

# A Critical Review of Nigerian Electricity Policies between 2001 and 2020

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**Abstract**—Like many developing nations, Nigeria has experienced prolonged electricity supply shortages for decades. As a result, the government has implemented various policies and reforms to address the issue, including privatisation, unbundling, and tariff adjustments. This paper critically reviews Nigeria's electricity policies, highlighting its strengths and weaknesses. The study adopts a mixed-method approach, combining a review of relevant literature, official documents, and interviews with experts in the field. The findings suggest that while some policies have had positive impacts, others have failed to address critical challenges in the sector.

Although progress has been made in improving electricity access and supply, much remains to ensure a sustainable and reliable electricity supply in Nigeria. The paper concludes by highlighting some key policy recommendations that could help overcome the sector's challenges.

**Keywords**—Nigeria, Electricity, Policies, Renewable Energy

## I. INTRODUCTION

Nigeria is the most populous country in Africa, with an estimated population of over 200 million. Despite being a major oil-producing country, Nigeria faces significant electricity challenges, with chronic power shortages, inadequate infrastructure, and electricity tariffs that are not cost reflective. These challenges contributed to hindering economic growth and development and led to a proliferation of alternative energy sources, such as diesel generators [1].

Eighty-five million Nigerians lack access to the electrical grid. This constitutes 43 percent of the country's population and makes Nigeria the world's biggest electricity access deficit. The lack of consistent power seriously hinders individuals and businesses, resulting in estimated yearly economic losses of \$26.2 billion (10.1 trillion), or almost 2% of GDP. According to the World Bank's 2020 report on the Ease of Doing Business, Nigeria ranks 171 out of 190 countries regarding access to power, which is seen as one of the most significant obstacles for the private sector [2].

The Nigerian government has implemented various policies to address these challenges, including privatisation, tariff, and regulatory reforms. This paper critically reviews the effectiveness of these policies and highlights the key challenges and opportunities facing the sector.

The availability of electricity is essential for economic growth and development. However, in Nigeria, the power sector has been plagued with challenges that have hindered the provision of adequate electricity supply to meet the growing demand of its population. As a result, Nigeria's electricity policies have undergone significant changes over the years as it has sought to improve its energy sector and increase access to electricity for its citizens [2]-[4].

This paper reviews the Nigerian electricity policies and the challenges that have impeded its effectiveness in providing sufficient electricity supply.

## II. BACKGROUND

Nigeria's electricity sector is dominated by the state-owned Nigerian Electricity Regulatory Commission (NERC), which oversees the regulation of the industry. The country's power sector has been characterised by low electricity generation capacity and inadequate transmission and distribution infrastructure, leading to frequent power outages and a lack of access to electricity for the population. The Nigerian government has implemented several policies to address these issues [5] [4], [6] .

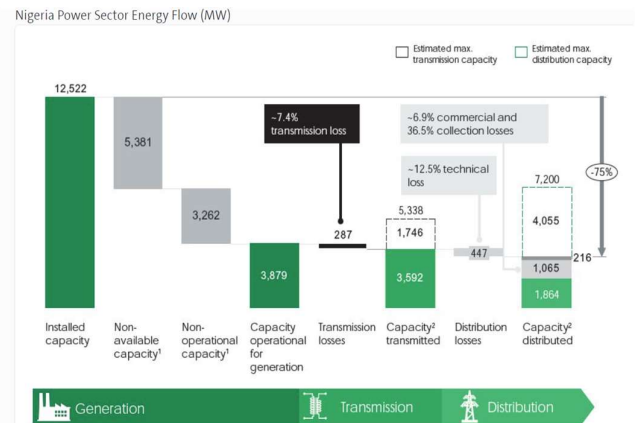


Fig. 1. Figure 1 Nigeria's Installed capacity, supply, and losses across the Power chain. Source: [7]

The first electricity was produced in the nation in 1896 with the construction of two power plants in the Lagos colony. The Nigerian Electricity Supply Company, the first electric utility company, was founded in 1929. The most popular commercial energy sources right now are hydropower, steam, and gas turbines. As shown in Table 1, the presence of electricity continues to be an important factor in the location of industries and a powerful accelerator of social development [8].

By amending the ESPRA Act, Nigeria had hoped to increase its overall generating capacity to 40,000MW by 2020. Unfortunately, this goal was not accomplished [9]. The lack of new capacity for the national system and all power plants, as well as lower investments in the public power sector during the 1990s, are to blame for Nigeria's electricity problems. As a result, by the turn of the century, the discrepancy between available capacity and actual generation had grown considerably [10]. As a result, Nigeria's consistent and reliable energy supply is still a cause for concern.

