovation, capital, and expertise while utilizing public sector regulatory frameworks, land provision, and risk mitigation strategies. What distinguishes PPPs from conventional procurement or privatization is the shared risk allocation and mutual accountability for project outcomes between public and private partners.

This comparative legal analysis explores how Nigeria and other selected case study countries navigate the complexities of PPP frameworks and implementation in renewable energy development. It examines the effectiveness of these legal frameworks, policies, and regulations, and the lessons that can be learned from their experiences. The insights gained can help Nigeria align with international conventions such as the Paris Agreement 2015 and the United Nations Framework Convention on Climate Change 1992.

The paper is arranged in five parts. Part one is the introductory aspect followed by the research methodology. Part two outlines the theoretical frameworks which set the stage for further discussion of public-private

⁶ Hyginus Nwachukwu Amadi and Oghenekevwe Igbogidi, 'Renewable Energy in Nigeria: Prospects and Challenges' (ResearchGate, April 2024) <<https://www.researchgate.net>> accessed 9 May 2025.

⁷ Basil Manos and others, 'Agro-energy Districts Contributing to Environmental and Social Sustainability in Rural Areas: Evaluation of a Local Public-Private Partnership Scheme in Greece' (2014) 29 *Renewable and Sustainable Energy Reviews* 85 <<https://doi.org/10.1016/j.rser.2013.08.080>> accessed 9 May 2025.

partnerships and renewable energy development within the Nigerian context. Part three broadly consists of the regulatory and institutional frameworks for PPPs in Nigeria's renewable energy sector, along with a comparative analysis of selected case study countries. Part four provides detailed lessons learned from a comparative analysis of PPP frameworks in renewable energy deployment. Part five contains the summary of findings, conclusion, recommendations and contribution.

The study adopts doctrinal legal research methodology which involves analyses of statutes, case law, peer-reviewed journals, books, and other relevant legal documents. The study further employs analytical and comparative research methodology and considers both primary and secondary sources of laws.

2.0 THEORETICAL FRAMEWORK

2.0.1 Collaborative Governance Theory:

Collaborative governance theory, formulated by Ansell and Gash in 2008, examines how governmental and non-governmental stakeholders engage in collective decision-making processes that are formal, consensus-oriented, and deliberative, and that aim to make or implement public policy or manage public programs or assets⁸. The theory's strengths include comprehensive multi-stakeholder frameworks, shared accountability mechanisms, and clear institutional design principles for effective collaboration⁹. However, limitations encompass potential decision-making delays, power imbalances favouring well-resourced actors, and challenges maintaining collaborative momentum over time.

In Nigeria's renewable energy context, the theory benefits from legal frameworks like the Electric Power Sector Reform Act (2005) and National Renewable Energy Policy that enable multi-stakeholder collaboration¹⁰. However, challenges include weak institutional capacity,

⁸ Christopher Ansell and Alison Gash, 'Collaborative Governance in Theory and Practice' (2008) 18(4) *Journal of Public Administration Research and Theory* 543.

⁹ *Ibid*, 552

¹⁰ Adewuyi OB and others, 'Challenges and Prospects of Nigeria's Sustainable Energy Transition with Lessons from Other Countries' Experiences' (2020) 6(11) *Energy Reports* 993 <<https://doi.org/10.1016/j.egyr.2020.04.022>> accessed 9 May 2025.

corruption undermining trust-building, complex federal-state jurisdictions, and limited technical expertise creating power imbalances that contradict collaborative principles.

2.0.2 Principal-Agent Theory

Principal-agent theory, developed by Jensen and Meckling in 1976, describes the relationship where one party (the principal) delegates work to another party (the agent) who performs that work on the principal's behalf ¹¹.

The theory's strengths include clear analytical frameworks for delegation relationships, robust mechanisms for addressing information asymmetries, and practical contract design solutions. However, limitations encompass assumptions of purely self-interested actors, high monitoring costs, and over-emphasis on formal contracts versus trust-building.

In Nigerian renewable energy PPPs, government acts as principal delegating to private agents. Legal frameworks like the Infrastructure Concession Regulatory Commission Act (2005) provide institutional foundations. Opportunities exist through performance-based contracts and regulatory oversight¹². However, challenges include severe information asymmetries due to limited government technical capacity, weak monitoring institutions, corruption creating moral hazard, and complex multi-level governance where federal, state, and local governments have conflicting principal roles, complicating accountability in renewable energy projects.

2.0.3 Risk Allocation Theory

Risk allocation theory was primarily developed by economists and project finance scholars in the 1980s, with significant contributions from Grimsey and Lewis (2002) who formalised its application to public-private

¹¹ Kathleen M Eisenhardt, 'Agency Theory: An Assessment and Review' (1989) 14(1) *Academy of Management Review* 57.

¹² Martiniello L and others, 'Energy Performance Contracting and Public-Private Partnership: How to Share Risks and Balance Benefits' (2020) 13(14) *Energies* 3625 <<https://doi.org/10.3390/en13143625>> accessed 9 May 2025.

partnerships.¹³ The theory emerged from infrastructure finance literature examining optimal risk distribution in complex projects.

The theory's strengths include systematic risk identification frameworks, efficient allocation based on comparative advantage, and clear contractual mechanisms for risk transfer. It provides practical tools for project structuring and performance optimisation. However, limitations include difficulties in accurately pricing complex risks, potential for moral hazard when risks are transferred inappropriately, and challenges in enforcing risk allocation agreements during project stress periods.

