

T.R.
ISTANBUL SABAHATTIN ZAIM UNIVERSITY
GRADUATE EDUCATION INSTITUTE
DEPARTMENT OF ISLAMIC ECONOMICS AND FINANCE

**THE GREEN SUKUK AS A SUSTAINABLE SOLUTION
TO THE LINGERING NIGERIA ELECTRICITY
POWER SYSTEM**

Ph.D. DISSERTATION

Aisha AHMED

Istanbul

June-2024

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DECLARATION OF SCIENTIFIC ETHICS AND ORIGINALITY

This is to certify that this PhD dissertation titled “The Green Sukuk as a Sustainable Solution to the Lingering Nigeria Electricity Power System” is my own work and I have acted according to scientific ethics and academic rules while producing it. I have collected and used all information and data according to scientific ethics and guidelines on thesis writing of Sabahattin Zaim University. I have fully referenced, in both the text and bibliography, all direct and indirect quotations and all sources I have used in this work.



Aisha AHMED

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I reiterate my special thanks to Allah, for it is He Alone that has made this possible. May He make this study a beneficial one for His religion and Ummah.

Aisha AHMED

ABSTRACT

THE GREEN SUKUK AS A SUSTAINABLE SOLUTION TO THE LINGERING NIGERIA ELECTRICITY POWER SYSTEM

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The global call for clean energy through green sources of power has been the major task for international agencies such as the United Nations and even the World Bank. This has made financing for Green sources being in alignment with SDG 7, SDG 12 and SDG 13 respectively. The Green financing again aligns with Islamic Shari'ah which prioritizes developmental, community and society friendly form of financing in all its ramifications. This study is aimed at offering solution to the lingering electricity power failure in Nigeria which is proffered through the development of 3 Ijarah Green Sukuk models of financing. The study reviewed the past and present capacities of the power sector in Nigeria in terms of generation plants, transmission channel, distribution companies along with the various internal and external financing that was deployed to the sector. The discussion covered the various Sukuk issuances in the country done by both government and public sectors which all came out to be 100% successful in issuance, performance and overall impact. An evaluation of the power sector loans and their cost of servicing was also overviewed in the study, pointing out to huge financial expenditures in the power sector with low-yielding results. However, interviews were conducted for respondents in different sectors which showed their interest in paying for constant electricity power through an ethical means of financing. The Green Sukuk financing is then considered as a solution to the power sector problems in Nigeria and 3 models that are all Ijarah Sukuk models to be used by the either the federal or state governments respectively in providing solar power to their various communities and populace with the third model being Ijarah lease that ends with ownership for individualized solar system. The solar Sukuk is developed in the

form of solar farm and individualized solar system in such a way that it could be geared towards servicing individual household, manufacturers, businesses, hospitals, schools, etc. The Sukuk investment is subscribed to by investors who provide the funds to be used in development of the project of which they receive annual returns in form of rents. The issuing government which becomes the 'Lessor' registers an SPV which appoints a developer that happens to be a government agency and manufacturer of solar system to execute the project of solar farm development in model I, II and solar system installation in model III. The Lessor then pays for electricity consumption in the case of all the models, while also paying for part-ownership in the case of the individualized solar system. The returns are distributed to investors as payment of rents and part-payment for ownership of the individualized solar system. A hypothesis carried out also shows that the cost of consumption and acquisition of solar electricity is far cheaper than that of the traditional power system in the country.

Keywords: Green Sukuk Financing, Renewable Energy, Ijarah Models, Electricity Power Failure, Sustainable Development Goals

ÖZET

DEVAM EDEN NİJERYA ELEKTRİK ENERJİSİ SİSTEMİNE SÜRDÜRÜLEBİLİR BİR ÇÖZÜM OLARAK YEŞİL SUKUK

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Temiz enerji çağrısının, Birleşmiş Milletler ve Dünya Bankası gibi uluslararası kuruluşlar için büyük bir görev haline geldiği, yeşil enerji kaynaklarına olan küresel çağrı göz önünde bulundurulmaktadır. Bu durum, yeşil kaynaklar için finansmanın sırasıyla SDG 7, SDG 12 ve SDG 13 ile uyumlu olmasını sağlamıştır. Yeşil finansman, İslami Şeriat'ın tüm yönleriyle toplum odaklı, kalkınma ve toplum dostu finansman biçimlerini önceliklendirdiği ile de uyumludur. Bu çalışma, Nijerya'da devam eden elektrik enerjisi kesintilerine çözüm sunmayı amaçlamakta ve bu çözüm, üç Ijarah Yeşil Sukuk finansman modelinin geliştirilmesi yoluyla önerilmektedir. Çalışmanın ilk iki bölümü, Nijerya'daki enerji sektörünün geçmiş ve mevcut kapasitelerini; üretim tesisleri, iletim kanalları, dağıtım şirketleri ve sektöre sağlanan çeşitli iç ve dış finansmanları incelemiştir. Takip eden bölümler, hem hükümet hem de kamu sektörleri tarafından yapılan çeşitli Sukuk ihracatlarını tartışmış ve tümünün ihracat, performans ve genel etki açısından %100 başarılı olduğu sonucuna varılmıştır. Ayrıca, çalışmada enerji sektörü kredileri ve bunların hizmet maliyetleri de değerlendirilmiş, sektördeki büyük mali harcamalara rağmen düşük verim alındığı belirtilmiştir. Bununla birlikte, farklı sektörlerden katılımcılarla yapılan mülakatlar, katılımcıların etik bir finansman yoluyla sürekli elektrik enerjisi için ödeme yapmaya olan ilgisini göstermiştir. Yeşil Sukuk finansmanı, Nijerya'daki enerji sektörü sorunlarına bir çözüm olarak değerlendirilmekte ve federal veya eyalet hükümetleri tarafından çeşitli topluluklara ve nüfusa güneş enerjisi sağlamak üzere kullanılacak üç Ijarah Sukuk modeli önerilmektedir. Üçüncü model bireyselleştirilmiş güneş sistemi için mülkiyetle sonuçlanan bir Ijarah kiralama şeklindedir. Güneş Sukuk'u, bireysel hane halkı,

reticiler, iletmeler, hastaneler, okullar vb. hizmet vermek zere tasarlanmı gne iftliđi ve bireyselletirilmi gne sistemi Őeklinde gelitirilmitir. Sukuk yatırımı, projenin gelitirilmesinde kullanılacak fonları sađlayan yatırımcılar tarafından abone olunur ve bunlar kira Őeklinde yıllık getiriler alırlar. İhra eden hkmet, 'Kiraya Veren' olarak bir SPV kaydettirir ve bu SPV, model I, II ve model III'te gne iftliđi gelitirme ve gne sistemi kurulum projelerini yrtecek olan bir hkmet kurumu ve gne sistemi reticisini gelitirici olarak atar. Kiraya Veren, tm modellerde elektrik tketimi iin deme yaparken, bireyselletirilmi gne sistemi durumunda kısmi mlkiyet iin de deme yapar. Getiriler, kira demeleri ve bireyselletirilmi gne sisteminin mlkiyetinin kısmi demesi olarak yatırımcılara dađıtılır. Yapılan bir hipotez alıması, gne elektriđinin tketim ve edinim maliyetinin lkedeki geleneksel g sisteminden ok daha ucuz olduđunu gstermektedir.

Anahtar kelimeler: Yeil Sukuk Finansmanı, Yenilenebilir Enerji, İjarah Modelleri, Elektrik Kesintisi Sorunu, Srdrlebilir Kalkınma Hedefleri

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LIST OF ABBREVIATION

AAOIFI	: Accounting and Auditing Organization for Islamic Financial Institutions
AIDI	: Africa Infrastructure Development Index
ASEAN	: Association of Southeast Asian Nations
CBN	: Central Bank of Nigeria
CIBN	: Chartered Institute of Bankers in Nigeria
CO2	: Carbon dioxide
DisCos	: Distribution Companies
DMO	: Debt Management Office
DNI	: Direct Normal Irradiation
ECN	: Electricity Company of Nigeria
EOCA	: Excess Crude Oil Account
EIA	: Energy Information Administration
EPSRA	: Electricity Power Sector Reform Act
ESG	: Environmental, Social, and Governance
EXIST	: Turkish Energy Exchange Istanbul
FGN	: Federal Government of Nigeria
FRACE	: Financial Regulatory Advisory Council of Experts
GDP	: Gross Domestic Product
GenCos	: Generation Companies
GHG	: Greenhouse Gas
GWh	: Gigawatt hours
HNI	: High Net worth Individuals
IDA	: International Development Association
IEA	: International Energy Agency

IFSB	: Islamic Financial Services Board
IMF	: International Monetary Fund
IPP	: Independent Power Producers
IRENA	: International Renewable Energy Agency
ISRA	: International Shari’ah Research Academy for Islamic Finance
ITO	: International Trade Organization
KDKAPSC O	: Kaduna State Power Supply Company
KDSG	: Kaduna State Government
KM	: Kilometer
Kv	: Kilovolt
LCOE	: Levelized Cost of Electricity
LHP	: Large Hydro Power
MAP	: Meter Asset Provider
MW	: Mega Watts
MYTO	: Multi Year Tariff Order
NAICOM	: National Insurance Commission
NAPTIN	: National Power Training Institute of Nigeria
NBET	: Nigerian Bulk Electricity Trading
NBS	: National Bureau of Statistics
NDA	: Niger Dams Authority
NDIC	: Nigeria Deposit Insurance Corporation
NDPHC	: Niger Delta Power Holding Company Limited
NELMCO	: Nigeria Electricity Liability Management Company
NEMP	: National Energy Master Plan
NEMSA	: Nigeria Electricity Management Services Agency
NEMSF	: Nigeria Electricity Market Stabilization Facility

NEPA	: Nigeria Electricity Power Authority
NERC	: Nigerian Electricity Regulatory Commission
NESCO	: Nigeria Electricity Supply Company
NESI	: Nigeria Electricity Supply Industry
NEXIM	: Nigeria Export-Import Bank
NIPP	: Nigeria National Integrated Power Project
NNPC	: Nigeria National Petroleum Corporation
NPSR	: Nigeria Power Sector Reform
OECD	: Organisation for Economic Co-operation and Development
OIC	: Organisation of Islamic Cooperation
PA	: Power Africa
PACP	: Presidential Action Committee on Power
PAF	: Payment Assurance Facility
PAIF	: Power and Airline Intervention Fund
PENCOM	: Pension Commission
PFA	: Pension Fund Administrators
PHCN	: Power Holding Company of Nigeria
PMS	: Premium Motor Spirit
PPA	: Power Purchase Agreement
PPI	: Presidential Power Initiative
PPP	: Public Private Partnership
PRI	: Principles for Responsible Investment
PSR	: Power Sector Reform
PSRO	: Power Sector Recovery Operation
PSRP	: Power Sector Recovery Program
PTFP	: Presidential Task Force on Power
PWD	: Public Works Department

RE	: Renewable Energy
REA	: Rural Electrification Agency
REF	: Rural Electrification Fund
REMP	: Renewable Energy Master Plan
SDG	: Sustainable Development Goals
SEC	: Securities and Exchange Commission
SEIA	: Solar Energy Industries Association
SHP	: Small Hydro Power
SPV	: Special Purpose Vehicle
SRI	: Socially Responsible Investment
SWOT	: Strength Weaknesses Opportunities and Threats
TCN	: Transmission Company of Nigeria
TREP	: Transmission Rehabilitation and Expansion Program
UN	: United Nations
UNDP	: United Nations Development Programme
UNEP	: United Nations Environment Program
UNFCCC	: United Nations Framework on Climate Change
UNFPA	: United Nations Population Fund
USAID	: United States Agency for International Development
USDT	: United States Department of Trade
WB	: World Bank
WHO	: World Health Organisation

CHAPTER I

INTRODUCTION

1.1 Background

Nigeria is an African country that lies on the West African axis of the continent, with a population of 223.8 million people (UNFPA, 2023) and an annual growth rate of 2.7%. (UN Data 2010 – 2015). It is reported that 47% of the country's population either lack access to grid electricity, or do not have access to electricity, or totally face power black-outs intermittently. This comes after a joint report by recognized international bodies comprising of the IEA, IRENA, UN, and WHO issued that Nigeria tops the global list of countries with the highest number of people without access to electricity in the world, where the list consists of 20 countries that make up 75% of the world population living without electricity in 2021, (IEA, 2023). The repercussions for the country is an economic cost of power shortages to the tune of about \$28 Billion annually, equal to 2% of its GDP, (World Bank, 2020). Access to electricity also affects industrialization of the private sector according to the Doing Business Report (2020).

However, the Federal Government of Nigeria has been trying to cushion the increased cost of electricity through the payment of the tune of ₦1.7 Trillion Naira in the last 5 years as intervention funds to power generation companies, (The Punch, 2020:9). A high frequency of grid collapse is also experienced in the country resulting in total blackout during those periods, with the grid collapse totaling to 46 between the years 2017 to 2022, (TCN, 2023). The government also got loans and grants from organizations such as the World Bank; Power Sector Reform Operation (PSRO), African Development Bank, USAID and Power Africa; all in a bid to finance power projects. These project financing funds received by the government however, come with accompanying costs which are to be borne by the government initially and in the long run passed to the citizens. The latest of such programs is that of the World Bank titled "Nigeria to Keep the Lights on and Power the Economy" (World Bank, 2020). This is a World Bank program that gave Nigeria the sum of \$750 million as a loan through the International Development Association (IDA) to be used for the Power Sector Recovery Operation (PSRO). The program was actually aimed at increasing

availability and dependability on electricity, push continuous economic progress, and enhance transparency in the power sector of Nigeria. The PSRO was projected to secure 4500 MWh / hour to the national grid by 2022.

Nigeria for over the past 10 years is a country that relies so much on external borrowings to finance its budget deficit, thereby causing so much debt financing that adversely affects the economy, (DMO, 2020). But the country has been in the news lately as an African country that is diversifying its infrastructure financing means through tapping from the Islamic finance option of Sukuk. Nigeria has seen Sukuk issuances at the State level; Osun State Sukuk (Issued in 2013) used to finance the building of schools in the state, Federal Government of Nigeria road infrastructure finance Sukuk; Sukuk 1 (Issued in 2017), Sukuk 2 (Issued in 2018), Sukuk 3 (Issued in 2020), Federal Ministry of Finance & Family Homes Fund Sukuk for financing housing projects (Issued in 2021). With the Debt Management Office of Nigeria recently stating that it is rolling out several Sukuk Issuances to finance several other federal infrastructure projects, (DMO, 2021).

The Nigeria debt service to revenue ratio was 51% at the start of 2018, which makes it higher than that of the UK and Canada both put together in 2019. The government is therefore, seeking to increase financial inclusion and diversify its sources of funding by deepening the market for domestic securities, (DMO, 2021). The increased over-subscription of Sukuk FGN1, FGN 2, and FGN 3, especially with the increase in the number of retail investors, clearly shows the dire need of Nigerians for real securities which are ethical in nature and for investment returns. The Debt Management Office also said that it is comfortable with Sukuk as part of the Federal Government's public debt raising methods /means.

There is still a huge gap in the financing of major infrastructure in Nigeria with borrowings by the federal and also state governments growing by the day making servicing those debts very difficult and almost impossible. The country's total public debt; foreign and internal-based borrowing was N46.25 trillion (US\$103.11 billion) in the Fourth Quarter of 2022 from N44.06 trillion (US\$ 101.91 billion) in the Third Quarter of 2022. This shows that public borrowings in Naira had a 4.96% increase in the Fourth Quarter of 2022. The foreign borrowings recorded was N18.70 trillion (US\$41.69 billion) in the Fourth Quarter of 2022, while its internal borrowing status was stated at N27.55 trillion (US\$61.41billion). The percentage of foreign borrowing

liabilities to total funded borrowing was 40.44% in the Fourth Quarter of 2022, while internal (local) debt share was 59.56%. The percentage of Federal Government domestic debt was 80.62% in Q4 2022. Nigeria has not been able to make proper usage of revenues from its resources to cater for the necessities of its populace leaving so much infrastructure deficit in major areas of communications, electricity / power, ports, railway, roads, water system, among others. According to the ITO of US Department of Trade, (2018), Nigeria's infrastructure deficit is 30% of its GDP which is 70% less than the international benchmark set by the World Bank, and which also states that Nigeria needs around \$3 Trillion to reduce its infrastructure deficit. This means the country will have to spend a minimum of \$150 Billion annually. The African Infrastructure Development Index (AIDI), however, reports that although the country was able to improve in the areas of ICT, power sector, sanitation system, transportation system between 2016 to 2020, bringing the deficit to \$2.3 Trillion in 2023, there is however the need to use a huge size of its revenues from resources in improving those critical infrastructure areas in Nigeria.

This, therefore, calls for better and more sustainable options of financing at least, the basic infrastructure needs in the country to improve economic performance and impact positively on lives, productivity, GDP of the country. Aworinde & Akintoye, (2019: 15(3)) in their quest to identify the impact of institutions and infrastructure on economic growth in Nigeria embarked on an empirical study using the two as coefficients, and were able to identify that the infrastructure coefficient is remarkably not positive. This translates to the fact that communally shared infrastructure has negative effects to the growth of the economy of the country, and leads to the conclusion that monetary allocations made to cater for the infrastructural development were squandered by those entrusted with those funds; bureaucratic officers in charge or political office holders. There are several official cases of embezzlement of funds allocated for the power sector which are opened and being investigated against officials of the ministry of power, with the latest being that of the ministers who served under the previous governments and some other officials. The cases with the Economics and Financial Crimes Commission (EFCC) involve an alarming \$6 billion hydropower project funds which are unaccounted for, and now presented in court, (Premium Times, 2023:1).

1.2 International Goals and Sukuk

1.2.1 Socially Responsible Investment (SRI)

According to Sparkes, (2003:3-10), SRI was found in July 2000, by the British legislation to provide fund investors (Private Pension Fund Managers, Mutual Fund Managers, etc.) an obligation to take into cognizance non-financial factors consisting of social and environmental factors when making decisions as regards their investment policies; which must also be made public. This legislation actually defined the start of a new paradigm from the old paradigm which was based on the assertion that the aim of every investment is just the maximization of short-term financial returns, and no other factor whatsoever is considered. Pension fund administrators were mandated to have Statement of Investment Principle which must include the extent of compliance to SRI in investment selection, and the guidelines which include voting rights to an investment.

SRI stemmed from the idea of the UK political class improving their transparency, divulgence of people related issues, being mindful of the increased citizen awareness of SRI, Ethical, and Green concerns. This implies therefore, that SRI is a concept that links financial objectives to social and environmental functions. And for every investment made, it must be assessed and ensured it complies with the well-being of the environment in which it is being operated. SRI is the same as Ethical Investment because they actually have same definition, although the idea of Ethical Investor started in 1995 but was considered by investors that were interested in doing business in an ethical way, (Sparkes, 2003:13-40).