TABLE I. TABLE 1: NIGERIA'S POPULATION, INSTALLED AND AVAILABLE POWER GENERATION.

Year	Population (Million)	Installed capacity (MW)	Available power (MW)
1980	73.7	2507	783
1985	83.9	4192	1133
1990	95.6	4548	1537
1995	108	4548	1810
2000	122.9	5580	1738
2005	139.6	6538	2494
2010	159.7	6904	3358
2014	177	8876	3795
2018	190	12,522	4000

Source [11] and [12]

Table 1 demonstrates that as Nigeria's population grows over time, the difference between installed capacity and available power widens. This study looks at how the country's resources can be used to address this issue with regard to electricity policies.

The Nigerian government's policies have not been adequately implemented due to several factors, including a lack of political will, institutional weaknesses, and corruption [13] [3], [14]. As a result, the privatisation of the distribution companies has not yielded the desired results, as the companies have been unable to improve the electricity supply to customers [14]. In addition, the government's policies have not focused enough on developing renewable energy sources and energy efficiency measures, which could improve the electricity supply and reduce the environmental impact of energy generation [6], [15].

This study critically examines includes the following policies:

- National Electric Power Policy (NEPP), 2001
- National Energy Policy (NEP), 2003
- National Power Sector Reform Act (EPSRA), 2005
- Renewable Energy Master Plan (REMP) 2005
- Renewable Electricity Policy Guidelines (REPG), 2006
- Multi-Year Tariff Order (MYTO I), 2008
- Multi-Year Tariff Order (MYTO II), 2012
- Nigerian Electricity Regulatory Commission Mini-Grid Regulation, 2016

- Rural Electrification Strategy and Implementation Plan (RESIP), 2016

#### A. Electricity policies

1) National Electric Power Policy (NEPP), 2001 - This marks the first step in the electricity sector reform. The NEPP defined three stages of achieving the reformation of the power sector. The first step was the privatisation of NEPA and introducing the Integrated Power Producers (IPPs) of electricity [15].

2) National Energy Policy (NEP), 2003 - The policy's primary goal is to create energy security through a robust combination of energy sources, thus resulting in sustainable development and environmental conservation. The NEP also promotes off-grid and standalone systems to supply electricity to remote areas of the country, thus improving rural electrification [15].

3) National Power Sector Reform Act (EPSRA), 2005 - This act was established to liberalise the Nigerian power sector by providing a new legal and regulatory framework resulting in the unbundling and privatisation of the power sector. It was intended to introduce competition in the electricity market, enhance rural electrification, develop performance standards and protect consumer rights [15].

4) Renewable Energy Master Plan (REMP) 2005 - This plan sets out a road map for increasing the renewable energy role in achieving sustainable development in Nigeria and points out the need for incorporating renewables in buildings, electricity and off-grid electrical systems. Furthermore, it emphasises the significance of solar power in the country's energy mix [15].

5) Renewable Electricity Policy Guidelines (REPG), 2006 - This policy mandated the FGN to expand electricity generation in the country from renewable energy sources to at least 5% of the total electricity generated and a minimum of 5 TWh of the electricity generation in the country by 2016 [15]. RE is considered to extend electricity services to areas not yet connected to supply sources and presents the government's plans, policies, strategies and goals for promoting renewables in the Nigerian power sector [15].

6) Multi-Year Tariff Order (MYTO I), 2008 - The MYTO 1 was developed as a fifteen-year roadmap towards cost-reflective tariffs. The first two stages, 2008-2011 and 2012-2017, were intended to retain low consumer prices through a gradual price increase. The final regime is intended to deliver the necessary incentives to operate and maintain electricity infrastructure for power producers and investors [15].

7) Multi-Year Tariff Order (MYTO II), 2012 - The MYTO 2 included some enhancements and was intended to review the retail tariff in MYTO 2 bi-annually. As a result, amendments may be made for all electricity generated at wholesale contract prices, adjusted for the Nigerian inflation rate, daily generation capacity, US\$ exchange rate, and accompanying actual CapEx and OpEx requirements that will change from those used in the previous tariff calculation [15], [16].