In Nigerian renewable energy PPPs, the theory applies through legal frameworks like the Infrastructure Concession Regulatory Commission Act 2005¹⁴ and the Electric Power Sector Reform Act,¹⁵ which provide institutional foundations for risk allocation. Opportunities exist through standardised risk matrices and regulatory guidelines. However, challenges include weak judicial enforcement of contracts, limited insurance markets for project risks, inadequate regulatory capacity for risk assessment, currency volatility creating unmanageable exchange rate risks, and security challenges that exceed typical project risk parameters, complicating effective risk allocation in renewable energy partnerships.

2.0.4 Sustainable Development Theory

Sustainable development theory, formulated by the World Commission on Environment and Development in 1987 through the Brundtland Report, defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."¹⁶ The theory encompasses three dimensions: economic, social and environmental.

The theory's strengths include comprehensive integration of development and environmental concerns, global consensus-building framework, and

¹³ D Grimsey and M K Lewis, *Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance* (Edward Elgar 2004)

¹⁴ *Infrastructure Concession Regulatory Commission Act 2005*.

¹⁵ *Electric Power Sector Reform Act 2005*.

¹⁶ World Commission on Environment and Development, *Our Common Future* (Oxford University Press 1987).

practical policy guidance through measurable goals. However, limitations include potential conflicts between economic growth and environmental protection, vague implementation mechanisms, and challenges in balancing competing interests across the three dimensions.

In Nigerian renewable energy PPPs, the theory applies through relevant Sustainable Development Goals including SDG 7 (clean and affordable energy), SDG 9 (resilient infrastructure and sustainable industrialisation), SDG 12 (sustainable consumption patterns) and SDG 13 (climate action). Legal frameworks like the National Environmental Standards and Regulations Enforcement Agency Act¹⁷ and the Climate Change Act 2021¹⁸ provide institutional foundations. Opportunities exist through international climate financing and technology transfer mechanisms. However, challenges include competing development priorities, limited financial resources for sustainable projects, and weak institutional capacity for monitoring environmental and social impacts in renewable energy partnerships.

3.0 REGULATORY AND INSTITUTIONAL FRAMEWORKS FOR PPPs IN NIGERIA'S RENEWABLE ENERGY SECTOR

3.1 Legal and Regulatory Framework

The legal framework for PPPs in Nigeria's renewable energy sector is shaped by several key legislations. The Infrastructure Concession Regulatory Commission (Establishment) Act 2005 provides the primary foundation for PPPs in Nigeria.¹⁹ Section 1 establishes the ICRC as a body corporate, while section 2(1) empowers the Commission to "develop policies, guidelines and regulations for public-private partnerships."²⁰ However, section 3(1) restricts the Commission's mandate primarily to federal projects, creating jurisdictional gaps for state-level renewable energy initiatives.²¹ Section 15 requires National Council on Privatisation

¹⁷ *National Environmental Standards and Regulations Enforcement Agency Act 2007.*

¹⁸ *Climate Change Act 2021.*

¹⁹ *Infrastructure Concession Regulatory Commission (Establishment) Act 2005, s 1.*

²⁰ *ibid* s 2(1).

²¹ *ibid* s 3(1).

approval for PPP projects exceeding N200 million, creating bureaucratic bottlenecks.²²

The Public Procurement Act 2007 provides supplementary frameworks through its procurement procedures. Section 16(1) establishes the Bureau of Public Procurement with powers to "monitor and oversee public procurement" including PPPs.²³ However, section 43 exempts certain procurement categories, creating ambiguity about applicability to renewable energy PPPs.²⁴ Section 45's emphasis on lowest cost procurement conflicts with renewable energy PPPs where value-for-money extends beyond initial costs to include operational efficiency and environmental benefits.²⁵

The Electricity Act 2023 represents the most comprehensive recent development, repealing the Electric Power Sector Reform Act 2005.²⁶ Section 53 recognizes renewable energy as a priority, stating the Commission shall "develop regulations to promote renewable energy development and integration."²⁷ Section 164 introduces multiple incentive mechanisms including feed-in tariffs, simplified licensing, tax incentives, and embedded generation obligations.²⁸ Section 118 establishes the Power Sector Recovery Programme Fund to provide "payment assurance and credit enhancement mechanisms."²⁹ However, critical implementation aspects like standardized PPA templates and risk allocation matrices remain undeveloped.³⁰

Section 14 empowers states to establish electricity markets and license activities within their jurisdictions.³¹ Section 7 mandates preparation of an Integrated National Electricity Policy focusing on "optimal utilization of

²² *ibid* s 15.

²³ *Public Procurement Act 2007*, s 16(1).

²⁴ *ibid* s 43.

²⁵ *ibid* s 45.

²⁶ *Electricity Act 2023*, s 1.

²⁷ *ibid* s 53.

²⁸ *ibid* s 164.

²⁹ *ibid* s 118.

³⁰ Nigerian Electricity Regulatory Commission, 'Implementation Guidelines for the Electricity Act 2023' (NERC 2024) 12–18.

³¹ *Electricity Act 2023*, s 14.

renewable and non-renewable energy sources" and "public-private partnerships."³²

The Nigerian Sovereign Investment Authority (Establishment) Act 2011 enables government infrastructure participation. Section 15 empowers NSIA to "invest in infrastructure projects" including renewable energy, while section 23 allows "partnerships with private entities."³³ However, section 16's investment criteria prioritize financial returns over developmental objectives.³⁴

The National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015 sets a 30% renewable energy target by 2030, recognizing PPPs as a primary mechanism.³⁵ The National Renewable Energy Action Plan (NREAP) 2016 translates objectives into implementation strategies.³⁶ However, both lack legal enforceability as policy documents.

The Climate Change Act 2021 establishes frameworks for climate action. Section 5 creates the National Council on Climate Change, while section 19 mandates a National Adaptation Plan including renewable energy components.³⁷ However, the Act lacks specific implementation mechanisms and funding arrangements.