1.2.2 Sustainable Development Goals (SDGs)

According to the United Nations, the Sustainable Development Goals (SDGs) are goals taken up by the UN in 2015 and known as the Global Goals which are expected to give both the living beings and environment in the world a better sense of living by the year 2030. The SDGs entail key elements of quality life that translate to freedom to thrive, have opportunity, have money, good health, welfare, well-being, wholeness, and success. According to the United Nations Development Programme (UNDP, n.d.), the Sustainable Development Goals (SDGs) are established as a global benchmark for

countries to achieve sustainable development. The SDGs comprise seventeen main goals:

No Poverty, Zero Hunger, Good Health and Well-being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable and Clean Energy, Decent Work and Economic Growth, Industry, Innovation, and Infrastructure, Reduced Inequalities, Sustainable Cities and Communities, Responsible Production and Consumption, Climate Action, Life Below Water, Life on Land, Peace, Justice and Strong Institutions, and Partnerships for the Goals.

The whole idea of the SDGs is towards achieving peace and prosperity, which could only be through attitude, institutions, and structures that create and sustain peaceful societies.

Principles for Responsible Investment (PRI) initiative is backed by the UN, although it was formed by a group of investors aimed at ensuring all investments made by them are in strict adherence to the Environmental, Social and Corporate Governance (ESG).

The PRI has 6 principles which are:

Principle 1: The incorporation of ESG concerns into capital budgeting and administrative processes.

Principle 2: To be effective business owners and including ESG in governance guidelines and procedures.

Principle 3: They will ask the companies they invest in to provide them with the necessary ESG consideration in a view of transparency.

Principle 4: They will encourage the investment sector's adoption and use of the Principles.

Principle 5: They will collaborate in order to increase effectiveness in applying the Principles.

Principle 6: They will individually provide an update on their actions and developments in putting the Principles into practice.

The PRI was developed in 2006 by the UNEP Finance Initiative and the UN Global Compact, and offers an independent model that enables all investors to align their goals with those of society at large by integrating ESG concerns into their ownership /

investment / shareholding and implementation choices. Practically, 1,500 investment firms joined the initiative with their total assets management now exceeding US\$ 62 trillion, (UN Global Compact Report, 2006).

Also known as Impact Investing, ESG has the recognition of organizations such as the European Union, World Bank, and many major international bodies following suit. The ESG just like the SRI is a consideration for investors to be considerate of the fact that the environment, social and corporate governance are impacting positively on the society, and not just the pursuit and consideration for profits.

The idea of Green Sukuk totally conform with SDGs, ESG, SRI in the sense that in addition to Islamic finance and Sukuk being environmentally friendly, in Green Sukuk there is a strict adherence to environmental conscious financing and does not get involved in projects that violate these environment factors and disrupt human or non-human eco-system in any negative way. Structuring and applying Green Sukuk in the country's power sector project financing seems to be ideal due to the high investor consideration to ethical investment which is vividly evident in all the Sukuk issuances made so far in the country. Then also is the issue of saving the country from unnecessary debt financing burden which accompanies foreign and conventional loans which are now piled up in the sector.

1.4 Aim and Value of the Research Subject

The aim of the research is to:

- a. Assess the performance of the power sector in Nigeria in terms of power generation, transmission and distribution before and after the sector's reforms, in comparison with the various financing both budgetary allocations, borrowing, and partnerships done in the sector by both government and private organizations.
- b. Explore the solar prospects of Nigeria as a country and the extent of its usage in order to indicate its ability to be the most reliable and cheap source of power generation.
- c. Analyze the Sukuk issuances done in Nigeria by both government and private organizations to exhibit their outstanding performance in terms of acceptance by the citizens, and its way of relieving the government of borrowings at the same time giving citizens an ethical investment opportunity with an imbued infrastructure ownership culture.

- d. Develop a policy recommendation document for the government to use as a roadmap for structuring Sukuk and more appropriately, the Green Sukuk to be used in financing the power sector infrastructure projects in Nigeria. Green Sukuk being the mode of financing entails that the investors are engaging in impact investing, and at the same time promote the ESG.

1.5 Study Structure

To achieve this objective the study will begin by presenting an overview detail of the power sector and the various reforms we have had in Nigeria for a period of 20 years. Then look at the funds that were committed to the revival and management of the power sector. The most widely speculated scandalous corruption saga in Nigeria still remains that of the power sector finance that happened in between those reforms.

Then again comes the issue of privatization of the power sector in the second time which made the distribution companies clearly demarcated from the generating companies and regulatory agencies. This still did not work in solving the electricity issues in the country.

The government keeps on borrowing funds to finance the power sector, with the latest coming from the world bank in the years 2020 and 2021 to the tune of \$750 million. However, a huge proportion of the population still lives far away from seeing electricity, with no city or household in the whole of the country that could confidently be assured or guaranteed enjoying 24 hours electricity provision without interruption.

However, the Sukuk in Nigeria got accepted by all Nigerian corporate, retail and government investors, with all of the issuances been oversubscribed. And the Sukuk is globally accepted and recognized as an alternative and secured means of financing that is confirmed to be linked to real economic activities, (Aassouli & Shah, 2022:39-47). Sukuk nowadays comprises Blue Sukuk and Green Sukuk.

Defining Green Sukuk and elaborating it as a global emerging means of Sukuk that is only used to finance those activities that are strictly directly beneficial and considerable of environmental factors. The Green Sukuk is mindful of SRI and ESG, where both are so much in commonality with Islamic finance. And this therefore, makes Green Sukuk an investment that is more concerned with reducing all types of pollution in the environment and other emissions' projects that involve natural

resources used in generating renewable energy for economic and community development, and utilizing utmost energy efficiency.

The Blue Sukuk is Sukuk for the development of infrastructure of the blue economy. The Blue Economy is mainly concerned with marine development; healthy ocean, people-centered activities, ocean governance (Ramdhani, et al, 2022:123-134). It therefore relates to the environment, and by extension to SDG 13; Climate Action and SDG 14; Life below water, (UN SDGs). Blue Sukuk is ideal for countries such as Indonesia that have marine and coastal opportunities which could be used for attaining sustenance in food security

1.6 The Scope and Content of the Research

The first area of this writing is focused on the Nigerian power sector, where I will have to rely heavily on policy documents that relate to the reforms especially relating to the clean (solar) power production in the sector to ensure that I base my study on genuine theory that is highly unbiased. Data was obtained on the financing that was made directly to the sector in the last 20 years with government budget, grants and loans all inclusive. The cost of debt financing, present and projected, in the sector is another information that constitutes part of this study. The investors in the power sector are also overviewed, with consideration to the related agencies and bodies that compose the regulatory authorities in the sector.

The study encompasses Sukuk issuances in Nigeria; Osun State Sukuk, FGN Sukuk 1, 2, 3, Federal Ministry of Finance / Family Homes Fund Sukuk, Katsina State Sukuk and other Sukuk recently issued. The role played by the issuing firms; Lotus Capital and FBNQuest Merchant Bank, and the Debt Management. The evaluation of the Sukuk performance is done through semi-structured interview data and descriptive analytical approach. The investors' quest for Sukuk in Nigeria is also surveyed and looked upon in the study.

The study then does a literature review of sample global Sukuk issuances especially for power sector infrastructure; Green Sukuk issuances and specifically for solar power are also reviewed and discussed. Then the linking of such financing to the Nigerian power sector in relation to our needs and to address the ethical and risk-averting nature and investment culture of majority of Nigerian investors.

Green Sukuk is presented and aligned with conformity to SDGs, ESG, SRI, and Impact Investing. Then a proposed structure is deduced to help the government in revamping investment in the power sector through a new narration with the green Sukuk issuance to revive the power sector with renewable energy.

However, the scope of the study is limited to Nigeria as a country with aforementioned considerations put in place.

1.7 The Importance of the Topic and Its Peculiar Value

Every research on the Nigerian power sector infrastructure development is important. Especially when it is related to developing the sector in terms of increasing its output and distribution for access to individual consumption and businesses for manufacturing and production. The unique nature of this research is firstly the fact that there is no research on green Sukuk financing for the power sector, thus giving consideration to clean production and the UN SDGs, ESG, and SRI, which are the current global trend in terms of positive impact to investors, human, non-human beings, communities and the environment as a whole. These globally recognized connotations are in no doubt in total alignment with the aim of Islamic finance.

Secondly, there is also the adverse effect of the present means of financing practiced by the federal government which is foreign loans used in financing the power sector in Nigeria. The effects come in the form of bogus interests paid, the servicing of which causes unnecessary and avoidable costs to the government and people of the country.

Thirdly is an insight into the Sukuk financing in the country and confirmation of the effects those Sukuk have on the people and government; both state involved and federal government.

The research therefore, seeks to provide a well-structured means of achieving sustainable financing for the power sector infrastructure in the country using a fair and ethical means of financing which is the green Sukuk for solar energy financing, thereby using an environmentally and socially-friendly finance option known ultimately as Islamic finance.

1.8 Research Methodology

1.8.1 Introduction

This section outlines the research methodology employed in conducting a survey aimed at understanding the level of satisfaction among individual electricity consumers in Nigeria. The primary objective of the survey is to identify consumer financing preferences for electricity consumers that could be used for various purposes, including domestic, commercial, industrial, manufacturing, business, and institutional power needs.

1.8.2 Research Design

The study utilized a descriptive survey design to gather quantitative data from a diverse group of respondents across various sectors of the productive economy. This design was chosen because it allows for a comprehensive analysis of the satisfaction levels and preferences of electricity consumers.

1.8.3 Population and Sampling

The target population for this study comprised sixty (60) prospective respondents, out of which fifty-five (55) responded, yielding a response rate of 91.67%. The stratified selected samples which are the respondents groups were carefully selected from different industries and sectors to ensure a representative sample of the productive economy in Nigeria.

1.8.3a Population Breakdown

- **Bankers:** 10 respondents currently working in various banks in Nigeria, including interest and non-interest commercial banks, Nigeria Export-Import Bank (NEXIM), merchant banks, and investment banks.
- **Insurance Workers:** 10 respondents from six different insurance companies in Abuja.
- **Federal Civil Servants:** 10 respondents working in various ministries and agencies under the Federal Government of Nigeria, such as the Ministry of Works, Housing, Labour, Power, Aviation, and Agriculture.

- **State Civil Servants:** 10 respondents from five states (Kaduna, Katsina, Lagos, Sokoto, and Bauchi).
- **Market Business Owners:** 10 respondents, with nine being wholesalers and one being a retailer.
- **Industrial Company Owners:** 10 respondents involved in various manufacturing businesses, including flour milling, marble production, mattress production, electrical appliance assembly, furniture production, rice milling, food processing, and construction.

1.8.4 Data Collection Instrument

The primary data collection instrument was a structured questionnaire designed to capture respondents' satisfaction levels and preferences regarding electricity supply and financing options. The questionnaire included both closed and open-ended questions to obtain detailed and relevant data.

1.8.5 Data Collection Procedure

The survey was conducted by distributing questionnaires to the sixty (60) prospective respondents. Efforts were made to ensure that the respondents represented a broad spectrum of industries and sectors, as detailed in the population breakdown. Out of the sixty (60) distributed questionnaires, fifty-five (55) were completed and returned, resulting in a high response rate.

1.8.6 Data Analysis

The data collected from the questionnaires were analyzed using descriptive statistical methods. Frequencies and percentages were calculated to summarize the responses for each question. This analysis helped to identify key trends and patterns in the data.

1.8.7 Key Findings

- **Electricity Supply Duration:** Over 50% of respondents reported receiving less than 10 hours of electricity supply per day.
- **Electricity Supply Rating:** Over 80% of respondents rated the electricity supply as poor.

- **Satisfaction with Electricity Distribution Companies:** 90% of respondents expressed extreme dissatisfaction with the services of electricity distribution companies.
- **Reliance on Generators:** 95% of respondents relied on fuel power generators for their electricity supply.
- **Reasons for Generator Use:** 80% of respondents cited epileptic power supply as the major reason for using generators, while 15% cited the high cost of power.
- **Interest in Renewable Energy Options:** 90% of respondents showed interest in exploring different options for power supply.
- **Preferred Payment Methods:** 98% of respondents agreed to all proposed options for a sustainable means of power payment.
- **Willingness to Participate in Financing:** 100% of respondents were willing to participate in an environmentally and socially friendly financing arrangement.
- **Government Financing Considerations:** 100% of respondents considered Sukuk as the preferred financing method based on past experiences.

1.8.7a Descriptive Summary

1) Average Number of Hours of Electricity Supply per Day:

- a) Over 50% of the population get less than 10 hours of electricity supply per day.
- b) Let's assume a hypothetical population of 100 respondents for clarity.
- c) Therefore, 50 respondents receive less than 10 hours of electricity supply per day.

2) Rating of Electricity Supply in the Last Month:

- a) Over 80% of respondents rate the electricity supply as poor.
- b) Therefore, 80 respondents rate the electricity supply as poor.

3) Satisfaction with Services of Electricity Distribution Companies:

- a) 90% are extremely dissatisfied.
- b) Therefore, 90 respondents are extremely dissatisfied.

4) Means of Electricity Supply:

- a) 95% rely on fuel power generators.

- b) Therefore, 95 respondents rely on fuel power generators.
- 5) **Reason for Rampant Use of Power Generating Machines:**
 - a) 80% complain of epileptic power supply.
 - b) 15% complain of high cost of power.
 - c) Therefore, 80 respondents complain of epileptic power supply and 15 respondents complain of high cost of power.
- 6) **Interest in Renewable Energy Options through a National Program:**
 - a) 90% are interested in a different option to power supply.
 - b) Therefore, 90 respondents are interested in renewable energy options.
- 7) **Favorable Means of Payment for Sustainable Power Supply:**
 - a) 98% agree to all options on means of payment.
 - b) Therefore, 98 respondents agree to all options.
- 8) **Willingness to Participate in a Financing Arrangement:**
 - a) 100% are willing to participate in an environmentally and socially friendly financing arrangement.
 - b) Therefore, all 100 respondents are willing to participate.
- 9) **Consideration in Terms of Government Financing Initiative:**
 - a) 100% consider Sukuk as the only consideration based on past experiences.
 - b) Therefore, all 100 respondents consider Sukuk.

1.8.8 Conclusion

The survey provides valuable insights into the satisfaction levels and preferences of electricity consumers in Nigeria. The high response rate and diverse respondent pool ensure the reliability and generalizability of the findings. The results indicate a strong need for improved electricity supply, better services from electricity distribution companies, and interest in alternative and sustainable power sources. The preferences for financing options and payment methods identified in the survey could be used to guide policymakers and stakeholders in developing effective strategies to enhance electricity availability, supply and satisfaction among consumers.

1.8.9 Appendix A

A copy of the questionnaire used in the survey is included in Appendix A.

1.9 Literature Review

According to a reaffirmation study carried out by Ajenikoko, et. al., (2018:64-71), it stated that although electricity is considered to be a basic infrastructure needed by any government for industrial development, growth, productivity, economic development and enhanced lifestyle, but the Nigerian power sector had experienced failure in achieving efficiency in these provisions. Despite the deregulations and reforms carried out in the sector, there is still nothing to show as regards the development of this sector. This study also emphasized, re-iterated the issues confronting the power sector in achieving the intended efficiency to boost industrial and economic development. However, the study fails to give an in-house financing solution which would help the citizens and the country in developing an easy power generation source which is simple and of immense benefit to the society through its contributions to the development of the whole economy in providing stable electricity and also to individual investors through returns they are meant to benefit from the Sukuk issued for any Green Power project. A study by Akinbola, (2018:15-23), aimed at identifying the relationship between availability of electricity and industrial development viz-a-viz the effect of the regulations and rules of government as regards the aforementioned sector, expressed its findings to be a negative impact of such government policies made in the power sector during the period of 1981 to 2010. These impacts which are negative in the long-run affect business viability as a result of adverse industrial output. The study only viewed the relationship of power stability to industrial growth considering government policies, and failed to look at the way in which improvement could be made through a head-on solution to providing power using ethical financing and at the same time in compliance with the laws of government which is exactly what this research work is aimed at doing.

Despite huge increased borrowings by the government to finance the power sector and make it more productive, including engagements in so many partnerships, there is still yet to be achieved. The government through the Electricity Power Reform Act 2005 made some major changes in the sector with new framework and renewed priorities, also in 2010 the federal government launched a program popularly known as Nigeria Power Reform, constituted a Presidential Task Force on Power to see to the Power Sector Roadmap, (Nigeria Power Sector Reform, 2010).

Nigeria as a country has a very high potential for renewable energy, considering the opportunities in Northern and Central Nigeria which are majorly environment, weather in the form of sunshine and with power generation of solar thermal potentials of around 427,000 Mega Watts in the country, (Newsom, 2012:15-23). There is the need for a transition to renewable energy in conformity with the global trend in order to secure energy security in Nigeria, and also to counter climate change and sustainability effects, (Nwedu, 2021:231-263). Although there are so many local and international programs aimed at financing electricity generation projects such as the Power Africa project embarked by the USAID, which so far has aided in the actualization of 3,043 MW of electricity generation in Nigeria, (Power Africa, 2019). There is however, failure of the government to develop the solar energy sector mainly due to various barriers that include insufficient solar initiatives study, poor mechanisms for innovation, temporary laws, low perception and uncertainty of political governance, (Abdullahi, et. al., 2017:3-5). There is insufficiency in terms of institutional framework which is suffered by the solar energy implementation and development activities in the country.

Sukuk is considered to be a certificate that represents the value of an asset, with the AAOIFI and IFSB disallowing financial assets in the form of receivables to form part of the underlying assets of a tradable Sukuk, and the SC Malaysia entertaining receivables as part of such underlying assets, (ISRA, 2016:412-413). Sukuk is considered globally as a safe haven for ethical investments which has effective positive impact on economic growth as shown in a study done by Yildirim, et al., (2020:209-218) where the researchers assessed the impact of Sukuk investment on growth in 9 countries; Brunei, Indonesia, Jordan, Kuwait, Malaysia, Nigeria, South Africa, Pakistan, and Turkey. The findings of the study showed that Sukuk market and economic growth had a positive relationship in the long-run considering the Sukuk variables which consist of Sukuk exports were contributed positively in the long-run. The global performance of Sukuk in growing the economy prompted the Nigerian state of Osun in 2013 to embark on the country's first Sukuk launching of a \$70 million debt issuance program, issued at the rate of 14.75% profit per annum at 1,000 naira per unit, to fund the development of the educational system through building of schools, (Oladunjoye, 2014:335-344). Another study conducted by AbdulKareem, et. al., (2021:57-75) in which 163 investors and potential Sukuk investors were surveyed,

the research outcome was able to determine and endorse the fact that the factors which influences Nigerians to invest in Sukuk include religiosity, perceived behavioral control, attitude and subjective norms. The study however refuted claims that awareness is negatively correlated with the desire of investors in directing their investments in Sukuk.