8) Nigerian Electricity Regulatory Commission Mini-Grid Regulation, 2016 - The Mini-Grid regulation was

adopted in 2016 to regulate a mini-grid sector and design a suitable environment for further investments to speed up the nation's electrification process. In this document, a mini grid is described as a system capable of generating electricity with its power with a generation capacity between 0 kW and 1MW and supplying power to more than one customer [15], [16].

9) Rural Electrification Strategy and Implementation Plan (RESIP), 2016 - The RESIP defines a roadmap for expanding access to electricity rapidly and cost-effectively in rural areas of the country. It considers utilising on-grid, off-grid and standalone systems for electricity supply with subsidies focused on expanding access rather than on consumption [15]. For papers with less than six authors: To change the default, adjust the template as follows.

### III. NIGERIAN ELECTRICITY POLICY ANALYSIS

Several studies have evaluated the effectiveness of Nigerian electricity policies. For example, Okoro and Eze (2017) reviewed Nigeria's power sector reforms. They concluded that despite the government's efforts to increase the electricity supply, the sector still faces several challenges, including a lack of investment, inadequate infrastructure, and institutional weaknesses. Similarly, Adeoti et al. (2019) examined the impact of privatisation on Nigeria's electricity industry. They concluded that although privatisation improved the sector's efficiency, the distribution companies have been unable to meet the electricity demand of the population. The issues with the policies for electricity generation and supply from the literature review can be classed under four main groups: infrastructure, investment, energy source and expertise.

#### A. Infrastructure

Ajayi 2013, Edomah, Foulds et al. 2017, Ikeme, Ebohon 2005 state that a primary reason for the gap between generation and supply is the state of the electricity infrastructure in Nigeria. Lin, Ankrah 2019, and Dada 2014 add that other factors that cause many power plants to generate well below the installed capacity include the frequent shortage of natural gas supply, low maintenance culture of electricity facilities, shutting down of gas plants for maintenance, vandalism or theft of power equipment and gas pipeline, and shortage of water in the dams. Akuru, Onukwube et al. 2017 posit that government monopoly, corruption and unprofessionalism have contributed to wheeling losses of more than 20%, and corruption and lack of maintenance have contributed to widening the gap between demand and supply.

#### B. Investment

According to GIZ 2015, diminished investment in Nigeria from the early 1990s is a primary cause for the current state of the national grid and the fleet of power stations in Nigeria. Akuru, Onukwube et al. 2017 posit that even though the Nigerian government has made considerable investments in the power sector in the recent past, about US\$16 billion was spent on revamping the electricity sector between 1999 to 2017, there is still an issue with electricity generation and supply leading to Nigerian spending an estimated sum of US\$4.65 billion annually on fuel to electric power generators, and this is apart from an estimated US\$2.04 billion spent by industries to fuel generating set [17]. Edomah 2020 argues that whilst we have challenges with investments, opportunities to build power plants that produce electricity through the

several energy resources available in Nigeria have led to the entry of global players, thus motivating investors. In Iyke 2015, the main conclusion of his findings is that electricity consumption is a fundamental driver of economic growth in the Nigerian context [18].

#### C. Energy sources

Regarding energy sources, many studies have confirmed the vast energy resource available for electricity generation, including renewable and non-renewable sources. Ebohon 1992 states that "shortages in commercial energy (gas, fuel oil, electricity and kerosene) supplies have become increasingly marked in Nigeria, and incessant power failures have graphically illustrated this" [19]. This was the case in 1992 and sadly remains the case currently. Ikeme, Ebohon 2005 and Edomah 2020 highlight that Nigeria has several energy resources which are either not currently well explored or not utilised and have called for a more diversified energy mix in the power sector. Emodi and Boo 2015 posit that the country's high reliance on conventional energy resources is due to the lack of effective policies and poor participation by the government in clean energy development. The development of sustainable clean, modern energy remains a challenge due to. The study suggests that the problems in the Nigerian power sector can be resolved if adequate policies are implemented to attract investors in renewable energy to Nigeria. Akuru, Onukwube et al. 2017 argue that the reason that the issue remains even after the huge investments made to revive the power sector is due to the continued outlook in fossil-generated electricity and go on to posit that Nigeria to divert its attention elsewhere vis-à-vis renewable energy, rather than the high dependence on fossil fuel, and propose a framework for moving towards 100% renewable energy soon. Lin and Ankrah 2019 propose a more reasonable solution to drive Nigeria's economic and industrialisation goals [20]. This policy will focus on electricity efficiently generated by non-renewable energy in the interim. At the same time, it maintains a roadmap of progressively converting to renewable power in the long term. The various electrical production options available in Nigeria are shown in Table 2.