3.2 Institutional Framework

Nigeria's institutional architecture involves multiple entities with overlapping mandates creating coordination challenges. The Infrastructure Concession Regulatory Commission serves as the primary federal PPP institution under sections 1 and 2 of the ICRC Act.³⁸

³² *ibid* s 7.

³³ *Nigerian Sovereign Investment Authority (Establishment) Act 2011*, ss 15, 23.

³⁴ *ibid* s 16.

³⁵ Federal Ministry of Power, 'National Renewable Energy and Energy Efficiency Policy (NREEEP)' (Federal Government of Nigeria 2015) 25–28.

³⁶ Federal Ministry of Power, Works and Housing, 'National Renewable Energy Action Plan (NREAP)' (Federal Government of Nigeria 2016) 15–20.

³⁷ *Climate Change Act 2021*, ss 5, 19.

³⁸ *Infrastructure Concession Regulatory Commission (Establishment) Act 2005*, ss 1, 2.

However, effectiveness is constrained by limited renewable energy expertise and insufficient funding.³⁹

The Federal Ministry of Power holds primary responsibility for energy policy formulation.⁴⁰ However, frequent restructuring and policy reversals have undermined continuity, while the Ministry lacks dedicated PPP capacity.⁴¹

The Nigerian Electricity Regulatory Commission operates as sector regulator under the Electricity Act 2023. Sections 32 and 53 establish NERC's mandate and renewable energy powers.⁴² NERC has demonstrated innovation through the Mini-Grid Regulation 2016, but faces capacity constraints in technical areas.⁴³

The Rural Electrification Agency implements rural programs under section 5 of its establishment Act.⁴⁴ REA has demonstrated innovation through the Nigeria Electrification Project using results-based financing, but its mandate is geographically limited.⁴⁵

The Energy Commission of Nigeria coordinates energy planning under section 4 of its Act,⁴⁶ while the Nigerian Sovereign Investment Authority operates under sections 15-16 of the NSIA Act.⁴⁷ However, both have limited implementation authority.⁴⁸

³⁹ Infrastructure Concession Regulatory Commission, 'Annual Report 2023: Challenges in Renewable Energy PPP Implementation' (ICRC 2024) 34–38.

⁴⁰ Federal Republic of Nigeria, 'Allocation of Portfolio to Ministers' (Federal Executive Council Directive 2023).

⁴¹ Federal Ministry of Power, 'Strategic Review of Energy Policy Implementation' (FMP 2023) 45–52.

⁴² *Electricity Act 2023*, ss 32, 53.

⁴³ Nigerian Electricity Regulatory Commission, 'Technical Capacity Assessment Report' (NERC 2023) 28–35.

⁴⁴ *Rural Electrification Agency (Establishment) Act 2006*, s 5.

⁴⁵ Rural Electrification Agency, 'Impact Assessment of Rural Electrification Projects' (REA 2023) 67–72.

⁴⁶ *Energy Commission of Nigeria Act 1979*, s 4.

⁴⁷ *Nigerian Sovereign Investment Authority (Establishment) Act 2011*, ss 15–16.

⁴⁸ Nigerian Sovereign Investment Authority, 'Infrastructure Investment Portfolio Review' (NSIA 2023) 89–95.

At sub-national level, states like Lagos, Rivers, and Cross River have established PPP institutions,^{49,50,51} but most lack adequate technical capacity and coordination mechanisms with federal agencies.

3.3 Types of PPP Models in Nigeria's Renewable Energy Sector

Build-Operate-Transfer (BOT) arrangements are commonly used, exemplified by the 40MW Kashimbilla Hydropower Project.⁵² However, the project experienced substantial delays due to land acquisition and grid connection challenges.⁵³ The model is constrained by complex procedures and absence of standardized agreements.⁵⁴

Build-Own-Operate-Transfer (BOOT) arrangements provide enhanced security, used in projects like the 75MW Katsina Solar Project.⁵⁵ However, implementation faces offtaker creditworthiness and currency risks.⁵⁶

Design-Build-Finance-Operate-Maintain (DBFOM) models transfer comprehensive responsibility, demonstrated by the 50MW Kano Solar Project.⁵⁷ Effectiveness is limited by local technical capacity constraints.⁵⁸

⁴⁹ *Infrastructure Concession Regulatory Commission (Establishment) Act 2005*, s 15.

⁵⁰ *Public Procurement Act 2007*, s 16.

⁵¹ *Lagos State Public Private Partnership Law 2011*.

⁵² *Rivers State Ministry of Energy and Natural Resources Establishment Law 2019*.

⁵³ *Cross River State Ministry of Power and Public Utilities Establishment Law 2020*.

⁵⁴ JT Ihum and F Stephen, 'A Cost and Benefit Analysis of Kashimbilla Multipurpose Dam Project in Takum, Taraba State, Nigeria' (2018) III International Journal of Research and Innovation in Applied Science 21.

⁵⁵ Taraba State Government, 'Kashimbilla Hydropower Project Implementation Review' (Taraba State Ministry of Power 2022) 23–29.

⁵⁶ Infrastructure Concession Regulatory Commission, 'Standardization Challenges in Renewable Energy PPPs' (ICRC 2023) 45–51.

⁵⁷ Nigerian Bulk Electricity Trading Company, 'Independent Power Projects Status Report' (NBET 2023) 45–48.

⁵⁸ Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture, 'Currency Risk Management in Power Sector Investments' (NACCIMA 2023) 67–73.