Nigeria's federal government debut Sukuk issuance in 2017 took almost everyone by surprise with the outcome received in regards to the oversubscription of investors to the tune of 105% subscription. This also was overtaken by the 2018 Sukuk issuance which had a turnout of 132%, and that of 2020 which had 470% despite the covid19 epidemic during the issuance period, (DMO Annual Report and Statement of Accounts, 2019 & 2020).

Researchers such as Lawal and Bukar, (2020:44-46), have made some findings which suggest that the Sukuk will help in funding the petroleum infrastructure in Nigeria thereby developing sets of new refineries which would in the long-run increase the output capacity in the country. Considering the global advocacy on climate change and the shift to renewable energy, refineries cannot benefit from Green Sukuk because of the emissions they pollute within the environment. This study therefore, is only considering options of other Sukuk in financing projects in Nigeria and not the Green Sukuk which is only peculiar to financing projects that are environmentally, socially, and climate conscious.

As presented by Alam, et. al., (2016:167-185), Green Sukuk are a combination of Islamic finance asset-back attributes and impactful characteristics of green bonds which have moral and environmental beneficial orientation. The researchers describe both the Islamic finance and SRI investor, as investors that aim at maximizing profits while at the same time, they are mindful of the effect of their business on the environment thereby promoting social welfare and ethical causes. However, Green Sukuk proves to be an innovation which has championed so many projects in Malaysia, Indonesia, and MENA countries. Green Sukuk are driven by leaders who make policies that are favorable in the implementation of such advocacy, (Abdullah and Keshminder, 2020:985-988). Morea and Poggi, (2017:53-57) wrote in their research study that after conducting an economical and analysis of expenditure funding for an Italian on-shore wind power station, the found out that Islamic finance through green

Sukuk financing is more cost-effective, and promotes value creation by making due consideration and protection of the environment and people involved.

Ohiare, (2014:85-92), proposed rural energy projects financing options in Nigeria where the study presented debt-financing, equity financing, end-user finance, and carbon finance. However, despite the options presented, the researcher was not able to clearly present just a single financing model that was ideal for adoption in the country in such a way that its advantages to both the financier and the consumers outweigh its disadvantages, as presented. It should also be understood that the options of financing failed to make mention of any non-interest financing mode to be precise.

In another related study, Akinlaso, (2021:65-122), various Islamic finance instruments were presented for financing renewable energy infrastructure in Nigeria, making the study concentrate on big projects and having less concentration on rural consumers although the study considered sukuk options for financing renewable energy. The study contains many Sukuk financing models / schemes that were developed and used in different countries in the world to finance energy projects with the study presenting information and details on the Sukuk structures which included Ijarah, Istisna', Musharakah, and Murabahah with Tawarruq structure. It is however distinctly different from this research because of the fact that this study actually makes policy suggestions with Shari'ah compliant Ijarah Sukuk models that cater for consumers according to their needs and bases its source of financing renewable energy supply; electricity power, to just financing solar through Sukuk. And categorically the study avoids Tawarruq as a legal means of transaction because in its real sense, it is entirely haram according to Shari'ah. This makes the research study narrower and more concerned with developing models for financing the basic necessity of a huge majority of both the urban and rural populace using solar power electricity source and making it available for Nigerians at all levels.

Islamic financing models were also developed by Tabet, (2017:39-97), for roof-top and solar farms using Ijarah Sukuk, in Qatar and Algeria. Although the study made a thorough analysis of the Ijarah model it considered, the study is specific to the aforementioned countries where roof-top is proposed for individual home owners in Qatar while solar farm is for Algeria, the two countries most definitely have different consumer classes where others were left out in some cases. The consideration of solar power financing using Sukuk in Nigeria is uniquely multi-dimensional in the sense

that it covers the most important power usage cycles from production, producers, to consumers, households.

This study is however very different considering the fact that it is considering and proposing Green Sukuk for financing the failed Nigerian electricity infrastructure. The study proposes Sukuk financing for the development of solar electricity to cater for households, businesses, educational institutions, healthcare institutions, industrial and manufacturing sectors of the country. The study unlike the previous studies on financing electricity in Nigeria or anywhere in the world, focuses solely on issuance of Green Sukuk which has environmental and societal considerations, to finance precisely Solar generated electricity while basically aligning them with human and other living beings friendly kind of considerations. The study lastly is all encompassing of the interest consideration of the majority of investors in Nigeria whom have proven to have Sukuk as their preferred investment choice by mere looking at the statistics of Sukuk issuances and the investor responses presented in this study, and using it to actually solve a highly disturbing issue of electricity shortage and unavailability in the country.

1.10 Questions of the Study

This research study squarely centers around five main questions which are:

- a) What is the extent of government reform, funding/financing and the effect of such on power accessibility in Nigeria? And to what extent has the country been able to, and could encourage solar power production in order to utilize the abundant resource in the form of sunshine, and at the same time meet the electricity needs of the economy and its population?
- b) What are the various structures used for Nigerian sukuk issued in the past and what is their level of conformity to AAOIFI standards and the OIC Fiqh Academy's decisions on such structure(s)?
- c) What are the various policies and structures needed to finance solar energy in the power sector of the country considering sustainability of such financing?
- d) What are the potentials of Green Sukuk in financing Solar Energy production expansion?
- e) And what is the best structure of Green Sukuk that suits Solar Energy financing in Nigeria and why they are superior to other Sukuk structures?

1.11 Design and Organization

This thesis consists of six chapters which are sequentially organized in such a way that one part leads to another. The first chapter of the thesis is the introduction, which gives an in-depth view of the idea upon which the topic lies. The second chapter will show the overview of Nigerian power sector system performance and its many rejuvenating attempts made by the federal government. Then briefly state how same was achieved in some other countries; Saudi Arabia and Ghana. The chapter also survey the electricity production in the country and the place of clean energy considering its possession of sunshine resource. This will be done through presenting various electricity power generation plants/projects; both government and private, also the consumers comprising both rural and urban, households, industries and commercial places that are being covered by solar power plants inclusive of the means through which the power is being acquired by households for domestic, commercial and other end-users. Preference of consumers on their desired means of electricity generation will briefly be examined. The survey will actually delve on the financial means currently being used for acquiring solar power especially for households and industries, then also seek to get the opinion of present and prospective consumers on the viability of alternative means of financing power consumption.

The third chapter of the thesis then gives details on the many financing means applied in the power sector in the last 20 years and present the many wastages, mismanagement, corruption issues, and debt-financing involved therein. These financing are related to federal government allocations, grants and loans from foreign institutions. The various partnerships in the form of PPP are also presented in this chapter. It will also take a holistic view at Sukuk as related to the topic, by starting with Sukuk definition and types as approved by the globally recognized Islamic guiding bodies. Then the chapter also discusses the various Nigerian Sukuk, the parties involved in the Sukuk structure and issuance. The chapter does an assessment of the various Sukuk issued in Nigeria with their performance measure stated. It goes further to present Green Sukuk, its relationship with also total alignment and conformation to the UN SDGs, ESG, SRI, and Impact Investing. Then the suitability of green Sukuk to sustainable renewable energy investment is also discussed in the chapter. Solar energy being the globally most acceptable form of green energy production is again

emphasized, presenting the development of technological advancement in the production of its components and other associated technologies such as installation.

The fifth chapter presents 3 proposed models of Green Sukuk which are majorly Ijarah Green Sukuk models ideal for individuals and businesses, their various modus operandi and characteristics, SWOT analysis, risk analysis; business and marketing analysis.

The final chapter is the conclusion which centers on future opportunities and recommendations, with implementation strategies stated for the successful execution of the Ijarah Green Sukuk implementation in Nigeria



CHAPTER II

NIGERIAN POWER SECTOR AND ITS VARIOUS REFORMS

This chapter discusses the history of the infrastructure transformation of the Nigerian power sector right from the development of its first power plant. It encompasses the generation of power with the various capacities presented at each transformational stage, so also the transmission is presented as it increased with all its features stated at each transformational point in time.

2.1 Brief Overview of the Sector's Performance

2.1.1 Electricity Generation

The story of the Nigerian power sector started in 1896, when the Power Works Department (PWD) generated Nigeria's first ever electricity in the Marina plant in Lagos; it produced 60 KW of power. Having produced electricity for the first time in fewer than 20 years following its debut in England, Nigeria was the 5th country in generation of electricity globally; after United Kingdom, United States, Germany, and Italy. Thereafter, Ijora Lagos coal mine was established in June 1923 with a capacity of 3.6 MW, and with increased growing demand in the country, a 13.75 MW generation was upgraded and achieved in 1924 in the same plant. Subsequently, another plant was established in Zungeru via the Niger Company in 1901. In 1924, a new coal-fired mine was also launched for operation in Enugu. In 1950, the Electricity Company of Nigeria (ECN) was created and saddled with the responsibility of being the central body regulating the distribution and sales of electricity, but thereafter in 1962 came the establishment of a power generation office controlled by Niger Dams Authority (NDA); which was responsible for the formation and preservation of dams on the Rivers used for electricity generation. A 2 MW hydroelectric power station was established in Jos which was owned by Nigeria Electricity Supply Company and Nigeria Electricity Utility Company; Nigeria's Electricity Corporation also opened in 1962, (Okoro & Chikuni, 2007:52-57), (Bakar & Baba, 2020:71-84).

The combination of ECN and NDA by the Federal Government in 1972 gave birth to the Nigeria Electricity Power Authority (NEPA) in an attempt to improve in the services of the company and attain efficiency and effectiveness. The duty of generating

and distributing power was placed on NEPA which had that monopoly for some almost four decades in Nigeria. Despite the poor performance of NEPA due to its so many inefficiencies in all ramifications, the government-run company maintained its role but never stood tall in that. NEPA was actually one new body that was in charge of both the nation's electricity production and delivery. Integration of the two organizations was expected to result in efficient use of the personnel, economic, and other appropriate resources for the nation's power supply.

The Nigerian government upon transition to democratic rule in 1999, took the boldest step and decided to privatize NEPA. The primary factor behind Nigeria's decision to privatize its power industry was its failure and subpar performance, (Idowu, et al., 2019:336-338). NEPA was never the power company it was envisaged to be by its creators. The country experienced a highly deteriorating power sector which could in no way take care of the country's population demand. The major economic development activities were fast declining due to the inability of the power generation and distribution company to perform its duty efficiently and effectively. The company was majorly that which only accumulated assets in the form of highly technologically sophisticated equipment which were only kept without making any attempt to make use of them for power generation.

The table below shows the gradual growth in the power station in Nigeria in regarding generation capacity. The generation grew as the population was growing too, however, the growth was not commensurate with that of the population of the country. This also led to too much demand and load on the few generating plants that were available in the country. The power sector became highly inefficient, thereby creating a wide vacuum of demand for electricity. The growth which started with 20.6 MW in 1959 from Afam power station, reached as high as 600 MW from Delta power station in 1990.

Table 2.1: Growth in the Generating Capacity of Power Stations in Nigeria, 1959-2001

Year	Location	Additional Capacity (MW)
1959	Afam	20.6
1965	Afam	34

1966	Delta	30
1968	Kainji	320
1975	Delta	120
1978	Kainji	200
	Sapele	720
	Delta	120
	Afam	110
1981	Sapele	300
1982	Afam	450
1985	Egbin	440
1986	Egbin	440
	Jebba	540
1987	Egbin	440
1989	Shiroro	150
1990	Shiroro	450
	Delta	600
2001	Egbin (Enron)	270
	Afam (Siemens)	276

Source: Agagu, 2002

Table 2.2 below shows the percentage of ECN power generation amount to the aggregate generated electricity in the country produced by ECN and other power generation companies. It clearly shows in the table that the ECN produced above 80% of the aggregate electricity generation over these years in view; from 1960 to 1966.

Table 2.2: Electricity Generating Capacity in Nigeria, 1960-66 (in MEGAWATTS)

Year	E.C.N	NESCO	Others	Total	E.C.N. % of Total
1960	360.70	62.50	17.20	440.40	81.90
1961	520.70	95.30	17.50	633.50	82.20

1962	548.90	101.00	16.00	665.90	82.40
1963	659.40	113.00	13.50	785.90	83.90
1964	795.70	121.20	14.70	931.60	85.40
1965	924.70	126.50	16.00	1067.20	86.60
1966	1056.90	136.20	15.30	1208.40	87.40

Source: Ukpong, 1973

Nigeria's electricity production decreased from 9,459 GWh Q4 2021 to 7,302 GWh in March 2022. Nigerian electricity production data is updated on a quarterly basis and averages 6,962 GWh from March 2005 to March 2022. The statistics peaked in September 2015 at 9,936 GWh and fell to a record low in June 2009 at 3,247 GWh, (CEIC, 2022). A record of the Nigeria electricity production from 2005 to 2022 is presented in the following table.

Table 2.3: Nigeria's Electricity Production from 2005 to 2022 (GWh)

Year	Q1	Q2	Q3	Q4	Average
2005	5.500	5.600	5.400	6.300	5.700
2006	6.700	6.500	5.900	5.500	6.150
2007	4.900	6.400	6.000	6.800	6.025
2008	8.300	8.300	5.400	7.000	7.250
2009	6.100	5.000	3.200	4.500	4.700
2010	4.800	4.400	4.000	6.400	4.900
2011	7.000	6.900	7.000	5.100	6.500
2012	6.900	6.000	7.100	7.200	6.800
2013	7.800	7.400	7.500	6.800	7.375
2014	7.600	6.900	7.000	6.300	6.950
2015	6.800	6.400	6.100	9.900	7.300
2016	9.000	8.300	6.800	7.100	7.800
2017	6.900	7.600	7.700	8.300	7.625
2018	8.700	7.900	8.600	7.200	8.100

2019	5.900	8.500	--	8.900	7.767
2020	7.900	7.800	--	9.500	8.400
2021	8.100	--	8.700	8.800	8.533
2022	9.500	8.800	6.900	7.500	8.175

Source: CEIC, 2023

Table 2.3 shows that the increase in production of electricity even after the reform is not significant because the difference is very meager. The highest production was in the 4th quarter (Q4) of 2015 which was 9.900.

2.1.2 Electricity Transmission

The Federal Government considered power to be the driving force towards achieving its economic transformation program attainment. However, the consumption rate of electricity kept increasing, while the ability to meet up with the increase remained stagnant and or reducing, (Okolobah & Ismail, 2013:410-418). At the end of the study, the researchers emphasized the grave importance of the power sector in the growth of any country and also designed suggested means of generation, distribution, transmission, and consumption of electricity in the country.

Table 2.4: Nigerian National Grid in 1973 and 1996

Description	1973	1996
0.4 kV Transmission lines (km)	441	12928
1.1 kV Transmission lines (km)	1986	7929
33 kV Transmission lines (km)	1262	5000
132 kV Transmission lines (km)	1012	6000
330/132 kV Substations	6	23
132/33 kV Substations	14	91

Source: Akarakiri, 1999

Table 2.4 shows the data of the national grid transmission lines and substations in a comparison between that of 1973 and 1996. The addition in the amount of lines and also sub-stations is seen for each year, however despite having a space of 23 years in-between as a margin, the additions are not proportionate to the increase in population,

consumers, and urbanization that happened. It could be seen in Table 5 that individual population had over 10 fold increase, revenue had over 70 fold increase, but the electricity supply is not commensurate. And with the number of customers in commercial units, in a dramatic and sad turn, there is a decrease of around one-third of the number of customers in those units.

Table 2.5: Electric Power Demand (in MW) in 1973 (385 MW Total) and 1996 (3000 MW Total); Also Shown Are the Numbers of Customers and Revenues

Area of application	1973	1996
Electric power (MW) for use in:		
Residences	130	1575
commercial units	216	777
Industries	39	645
Number of customers in:		
Residences	208500	2195000
commercial units	65300	40920
Industries	2650	16740
Revenues from sales of electricity (in current 106 N) to:		
Residences	10.08	735.1
commercial units	25.39	1517
Industries	10.94	1810

Source: Akarakiri, 1999

Electricity is being considered as a basic necessary requirement and infrastructure for productivity, industrialization and aids in economic growth, (Ajenikoko, et al., 2018:64-71). The state of the electricity infrastructure is a significant barrier to the expansion and improvement of the economy as a whole, (Olabode, et. al, 2021:1-5). This is however concurrent to determining the quality of life of individuals in a country. The extent of access to electricity means the extent to which all aspects of needs of the human are to be met. These include energy sources to meet the needs of households, government agencies, businesses, industries, non-governmental agencies, schools, healthcare centers, etc.

There is a high mismatch between generation capacity and transmission of electricity in Nigeria which has caused technical and commercial misalignment being the main problem. Because of a shortfall in infrastructure, there is a technical imbalance. Why the nation produces more energy than it can send through the TCN and sends more energy than Discos can bill for remains a significant unanswered question, (Tajudeen, 2022:1). According to the NBS (most recent data of the National Bureau of Statistics), the total amount of electricity generated by the Gencos in 2019 is: Privatized GenCos generated 19,692,683 MWh but transmitted 19,233,151 MWh. IPP Gencos generated 7,798,253 MWh and transmitted 7,648,700 MWh. NIPP Gencos generated 5,957,697 MWh and sent out 5,917,262 MWh.

Nigeria is the leading producing country for oil and natural gas in Africa while also standing as 9th biggest oil reserve holder for natural gas in the world. In 2011, the industrial and manufacturing sectors contributed 6% and 4%, respectively, to the nation's GDP. Electricity blackouts, traffic jams, crime, and corruption are the main causes of this low rate because they all prevent business growth. Among other things, Nigerian businesses face severe shortages. Voltage changes and power outages frequently occur, resulting in damage to machinery and equipment. The majority of businesses use generators to self-supply electricity, which drives up their production costs and reduces their ability to compete with foreign businesses, (Chete, et al., 2014:3-5).

Acute blackouts in Nigeria are a clear consequence of the power sector's bad performance. The government has implemented a number of programs to solve the poor status of the energy industry's power generation, transmission, and distribution sectors. Numerous techniques to promote energy efficiency, the inclusion of the private sector, and the diversification of energy sources for sustainable development, (Gatugel, et. al., 2015:12-18).

The major reason behind the privatization of the power sector was the precariousness of power in the country which had adverse effects on the social and economic development of the country. A study where the researchers surveyed customers of the Ibadan and Ikeja Discos discovered that the Discos brought no considerably meaningful changes in the electricity supply given due consideration to the effectiveness, charging, wide customer outreach, provision of meters, managing of overload, and customer service, (Idowu, et. al., 2020:1413-1420).

Maintenance procedure and culture is not taken important as regards the power generating machines, so also do the employee work ethics and culture with no good skills to manage the machines. A study by Oyedepo & Olayiwola, (2011:207), found out that poor maintenance affected the performance of turbine machines in the Egbin thermal plant, where from 2005 to 2009 the availability and reliability of 5 turbines out of 6 was approximately 28% to 95% while the 6th turbine was out of service for around 2 to 3 years during the same period. In the same vein, another study by Oyedepo, et al., (2015:161-168), on the productivity analysis and the monetary implications of unavailability of energy generation of a gas turbine plant through the years 2001 to 2010, found out that the plant which had 9 turbine units and a capacity of 301 MW had only 61% of its installed capacity available for usage. The gaps in energy generation were recorded at 4.18% to 14.53% compared to the international best practice of 5% to 50%. The lost energy from the plant was recorded at 35.7% amounting to 251 million dollars, with low average availability, low capacity factor and low utilization. A confirmatory study by Emovon, (2011:2-4) which covered the year 1999 to 2008 productivity in energy generation in Egbin Thermal Power Station in Nigeria, uncovered that there was a power generation loss of 46% of the plant's installed capacity. This percentage equals to a loss of revenue of 24,186,569,250.00 USD.