TABLE II. RENEWABLE ENERGY POTENTIAL IN NIGERIA

Resource	Energy Potentials
Hydropower (large scale)	11,000 MW
Hydropower (small scale)	3500 MW
Wood fuel	43.1 billion tons/year
Animal waste	61 million tons/year
Crop residue	83 million tons/year
Solar radiation	3.5–7.0 kWh/m <sup>2</sup> /day
Wind speed	2–4 m/s (annual average) at 10 m height

Source: [11]

#### D. Expertise

Dada 2014 posits that one of the causes of the issues in the Nigerian power sector is inadequate human capital to maintain the various units of the existing infrastructure [21]. This situation is predicted to deteriorate with the adoption of new technologies if nothing is done to address this trend. According to Edomah 2020, challenges within the expertise context is visible in the following ways: non-professional actors appointed as energy ministers, employing a legal professional without the knowledge or understanding of the power sector to prepare and draft the policies, disregarding

contributions of experts involved in the previous development of the Nigerian power sector, leading to the sale of power plants and other infrastructure to parties that do not understand the changing aspects of the power sector, improper audits of the electrical infrastructure before the sale and inconsistent direction in electrical power sector policy [22]. Dada 2014 calls for the necessity to build indigenous human and manufacturing capacities, which will require investment by the government and industrial sector to support education programs in Nigeria.

#### IV. RESEARCH METHODOLOGY

In this study, a mixed-method technique was adopted to combine data and advance knowledge more significantly than any one model could do alone [23]. After carefully reviewing the literature and the pertinent policies, various professionals from the Nigerian power sector were selected to participate in the survey using a purposeful sampling method.

This study's first step was to conduct a critical literature review of electricity policy proposals to determine how they affected Nigeria's electrification. In a study of nine electrical policies created from 2001 to 2020, survey respondents were asked to identify which policies contributed to rising electric power generation and supply.

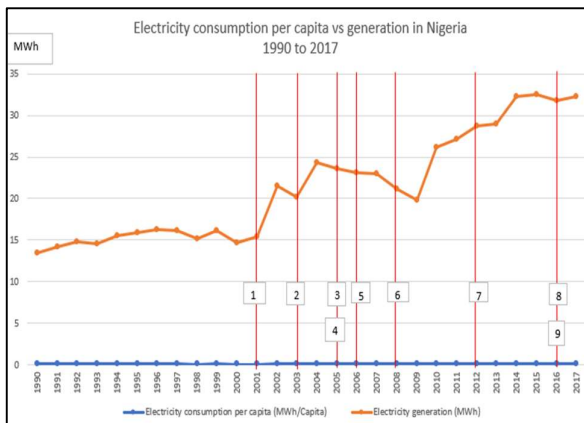


Fig. 2. Comparison of Electricity generation, supply and policy launch in Nigeria [24]

Figure 2 displays the dates between 1990 and 2017 when the relevant policies regarding electricity generation were implemented. It should be noted that the generation peaked around 2001, which is when the first policy covered by this study was released. The purpose of the survey was to determine how the nine policies affected the generation and supply of electricity across the country.

After carefully reviewing the literature and Nigerian power policies, professionals from the Nigerian electricity sector were selected to participate in the survey using a purposeful sampling method. As a result, 78 experts with in-depth knowledge and expertise in the industry took part in the research. Quantitative analysis was used to validate and prioritise the survey results. The Likert-scale questions on a survey of multiple-choice questions were distributed to the participants using JISC surveys.

#### V. RESIP AND MINI-GRID REGULATION POLICIES

The survey showed that the RESIP and Mini-Grid Regulation policies provided the most contribution within the relevant timeframe, as shown in Figure 3. The Pareto chart shows that more than 80% of the improvements were associated with developing these policies.