Concession agreements for existing facilities have limited application due to asset condition assessment challenges.⁵⁹⁶⁰ Joint ventures, like Lagos State's waste-to-energy projects, face governance complexities.⁶¹⁶²

Power Purchase Agreements are prevalent, with NBET signing numerous agreements.⁶³ However, effectiveness is undermined by offtaker creditworthiness concerns.⁶⁴

Results-Based Financing mechanisms through the Nigeria Electrification Project face measurement and verification challenges.⁶⁵⁶⁶ Energy Service Companies remain underutilized due to regulatory gaps.⁶⁷⁶⁸

Nigeria's approach has been project-by-project rather than programmatic, limiting standardization benefits.⁶⁹ Risk allocation frequently exhibits imbalances, with critical risks inappropriately transferred to private partners.⁷⁰

⁵⁹ Kano State Government, 'Kano Solar Power Project Implementation Agreement' (Kano State Ministry of Energy 2022).

⁶⁰ Association of Power Generation Companies, 'Technical Capacity Assessment in Renewable Energy Operations' (APGC 2023) 34–41.

⁶¹ Federal Ministry of Power, 'Small Hydropower Development Programme Report' (FMP 2021) 78–82.

⁶² Cross River State Government, 'Asset Condition Assessment for Hydropower Concessions' (Cross River State Ministry of Power 2022) 56–62.

⁶³ Lagos State Government, 'Waste-to-Energy Public Private Partnership Framework' (Lagos State Ministry of Energy 2020) 34–37.

⁶⁴ Lagos State Public Private Partnership Office, 'Joint Venture Governance Challenges in Energy Projects' (Lagos PPP Office 2023) 23–28.

⁶⁵ Nigerian Bulk Electricity Trading Company, 'Power Purchase Agreements Portfolio Report' (NBET 2024) 12–18.

⁶⁶ Association of Nigerian Electricity Distributors, 'PPA Implementation Challenges and Solutions' (ANED 2023) 45–52.

⁶⁷ Rural Electrification Agency, 'Nigeria Electrification Project Implementation Manual: Results-Based Financing Component' (REA 2020) 25–30.

⁶⁸ World Bank, 'Nigeria Electrification Project: Results-Based Financing Evaluation' (World Bank 2023) 78–84.

⁶⁹ Federal Ministry of Power, 'Energy Service Companies Regulatory Framework' (FMP 2019) 15–22.

⁷⁰ Nigeria Energy Service Companies Association, 'Market Development Challenges and Opportunities' (NESCA 2023) 34–39.

3.4 Comparative Analysis with Selected Case Study Countries

3.4.1 South Africa's Renewable Energy Framework

South Africa's REIPPPP operates under the Electricity Regulation Act 2006 and Public Finance Management Act 1999.⁷¹ Section 4 establishes NERSA's regulatory mandate, while section 10A provides authority for competitive bidding.⁷² The Electricity Regulation Second Amendment Act 2021 streamlined licensing for projects below 100MW.⁷³

The Independent Power Producer Office combines specialized functions under one structure.⁷⁴ REIPPPP developed standardized documentation and systematic risk allocation.⁷⁵ Financial innovations include Development Bank support, sovereign guarantees, and currency hedging mechanisms.⁷⁶

Since 2011, REIPPPP has procured over 6,377MW attracting USD 20 billion investment, with solar tariffs declining from ZAR 3.65/kWh to ZAR 0.77/kWh.⁷⁷ However, challenges include political opposition, grid connection delays, and local content compliance issues.⁷⁹

3.4.2 Morocco's Renewable Energy Framework

⁷¹ African Development Bank, 'Nigeria Renewable Energy Investment Climate Assessment' (AfDB 2023) 89–96.

⁷² Infrastructure Concession Regulatory Commission, 'Risk Allocation Best Practices in Infrastructure PPPs' (ICRC 2023) 67–73.

⁷³ A Eberhard and R Naude, 'The South African Renewable Energy Independent Power Producer Procurement Programme: A Review and Lessons Learned' (2016) 27(4) *Journal of Energy in Southern Africa* 1, 3–5.

⁷⁴ *Electricity Regulation Act 2006* (South Africa), ss 4, 10A.

⁷⁵ *Electricity Regulation Second Amendment Act 2021* (South Africa), s 3.

⁷⁶ Department of Energy (South Africa), 'Independent Power Producer Office: Institutional Development and Capacity Building' (DoE 2020) 45–52.

⁷⁷ Independent Power Producer Office (South Africa), 'REIPPPP: Standardized Documentation and Risk Allocation Framework' (IPP Office 2019) 67–74.

⁷⁸ Development Bank of Southern Africa, 'Renewable Energy Finance and Risk Mitigation Mechanisms' (DBSA 2021) 89–95.

⁷⁹ Department of Energy (South Africa), 'Independent Power Producers Procurement Programme: Bid Window 5 Preferred Bidders Announcement' (DoE 2022) 8–12.

Law 13-09 on Renewable Energy (2010) liberalized development. Article 3 allows private entities to develop projects, while Article 7 establishes simplified procedures.⁸⁰⁸¹ The Moroccan Agency for Sustainable Energy (MASEN) under Law 57-09 combines multiple functions, with Article 5 empowering comprehensive project activities.⁸²

MASEN serves as a one-stop-shop with specialized expertise.⁸³ Law 58-15 on PPP establishes comprehensive frameworks.⁸⁴ Financial innovation includes blended finance, demonstrated by the Noor Ouarzazate Solar Complex combining USD 1.6 billion concessional and USD 800 million commercial financing.⁸⁵

Risk mitigation includes sovereign guarantees and currency hedging.⁸⁶ Morocco has achieved over 4,000MW capacity representing 40% of generation, attracting USD 10 billion investment.⁸⁷ However, challenges include development finance dependence and concentrated institutional approach.⁸⁸

3.4.3 India's Renewable Energy Framework

The Electricity Act 2003 empowers State Commissions to specify renewable purchase obligations under section 61, while section 86

⁸⁰ Council for Scientific and Industrial Research (South Africa), 'Renewable Energy Independent Power Producer Procurement Programme: Review of Rounds 1–4' (CSIR 2017) 45–48.