According to a study by Olabode, et al., (2020:1142-1144), each authority at the observations identified by the research seems to lack the ability to reconcile the new innovation implementation's capacity with the ever-growing demand brought on by population expansion and the new installation's ability to cope with the unpredictable events like unexpected breakdown. This indicates a persistent strategic innovation decision problem in the Nigerian power sector.

Table 2.6: Households Access to Electricity, 2018

Region	No Electricity	Primary Source of Electricity (% of HH with electricity)						Other Sources of Electricity (% of HH with electricity)					
		National Grid	Mini Grid	Generator	Solar System/Lantem	Rechargeable Battery	Other	National Grid	Mini Grid	Generator	Solar System/Lantem	Rechargeable Battery	Other
North	47.0	94.0	0.0	4.5	0.0	0.9	0.6	2.6	0.2	11.0	0.4	5.3	0.0
Central													

North East	79.1	83.0	0.0	1.5	4.9	10.1	0.4	6.7	0.0	4.2	0.1	0.0	0.0
North West	59.7	97.3	0.0	1.6	0.8	0.3	0.0	1.5	0.0	5.8	0.5	2.9	0.0
South East	28.6	74.4	0.0	20.7	0.0	3.8	1.1	14.5	0.3	20.3	0.8	6.7	0.0
South South	27.2	70.6	1.1	24.1	1.2	0.4	2.6	7.6	0.0	14.7	0.2	1.9	0.0
South West	32.7	97.6	0.0	2.4	0.0	0.0	0.0	0.8	0.0	10.2	0.1	0.0	0.0
Urban	16.1	92.4	0.0	6.3	0.1	1.0	0.3	4.1	0.1	16.3	0.5	2.4	0.0
Rural	57.6	79.2	0.5	15.8	1.1	1.9	1.5	7.3	0.1	9.0	0.3	3.7	0.0
Nigeria	44.6	85.4	0.3	11.3	0.6	1.4	0.9	5.8	0.1	12.4	0.4	3.0	0.0

Source: NBS, 2019

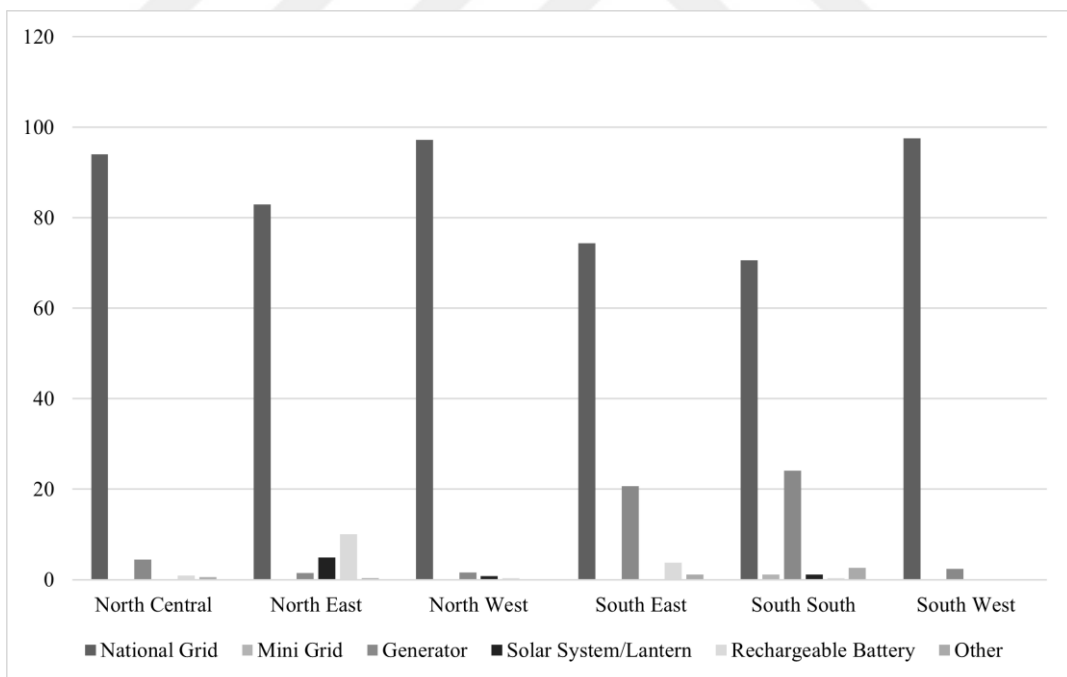


Figure 2.1: Access to Electricity by Zone (% of Households)

2.2 Historical Reforms of the Sector in the Last 20 Years

Source: NBS, 2019

The major challenges faced by the power sector market reform is considered by Arowolo & Perez, (2020:1-3) to be the nature in which the privatization process was done half-way, the transmission acquisition process as well as the network operations, the poor state of gas delivery access network, the inefficiency of the regulatory system.

NEPA which was created in 1972 to carry out the business of generating and distributing of electricity in Nigeria was marred with so much inefficiencies and ineffectiveness in its activities, which led to so much of the populace resorting to alternatives to source of power. Between the year 1991 and 1992 alone, the country experienced the importation of 7438 generators, thereby giving foreign generator manufacturers business in Nigeria where they had to set up so many centers for assembling and maintenance to serve the various private, government public, and other organizations requiring their services, (Akarakiri, 1999:445-447).

The change to democratic rule in Nigeria in 1999, was followed by the decision of the Nigerian government to privatize the power sector through various reforms which were aimed at increasing the performance of NEPA to ensure its meeting the demand of the citizens of the country, (Okworo and Chikwuni, 2007:52-57). The federal government's efforts was to revive NEPA and improve its effectiveness, efficiency, and accountability to the clamoring population. To combat capital shortage, economic inefficiencies, prolonged poverty, debt and deficits, reform was urgently needed, (Adoghe, et al, 2009:36-42).

According to Ogunleye, (2017:391-408), due to the fact that NEPA which is solely a government controlled company, it had the monopoly of generating electricity and at the same time distributing and transmitting same for years. Reform removed obstacles to the private sector investment, build up energy generation autonomy and broaden power generation from its historical paths to cleaner energy sources. For several years, the government-owned corporation had a control on power production, distribution, and transmission. In order to improve energy independence, remove barriers to private sector investment, and diversify energy sources in favor of cleaner energy sources including solar, geothermal, and wind, reform was implemented.

The Federal Government incorporated the Nigerian National Integrated Power Project (NIPP) in 2004 as the Niger Delta Power Holding Company Limited which serves as a legitimate vehicle created to serve the purpose of managing the assets of the NIPP

and also improving the conviction of the NIPP, (NDPHC website). The NIPP was saddled with the responsibility of first and foremost, the development and privatization of 10 gas-fired plants which were owned by the Federal Government, and these plants are; Olorunsogo, Geregu, Gbarain, Alaoji, Omoku, Egbema, Sapele, Omotosho, Ithoubor, and Calabar Gas Plants. The project was also approved the sum of 2.5 billion USD in 2005 as funding from the Excess Crude Oil Account (ECO), with the aim that the project generates power to be used by oil companies in the Niger Delta area for hitch-free oil exploration activities, (NERC, nd).

In the view of Ikeme and Ebohon, (2005:1213-1221), the power sector reform needed to achieve economic development, and poverty alleviation program of government privatization was expected to break monopoly of NEPA. Power plants were in a bad situation and shape because they were not cared for at all nor maintained. Structuring the electric power company / industry into a company to give increased access, effectiveness, reduced adverse environmental effects. Reform efforts not impactful unless the end-user inefficiency is not constrained.

This however, gave birth to the Electricity Power Sector Reform Act (EPSRA) in March 2005, which established a stepping stone of transforming the NEPA to Power Holding Company of Nigeria (PHCN), (Onochie, et. al., 2015:494-502). The PHCN was also a government-owned company that held ownership of all power stations, distribution systems and transmission network. The reform was however, mainly based around the following:

- a) Decoupling NEPA was the major goal of the reform bill.
- b) Create an electricity regulatory organization
- c) Sell the unbundled organizations
- d) Create a rural electrification organization
- e) Create a fund for electricity consumer support

The reform was actually meant to achieve the following objectives (Ogunleye, 2017:391-408):

- a) Creating an innovative national power sector policy, driven by investors.
- b) Creating a business, legislation, and legal framework that will facilitate the participation of all significant industry participants.
- b) The industry's commercialisation.

The EPSR bill was invariably meant to break-down (unbundle) the PHCN into the organizations below:

- Six (6) generating companies (GenCos) with four (4) thermal and two (2) hydro: Afam, Egbin, Kainji, Sapele, Shiroro, and Ughelli.
- Eleven (11) Distribution Companies (DisCos) spread across the various geopolitical zones in the country as follows:

Abuja Electricity Distribution Company, Benin Electricity Distribution Company, Enugu Electricity Distribution Company, Ibadan Electricity Distribution Company, Jos Electricity Distribution Company, Kaduna Electricity Distribution Company, Kano Electricity Distribution Company, Eko Electricity Distribution Company, Ikeja Electricity Distribution Company, Port Harcourt Electricity Distribution Company, and Yola Electricity Distribution Company.

- One (1) Transmission Company
 - Transmission Company of Nigeria / TCN: The TCN is managed by Manitoba Hydro International (Canada).

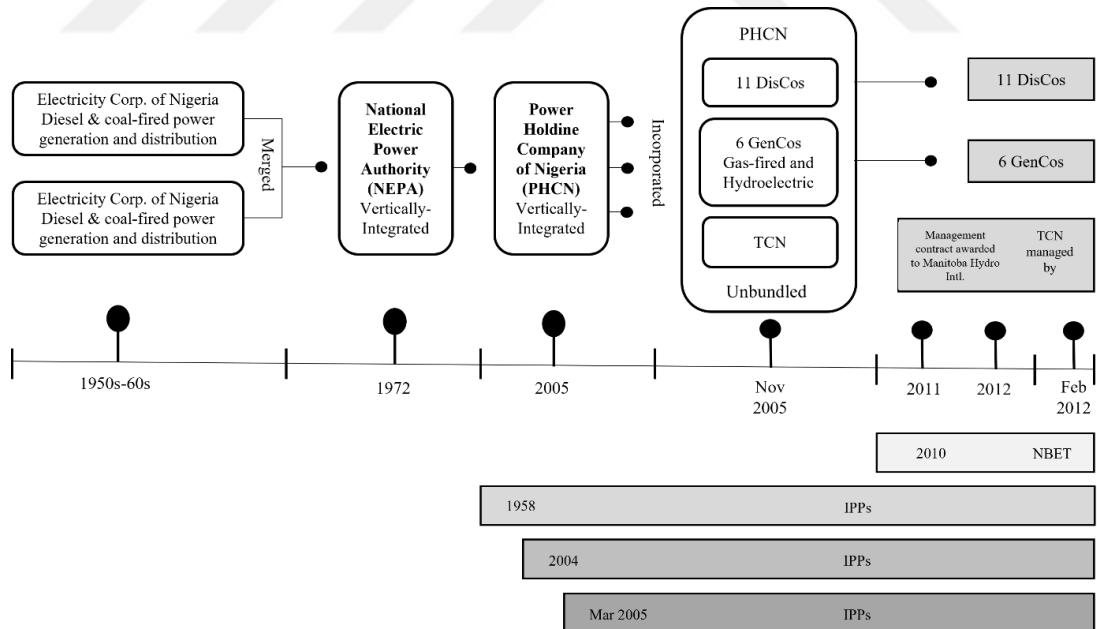


Figure 2.2: The Historical Reform Transformation of the Electricity Power Company of Nigeria

Source: NERC, n.d.

There also exists the FGN Power Company of Nigeria which co-ordinates the necessary planning and implementation activities to achieve the aim of the PPI through several stakeholder strategy. There exists 40% ownership stake of the government in all the Discos which it holds through the BPE.

The reform which actually started with the enactment of the EPSR Act 2005 and other Acts which followed afterwards, actually saw to the establishment of agencies that are related to the regulation, management, and supervision of the power sector and they are:

2.2.1 Establishment of the Nigerian Electricity Regulatory Commission (NERC)

NERC is an independent power sector regulator to ensure prudence in the sector; rules and market guidelines provides competitive cost-relative tariff prices; Multi Year Tariff Order (MYTO) and also a competitive power sector in the long-run, which will be open to both local and international investors. NERC issues licensing for transmitting, distributing and generation of power, tariffs rules, market rules, regulations, directives, codes of conduct, standards, dispute resolutions, permits for renewable energy sector, regulations for mini-grids, meter manufacturers, suppliers, vendors and installer regulations. In summary, the NERC plays the role of a police man to both industry operators and the consumers.

2.2.2 Establishment of the Rural Electrification Agency (REA)

The REA was established by the EPSRA in 2006 by the Federal Government of Nigeria as an implementing agency in charge of electrifying rural and underserved regions of the country. The activities of the REA upon which it was established center around promoting the country's rural electrification, coordinating national programs for rural electrification, and to promote, encourage, and supply rural electrification through overall divisional engagement irrespective of sectoral inclination, and management of the Rural Electrification Fund (REF). The REA has a mandate of electrifying 2.5 million households in rural areas across the country by 2030. Rural electrification is done through household solar systems, mini grids for communities, tertiary institution electrification projects, and hospitals projects through the container electrification system, (REA website).

2.2.3 Establishment of the Nigerian Bulk Electricity Trading Plc (NBET)

The Nigerian Bulk Electricity Trading Plc (NBET) which is the supervisor, operator and controller of the electricity pool in the Nigerian Electricity Supply Industry (NESI) established in July 2010 and is fully owned by the Federal Government of Nigeria, (NERC, n.d). According to the Act, a bulk trader (NBET) must be licensed in order to purchase large quantities of electricity and ancillary services from GenCos via PPAs and resell same utility to DisCos through contractual agreements. The main purpose of NBET's creation is to provide payment guarantee security to GenCos for the large-scale purchase of electrical power and auxiliary services. Additionally, it guarantees that each DisCo will receive a minimum amount of accessible MW through the vesting contracts.

2.2.4 Establishment of Nigerian Electricity Management Services Agency (NEMSA) 2015

The growth of the Nigerian power sector has been hampered for years by the use of subpar electrical equipment and materials in the NESI, as well as vandalism, poor building techniques, and negligence culture towards installed equipment in the overall energy production chain including utilization. This is primarily caused by a lack of effective testing, certification, and enforcement of technical standards for electricity connections in the NESI. As a result, the Federal Government had to create the independent, professional, and technical agency NEMSA to address these technical shortcomings in the sector.

The Nigerian Electricity Management Services Agency (NEMSA) was established by NEMSA Act No. 6 of 2015 to ensure the safety of people and assets in the NESI and its associated areas by carrying out technological examination, evaluation and certification of all kinds of electrical infrastructure, meters, and devices. Their duty entails in totality enforcing engineering regulations and laws.

2.2.5 Establishment of Nigeria Electricity Liability Management Company (NELMCO)

The assets of NEPA were transferred to PHCN in the process of splitting the organization, with the trapped assets and liabilities were moved to Nigeria Electricity Liability Management Company (NELMCO) which was established in 2006. In accordance with the directive of NCP, NELMCO was chosen as one of the emerging

institutions created under EPSRA and given the task of taking over all PHCN obligations prior to the transfer of the companies on November 1, 2013, in addition to the administration of supplementary assets of the companies before they were sold.

We serve as the stranded liability vehicle for a seamless shift towards a new, liberalized, prosperous, and effective electricity sector. As stated by NCP within the NESI, the mandate of NELMCO is to assume administration and settlement of PHCN's PPA commitments and other legacy debts. In ensuring a smooth transition into a more liberalized, successful, and effective electricity sector, it serves as the stranded liability vehicle.

2.2.6 The Nigerian Electricity Supply Industry (NESI)

NESI comprises of the following components: Federal Ministry of Power, NERC, GenCos, TCN, DisCos, NBET, Gas Aggregator Company of Nigeria, NEMSA, 23 power generation plants that are connected to the grid and engaged in the supply of power nationwide.

2.2.7 Establishment of National Power Training Institute of Nigeria (NAPTIN)

In September 2009, the National Power Training Institute of Nigeria (NAPTIN), which was founded in March 2009, officially opened for business. Its formation is primarily focused on coordinating training initiatives and offering personnel in the power sector training. NAPTIN has assumed control of PHCN's seven existing regional training centers in order to carry out this duty.

The Gencos are the generating companies licensed by the government and are responsible for generating power. The government majorly controlled the production of electricity prior to the sector's privatization. The government owned and operated 3 hydropower plants and 7 thermal power generating facilities in this regard. The government's efforts to privatize its assets, which were unbundled as successor generation businesses, were motivated by the need to increase generation capacity. The government built 10 thermal power stations as part of the National Integrated Power Project (NIPP) program. In 2013, the government started the process of privatizing the NIPP facilities. Additionally, the Act encourages private investors to seek for generation licenses and build independent power plants with NBET's assured on-grid power offtake, subject to the execution of a PPA, (NBET, n.d.).

Transmission is done by the government-owned company TCN which is solely in charge of the transmission network. It is one of the successor businesses that emerged as a result of the Act that led to the separation of the state power provider. TCN holds licenses for the following activities: market operator, transmission service provider for system planning, system operations and managing administration of the wholesale electricity market in accordance with its functions, and system operator for maintenance and operation of the transmission infrastructure, enforcing grid discipline, promoting efficiency, and check-mating corruption, (Ajenikoko, et al., 2018:64-71).

Distribution is done by the eleven DisCos were created to handle the assets and liabilities associated with the distribution of the PHCN. Each DisCo is allowed to have a dual distribution and trading license, which gives it the authority to build, run, and maintain a distribution network for connecting consumers and installing and maintaining meters, among other things. The trading license gives it the authority to buy electricity from other trading licensees and, with NERC's approval, from other sources.

The privatization was however suspended in the midst of the preparation and by the government and postponed to 2006. A new President was sworn into office in 2007 and he started the “Agenda for Industrializing Nigeria 2020”. The government embarked on total rejuvenation of the sector including creating several agencies to manage the activities of the power sector.

Another new President was sworn into office as a result of the sudden death of the previous President, and he launched a different program on power on 26th August, 2010, which was termed the “New Power Sector Roadmap”. He also constituted the Presidential Action Committee on Power (PACP) which was established to end administrative bottleneck, and ensure sustainability of policies, (Onochie, et. al., 2015:496-498). This gave way to the full actualization of the privatization process in 2013 with all the DisCos and GenCos bought by private investors. However, the TCN remained the sole ownership of the federal government with all transmission assets owned by the government.