The Mini-Grid policy was passed in 2016 to govern a sector of mini-grids and provide a favourable setting for future investments to accelerate the nation's electrification roadmap. A mini grid is defined in this article as a structure able to generate electric power ranging from 0 kW to 1MW and delivers electricity to two or more consumers. The RESIP establishes a road plan for promptly and cost-effectively increasing access to electricity in rural sections of Nigeria. It recommends employing off-grid, on-grid, and independent power delivery techniques with incentives to boost access rather than consumption [15], [25]

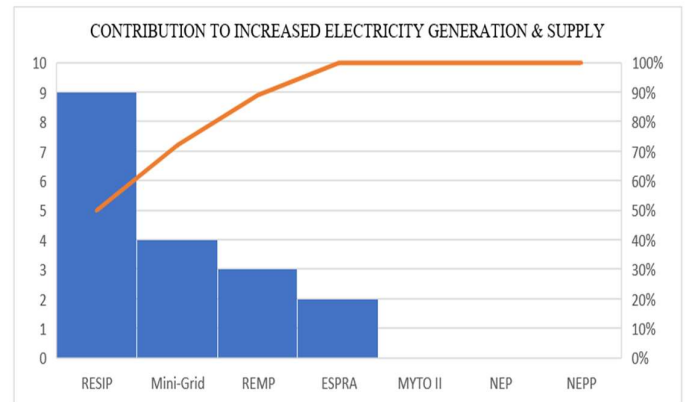


Fig. 3. Comparison of policy contributions to electricity generation and supply in Nigeria

Researchers examined five factors in this study to determine how each policy affected Nigeria's electricity supply and generation: Off-grid and rural areas should be further electrified, a competitive electricity market should be established and regulated, attractive investment opportunities should be made available, the energy mix should be increased, and finally, the entire value chain should be encouraged to participate more. Figure 4 shows that the policies that addressed an increase in off-grid and rural electrification were the ones that performed the best. Future policies should therefore favour off-grid and rural electrification, especially in regions not connected to the national grid.

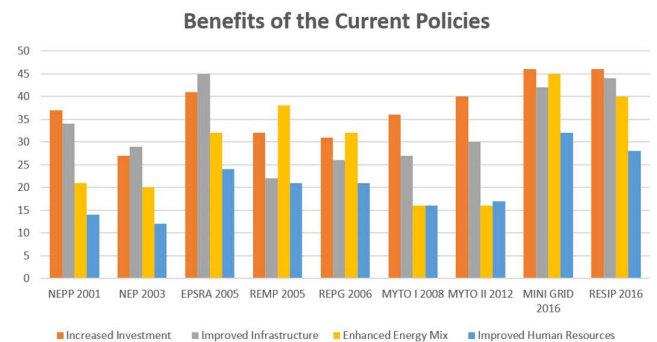


Fig. 4. How the policies contributed to electricity generation and supply in Nigeria



The survey participants were asked to comment on steps that could be taken to ensure that the current and future electricity policies in Nigeria effectively reduce and eventually eliminate energy poverty in the country. The responses were coded using the tree diagram in Figure 5 shows a frequency chart that we created based on the study results. 21% of the participants proposed creating attractive investment opportunities and involving subject matter experts and participants from the entire value chain, 15% suggested encouraging the implementation of existing policies, 13% posited supporting the enhancement of the regulation of the power sector, 10% asked to increase rural and off-grid electrification, 8% proposed localising future policy designs, 5% suggested utilising more energy sources than is present in the current energy mix, and to encourage the political will to implement the existing policies, finally, 3% recommended the development of the relevant skills to the people that are resident in the affected regions [25].

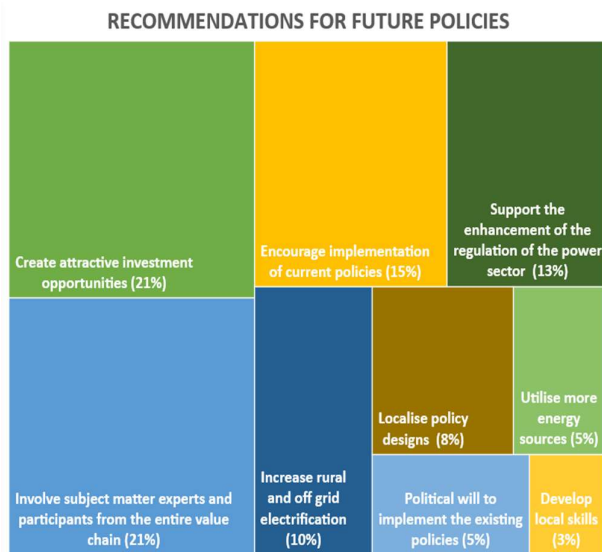


Fig. 5. Survey results on ways to improve future electricity policies in Nigeria

## VI. DISCUSSION

### A. Privatisation

The privatisation of electricity utility companies has been debated for many years. The argument for privatisation is that it leads to increased efficiency and reduced costs, while the argument against it is that it can lead to higher prices and reduced access for low-income households. Studies have shown the benefits of privatisation to include increased efficiency (World Bank 2019a), improved service quality [26] and reduced costs [27]. On the other hand, studies have shown that the disbenefits of privatisation could include higher prices, reduced access for low-income households and loss of control [27], [28].