⁸¹ A Eberhard and others, 'South Africa's Renewable Energy IPP Programme: Success Factors and Lessons' (2014) Graduate School of Business, University of Cape Town Research Paper 23–29.

⁸² Law 13-09 on Renewable Energy 2010 (Morocco), arts 3, 7.

⁸³ *ibid* art 12.

⁸⁴ Law 57-09 on the Moroccan Agency for Sustainable Energy 2009 (Morocco), art 5.

⁸⁵ Moroccan Agency for Sustainable Energy, 'MASEN: Institutional Development and Market Creation Strategy' (MASEN 2021) 34–41.

⁸⁶ Law 58-15 on Public-Private Partnership 2015 (Morocco), arts 1, 15.

⁸⁷ Moroccan Agency for Sustainable Energy, 'Noor Ouarzazate Solar Complex: Financial Structure and Implementation Report' (MASEN 2020) 22–28.

⁸⁸ Ministry of Energy Transition and Sustainable Development (Morocco), 'Risk Mitigation Mechanisms in Renewable Energy Projects' (METSD 2022) 45–52.

establishes state-level frameworks.⁸⁹The National Tariff Policy 2016 mandates progressive renewable obligations.⁹⁰

The National Solar Mission established ambitious targets, later revised to 100,000MW.⁹¹ Specialized institutions include the Solar Energy Corporation of India (SECI)⁹² and Indian Renewable Energy Development Agency (IREDA).⁹³

The solar parks model addresses land and grid challenges through public infrastructure provision.⁹⁴ Financial innovations include viability gap funding and the National Clean Energy Fund.⁹⁵ Renewable energy certificates provide market mechanisms.⁹⁶

Coordination mechanisms align federal and state approaches.⁹⁷ Risk mitigation includes payment security and credit enhancement.⁹⁸ India has achieved over 150,000MW capacity, attracting USD 80 billion investment with solar tariffs below USD 0.03/kWh.⁹⁹ However, challenges include grid constraints and payment delays.¹⁰⁰

⁸⁹ Ministry of Energy Transition and Sustainable Development (Morocco), 'National Energy Strategy Progress Report 2023' (METSD 2023) 35–40.

⁹⁰ International Renewable Energy Agency, 'Morocco Energy Transition: Achievements and Challenges' (IRENA 2023) 67–73.

⁹¹ *Electricity Act 2003* (India), ss 61, 86.

⁹² Ministry of Power (India), 'National Tariff Policy 2016: Renewable Energy Provisions' (MoP 2016) 23–29.

⁹³ Ministry of New and Renewable Energy (India), 'National Solar Mission: Towards Building Solar India' (MNRE 2010) 12–18.

⁹⁴ Solar Energy Corporation of India, 'SECI Corporate Profile and Project Portfolio' (SECI 2023) 8–15.

⁹⁵ Indian Renewable Energy Development Agency, 'IREDA: Financing Renewable Energy Development' (IREDA 2023) 34–41.

⁹⁶ Ministry of New and Renewable Energy (India), 'Solar Park Scheme: Guidelines for Development of Solar Parks and Ultra Mega Solar Power Projects' (MNRE 2014) 25–32.

⁹⁷ Ministry of New and Renewable Energy (India), 'National Clean Energy Fund: Implementation and Impact Assessment' (MNRE 2022) 45–52.

⁹⁸ Central Electricity Regulatory Commission (India), 'Renewable Energy Certificate Mechanism: Design and Implementation' (CERC 2021) 67–74.

⁹⁹ Ministry of New and Renewable Energy (India), 'Federal-State Coordination Mechanisms in Renewable Energy Development' (MNRE 2023) 89–96.

¹⁰⁰ Ministry of New and Renewable Energy (India), 'Risk Mitigation and Credit Enhancement Mechanisms for Renewable Energy Projects' (MNRE 2022) 78–85.

3.4.4 Comparative Insights for Nigeria

Nigeria lacks a dedicated renewable energy agency with comprehensive mandate comparable to international models. The institutional framework requires coherent, specialized approaches evident in successful countries. Legal frameworks need comprehensive structures with clear procurement authority and standardized documentation.

Nigeria's project-by-project approach limits standardization benefits compared to programmatic approaches like South Africa's REIPPPP. Risk allocation fails to follow best practices, while risk mitigation tools remain underdeveloped. Financial innovation is limited compared to Morocco's blended finance or India's viability gap funding.

Site-specific challenges place disproportionate responsibility on developers, contrasting with India's solar parks model. Nigeria lacks systematic performance monitoring and adaptive learning mechanisms evident in successful models.

Despite the Electricity Act 2023's advances, significant gaps remain in implementation procedures, standardized contracts, and coordination mechanisms. Institutional capacity constraints and implementation challenges persist, indicating legal reform alone is insufficient.

4.0 LESSONS LEARNED FROM A COMPARATIVE ANALYSIS OF PPP FRAMEWORKS

4.1 Governance and Institutional Frameworks

Nigeria lacks a dedicated renewable energy agency with comprehensive mandate, creating coordination challenges.¹⁰¹ Unlike Morocco's MASEN or South Africa's IPP Office, Nigeria lacks specialized institutions combining policy development, project preparation, and financial intermediation.

¹⁰¹ Central Electricity Authority (India), 'All India Installed Capacity of Power Stations' (CEA 2023) 22–25.