Another team / body constituted by the President was the Presidential Task Force in 2010, which brought together the Ministry of Power, Ministry of Finance, Bureau of

Public Enterprises, Bureau of Public Procurement, Nigerian Electricity Regulatory Commission, Nigeria National Petroleum Corporation, Power Holding Company of Nigeria, and Nigeria Gas Company Limited, to drive the power sector reform effectively.

A study by Oseni, (2011:4766-4771) stated that the degree of infrastructure advancement in a country is a key factor in determining rapid growth and long-term development. This therefore implies that having a thorough understanding of how an economy's infrastructure functions is crucial and a necessary policy that aims to achieve sound and robust economic development is necessary. Drawing upon this foregoing, the research evaluates the Nigerian electricity (energy) sector's overall performance and offers some recommendations for achieving a global standard. Nigeria's power system is struggling, and effective policy is urgently needed to create a reliable, long-term electrical market in the nation. Forty percent (40%) of the installed capacity of generating companies, which is 6000 MW, is produced annually. Industrialization and the creation of jobs in the nation are hindered by the limitations that prevent local industries from competing regionally and internationally.

The power sector initiatives were severely hindered by dwindling infrastructure investment, corruption, insecurity, institutional arrangements, and political factors. Supply-side measures, the appropriate institutional structure, integrity in policy, and guarantee of investment are also required to lessen power supply challenges as a reaction to reform initiatives. A great sizable portion of home energy is unmetered. In order to lower the amount of household energy use that is recorded, households are also tampering with prepaid PHCN meters, (Babatunde, 2011:369-380).

According to the World Bank report, an estimated 80 million Nigerians have no access to electricity, with another 40% living below poverty line, and an average of 60% spend an estimated 4.2 billion naira on owning and maintaining fossil energy providers, (World Bank 2018). Onyi-Ogelle, (2016:279-289) in his own study considers that over half of Nigeria's population is without light, which results in agony, destruction, difficulties, and pain. Examining the effects of reforms enacted through legislation and policy, the degree to which they improved the sector's ability to supply electors, the difficulties associated with generation, distribution, and transmission, and the capability the sector has to service the full population of Nigeria. Implementation. The National Assembly should check excesses of the privatization process to ensure

conformity, an effective post-privatization process should be put in place for monitoring, working documents such as a road map should be provided, Nigeria rural electrification should be carried out with all seriousness, and the corruption obstacle should be minimized or eliminated. These are recommendations for the implementation of the reform act.

Gatugel, et. al., (2015:12-21) also stated that when compared to India, Nigeria faces higher difficulties in power sector reform performance because of both long-term neglect of the industry and corruption. Another significant barrier is performance that falls short of installed capacity, given the nation's population growth's rapid expansion and the resulting rise in demand. There continues to be so much electricity problems in the nation.

Deregulation is crucial for the high quality and excellence of Nigeria's electricity supply, however the public has not yet fully experienced its effects. Despite the parachuted-in numbers from the generation, distribution, and transmission companies, the citizens have not immediately benefitted from the deregulation. (Kalu & Agbaeze, 2018:378-382).

A study made by Idowu, et. al, (2019:337-340), contains that the researchers made recommendations for more funding and financing to be made to enable the Discos to obtain the necessary various equipment needed that are technologically upgraded, and the government should also provide them with an enabling environment after an interview with some customers of the Ibadan and Ikeja Discos revealed results that there is no improvement in the electricity supply.

In view of the fact that NESI is proved to be inefficient and ineffective, but even with that, its importance to the economy cannot be overstated. Gencos, NBET, TCN, and Discos make up NESI's value chain, which serves as a link between the client and the value chain. Discos' infrastructure is without doubt in a very terrible shape, (Yusuf, 2021:3). In the end of the year 2017, there were 17 grid-tied power plants in the NESI with an aggregate of 12,800 MW put in place and an accessible capacity of 7,139 MW, this is in comparison to December 2009 where the number of power stations was 16 with an installed capacity of 8,876 MW but an available capacity of 3,653 MW, (Emovon, et al., 2011:1-5). Power generation in the country despite the reforms and huge financial commitments from both within and outside the country, have not been

anything to write home about. The expected power generation from the year 1999 to 2008 is 115,632,000 MWh as envisaged, but unfortunately, it had a reduction of 53,027,763 MWh which translates to a reduction of 46%.

Another research study by Oseni, (2011:766-773) also identified that only 40% of installed capacity of power was actually generated annually. The major reasons for the underperformance being considered to be non-implementation of policies which result in non-qualitative and under-functioning of the electricity sector. This is a major constraint to the performance of the industrial sector thereby leading them to be unable to compete with other markets within and outside the continent.

2.3 Various financing Schemes to the Sector by the Federal Government

The federal government allocated billions of naira with the highest in 1995 being 1,426,276,710 naira and resulted in a peak capacity of 5,715.70 MW, as seen in Table 2.7 below:

Table 2.7: Federal Budgetary Allocation to the Electric Power Sector, 1973-1995

Year	In Naira	In US Dollars	Additional Capacity (MW)	Peak Capacity (MW)
1973	1,392,552.00		398.10
1974	25,350,000.00	15,796,360.92		398.10
1975	115,013,000.00	71,083,436.34	120.00	518.10
1976	160,000,000.00	100,496,199.99	335.60	853.70
1977	207,079,989.00	134,223,482.63		853.70
1978	509,210,000.00	324,193,034.95	1,190.00	2,043.70
1979	540,000,000.00	326,173,621.01		2,043.70
1980	370,000,000.00	203,341,393.71		2,043.70
1981	222,481,000.00	136,726,278.27	300.00	2,343.70
1982	112,370,280.00	75,843,871.49	312.00	2,655.70
1983	111,530,000.00	8,356,706.68		2,655.70
1984	167,571,370.00	128,436,705.76		2,655.70
1985	110,189,433.00	98,931,076.46	440.00	3,095.70

1986	17,666,660.00	10,640,002.41	980.00	4,075.70
1987	282,303,446.00	69,142,875.63	440.00	4,515.70
1988	143,596,149.00	31,818,335.70		4,515.70
1989	14,922,058.00	2,005,464.27	150.00	4,665.70
1990	15,000,000.00	1,853,591.02	1,050.00	5,715.70
1991	26,625,513.00	2,678,407.47		5,715.70
1992	23,750,000.00	1,359,971.60		5,715.70
1993	152,203,000.00	6,921,873.51		5,715.70
1994	142,425,639.00	6,475,069.97		5,715.70
1995	1,426,276,710.00	18,603,698.24		5,715.70

Source: Ministry of Finance, 1996

Table 2.7 also shows the percentage of power sector spending to total federal capital budget. Although the size of federal spending kept on increasing from 315.22 to 4749.10, the percentage of spending to the power sector did not really increase tremendously within the same period in consideration of the increase in population and consumption within the period in view.

Table 2.8: Breakdown of Budgetary Allocations to Power 1999 to 2012 (Billion Naira)

Year	Federal spending	Power sector total spending	Power sector capital spending	Total federal capital spending	Power sector capital spending as a % of total federal capital budget (%)
1999	315.22	6.93	5.50	189.13	2.91
2000	537.57	31.97	29.54	321.12	9.20
2001	851.75	80.41	78.40	496.36	15.79
2002	840.85	69.96	63.44	486.71	13.04

2003	765.13	46.68	40.59	382.35	10.62
2004	918.30	58.94	54.62	349.89	15.61
2005	1617.63	93.29	41.11	617.28	14.76
2006	1876.30	75.85	73.51	539.23	13.63
2007	2266.39	104.65	100.78	781.53	12.90
2008	2492.08	139.78	114.38	673.16	16.99
2009	2870.51	93.44	88.47	796.74	11.10
2010	4608.62	194.52	189.78	1853.91	10.24
2011	4226.19	90.03	86.25	1005.99	8.57
2012	4749.10	73.42	70.30	1319.78	5.33

Source: Ministry of Finance, 2012

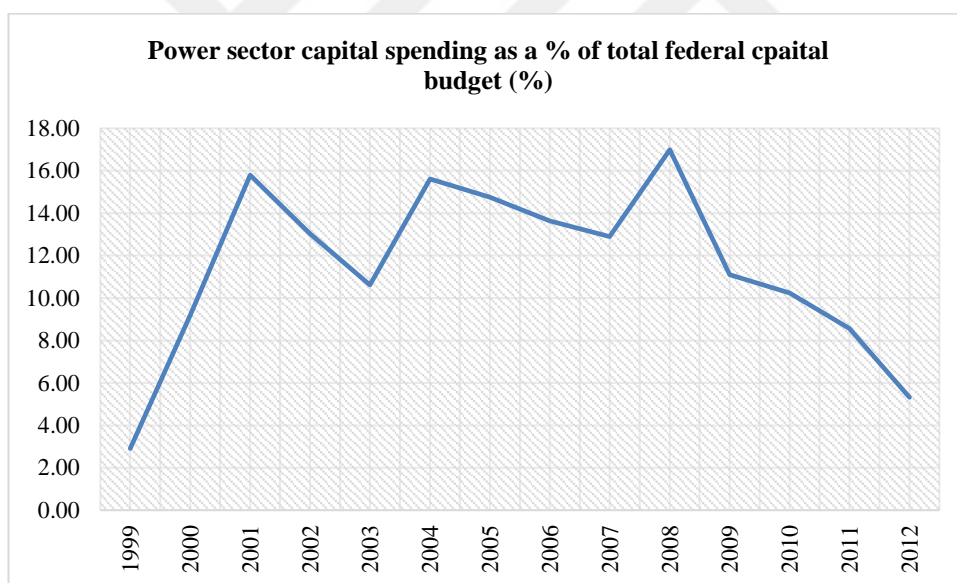


Figure 2.3: Power Sector Spending as a % of Total Federal Capital Budget 1999 – 2012 (Billion Naira)

Source: Ministry of Finance, 2012

Both chart 2.3 and 2.4 present a graphical representation of the Federal budgetary spending to the power sector which could be seen although in an increasing way, but more between the year 1999 to 2012 as against between 1973 to 1995. This is as a result of the change to democratic government and the focus of the government on

reforming the sector through several amendments, unbundling, the creation of supervisory and regulatory agencies among others.

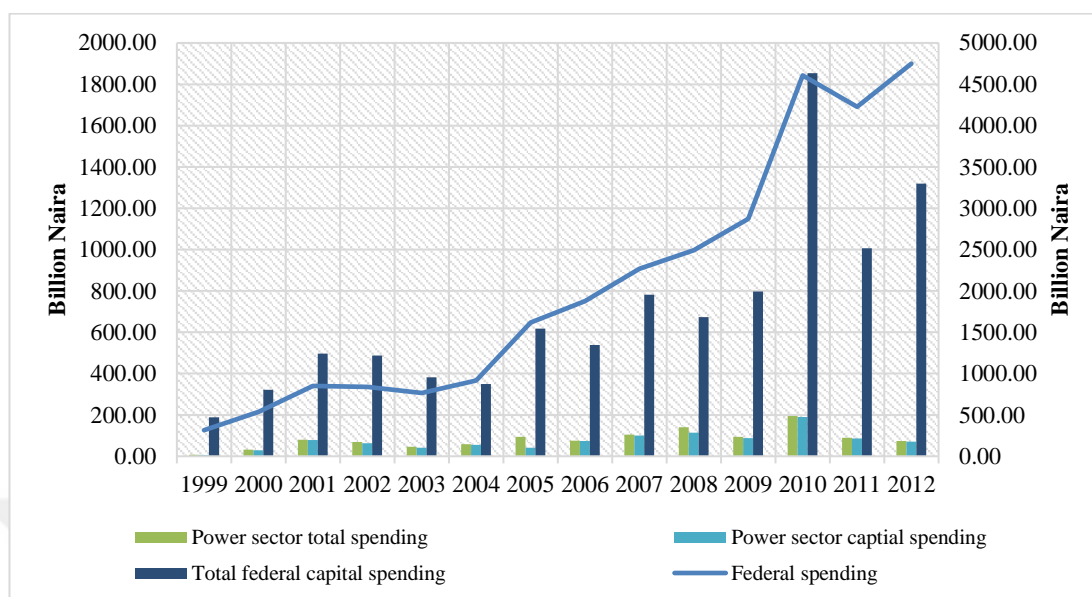


Figure 2.4: Power Sector Total Spending to Total Federal Capital Spending 1999 – 2012 (Billion Naira)

Source: Ministry of Finance, 2012

The Nigerian power sector had benefitted from so many forms of financing even before the reform. However, the reform and privatization gave room for so many forms of financing by the FGN especially through the CBN. According to the CBN, the apex bank extended financing on behalf of the Federal Government to the power sector through the 300 billion naira Power and Airline Intervention Fund (PAIF). This was meant to expedite the development of electric power projects, particularly in the country's selected industrial areas, stabilize power supply which will raise the quality of life for citizens, create jobs, and improve the power supply, and attract greater private sector investments in the power industry. The loan was in collaboration with the Bank of Industry, and has AFC as the Technical Adviser. The loan was in different types which include loans that have a long life-span (for new Power Projects), current loan refinancing, current lease refinance, operating capital (for current Power Projects), (CBN PAIF Guidelines, 2012).

In 2014, the federal government through the CBN extended a 213 billion naira facility to power generating companies to settle certain legacy debts.

In 2015, CBN gave 1.1 billion USD as Nigeria Electricity Market Stabilization Facility (NEMSF) which was availed to pay for incurred debts and resolve debt legacy of the PHCN to gas supply service providers. The Payment Assurance Facility (PAF) was also given to NBET to pay outstanding invoices of Gencos to the lowest levels of 80%.

In 2017, CBN made available financing to the tune of 702 billion naira Payment Assurance Facility, and an additional 165 billion naira to assist GenCos with gas payment.

CBN also extended 3.6 billion naira to make available pre-paid meters in order to ensure appropriate billing system.

In June, 2020 the government of Nigeria made available 5.9 billion USD as a stimulus plan for economic recovery aid. This included making available solar power in a proposed one year project aimed at providing 5 million household with solar systems.

In June 2020, the FG gave an approval of 120 million USD for the execution of Kashimbila Multipurpose Dam in Taraba with an expected generation capacity of 40 MW. While the project remains listed as being in progress by the Federal Ministry of Power in 2021, it is believed however, that the power generation plant is yet to commence operations.

2.4 The Various Partnerships in the Sector and their Evaluation

In 2020, CBN opened its window for 140 billion naira support for the Solar Power Naija Program. The World Bank will provide a grant to finance 20% of the project, which would cost close to \$367 million (140 billion Naira). To electrify areas of Nigerian society that are not connected to the national energy grid, the federal government is depending on solar household systems to enable a larger outreach to the part of the citizens that have difficulty in accessing electric power, (Africa Energy Portal).

Power Africa (PA) which is a market driven US government led PPP to double access to electricity in Sub-Saharan Africa where it provides private sector and businesses facilitation to doing business. Power Africa was established by the Electrify Africa Act of 2015 in the US. PA Support to Nigeria was in a financial close in an IPP in 2015 which added 450MW to the grid. There is also another partnership resulting in a 1005MW of generation capacity, 1,845,681 new on-grid and off-grid connections. There is also an additional financing investment of 1.48 billion USD for on-grid and

off-grid generation. PA also helped in some aspects of unbundling the power sector in Nigeria, (trade.gov-Nigeria).

The government of Nigeria through the Presidential Power Initiative (PPI) signed a 6-year partnership contract of 3.8 billion USD with SIEMENS AG Germany, an agreement which requires the foreign company to construct a 3-phased electrification project for an additional generation of 25,000 MW of power by 2025. SIEMENS is expected to invest in Discos, TCN, NERC with equipment that are of German and European standards to ensure service delivery and efficiency in the Nigerian power sector electricity supply. The first phase of the project is expected to generate 7,000MW, the second phase is to generate 11,000MW, and the remaining to be balanced-up in the last phase. The FG through the Federal Executive Council, approved the sum of 1.9 million USD and 62.9 million Euros as part of its partnership commitment towards the first phase of the PPI. The partnership if implemented, is expected to save the country 1 billion USD annually in costs which relate to alternative electricity generation options, unpaid consumer debts, etc.

The Federal Government of Nigeria through NBET in the year 2022 entered into a partnership with the Turkish firm, Turkish Energy Exchange Istanbul (EXIST) to enhance co-operation, skills, capacity, and interchange between the two organizations. Turkey being a country that generates 100,000 MW of power, has approximately 54% of total electricity from renewable energy; hydroelectric, wind, solar, geothermal, and biomass power plants. The ranking of Turkey is 6th biggest electricity market in Europe and 14th in the world, 5th biggest in terms of generation of green energy in Europe, and ranks as the 12th in terms of size for renewable energy in the world. In line with the Federal Government's aim to vary the nation's energy sources and move towards the renewable energy line, the two agencies are collaborating to build a framework for scaling up sustainable investments in renewable energy, (VON, 2022:8).

2.5 Other Investors in the Sector

World Bank approved 750 million USD for the Power Sector Recovery Operation (PSRO); which was launched in 2019 in a collaboration between the federal government and the World Bank. The international agency also approved another loan of 550 million USD for mini-grids and solar home systems.

United States government through Power Africa Project, Overseas Private Investment Corporation (Now the US International Development Finance Corporation), US Trade and Development Agency. US companies; GE and Continuum Associates also have partnerships with Nigeria National Petroleum Corporation (NNPC) on power generation and Abuja 1350 MW power plant which

African Development Bank working in Nigeria on 410 million USD transmission project. The organization also pledges another additional 200 million USD through the Rural Electrification Agency. Several companies especially those in the renewable energy line, example the solar for domestic use manufacturers, importers, and sellers.

2.6 Electricity Power Generation and Clean Energy

This encompasses the evolution of power generation from its initial establishment stage of the generation company to the present individual electricity generation capacity of the power generation plants in the country and dwells on customer categories and metering coverage in the country including consumer preferences in choice source of electricity.

Power generation started in Nigeria in 1886 with the establishment of two (2) power generation equipment sets to cater for the then colonial power in Lagos. The Electricity Corporation of Nigeria (ECN) was established by a 1951 law, and the Niger Dams Authority (NDA) was also established for the generation of hydroelectric electricity in 1962, (NERC). Electricity power generation was initiated by the government in Nigeria and was monopolized by it until the reform era came which established the ESPR Bill 2005, with the government alone having the sole authority to license anyone that wants to engage in the business of power generation in the country till now. Power generation could be done through the use of fossil fuels (hazardous and pollution to the environment) or clean energy generation ways. Nigeria has power generation plants consisting of the government generating plants, NIPPs, and IPPs, (as seen in Chapter 2), and a meager fraction made up of solar power plants. This chapter discusses the various power generation plants available in Nigeria, and the potentials of the country of generating power through clean energy products which is a campaign brought forward by the UN lately, and interestingly however, aligns with the Islamic concept of operating every and all human activities through means that are not hazardous in any way to the humans and society at large. This is more the reason why

Islamic finance allows investment in activities that are only beneficial to all living beings. The generation sub-sector currently has 23 grid-connected generating plants working, (NERC). However, the total generation of electricity / power in Nigeria is majorly from the National Integrated Power Project's (NIPP) generating stations, privatized GenCos, and Independent Power Producers (IPPs).

