# Assessment of Renewable Electricity Policy for Sustainable Electricity Generation in Nigeria

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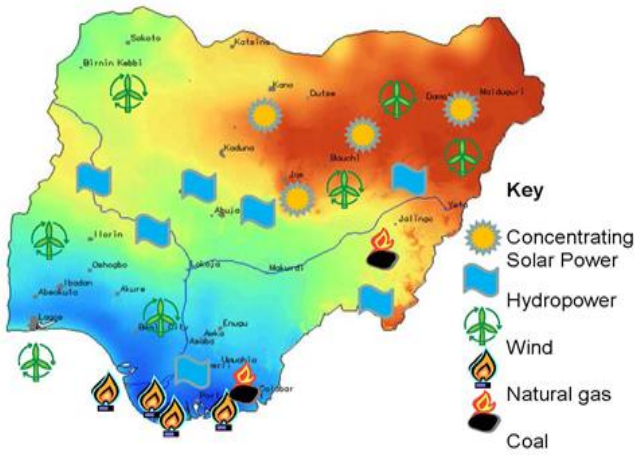
## Key Messages

- Renewable energy policy has little effect in facilitating renewable electricity integration in Nigeria due to lack of political will and its adverse effect evident in the non-implementation of incentives like feed-in-tariffs and a zero import duty waiver.
- Increased fossil fuel consumption impedes the deployment of renewable electricity in Nigeria due to hydrocarbon endowment and its subsidization.
- Domestic financial market development in Nigeria does not support the deployment of renewable electricity that requires long-term finance.




Geographic Distribution of Nigeria's Energy Portfolio [1]

## Introduction

Nigeria's non-renewable energy, which constitutes about 80% of the total electricity generation, is finite [1] and significantly contributes to the environmental footprint [2]. Active policies could moderate the underlying political economy of renewable electricity integration. Thus, it is necessary to identify the extent to which renewable policy facilitates renewable electricity integration for sustainability.

In 2015, Nigeria enacted a National Renewable Energy and Energy Efficiency Policy (NREEEP) to strengthen electricity security and system resilience, increase access, and mitigate climate change. The policy commits to adding about 8,188 Megawatts (MW) and 23,135 MW of renewable energy by 2020 and 2030 respectively (**Figure 1**). By 2019 the total renewable electricity capacity of 2,152 MW was 74% less than the 2020 medium-term projection of 8,188MW [3, 4].[1]

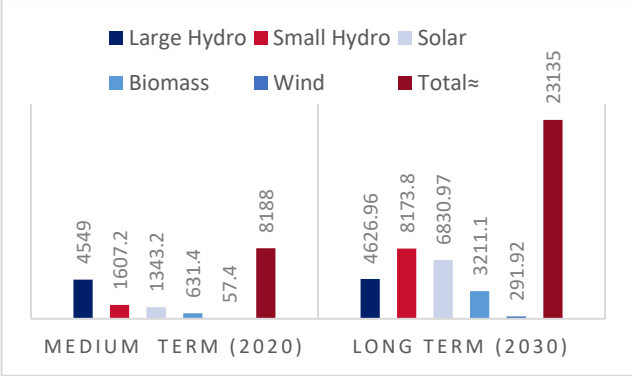



Figure 1: Summary of 2015 NREEEP Targets [5]

Although renewable energy has great potential to limit the effect of vulnerabilities associated with fossil fuel consumption, Nigeria may face challenges with its energy transition due to the inertia of the legacy system and institutional framework of fossil fuel consumption. Thus, this brief examines

[1] This calculation is on on-grid renewable electricity installed capacity due to the unavailability of uniform official data on off-grid renewables.

the extent of the 2015 policy's impact on renewable electricity generation integration in Nigeria. To achieve this, the study investigates the factors that determine renewable electricity adoption. Beyond policy, socio-economic factors also promote the integration of renewable electricity, as identified in the literature [6, 7, 8]. A combination of these factors influences the adoption of electricity generation from renewable sources in the short term to long term.

The study adopts an Autoregressive Distributed Lag (ARDL) econometric methodology, a parametric method for performing a time-series analysis for a small number of data observations and stationary or series of different integration orders. The technique can reveal the pattern of relationship between variables of interest. In this study, the variables of interest are renewable electricity generation and its determinants: renewable electricity policy (NREEEP), trade openness, fossil-fuel consumption, carbon emission, per capita Gross Domestic Product (GDP), financial development, and Foreign Direct Investment (FDI) with a data span from 1990 to 2019[2]. The analysis was limited to hydroelectric power due to the paucity of data on renewables like wind and solar energy. Thus, megawatts of electricity generation from hydro sources is a proxy for renewable electricity generation. Besides, the ARDL approach is appropriate for estimating and identifying the short to long-term drivers and barriers of renewable electricity adoption proposed in this brief [9, 10]. Hence, the outcome from the study indicates the role of policy, among other factors, on renewable electricity generation adoption in Nigeria.

Including the introduction, the brief also presents preliminary findings from the study and recommends strategies for scaling up renewable electricity integration for sustainability.