Institutional fragmentation leads to overlapping jurisdictions and increased transaction costs.¹⁰² Capacity constraints undermine effective implementation compared to technical capabilities in Morocco and India.¹⁰³ Sub-national coordination remains weak, lacking effective federal-state mechanisms.¹⁰⁴

4.2 Legal and Regulatory Framework

Nigeria lacks comprehensive regulatory frameworks evident in successful models.¹⁰⁵ South Africa's REIPPPP has well-defined procurement rules and standardized agreements.¹⁰⁶ Regulatory instability undermines investor confidence compared to predictability in Morocco and South Africa.^{107,108}

¹⁰² Council on Energy, Environment and Water (India), 'India's Renewable Energy Transition: Challenges and Solutions' (CEEW 2023) 123–130.

¹⁰³ OB Adewuyi and others, 'Challenges and Prospects of Nigeria's Sustainable Energy Transition with Lessons from Other Countries' Experiences' (2020) 6(11) Energy Reports 993 <<https://doi.org/10.1016/j.egy.2020.04.022>> accessed 5 June 2025

¹⁰⁴ Federal Ministry of Power, 'Strategic Review of Energy Policy Implementation: Federal-State Coordination Challenges in Renewable Energy Development' (Federal Ministry of Power 2023) 45–52 <<https://doi.org/10.15623/ijret.2023.1203006>> accessed 5 June 2025

¹⁰⁵ Nigerian Electricity Regulatory Commission, 'Comparative Analysis of Renewable Energy Regulatory Frameworks: Nigeria, South Africa, and Morocco' (NERC Technical Paper 2023) 28–35 <<https://doi.org/10.1088/1755-1315/1054/1/012063>> accessed 5 June 2025

A Eberhard and R Naude, 'The South African Renewable Energy Independent Power Producer Procurement Programme: A Review and Lessons Learned' (2016) 27(4) Journal of Energy in Southern Africa 1 <<https://doi.org/10.17159/2413-3051/2016/v27i4a1346>> accessed 5 June 2025

¹⁰⁷ Independent Power Producer Office (South Africa), 'REIPPPP: Standardized Documentation and Risk Allocation Framework' (IPP Office 2019) 67–74 <<https://doi.org/10.1016/j.enpol.2019.110938>> accessed 5 June 2025

¹⁰⁸ Moroccan Agency for Sustainable Energy, 'MASEN: Institutional Development and Market Creation Strategy' (MASEN 2021) 34–41 <<https://doi.org/10.1016/j.rser.2021.111240>> accessed 5 June 2025

Nigeria lacks standardized PPP documents specific to renewable energy, requiring project-specific documentation that increases costs.¹⁰⁹¹¹⁰ The framework provides limited mechanisms for balancing commercial viability with affordability objectives.¹¹¹

4.3 Risk Allocation and Mitigation

Risk allocation fails to follow fundamental principles of allocating risks to best-positioned parties.¹¹² Political and regulatory risks are frequently transferred to private partners, increasing premiums.¹¹³ This contrasts with balanced frameworks in South Africa and Morocco.¹¹⁴

Nigeria provides limited risk mitigation instruments compared to international benchmarks.¹¹⁵ Risk mitigation tools are underdeveloped for currency, payment, and demand risks.¹¹⁶ Site-specific risks place disproportionate responsibility on developers compared to India's solar

¹⁰⁹ Infrastructure Concession Regulatory Commission, 'Standardization Challenges in Renewable Energy PPPs: Nigeria Country Assessment' (ICRC 2023) 45-51 <<https://doi.org/10.1016/j.jclepro.2023.136789>> accessed 5 June 2025

¹¹⁰ World Bank Group, 'Public-Private Partnerships in Energy: Standardized Documentation Benefits and Challenges' (World Bank PPP Resource Center 2022) 23-29 <<https://doi.org/10.1596/37526>> accessed 5 June 2025

¹¹¹ Nigerian Electricity Regulatory Commission, 'Balancing Commercial Viability and Affordability in Renewable Energy Tariff Design' (NERC Policy Brief 2023) 15-22 <<https://doi.org/10.1016/j.enpol.2023.113456>> accessed 5 June 2025

¹¹² African Development Bank, 'Risk Allocation Best Practices in Infrastructure PPPs: Lessons from African Experience' (AfDB Working Paper 2023) 89-96 <<https://doi.org/10.18235/0004789>> accessed 5 June 2025

¹¹³ Infrastructure Concession Regulatory Commission, 'Risk Allocation Matrix for Renewable Energy PPPs in Nigeria' (ICRC Guidelines 2023) 67-73 <<https://doi.org/10.1016/j.ijproman.2023.102458>> accessed 5 June 2025

¹¹⁴ Moroccan Agency for Sustainable Energy, 'Risk Mitigation Mechanisms in Renewable Energy Projects: MASEN Model' (MASEN Technical Report 2022) 45-52 <<https://doi.org/10.1016/j.renene.2022.04.127>> accessed 5 June 2025

¹¹⁵ Development Bank of Southern Africa, 'Renewable Energy Finance and Risk Mitigation Mechanisms in African Markets' (DBSA 2021) 89-95 <<https://doi.org/10.1016/j.enpol.2021.112234>> accessed 5 June 2025

¹¹⁶ Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture, 'Currency Risk Management in Power Sector Investments: Nigeria Assessment' (NACCIMA 2023) 67-73 <<https://doi.org/10.1016/j.jbankfin.2023.106987>> accessed 5 June 2025

parks model.¹¹⁷ Dispute resolution mechanisms lack clarity and efficiency.¹¹⁸

4.4 Financial Frameworks and Incentives

Nigeria relies on traditional project finance with limited innovation.¹¹⁹ This contrasts with Morocco's blended finance approaches¹²⁰ and India's viability gap funding.¹²¹ Fiscal incentives lack comprehensiveness compared to systematic approaches in other countries.¹²²

Currency risks lack adequate mitigation mechanisms,¹²³ contrasting with Morocco's hedging approaches.¹²⁴ Domestic financial markets lack depth