According to USAID (Power Africa Project), Nigeria has a total installed capacity of 16,384MW and this comprises of Hydro power 2,062MW, Gas power 11,972MW, Wind power 10MW, Solar 7MW, and other / Diesel / HFO 2,333MW.

The first section discusses the various federal and state government owned generating plants with their capacity and their functionality status. In the second section, the private generation plants are discussed. In section three, customer categorization and preferences are discussed. Section four discusses the cost of hybrid generation and solar power generation in Nigeria and concludes, in section five, with the financing preferences of consumers based on the interview that was carried out in this study. The data represents choice of individuals in the population sample on their acceptable, trusted and easy source of electricity, also their preferred means of financing the power generation project.

2.7 Government Generating Plants

According to the NERC, (n.d.), the federal government dispossessed itself from ownership of the 7 generating companies that were unbundled from NEPA. This it did by selling 4 of the companies and giving the other 3 for long-term concession agreements to other companies.

Table 2.9: The Power Generation Plants, Their Installed Generation Capacity, and Their Ownership Status

S/N	GENCO	Installed Capacity (MW)	Type	Privatization Status
1	Afam Power Plc	776MW	Gas	100% Sold
2	Sapele Power Plc	414MW	Gas	51% Sold
3	Egbin Power Plc	1,020MW	Gas	100% Sold
4	Ughelli Power Plc	900MW	Gas	100% Sold
5	Kainji Power Plc	760MW	Hydro	Long Term Concession

6	Jebba Power Plc	578MW	Hydro	Long Term Concession
7	Shiroro Power Plc	600MW	Hydro	Long Term Concession

Source: NERC, 2022

The table shows that FGN sold 100% of the 3 GenCos and also 51% of one of the GenCos that are all gas operated. The other 3 which are hydro power GenCos are given out for long-term concession to companies that are now operating them. The FG removed the burden of the management and administration of these companies during the power sector reform (as explained earlier in this Chapter).

The NIPP according to the NERC and privatization documents, consisted of 10 gas fired power plants out of which some were up to completion stage and others were in construction stage when the privatization was carried out. The power stations are as follows:

Alaoji (1,074MW) in Abia state, Benin (Ihovbor) (451MW) in Edo state, Calabar (563MW) in Cross River state, Egbema (338 MW) in Imo state, Geregu (434 MW) in Kogi State, Olorunsogo in Ogun state, Omotosho (451 MW) in Ondo state, Omoku (225MW) in Rivers state, and Sapele (Ogorode).

Table 2.10 below shows the latest electricity generation production of the power plants in Table 1. It gives details of the privatization agreements for the power plants and also their last tested capacity of generated power and dates, with the generation capacity average stated clearly on the table.

Table 2.10: Government-Generating Plants

S/No	Successor Gencos	Type	Contract Type	Contract Capacity (MW)	Last Capacity Test Date	Last Tested Capacity (MW)	2021 Average Generation Capacity (MW)
1	Kainji	Hydro	PPA	760	Aug. 2021	141.1	152.8
2	Jebba	Hydro	PPA	576	Aug. 2021	336.5	331.58
3	Shiroro	Hydro	PPA	600	Aug. 2021	422.23	247.55
4	Mabon	Hydro	Interim Agreement	40	N/A	N/A	N/A
5	Egbin	Gas	PPA	1100	July 2021	898.3	606.44
6	Sapele	Gas	PPA	1020	June 2021	52.29	46.39

7	Delta	Gas	PPA	900	July 2021	450.9	281.54
8	AFAM IV-V	Gas	PPA	776	July 2021	121.9	66.75
9	Geregu	Gas	PPA	414	June 2021	428.5	277.35
Sub-total				6186		2853.72	2010.4

Source: NERC, 2022

Table 2.11 shows a list of state power plants that were approved by the FG the main aim of providing especially multi-national oil corporations with electricity to enable them carry out their exploration activities without hindrance and effects of their productive capacity.

Table 2.11: State Government Power Plants

State Power Plants	Government	Type	Contract Type	Contract Capacity (MW)	Last Capacity Test Date	Tested Capacity (MW)	2021 Average Generation Capacity (MW)
IBOM POWER		Gas	Interim Agreement	190	July 2021	112.83	12.53
OMOKU FIPL		Gas	PPA	150	July 2021	102.3	31.52
TRANS AMADI FIPL		Gas	PPA	130	July 2021	86.34	75.73
AFAM (RIVERS IIP) FIPL		Gas	Interim Agreement	360	2015	151.24	65.31
ELEME		Gas	PPA	N/A	N/A	N/A	Not generating onto the grid
Sub-total				830		452.72	185.09
Grand Total				13461		6884.76	4022.48

Source: NERC, 2022

The FG however, also has some other Gencos fully owned by the FGN with some of them presently under construction which are listed below:

- a. Mambilla hydro-power plant which is a reservoir power generating plant with generation capacity of 3,050MW in Taraba State of Nigeria.
- b. Itobe power plant which is a circulating fluidized bed technology power plant with 1,200MW generation capacity located in Kogi State of Nigeria.

- c. Azura power plant is an easily operated gas turbine plant with a generation capacity of 450MW in Edo State of Nigeria.
- d. Kano power plant is a hydro-powered plant with a generation capacity of 100MW in Kano State of Nigeria.
- e. Qua Iboe power plant is a lowest cost thermal plant with a generation capacity of 540MW in Akwa Ibom State of Nigeria.
- f. Zungeru power plant is a hydro power plant with 700MW generation capacity in Niger State of Nigeria under the supervision of Ministry of Mines, Industry and Energy of Niger State.
- g. Kaduna power plant is a dual-fired power plant (diesel and gas) with 215MW generation capacity in Kaduna State of Nigeria.
- h. Gurara power plant is also a hydro power plant with 40MW generation capacity in Kaduna State of Nigeria too.
- i. Dadin Kowa power plant is a hydro power plant with 29MW generation capacity in Gombe State of Nigeria.
- j. Okpai Phase 2 power plant is a power plant with 480MW generation capacity in Delta State of Nigeria.

2.8 Private Generating Plants

There are also Independent Power Producers (IPPs) and the power generation plants under the National Integrated Power Project (NIPP), (as presented in earlier in this Chapter) which were also part of the power sector reform project. The IPPs include Shell operated – Afam VI with a generation capability of 642MW, Agip operated – Okpai with 480MW capability, and Ibom Power, NESCO and AES Barges with 270MW capacity, (NERC, n.d.). These are private power generation plants which are managed by private investors even prior to the power reform and privatization era.

Table 2.12: Private Generating Plants

Legacy IPPS	Type	Contract Type	Contract Capacity (MW)	Last Capacity Test Date	Tested Capacity (MW)	2021 Average Generation Capacity (MW)
OKPAI	Gas	PPA	480	July 2021	464.96	261.04
AFAM VI (SHELL)	Gas	PPA	650	July 2021	379.03	287.29
Sub-total			1130		843.99	548.33

GAS IPP							
OMOTOSHO GAS	Gas	PPA	304	July 2021	253.98	174.16	
OLORUNSOGO GAS	Gas	PPA	304	July 2021	265.04	195.35	
Sub-total			608		519.02	369.51	
GREENFIELD GAS IPP							
Azura Edo IPP	Gas	PPA	450	June 2021	453.28	420.84	
Total			450		453	421	

Table 2.13: Private Generating Plants

Source: NERC, 2022

NDPHC/NIPP Power Plants	Type	Contract Type	Contract Capacity (MW)	Last Capacity Test Date	Tested Capacity (MW)	2021 Average Generation Capacity (MW)
Geregu NIPP	Gas	Interim Agreement	434	2015	273.04	77.27
Sapele NIPP	Gas	Interim Agreement	450	2015	292.62	33.49
Alaoji NIPP	Gas	Interim Agreement	960	June 2021	212.33	58.19
Olorunsogo NIPP	Gas	Interim Agreement	675	2015	212.67	23.07
Omotosho NIPP	Gas	Interim Agreement	500	2015	219.61	43.24
Ihovbor NIPP	Gas	Interim Agreement	450	2015	202.34	16.87
Calabar NIPP	Gas	Interim Agreement	563	2015	339.55	236.02
Gbarain NIPP	Gas	Interim Agreement	225	2015	110.14	0
Total			4257		1762.31	488.15

In 2020, 71% of electricity generation comes from 9 out of all the power plants connected to the national grid. The average load factor for all the power generation plants is reported to be 61.74% in 2020, (The Punch, 2022:3). This means that the remaining almost 20 power generation plants contributed just 29% of the electricity

generated. It invariably implies that if all the power plants were working efficiently, then, there would be more electricity generation in the country which will be used for consumption by the populace.

According to USAID, Nigeria has a total installed capacity of 16,384MW as at 2019, however, the data of generated power and also the transmitted portion of it is as follows (NBS, 2022):

- Electricity generated in Q4 2020 is 9,668.16 Gwh
- Electricity generated in Q1 2021 is 9,717.81 Gwh and transmitted 9,519.75 Gwh
- Electricity generated in Q2 2021 is 8,917.81 Gwh and transmitted 8,728.87 Gwh
- Electricity generated in Q3 2021 is 8,684.50 Gwh and transmitted 8,510.84 Gwh
- Electricity generated in Q4 2021 is 9,077.80 Gwh and transmitted 8,894.97 Gwh
- Total generated electricity in 2021 is 36,397.92 Gwh and transmitted 35,654.43 Gwh

Table 2.14: Total Energy Generated (MWH) by GENCOS

GENCOS	2016	2017	2018	2019
KAINJI	2,420,487.90	2,696,807.00	2,650,734.00	2,964,722.00
JEBBA	3,039,053.00	2,820,159.00	2,611,380.00	2,879,189.00
SHIRORO	2,687,750.00	2,233,012.00	2,442,999.00	2,520,234.00
EGBIN	4,401,239.00	3,425,163.00	4,311,291.00	3,786,313.00
SAPELE	386,361.90	310,725.40	250,647.93	321,108.94
DELTA	2,380,455.95	3,042,107.35	3,884,936.50	2,715,799.91
AFRAM III-IV	0.00	90,543.40	313,365.95	304,702.64
OMOTOSHO 1	943,504.50	1,151,276.00	1,087,283.70	1,034,818.00
GEREGU	690,459.00	1,626,580.50	1,584,515.50	1,800,594.83
OLORUNSOGO 1	875,124.18	1,180,699.68	1,156,778.81	1,385,201.58

TOTAL (PRIVATIZED)	17,824,435.43	18,577,073.33	20,293,932.39	19,692,683.90
AZURA			1,616,876.32	2,251,480.50
OKPAI	2,622,060.00	2,343,999.20	1,944,887.00	1,419,724.20
IBOM	480,050.07	489,608.47	521,868.96	496,702.70
TRANSAMADI	63,441.30	144,620.40	240,230.70	323,311.74
PARAS	236,345.56	522,132.84	563,173.70	491,582.86
OMUKU	238,055.10	549,382.76	493,957.80	506,991.90
AFAM VI	2,239,337.89	2,259,149.16	1,832,729.81	1,474,969.09
RIVERS IPP	12,725.90	30,788.60	627,372.18	833,490.00
IPP TOTAL	5,892,015.82	6,339,681.43	7,841,096.47	7,298,252.99
SAPELE NIPP	799,487.90	934,620.00	1,161,461.50	609,674.10
OLORUNSOGO NIPP	168,291.20	675,996.60	511,016.79	211,280.30
OMOTOSHO NIPP	883,133.20	967,292.70	984,454.30	821,463.90
GEREGU NIPP	695,813.12	911,180.02	716,051.06	1,204,151.91
IHOVBOR NIPP	732,392.70	820,519.30	812,323.70	696,478.50
GBARAIN NIPP	178,302.80	344,561.52	360,076.61	257,441.58
ALAOJI NIPP	881,826.96	480,475.60	241,076.75	209,453.16
ODUKAPANI NIPP	476,286.21	1,444,647.05	750,319.35	1,947,753.53
	4,815,534.09	6,579,292.79	5,536,780.06	5,957,696.98
NIPP TOTAL	3,279,118.12	4,309,608.62	5,536,780.06	5,957,696.98
GRAND TOTAL	28,531,985.34	31,496,047.55	33,671,808.92	33,448,633.87

Source: TCN, 2023

Table 2.15: Energy Sent Out (MWH) by GENCOS and Year

GENCOS	2016	2017	2018	2019
KAINJI	2,414,700.51	2,690,481.08	2,628,844.70	2,935,403.70
JEBBA	3,034,433.90	2,812,294.12	2,574,811.58	2,803,337.27
SHIRORO	2,677,519.67	2,222,692.90	2,432,983.92	2,509,309.46
EGBIN	4,156,786.60	3,219,267.78	4,056,388.80	3,539,252.30
SAPELE	368,723.40	299,211.20	236,208.13	290,720.06

DELTA	2,365,564.00	3,028,300.24	3,877,515.70	2,694,922.10
AFAM II-IV	0.00	90,170.78	311,005.22	303,149.20
OMOTOSHO 1	919,675.90	1,120,672.30	1,250,703.51	1,010,648.50
GEREGU	687,757.30	1,624,738.19	1,413,143.46	1,792,144.77
OLORUNSOGO 1	860,842.80	1,150,803.29	1,136,883.01	1354264.S
TOTAL (PRIVATISED)	17,486,004.08	18,258,631.88	19,918,128.03	19,233,151.86
ASCO				
AZURA			1,615,187.27	2,249,916.82
OKPAI	2,565,681.06	2,294,967.99	1,897,038.68	1,380,360.90
IBOM	477,181.00	486,790.00	519,361.00	494,040.00
TRANSAMADI	61,559.00	141,183.20	234,311.80	315,921.10
PARAS	234,317.41	519,661.10	560,684.90	489,149.60
OMOKU	216,318.72	504,453.45	443,878.15	448,545.28
AFAM VI	2195288.47	2,212,273.82	1,797,735.23	1,440,730.62
RIVERS IPP	12,572.79	30,686.24	625,032.72	830,036.10
IPP TOTAL	5,762,918.45	6,190,015.80	7,693,229.75	7,648,700.42
SAPELE IPP	798,391.80	933,714.00	1,156,014.90	604,315.07
OLORUNSOGO NIPP	162,352.20	666,557.00	502,118.20	206,380.68
OMOTOSHO NIPP	877,978.89	961,087.11	983,306.40	817,541.39
GEREGU NIPP	694,267.17	910,878.65	711,063.65	1,199,076.95
IHOVBOR NIPP	877,512.36	815,815.55	806,732.76	690,979.58
GBARAIN NIPP	176,831.10	341,227.62	357,207.71	255,448.78
ALAOJI NIPP	727,065.70	474,929.39	236,274.19	207,363.63
ODUKPANI NJPP	470,308.22	1,434,804.03	744,846.74	1,936,155.98
NIPP TOTAL	4,784,707.44	6,539,013.35	5,497,564.55	5,917,262.06
GRAND TOTAL	28,033,629.97	30,987,661.03	33,108,922.33	32,799,114.34

Source: TCN, 2023

Table 2.16: Energy Generated by GENCOS 2020

Quarter	Q1	Q2	Q3	Q4	Total
AFAM (I-V)	166.00	89.00	64.00	130.00	449.00
GEREGU	8,560.97	8,797.42	8,693.72	9,668.16	35,720.27
EGBIN	166.00	89.00	64.00	130.00	449.00
SAPELE	463.96	532.47	449.41	602.57	2,048.41
UGHELLI	1,276.11	1,174.90	1,027.64	1,327.43	4,806.08
SHIRORO	60.08	85.20	80.56	98.33	324.17
KAINJI	558.61	766.63	700.39	681.63	2,707.26
JEBBA	676.22	398.89	754.67	804.00	2,633.78
AES BARGE	892.20	644.33	615.23	801.43	2,953.19
OKAPAI	725.87	573.90	668.51	765.15	2,733.43
AFAM VI					0.00
OMOKU	256.42	359.01	625.45	390.28	1,631.16
TRANS-AMADI	483.46	614.72	528.39	641.24	2,267.81
RIVERS IPP	166.00	163.50	124.34	102.17	556.01
IBOM POWER	89.25	153.84	97.91	157.80	498.80
OLORUNSOGO	239.85	240.40	242.96	193.09	916.30
OMOTOSHO	20.15	116.62	96.86	91.26	324.89
OLORUNSOGO NIPP	203.55	267.85	362.53	309.91	1,143.84
OMOTOSHO NIPP	201.26	251.22	325.49	287.39	1,065.36
ALAOJI NIPP	23.40	77.40	18.00	11.50	130.30
SAPELE NIPP	137.34	182.28	141.10	195.28	656.00
IHOVBOR NIPP	206.08	179.41	60.92	96.32	542.73
GEREGU NIPP	10.19		85.84	156.43	252.46
CALABAR NIPP	21.29	43.41	94.22	29.21	188.13
NESCO	232.02	191.69	170.55	224.84	819.10
PARAS	690.60	730.90	383.47	668.31	2,473.28
GBARAIN	21.04	19.99	20.62	13.91	75.56

AZURA-EDO	141.50	143.20	146.57	146.15	577.42
DADIN KOWA					
Total	16,689.42	16,887.18	16,643.35	18,723.79	68,943.74

Source: TCN, 2023

Table 2.17: Energy Sent Out by GENCOS 2020

Quarter	Q1	Q2	Q3	Q4	Total
AFAM (I-V)	164.00	83.00	63.00	129.00	439.00
GEREGU	458.31	526.15	444.04	594.67	2,023.17
EGBIN	1,202.85	1,108.49	972.39	1,257.52	4,541.25
SAPELE	52.98	78.42	78.28	98.33	308.01
UGHELLI	550.80	762.39	694.65	678.74	2,686.58
SHIRORO	673.39	395.84	751.70	801.00	2,621.93
KAINJI	883.73	686.44	607.53	791.80	2,969.50
JEBBA	710.63	562.42	656.50	752.16	2,681.71
AES BARGE					0.00
OKAPAI	259.75	346.75	609.06	375.69	1,591.25
AFAM VI	473.48	605.22	520.07	631.49	2,230.26
OMOKU	147.34	145.10	107.20	82.78	482.42
TRANS-AMADI	87.41	150.53	95.31	152.78	486.03
RIVERS IPP	238.95	239.41	241.82	192.24	912.42
IBOM POWER	20.03	115.98	96.24	90.36	302.58
OLORUNSOGO	199.41	262.50	355.57	302.62	1,120.10
OMOTOSHO	199.20	248.91	822.82	285.09	1,556.02
OLORUNSOGO NIPP	22.39	74.80	17.00	10.50	124.69
OMOTOSHO NIPP	136.17	180.86	140.43	194.55	652.01
ALAOJI NIPP	205.38	178.65	60.62	96.28	540.93
SAPELE NIPP	10.15		85.55	156.10	251.80
IHOVBOR NIPP	20.35	42.16	92.67	28.72	183.90