## What Determines Renewable Electricity Generation Integration?

Results in Table 1 are preliminary findings from the ARDL analysis. The result has its limitation and may be affected by looking at hydropower only, rather than a wide range of renewables. However, all variables selected are significant determinants of renewable electricity generation, except the level of economic development measured by per capita GDP. The factors are either barriers or drivers of renewable electricity generation deployment depending on whether the variables have a negative or positive relationship.

| **Dependent Variable:** Renewable Electricity Generation | |
|---|---|
| | Coefficient |
| Renewable Electricity Policy | -0.14* |
| Fossil Fuel Consumption | -2.30*** |
| Carbon Emission | -0.18* |
| Financial Development | -0.58** |
| FDI | -0.06* |
| Trade Openness | 1.09* |

Table 1: Determinants of Renewable Electricity Generation Integration in Nigeria. Note: *, **, and *** are 1%, 5%, and 10% level of statistical significance, respectively.[3]

- **Renewable Electricity Policy.** The results show that policy has little effect on the deployment of renewable electricity generation. Policy should accelerate the deployment of renewable electricity generation, but lack of political will and its adverse effect limits its impact in stimulating the integration of renewable electricity generation. Herein, aggregate renewable policy (NREEEP) represents political will since Nigeria's specific renewable electricity policy, including incentives/subsidies, only exists on paper [11, 12]. This result corroborates the assertion that fossil-fuel endowed countries experience low clean energy transition due to weak institutions and regulatory framework [13] and the favourable investment climate for fossil fuel [14].
- **Fossil Fuel Consumption.** Fossil fuel consumption, also known as the fossil fuel lobby effect, impedes renewable electricity deployment, evidenced by the negative relationship. The impact of the fossil fuel lobby is associated with the rich deposit of fossil fuel resources in Nigeria. Besides, the outcome is supportive of the carbon curse fallacy, whereby fossil fuels are viewed favourable as a result of continuous subsidization of fossil fuel and the ease of hydrocarbon access.
- **Carbon Emission.** The relationship between emission and renewable electricity generation suggests that the renewable electricity deployment rate is minimal despite rising emissions.

[2] The dataset selected is available from the World Bank, World Development Indicator, and U.S. Energy Information Administration, except for the political factor, 2015 NREEEP, measured by a dummy variable of 0 and 1. A dummy variable of 1 if renewable electricity policy is enacted in a given year and 0 otherwise, implying that the 2015 NREEEP is categorical data.

[3] The magnitude of the coefficients indicates the percentage (rate) at which the variables explain renewable electricity deployment. The statistical significance levels indicate how strong the coefficients affect renewable electricity generation, with 1% representing the strongest and 10% the weakest.

Usually, the need for emission control stimulates measures like the deployment of renewables; this situation may not hold for an energy-poor country like Nigeria as the need for increased electricity access and economic development outweighs carbon reduction plans. Thus, this outcome questions the credibility of Nigeria's climate plan for a low-carbon economy.

- **Financial Development**. Financial market development is another barrier to renewable electricity technologies integration. This result indicates the negative relationship between financial market development and renewable electricity generation. Possibly, the risk factors associated with green technologies remain high in niche markets, like Nigeria, where policy-induced mechanisms are to support investment under-recovery.[4] Loan facilities in local financial markets are short-term. They are also ineffective in attracting renewable electricity investment that usually requires long-term financing due to the long gestation period.
- **FDI.** Foreign direct investment may not enhance renewable electricity generation technology adoption due to its negative effect. In an environment marred with weak institutions and regulatory frameworks, risk and uncertainty are commonplace, thus inhibiting investments in green technologies.
- **Trade Openness.** A market that supports open trade tends to drive the integration of renewable electricity generation technology. An increase in the level of trade openness accelerates the penetration of renewable electricity technology adoption in Nigeria. The significant positive impact suggests that a trade open market encourages green technology deployment. This outcome conforms to other empirical literature elsewhere [15, 3].

## Recommendations

Nigeria has shown increased commitment towards the development of renewables for electricity generation-mix by enacting the 2015 National Renewable Energy and Energy Efficiency Policy (NREEEP). Renewable electricity generation integration lags behind projection as **policy makes no significant dent in renewable energy development in Nigeria**.

The implementation and possible review of government support mechanisms are necessary to fast-track the integration of renewables for sustainable electricity generation. Specific strategies include:

- A political will for Nigeria's renewable electricity policy implementation and its effective integration for sustainable electricity generation.
- A total removal of fossil fuel subsidy to lessen non-renewable energy consumption and promotes renewable electricity integration.
- Provide a partial loan guarantee scheme as a security for financial institution loans for renewable electricity projects. This strategy could limit any form of risk associated with renewable equity financing and its deployment since Nigeria's financial market is not fully developed to support large-scale renewable electricity projects.

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[4] Under-recovery is the difference between the required energy price and the actual selling price. It indicates a possible loss in revenue.

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## Notes

**Climate Compatible Growth (CCG) programme:** CCG is funded by the UK's Foreign Development and Commonwealth Office (FCDO) to support investment in sustainable energy and transport systems to meet development priorities in the Global South.

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