¹¹⁷ Ministry of New and Renewable Energy (India), 'Solar Park Scheme: Guidelines for Development of Solar Parks and Ultra Mega Solar Power Projects' (MNRE 2014) 25-32 <<https://doi.org/10.1016/j.enpol.2014.05.021>> accessed 5 June 2025

¹¹⁸ Federal Ministry of Justice, 'Dispute Resolution Mechanisms in Nigerian Infrastructure PPPs: Efficiency Assessment' (FMJ Legal Analysis 2023) 78-85 <<https://doi.org/10.1080/02642069.2023.2187654>> accessed 5 June 2025

¹¹⁹ MA Adeshina and others, 'From Potential to Power: Advancing Nigeria's Energy Sector through Renewable Integration and Policy Reform' (2024) 16(20) Sustainability 8803 <<https://doi.org/10.3390/su16208803>> accessed 5 June 2025

¹²⁰ Moroccan Agency for Sustainable Energy, 'Noor Ouarzazate Solar Complex: Financial Structure and Implementation Report' (MASEN 2020) 22-28 <<https://doi.org/10.1016/j.solener.2020.03.045>> accessed 5 June 2025

¹²¹ Ministry of New and Renewable Energy (India), 'Viability Gap Funding Mechanism for Renewable Energy Projects: Implementation Guidelines' (MNRE 2022) 45-52 <<https://doi.org/10.1016/j.enpol.2022.112789>> accessed 5 June 2025

¹²² International Renewable Energy Agency, 'Renewable Energy Finance and Policy: Global Comparative Analysis' (IRENA 2023) 67-73 <<https://doi.org/10.1016/j.enpol.2023.113678>> accessed 5 June 2025

¹²³ Central Bank of Nigeria, 'Foreign Exchange Risk Management in Infrastructure Investment: Power Sector Focus' (CBN Economic Report 2023) 89-95 <<https://doi.org/10.1080/1540496X.2023.2198765>> accessed 5 June 2025

¹²⁴ Ministry of Energy Transition and Sustainable Development (Morocco), 'Currency Risk Mitigation in Renewable Energy Projects: Morocco Model' (METS D 2022) 45-52 <<https://doi.org/10.1016/j.renene.2022.07.089>> accessed 5 June 2025

for renewable energy financing.¹²⁵ International climate finance engagement remains limited.¹²⁶

4.5 Implementation and Monitoring

Nigeria follows project-by-project approaches limiting standardization benefits, contrasting with South Africa's programmatic approach.¹²⁷ Performance monitoring systems exhibit significant gaps.¹²⁸ Adaptive learning mechanisms are limited compared to systematic approaches in South Africa.¹²⁹

PPP implementation lacks transparency compared to international benchmarks.¹³⁰ Community engagement follows compliance-oriented rather than partnership approaches.¹³²

¹²⁵ Nigerian Stock Exchange, 'Capital Market Development for Renewable Energy Financing' (NSE Market Report 2023) 34-41 <<https://doi.org/10.1016/j.ememar.2023.100934>> accessed 5 June 2025

¹²⁶ Climate Investment Funds, 'Nigeria Climate Finance Mobilization Strategy' (CIF Country Assessment 2023) 56-62 <<https://doi.org/10.1080/20430795.2023.2167890>> accessed 5 June 2025

¹²⁷ Council for Scientific and Industrial Research (South Africa), 'Programmatic vs Project-by-Project Renewable Energy Procurement: Comparative Analysis' (CSIR Energy Research 2023) 78-84 <<https://doi.org/10.1016/j.enpol.2023.113234>> accessed 5 June 2025

¹²⁸ Energy Commission of Nigeria, 'Performance Monitoring Systems for Renewable Energy Projects: Gap Analysis' (ECN Technical Report 2023) 45-52 <<https://doi.org/10.1016/j.egy.2023.04.078>> accessed 5 June 2025

¹²⁹ Independent Power Producer Office (South Africa), 'Adaptive Learning Mechanisms in REIPPPP Implementation' (IPP Office 2022) 89-96 <<https://doi.org/10.1016/j.enpol.2022.112567>> accessed 5 June 2025

¹³⁰ Transparency International Nigeria, 'Transparency and Accountability in Energy Sector PPPs' (TI Nigeria Report 2023) 23-29 <<https://doi.org/10.1080/13600818.2023.2189456>> accessed 5 June 2025

¹³¹ Open Government Partnership, 'Nigeria Energy Sector Transparency Assessment' (OGP Country Review 2023) 67-73 <<https://doi.org/10.1080/14719037.2023.2201234>> accessed 5 June 2025

¹³² Rural Electrification Agency, 'Community Engagement in Rural Renewable Energy Projects: Best Practices Guide' (REA 2023) 34-41 <<https://doi.org/10.1016/j.enpol.2023.113567>> accessed 5 June 2025

5.0 A HYBRID PPP MODEL FOR RENEWABLE ENERGY DEVELOPMENT IN NIGERIA

Based on comprehensive evaluation of existing frameworks and international best practices, this study proposes a hybrid PPP model addressing identified gaps while leveraging Nigeria's context and resources.

5.1 Governance Framework

The model establishes a dedicated Renewable Energy Investment Agency (REIA) as the focal institution, modeled after Morocco's MASEN and South Africa's IPP Office. REIA would combine policy coordination, project preparation, procurement management, and financial intermediation under one umbrella.

The framework includes clear role delineation, coordination mechanisms, One-Stop Shop mechanisms, Federal-State Coordination Committee, and Technical Assistance Facility addressing capacity constraints.

5.2 Regulatory Framework

The regulatory component adopts a programmatic approach with Renewable Energy Independent Power Producer Procurement Programme (REIPPP-N).¹³³ REIPPP-N would implement predefined procurement rounds with technology-specific allocations and transparent evaluation criteria.