GEREGU NIPP	231.30	190.99	169.63	224.08	816.00
CALABAR NIPP	686.88	727.23	379.77	664.88	2,458.76
NESCO	19.97	18.89	19.31	12.76	70.93
PARAS	139.17	140 .68	144 .10	143.95	283.12
GBARAIN					
AZURA-EDO	596.29	793.86	805.39	739.93	2,935.47
DADIN KOWA					
Total	8,370.28	8,524.99	8,886.55	9,488.02	35,269.84

Source: TCN, 2023

Table 2.18: Total Energy (MWH) Consumed by the Eleven DISCOS and Year from 2016-2019

DISCOS	2016	2017	2018	2019
ABUJA	2,968,937.77	3,241,918.71	3,480,208.60	3,699,503.23
IBADAN	2,871,258.81	3,473,075.00	3,444,791.98	3,523,406.62
EKO	2,573,913.82	3,141,823.26	3,387,606.07	3,511,189.94
IKEJA	2,997,740.43	3,211,225.65	3,816,951.07	4,087,971.15
BENIN	224,893.39	2,356,154.46	2,443,522.31	2,371,297.86
JOS	1,056,348.40	1,349,448.10	1,229,177.40	1,224,698.00
KADUNA	1,923,136.88	1,937,050.98	1,953,077.22	1,911,048.00
YOLA	540,803.88	801,815.70	971,290.00	1,122,534.50
PORTHARCOURT	2,794,201.57	2,778,031.51	2,674,806.64	3,122,407.39
ENUGU	1,755,770.97	1,549,057.62r	1,575,553.30	1,650,757.44
KANO	1,459,444.93	1,794,478.55	1,947,272.46	1,801,688.87
TOTAL	23,190,151.00	25,634,080.00	26,924,268.00	28,026,503.00

Source: TCN, 2023

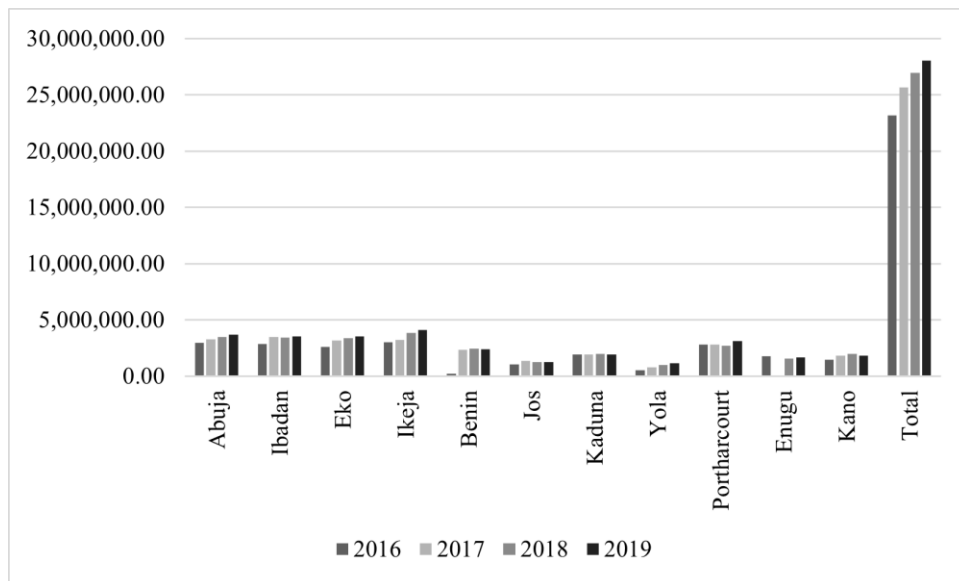


Figure 2.5: Showing Total Energy (MWH) Consumed by the Eleven DISCOS and Year from 2016-2019

Source: TCN, 2023

Despite the fact that Nigeria has the capacity to generate twice as much as the power that it transmitted during the period in view, but it was not able to transmit such due to constraints experienced by the generation companies.

Looking at the data tables above, we could deduce from them the following in relation to each year as presented and analyzed:

- **2016** – GenCos generated a total of 28,531,985.34MWH but sent out a total of 28,033,629.97MWH, thereby leaving a gap of 498,355.37MWH as wasted energy.
- **2017** – GenCos generated a total of 31,496,047.55MWH but sent out a total of 30,987,661.03MWH, thereby leaving a gap of 508,386.52MWH as wasted energy.
- **2018** – GenCos generated a total of 33,671,808.92MWH but sent out a total of 33,108,922.33MWH, leaving a gap of 562,886.59MWH as wasted energy.
- **2019** – GenCos generated a total of 33,448,633.81MWH but sent out a total of 32,799,114.34MWH, leaving a gap of 649,519.47MWH as wasted energy.
- **2020** – Energy generated by GenCos is recorded as 68,943.74MW while only 35,269.84MW was sent out, leaving a very huge gap of 33,673.90MW wasted energy.

And out of the summation of the above sent out total energy from 2016 to 2019, the total energy consumed by the eleven (11) DisCos; i.e distributed to final consumers is recorded to be 103,775,002MWH.

2.9 Population and Categories of Consumers

The federal government embarked on a National Mass Metering Program to ensure availability and access to meters by various customers to close the metering vacuum and disparity through the Meter Asset Provider (MAP), (NERC, n.d.). According to the National Bureau of Statistics in Nigeria, the number of metered electricity customers as at 2021 is 4.4 million. While that of registered electricity customers as at 2021 is 11 million in number; out of which 4,753,027 (42.93%) were metered in September 2021, and 4,404,013 (39.08%) were metered in June 2021. However, there are also the unregistered and unmetered customers who are in a reasonable number too. However, the number of current access rate of connections is 60%; with urban connections comprising about 86% and rural connections with the remaining 14%, (USAID, 2019). Each Disco is designed and structured in such a way that it covers the distribution of electricity in more than two states.

Customers are of two major categories which are the Maximum Demand Customers (MD), and the Non-Maximum Demand Customers (Non-MD). The differentiating factor is that the MD customers have their individual transformers installed for the customer usage, while the Non-MD customers have transformers which are shared with other members of the several grouped communities, (NERC,n.d.). Customer classification according to the NERC in consideration to the customer activities and nature of consumption, and are as follows:

- Residential (Domestic) customer: This category of customers are residential and using the normal daily household domestic appliances. Properties exclusively used for residential purposes fall into this category of consumers. They could be in the form of the following:
 - ⇒ R1 – Customers with consumption below 50KW
 - ⇒ R2 – Customers with consumption above 50KW
 - ⇒ R3 –This comprises of small estates and government houses

- Commercial customer: Consumers in this category are neither residential nor industrial consumers, rather they are consumers engaged in businesses and which fall into one of the under-listed:
 - ⇒ C1 – Small businesses
 - ⇒ C2 – Hotels, banks
 - ⇒ C3 – Large supermarkets and Hypermarkets
- Industrial customer: These are customers that are involved in majorly the business of production and manufacturing. It could be in the form of one of the following:
 - ⇒ D1 – Small industries
 - ⇒ D2 – Large scale industries
 - ⇒ D3 – Oil companies and large construction companies
- Special customers: Special customers are those customers having the characteristics of security forces, educational institutions, or worship centers. Agro-processing companies also fall into this category
 - ⇒ A1 – Schools, mosques and churches
 - ⇒ A2 – Medium sized barracks
 - ⇒ A3 – Large barracks, and agro-processing companies
- Public Street Lighting: As the name indicates, this is the street lighting system installed on the roads to provide basic amenity of electricity brightness on the streets and roads. It is categorized as S1. (NERC, n.d.).

NESI operates a 2-way tariff flat rate system in charging its customers. Firstly, there is a fixed charge through which cost of all fixed assets from generation to distribution is being catered for, although it is not same for all customer class but however, includes meter maintenance, demand and minimum charges associated with the consumption. The energy charge is the second cost associated with electricity power consumption. This charge is majorly tied to consumption and rate of use carried out by a customer within his class and varies depending on the obtainable and acquired amount of consumption, which is measured per KWh.

The MD customers drawn from the above classification is made up of R3, C2, C3, D2, D3, A2, A3, S1. The Non-MD customers are made up of R1, R2, C1, D1, A1.

The customer categorization and its associated tariff charges are considered by the NERC to have some related issues which is also expected to be resulting in some few misunderstandings. They include the fact that the existing client / customer categorization is difficult to understand due to its size, because just the R2 customer category is made up of about 60% of customer population, and the R1 customer category has a rather unambiguous description, which has a long-term negative impact on the Discos revenue collection. The usage of the meter maintenance charge in the rate element has recently come under severe attack, thus necessitating review and reconsideration, (NERC, 2010). However, even after these long years, the issues just mentioned are yet to be rectified by the regulatory and supervisory authorities.

Table 2.19: Lighting Fuel by Region, 2015/2016

Geopolitical zone	Fuel Type									
	Collected Firewood	Purchased Firewood	Grass	Kerosene	Electricity/PHCN	Generator	Gas	Battery/Dry Cell (Torch)	Candles	Others
North Central	4.9	1.1	0.1	9.1	35.9	5.8	0	41.4	1.5	0.2
North East	5.4	2	0.2	8.5	19.5	2.8	0	61.4	0.3	0
North West	10.1	2.8	0.3	8.6	25.4	2	0.2	49.4	0.4	0.9
South East	2.1	0.8	0	36.3	54.1	3.1	0	2.7	0.4	0.3
South South	2.2	0.3	0	21.3	54.4	9.5	0.3	7.1	0.7	4.2
South West	0.9	1	0	16	63.7	4.8	0.3	12.4	0.5	0.5
Urban	1.2	1.2	0.1	9.7	72.9	4.9	0.3	9.1	0.5	0.2
Rural	6.2	1.4	0.1	21.2	25.6	4.5	0.1	38.5	0.7	1.6
NGA	4.1	1.3	0.1	16.6	44.8	4.7	0.2	26.6	0.6	1.1

Source: NBS, 2017

The table above shows the sources of lighting in Nigeria from which we could see that Federal Government power supply channels are the highly used with South-West

region being the highest consumers. We see from the table also that there are still a reasonable number of consumers who go for options of lighting which are highly harmful to the environment; they are not renewable energy at all. These consist of Firewood, Grass, Kerosene, Generators and Candles. These are very harmful to the environment, hazardous to the society, dangerous to both humans and animals.

The data forms the basis upon which renewable energy generated through Sukuk mechanism can be successfully injected into the grid for distribution to prospective customers / interested and subscribed consumers.

2.10 Current cost of hydro-electricity generation Vs Solar power generation

The cost of hydro-electricity in Nigeria is between the range of 4 to 48 naira per kWh depending on the customer classification and the area (DisCo) where the service was provided and tariff is charged (NERC n.d). Discos have varying charges which they use to bill their customers depending on their ascertained cost of power generation. As a result, customers pay for electricity consumption using either pre-paid meters which records the consumption and is a pay-as-you-go service, or through the billing system where approximate or estimated costs are applied to customers with consideration to so many factors used by the Discos in determining such.

2.10.1 Potentials of Solar Energy in Nigeria

According to Diemuodeke, et. al., (2021:2-20), the accumulated solar wealth potential across Nigeria ranges between 3.4 to 6.7kWh / m² / per day. Countries such as Germany with much lower solar availability than Nigeria, is utilizing it for greater output. The study also presented that the Levelized Cost of Electricity (LCOE) using the PV system ranges from 0.387 to 0.475 USD / kWh. While that of diesel generator is from 0.947 to 0.559 USD / kWh.

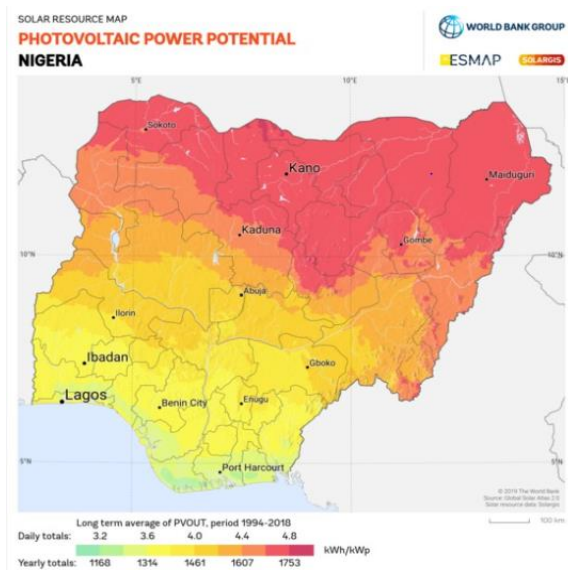


Figure 2.6: The PV Power Potential of Nigeria

Source: World Bank, n.d

The photovoltaic (PV) potential for grid-connected PV systems without batteries is the anticipated lifetime average power production (in kWh) produced per kilowatt of installed photovoltaic DC capability assessed at Standard Test Conditions (STC). This measures the potentials of using solar panels in saving energy for use by the consumers. The diagram 2.6 shows the amazing potentials of the PV system in the Northern part of the country. Although there is an average availability of sunshine in other parts of the country also, however, it is higher in certain part of the country than the others.



Figure 2.7: Global Horizontal Irradiation

Source: World Bank, n.d.

GHI is the amount of solar energy (integrated over a time) attenuated by all constituents of the atmosphere and falling on a horizontal surface on the Earth. Global horizontal irradiation integrates direct, diffuse and reflected components of solar energy (European Commission).

In other words, GHI is the total amount of shortwave radiation that comes from the top and falls directly on the earth. In Table 2.7, it could be seen that the Northern part of Nigeria has as high as 6.2kWh/m². This confirms the potentials of irradiation power in the



Figure 2.8: Direct Normal Irradiation

Source: World Bank, n.d.

A surface's amount of solar radiation absorbed as it remains constantly normal and towards the rays that travel in an unobstructed path from the sun's anticipated direction at it is presently located in the sky is known as Direct Normal Irradiation (DNI), (Handbook of Energy, 2013). This actually means the direct solar rays that fall on anything directly beneath the sun on the floor or ground. This could also be seen to have high potentials in Nigeria, with the table showing a very high concentration in the Northern States where there is always sun rays present in all seasons throughout the year.

Nigeria has an annual average daily solar radiation of 5.533KWh/m², ranging between 3.5KWh/m² per day and 7.0KWh/m² per day, (Oji, et. al., 2012:55-58). The areas that have an accumulated abundance of solar potentials are those areas around the Northern part of the country. These includes those states in the North-East and North-West part of the country.

It is estimated that the cost of the off-grid solar pv systems are at an average of USD 20 cents/kWh, (Yetano, 2017:7-12). However, in the United States, solar electricity price is 4.6 cents/kWh, according to SEIA, (Solar Energy Industries Association, 2020). This indicates that the US has a lower or below average cost of solar PV systems which makes it more accessible to the citizens.

Saudi Arabia has an amazing solar electricity price of 1.48 cents/kWh which is the lowest globally, (www.bloomberg.com, 2022:1). This surely makes the solar system more than affordable in the country. Reduced cost of solar electricity means more accessibility by the citizens and associated communities, and also avoidable cost of other electricity sources which tend to have higher cost than solar.

In Ghana businesses pay as high as 15-20 USD/KWh for solar systems, which is almost double the OECD average, (Amo-Aidoo, et. al, 2022:1-6). This makes the cost of solar system in Ghana more expensive than that of Nigeria.

According to the IEA, solar can now generate electricity at or below 20 USD/MWh, and it is now very clear that solar PV is the cheapest source of electricity ever in history, (IEA, 2020). This is also coupled with the fact that an average solar PV system has a lifespan of around 30 years. This involves guarantees and warranties by manufacturers to boost consumer confidence.

Rural access to power is very low in Nigeria; for households, social, community uses and rural industries. The REA is however saddled with the responsibility of electrification of areas that lack access to electricity, thereby reaching the unreached, and giving access to the inaccessible populace. This it does through receiving funds from the federal government, grants from international organizations, partnerships with other agencies such as the NSIA, and also partnerships with private investors, (REA, n.d.).

Renewable Energy Master Plan (REMP): Renewable energy should be generated and supplied in the form of electricity from 13% of the aggregate electricity generation in the year 2015, to 23% in 2025 and 36% by 2030. REMP targets Solar PV generation of 500MW in 2025. National Energy Master Plan (NEMP) was approved by the government in April 2022.

Nigeria has a solar project which is Ashama Solar Farm (Ashama, Delta State) of 200MW on 304 hectares of land (750 acres) of real estate and is the largest solar power station in Africa, (www.power.gov.ng, 2021). Although the project was reported by the government ministry, it is owned by a private individual through a partnership with foreign partners.

The President also commissioned a solar power plant with a 10MW capacity in Kano State in a collaboration between the federal government, state government, local

government, Sovereign Investment Authority, which was just launched in January, 2023.

Table 2.20: Renewable Electricity Supply Projection in MW (13% GDP Growth Rate), 2016-2030

Resources	Short Term (2013-2015)	Medium Term (2016-2020)	Long Term (2021-2030)
Hydro (LHP)	4000	9000	11250
Hydro (SHP)	100	760	3500
Solar PV	300	4000	30005
Solar Thermal	300	2136	18127
Biomass	5	30	100
Wind	23	40	50
All Renewables	4628	15966	63032
All Energy Resources	47490	88698	215158

Source: Energy Commission of Nigeria, 2012

According to the Energy Commission of Nigeria, the country is projected to have a total of generated renewable energy of 215,158 MW by 2030, which is expected from all sources; Hydro (LHP and SHP), Solar (PV and Thermal), Biomass and Wind energy sources. This is expected to result in a 13% GDP growth increase. This clearly shows the effect renewable energy, which is Green Energy, is expected to have on the economic growth of Nigeria.

2.11 Consumer Financing Preferences

A survey was conducted with questionnaires given to a population of sixty (60) prospective respondents out of which fifty-five (55) responded. The respondents are from across all industries and sectors of the productive economy. The survey was conducted in seeking to understand the level of satisfaction of individual electricity consumers; tailored to their needs. The main aim of the survey is to identify a consumer financing preference for electricity consumers in Nigeria which could be used for domestic, commercial, industrial, manufacturing, business, institutional power purpose (Appendix A).