The Nigerian government implemented a comprehensive power sector reform program in 2005, which aimed to privatise the generation and distribution sectors of the electricity industry. Privatisation was intended to attract private investment, improve the sector's efficiency, and increase electricity access and supply. However, the privatisation process has been marred by corruption, lack of transparency, and inadequate regulation. The result has been a

slow and uneven improvement in electricity access and supply, with many consumers still relying on diesel generators. In addition, the high cost of electricity tariffs has been a significant challenge for consumers.

### B. Tariff Reforms

The Nigerian government has implemented various tariff reforms to reduce the cost of electricity and improve access. However, these reforms have been met with resistance from consumers, who have protested against the high cost of electricity tariffs. The government has also struggled to implement the reforms effectively, with some electricity distribution companies failing to pass on the cost reductions to consumers. The result has been a slow and uneven reduction in electricity tariffs, with many consumers still unable to afford the high tariffs.

More recently, in 2020, the Nigerian government launched the National Mass Metering Program (NMMP), which aims to provide electricity meters to all electricity consumers in the country to improve billing accuracy and reduce revenue losses for electricity distribution companies [29].

Despite these policy initiatives, Nigeria still faces significant challenges in its electricity sector, including inadequate infrastructure, high energy losses, and low levels of access to electricity in rural areas. The government continues to work towards addressing these challenges and achieving its energy goals [1], [5], [24].

### C. Regulatory Reforms

The Nigerian Electricity Regulatory Commission (NERC) was established in 2005 to regulate the electricity industry and promote competition. However, the regulator has been criticised for being ineffective, with inadequate enforcement powers and a lack of transparency. The regulator has also struggled to address the sector's challenges, including inadequate infrastructure and chronic power shortages. In addition, the regulator has been criticised for being biased towards the interests of the electricity distribution companies rather than the interests of consumers.

### D. Challenges and Opportunities

Despite the challenges facing the Nigerian electricity sector, there are also opportunities for improvement. One opportunity is the potential for renewable energy, particularly solar energy, which could provide a reliable and sustainable source of electricity for off-grid communities. Another opportunity is the potential for increased investment in the sector, particularly from foreign investors, which could provide the necessary capital for infrastructure upgrades and modernisation [30] [1].

### E. Limitations of Study and Areas for Further Research

As this particular study focused solely on analysing the effects of the policies on Nigeria's electricity generation and supply, subsequent research might investigate how the policies have influenced Nigeria's electricity storage.

Finally, the impact of the policies between the years 2001 and 2020 was investigated in this study; however, the impact of current policies can be investigated in future studies that extend beyond this time frame.

## VII. CONCLUSION

The Nigerian electricity sector faces significant challenges, including chronic power shortages, inadequate

infrastructure, and high electricity tariffs. The government has implemented various policies to address these challenges, including privatisation, tariff, and regulatory reforms. However, these policies have been marred by a lack of transparency and inadequate regulation. Despite these challenges, there are also opportunities for improvement, including the potential for renewable energy and increased investment.

The Nigerian government must focus on developing a comprehensive and strategic plan for the sector that includes renewable energy sources, energy efficiency measures, and addressing institutional weaknesses. The government must also prioritise investments in the transmission and distribution infrastructure to improve electricity supply and meet the population's growing demand. This has been successfully implemented in countries like India.

A combination of government policies, public-private partnerships, and the adoption of innovative technologies helped India achieve 100% electrification, which has had a significant impact on improving the quality of life of people, promoting economic growth, and reducing carbon emissions [31].

India achieved 100% electrification in 2019 via the government's ambitious rural electrification program, which provided financial support to state electricity distribution companies to set up infrastructure in rural areas, electricity connections to households and promoting the use of renewable energy sources such as solar power. The government's efforts were also complemented by the private sector's investments in the power sector and the growth of decentralised renewable energy solutions such as micro-grids, which provide power to remote areas that are not connected to the main grid [31].

In conclusion, while the Nigerian government has implemented several policies to address the electricity problem in the country, there is a need for more robust governance and regulatory frameworks, more investment in infrastructure, and a concerted effort to tackle corruption in the sector. Without addressing these fundamental issues, providing Nigerians with a reliable and sustainable electricity supply cannot be achieved.

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