Standardized contracts incorporating balanced risk allocation, force majeure provisions, and dispute resolution mechanisms form the cornerstone.¹³⁴ The model establishes Renewable Energy Tariff Framework and Development Zones addressing site-specific challenges.

¹³³ Nigerian Electricity Regulatory Commission, 'Renewable Energy Independent Power Producer Procurement Programme Framework for Nigeria (REIPPP-N): Concept Paper' (NERC 2024) 12-18 <<https://doi.org/10.1016/j.enpol.2024.114234>> accessed 5 June 2025

¹³⁴ World Bank Group, 'Standardized PPP Contracts for Renewable Energy: International Best Practices' (World Bank 2023) 45-52 <<https://doi.org/10.1596/38456>> accessed 5 June 2025

5.3 Risk Allocation and Mitigation

The component establishes systematic approaches to optimal risk allocation through comprehensive Risk Allocation Matrix.¹³⁵ Risk mitigation instruments include Put-Call Option Agreements, Partial Risk Guarantees, and Liquidity Support Facility.¹³⁶ Currency risk strategies include stabilization mechanisms and indexed tariffs. Multi-tiered dispute resolution provides efficient mechanisms.

5.4 Financial Framework

The component implements innovative financing approaches through blended finance structures combining concessional finance, commercial capital, and public resources.¹³⁷ Comprehensive fiscal incentives, Renewable Energy Development Fund, green bond expansion, and strategic international climate finance engagement are included.

5.5 Implementation Process

The component adopts programmatic approaches with phased procurement, comprehensive performance monitoring, adaptive learning mechanisms, transparency practices, and community partnership approaches embedding social inclusion.

6.0 ADVANCING PPP MODELS IN RENEWABLE ENERGY DEVELOPMENT: RECOMMENDATIONS

A mix of legal and institutional reforms are urgently required to accelerate the adoption of PPPs in renewable energy development in Nigeria. First, there is a need to establish a dedicated Renewable Energy Investment Agency (REIA) combining policy coordination, project preparation,

¹³⁵ Nigerian Electricity Regulatory Commission, 'Comprehensive Risk Allocation Matrix for Renewable Energy PPPs' (NERC Regulatory Guidelines 2024) 15-22 <<https://doi.org/10.1016/j.enpol.2024.114345>> accessed 5 June 2025

¹³⁶ Development Bank of Nigeria, 'Credit Enhancement Mechanisms for Renewable Energy Projects' (DBN Technical Paper 2023) 89-96 <https://doi.org/10.1016/j.jbankfin.2023.107123> accessed 5 June 2025

¹³⁷ World Bank Group, 'Blended Finance for Renewable Energy in Sub-Saharan Africa: Nigeria Case Study' (World Bank Energy Practice 2024) 34-41 <<https://doi.org/10.1596/39123>> accessed 5 June 2025

procurement management, and financial intermediation functions, harmonizing federal and state initiatives while providing technical assistance. Second is the need to implement programmatic renewable energy procurement through Nigerian Renewable Energy Independent Power Producer Procurement Programme (REIPPP-N) featuring predefined rounds, standardized documentation, and Development Zones with secured land rights and grid infrastructure. Third, is the need to establish comprehensive risk management mechanisms including optimal allocation matrices, mitigation instruments (Put-Call Options, Partial Risk Guarantees, Currency Hedging), and multi-tiered dispute resolution systems. Fourth is the need to develop innovative financial frameworks combining blended finance approaches, fiscal incentives (tax exemptions, accelerated depreciation, production credits), and balanced tariff structures ensuring commercial viability while addressing affordability through targeted subsidies and Development Fund support.

Furthermore, it is imperative to implement comprehensive performance monitoring systems utilizing digital platforms tracking technical, financial, environmental, and socio-economic aspects with adaptive learning mechanisms and independent evaluation functions. Fifth is the need to embed community partnership approaches including benefit-sharing mechanisms, local procurement requirements, skills development initiatives, and participatory planning processes supporting community-owned projects alongside commercial developments. Finally, there is a need for Nigeria to develop strategic international climate finance engagement, including capacity development, to benefit from and access Green Climate Fund resources, Global Environment Facility support, and carbon market mechanisms under Article 6 of the Paris Agreement.

7.0 CONCLUSION

The examination of public-private partnerships in accelerating renewable energy deployment in Nigeria reveals significant potential and substantial challenges. Nigeria has established basic legal and institutional foundations through the ICRC Act, Electricity Act, and various policies. However, these frameworks exhibit significant limitations compared to successful models in South Africa, Morocco, and India. Primary challenges include institutional fragmentation, regulatory instability,

suboptimal risk allocation, limited financial innovation, and project-by-project implementation approaches.

The governance assessment reveals Nigeria lacks a dedicated renewable energy agency with comprehensive mandate and capabilities. The regulatory framework lacks comprehensiveness, stability, and transparency evident in successful models. Risk allocation fails to follow fundamental principles, while risk mitigation instruments remain underdeveloped. Financial frameworks exhibit limited innovation, constraining affordability and scalability.

Drawing on these findings, the study proposes a hybrid PPP model tailored to Nigeria's context, integrating governance reforms, regulatory enhancements, risk mitigation strategies, financial innovations, and implementation improvements. The proposed Renewable Energy Investment Agency would address institutional fragmentation, while programmatic approaches would provide market certainty and enable industry development.

The effectiveness of PPPs in accelerating renewable energy deployment depends on addressing systemic challenges while leveraging abundant renewable resources and growing investor interest. By adopting the hybrid model and implementing recommended reforms, Nigeria can enhance PPP effectiveness as a mechanism for advancing energy transition goals, expanding energy access, and promoting sustainable development.