The survey population is sixty (60) people, with a positive outcome of fifty-five (55) respondents. The population interviewed consists of:

- 10 Bankers whom are currently working in different banks in Nigeria: Interest and Non-interest Commercial Banks, Nigeria Export-Import Bank (NEXIM), Merchant Bank, and Investment Bank
- 10 Insurance Workers from a diverse range of insurance companies summing up to 6 different insurance companies in the capital city of Abuja.
- 10 Federal Civil Servants that work in ministries and agencies under the Federal Government of Nigeria such as the Ministry of Works, Housing, Labour, Power, Aviation, and Agriculture.
- 10 State Civil Servants from 5 states of Nigeria namely Kaduna, Katsina, Lagos, Sokoto and Bauchi.
- 10 Market Business Owners that sell as wholesalers and just 1 is a retailer in his business.
- 10 Industrial Companies Owners who are into manufacturing and have businesses in Flour Mill, Marble Production, Mattress Production, Assembling of Electrical Appliances, 3 Furniture Production Companies, Rice Mill, Food Processing Company, and a Construction Company.

The survey I carried out showed that over 50% of the population get less than 10 hours electricity supply per day. This also made the respondents to conclude and rate electricity supply poor with over 80% of my response population agreeing to the poor rating. 90% of the survey study also expressed that they are extremely dissatisfied with the services of the electricity distribution companies. 95% of the respondents rely on fuel power generators for their electricity supply. 80% of the respondents complained of epileptic power supply, while another 15% complained of high cost of power as the major impediments to access to electricity supply.

Another 90% interest in a different option to power supply was recorded. 98% of the respondents agreed to all options on the means of payment for a sustainable means of power energy. 100% of the respondents agreed to an environmentally and society friendly means of financing arrangement by the government. 100% of the respondents also consider Sukuk as the only consideration they have based on past experiences with government financing.

This is translated to mean that a huge majority of the survey population are dissatisfied and fed up with the services of the present Discos and would not mind having a more reliable form of electricity supply. They are also satisfied beyond reasonable doubt about the morality involved in the Islamic finance form of financing and also interested in a considerate means of financing which is environmentally and society friendly. All the respondents also showed full interest in making use of the Sukuk in providing financing to the government through subscribing to the Sovereign Sukuk.

The interview is a strong indication of the acceptance of the Green Sukuk which we are considering proposing for the financing of solar power system to end the lingering electricity scarcity issues suffered by the citizens of the country.



CHAPTER III

SUKUK PROJECT FINANCING IN NIGERIA

3.1 Sukuk Definition, Types, and their Applicability

Sukuk is defined by AAOIFI as securities of same and exact denomination which represents independent ownership entities in a whole portfolio of assets that are qualified and could either be in existence or projected future, (AAOIFI, 2018). This is stated by AAOIFI (2018) verbatim where it defines Sukuk as (AAOIFI, 2018):

Certificates of equal value representing undivided shares in ownership of tangible assets, usufruct and services or of the assets of a particular project or specific investment activity; however, this is true after receipt of the value of the sukuk, the closing of subscription and the employment of funds received for the purpose for which the sukuk were issued.

The IFSB also defines Sukuk as “certificates that represent the holders’ proportionate ownership in an undivided part of an underlying asset where the holder assumes all rights and obligations to such assets” (IFSB, 2005).

According to the World Bank, “Sukuk are a form of investment in which there must be permissible assets or transactions for which the investment is made”. Depending on the structure, with Sukuk's risk and return characteristics resembling bonds or other debt instruments, which is why they are frequently referred to as a type of debt securities, (World Bank, 2014). Sukuk are also referred to as physical and balance sheet backed assets which are used by government agencies or parastatals or private companies to raise financing and are backed by physical assets even when the Sukuk is a balance sheet financial instrument, (Rezali, 2013:2). SEC Nigeria defines Sukuk as:

An Arabic word that refers to investment certificates or notes which evidence proportionate interest in ownership of tangible assets, usufructs and services or investment in the assets of particular projects or special investment activity that adhere to the principles of Shariah.

It also believes the fundamental idea behind Sukuk, also known as an Islamic or Shariah-compliant "Bond", is in respect to the fact that an investor holds on to an

undivided ownership stake in a particular asset and therefore, entitled to earn through return generated by the asset. Sukuk which is undoubtedly a component of Islamic finance, is a non-interest-based investment and financing mechanism, but because it upholds moral principles and justice, its use is not limited to Muslims.

The first time Council of the Islamic Fiqh Academy (IFA) of the Organization of Islamic Cooperation (OIC) discussed sukuk was in its meeting in Riyadh in the year 2000 upon a paper on Sanadat al Ijarah presented to this meeting by Prof (Dr) Monzer Kahf where the idea of sukuk was discussed for the first time and a decision was issued by the IFA in 2003 endorsing and approving its wide usage as a means of finance. The creation of Sukuk was initially prompted by the desire for a different financing and investment option that complied with Shari'ah laws from issuers and investors in Muslim-majority nations, (Zulhibri, 2015:238-241). The government of Bahrain issued the first Sukuk ever in 2003, (www.cbb.gov.bh, 2003).

According to the IMF, Sukuk are usually of asset-backed form but however, could be issued as either asset-backed or asset-based in their structure as such that recourse falls on asset or its originator, (IMF, n.d). This clearly means that Sukuk has an asset that generates revenue and at the same time cushions all unforeseen circumstances which could befall the investment project being undertaken. This is the realism involved in Sukuk projects which makes it mandatory for that asset to be visibly available to generate the profits to be shared to the Sukuk holders as per agreed in the subscription contract. According to IFSB Standard 7 on capital adequacy requirements for Sukūk, securitizations and real estate investments (IFSB, 2009), Sukuk in applicability could only take any of the following forms:

1. Asset-backed Sukūk Structures: The risk here is directly tailored to the asset and the investor / Sukuk holder bears the consequences of any damage or destruction which happens to that asset.

2. Asset-based structure: This contract is tailored to a binding purchase agreement between the issuer and the investor. The IFSB relate this as “the issuer purchases the assets, leases them on behalf of the investors and issues the Sukūk. Normally the assets are leased back to the originator in a sale and lease back type of transaction.” In this instance, investors are subject to the credit risk of the originator. Because the income from the assets is distributed to the investors via the issuer, the IFSB calls this

arrangement "pay-through". This type of structure is embodied with credit risk vulnerability to be faced by the investor which could arise considering the return being generated for payment is being derived through that particular asset in question.

3. Asset-based Sukūk with "pass-through" structure: This structure comprises of 3 parties which include an issuing entity which buys the asset(s) from the originator and packages them to issue certificates, the issuer and the Sukuk holder (investor). Here the originator is the resort for the Sukūk holders, the issuer pledges to pay back in a situation where the originator fails to do so, (Kahf, 2016:71-77).

The implied translation of a Sukuk description is that Sukuk literally means a certificate, but then technically it means papers that register ownership arising from trading or business activities, (Dusuki & Mokhtar, 2010:1-3). Sukuk actually represent ownership of the extent of purchase contract in an asset, it is tied to an asset in any case. The ownership aspect of Sukuk is what truly qualifies earning from that asset according to Shari'ah.

Sukuk and bonds share some similarities between them which are their receipts of frequent payment streams and also their tradability in the stock market. But they are entirely different in nature because bonds are debt obligations with fixed interest returns, and whose values are determined by some risk factors. However, Sukuk represent share(s) in ownership of a certain asset that guarantees the holder return(s) owing to the fact that he/she shares in the risks involved and accompanied with that ownership (asset). Sukuk is committed to an exit at the end of the transaction and is always tailored to return; could be pre-fixed return in instances where it is agreed upon in the contract to be so as in Ijarah-based sukuk. Sukuk maturities are mostly long-run and with certificates usually held till maturity, (Balli, et al., 2021:530-536). Bonds are either attached or not attached to collaterals, and the investor is considered a creditor in all instances. Differently with the bonds in the case of Sukuk, the Sukuk holder is an investor with rights of return attached because he has ownership stake in an underlying asset that exists in reality, which forms the legality of the returns he receives from the Sukuk. The ownership and its imbued / inbuilt risks borne by the Sukuk holder in Shari'ah is what affirms the legality of returns received, a share in risks associated with ownership is what validates a share in its return.

Sukuk is ideal to finance necessities of governments that are related to infrastructure, (Kahf, n.d.). Sukuk is an alternative form of financing which relieves governments of having to deal with the burden of servicing loans through interest payment(s). Governments rather than dealing with debts are moving towards dealing with managing investments of its citizens, which is proving to be more desired by the populace considering the rate, speed, and manner in which Sukuk issuance is being bought and mopped-up whenever it is offered. This is clearly exhibited to be visibly seen in the demonstration of subscribers in all the issuance of the government in Nigeria; FGN Sovereign Sukuk Al Ijarah. In all its Sukuk issuances, Nigeria has seen an all-time-high numbers in oversubscription like never been seen before where the populace irrespective of religious and ethnic affiliations, have embraced it as the most ideal investment saver in terms of returns and security. Sukuk could also be used as a form of financing for businesses to be used in expanding their business activities, especially in the Islamic world according to Lackmann, (2015:19-20), where the Japanese companies stand to benefit more from it considering the fact that the population of ASEAN countries has a 50% Muslim populace, and also consider a quarter of the world population to be Muslims.

Sukuk are classified based on their shari'ah contracts to be either Murabaha Sukuk, Musharaka Sukuk, Mudaraba Sukuk, Hybrid Sukuk, etc. Sukuk could be in all forms of Islamic finance contracts and could be traded in the stock markets, except for those Sukuk laden with debt-based contracts such as Murabahah Sukuk which cannot be traded to avoid sale of debt which is totally prohibited by Shari'ah.

Ijarah Sukuk: Ijara is a contract where one party purchases an asset (machinery, equipment, land, or building) and leases same to another party that requires to make use of it through its usufruct, in return for a price which is considered as the rent payment. The agreement involves the lessor (the asset owner) and the lessee (the usufruct owner) specifying the duration of the contract and an advance payment made. While ownership of the asset remains with the lessor, the lessee has the ownership of usufruct rest with him of which he benefits from during the agreed period. Ijarah Sukuk are instruments of finance which represent lease contracts of owned assets of a lessor and where investments are made with an expectation of rental income stream(s). Additionally, the instruments have the advantage of being traded on the secondary market like other instruments at a price, (SEC, Nigeria).

The assets of Ijarah could be divided into either equal or unequal parts which can be traded at market prices. The Ijarah Sukuk which represent leased assets however, has some limitations to being traded at the market until the assets' construction has physically started and become visible. This implies that it is not allowed to trade Sukuk or any security or stock in the market, or even in future exchange as long as funding is still debts in depository fund, (Kahf, 2013:71-85). There are several instances of Ijarah Sukuk issuance with one of the earliest being the Zamzam Sukuk in Makkah. Another example is the FGN Sovereign Sukuk Al Ijarah which was issued in 5 separate issuances and used for financing roads infrastructure in all parts of the country.

Musharakah Sukuk: When two or more parties partner together to finance a commercial venture, the term "Musharakah" refers to the partnership agreement in which each party provides capital for the venture, either in the form of cash or in-kind contributions. A pre-determined profit sharing ratio will be used to distribute any profits made from the enterprise, but losses will be allocated according to capital contributions. Musharakah Sukuk entails partnership in a project/business whereby finance is contributed as a form of equity. The issuer in this form of Sukuk is one of the partners, while the shareholders (Certificate Holders) are the co-owners of the project. The investors are represented by an SPV which acts on behalf of them. The Musharakah structure mandates that both parties put up finance in equity for the actualization of the project, either with cash or cash equivalent financing, and that they split profit and loss according to an established ratio.

Mudarabah Sukuk: The term "Mudaraba" refers to a partnership agreement between a capital provider (Rab-al-Mal) and an entrepreneur (Mudaarib), whereby the capital provider agrees to give capital to an entrepreneur to carry out a certain business or activity. In this kind of business, the financier; capital provider bears all losses except in the case of negligence or violation of contract, the situation of which it is shared according to what is stipulated in contract agreement, likewise the profits realized. Mudarabah Sukuk are investment certificates used for the financing of projects or business ventures and are administered by the Issuer on behalf of the Sukuk Holders. The SPV which is representing the investments of the Sukuk holders and Issuer acting as an agent share any profits made from the project or business activity.

Istisna' Sukuk: Istisna' comprises the sale of a particular asset in exchange for a certain price that will be paid in full or in installments. The seller will be required to create or

construct the asset using his own resources and to deliver it by a specific date. Certificates known as Istisna' Sukuk are used to obtain capital for large-scale manufacturing and real estate projects, such as constructing power plants. The manufacturer or contractor gets compensated using the proceeds from the Sukuk during the asset's construction. After completion, the investors lease the asset to the developer in a hybrid structure, or they promptly transfer title to the Obligor on pre-arranged conditions for deferred payments via SPV.

Hybrid Sukuk: a kind of Sukuk structure where the base asset pool is made up of two or more Islamic finance agreements. An Istisna contract, an Ijarah contract, and a Mudarabah contract, for instance, might all be used to mobilize the funds at the same time and inside the same framework.

There is also the issue of Wakalah in Sukuk which is very common and important. This is because there is either an agency attached to an issued Sukuk or a trustee that represents the Sukuk holders, (Kahf, 2013:77). This is the body that represents the interest of the Sukuk holders and acts on their behalf with all rights and obligations of an agent attached to the representation. The SPV is mostly the Wakala body in a Sukuk issuance, however, the SPV cannot initiate or issue a third-party guarantee or be a guarantor of any form because it is just a body representing ownership of Sukuk holders.

The classification of the above mentioned Sukuk types is based on their Shari'ah contract type which could be either of the following:

- a) Sale-based
- b) Lease-based
- c) Partnership-based
- d) Agency-based

AAOIFI considers Murabahah Sukuk as being non-eligible to trading because of the Sukuk being debt-based, i.e., being that the underlying contract is a debt contract of Murabahah. IFSB on another hand also considers Salam Sukuk as non-eligible for trading, this is also because a Salam contract is a debt contract and it forms the underlying contract of the Sukuk.

Sukuk Applicability: According to SEC Nigeria, Sukuk issuers comprise of sovereign, company and financial institutions which can obtain financing by issuing Sovereign,

Sub-national or corporate Sukuk. This therefore, means that Sukuk could be issued by the Federal Government, State Governments, Government Agencies, Multi-national Corporations, and Corporate Companies which includes all companies registered within the laws of the country and operating therewith. It is also applicable as rightly known within the context of the Shari'ah with approvals obtained from both FRACE and SEC.

The SEC also sees the advantages and benefits of Sukuk financing as it being a Shari'ah compliance form of financing which is used for only beneficial projects and of course are projects that are acceptable and not harmful to the environment and community, with real exchange in asset ownership through legally recognized means of contracts. Sukuk transactions are transparent, without gambling, no interest associated, revenue and return generation characteristic of investment underlying asset, and could be either tangible or intangible assets, (www.sec.gov.ng).

3.2 Overview of Sukuk in Nigeria, Issuers and other Parties Involved

The Osun state of Nigeria in 2013 issued a 10 billion Naira Sukuk which was oversubscribed by 1.4 billion naira. The Sukuk was used to finance the construction of 27 High and Middle Schools in the state. It was a 14.75% fixed return Ijarah sukuk due in the year 2020; with a 7-year tenure, (Osun State Government, 2014). According to the state, the government through the SEC was able to issue the first Sukuk in the history of Nigeria, and West African region. It registered an SPV which was named Osun State Sukuk Company and which held ownership of the schools and sold same to the Sukuk shareholders. Rentals were paid as agreed in the contract, and finally, the Osun state government bought the schools outright and returned the funds to sukuk holders as principal. The schools constructed were 3 in the capital of Osogbo, and others in different parts of the state, (Salaudeen, 2021:108-109).

The federal government of Nigeria however, after the issuance of the Osun state Sukuk by the state government, embarked on a journey of actualizing its debut Sukuk issuance through firstly clearing the ways by introducing several laws and regulations that are in compliance with the Shari'ah through both the DMO and SEC to enable meeting up with the Shari'ah requirements involved. Ultimately, in 2017, the government issued its first Sovereign Al Ijarah Sukuk which it called FGN Sukuk I through its registered SPV which is FGN Sukuk Company 1. The Sukuk issued was

100 billion naira for the construction of 25 road projects across the 6 geo-political zones of the country. The rental rate was 16.47% per annum payable twice a year, and the Sukuk was oversubscribed by 105%, (DMO). The Sukuk is due in the year 2024. All Sukuk issued by the government is backed by the full faith and credit of the Federal Government of Nigeria, which serves as the security.

The federal government issued a 100 Billion Naira second Sovereign Al Ijarah Sukuk in 2018. This Sukuk too was targeted at constructing 28 road projects across the 6 geo-political zones of the country. The Sukuk was oversubscribed again, but now by 132%, (DMO). The Sukuk rental rate is 15.743% per annum and is due in the year 2025.

In the year 2020, the federal government issued a 7-year tenure Sovereign Al Ijarah Sukuk of 150 Billion Naira with an 11.20% rental rate which is payable twice a year. The Sukuk was oversubscribed by 446%, and was used to finance 44 critical road projects across the 6 geo-political zones of the country.

The Family Homes Fund (FHF) is an agency owned by the FG through the Federal Ministry of Finance and the Nigeria Sovereign Investment Authority and is focused on the attainment of the UN-SDGs and the urbanization agenda, rolled out a debut Sukuk issuance of 10 Billion Naira corporate Sukuk which is the first to be approved by the CBN Committee of Experts and certified by SEC for trading on the Nigeria Stock Exchange. The Sukuk is a Series 1 funding to finance 40,000 housing units. It was issued at a rental rate of 13% per annum and is due in the year 2028. 21.3 Billion Naira was raised which means an oversubscription of 2.1 times.

The FG in 2021 issued another Sovereign Al Ijarah Sukuk of 250 Billion Naira, for a 10-year tenure at the rate of 12.8% per annum. The Sukuk was for key economic road infrastructure through construction and rehabilitation of importantly routing roads across the Federal Capital Territory (FCT) and Ministry of Niger Delta, and the Federal Ministry of Works and Housing, (DMO).

In 2021, Purple Urban Limited which is a real estate development company issued a 5 billion naira Sukuk to fund the construction of 94 out of 112 housing units in a housing development project in Lagos State. The Sukuk was fully subscribed at 100%. The due date is 2026, with no rate of return stated, rather an agreement option for the Sukuk holder to pay up an amount (the contract is not clearly stated in available data) and take ownership possession of house(s).

In 2022, Taj Bank Limited issued a Tier1 Mudaraba Sukuk of 10 Billion Naira from a 100 Billion Naira Sukuk which the company believes is aimed at strengthening its capital adequacy ratio and corporate business services which include manufacturing and agricultural services; targeted at youth involvement and empowerment, (This Day, 2023:2). The Sukuk was oversubscribed by 113.6%, and was listed on the Nigeria Stock Exchange in January, 2023.

Family Homes Fund issued Series II Ijarah Sukuk of 20 Billion Naira in 2022. This is a completion of the previous issuance they had issued in 2021. The second Sukuk was also listed on the NGX in January, 2023.

In 2022, the FG issued its latest Sovereign Al Ijarah Sukuk of 100 Billion Naira which was oversubscribed by 165%, with an annual rental rate of 15.64%. The issuance was aimed to raise funds for construction and rehabilitation of key road projects in the country. The Sukuk tenure is until 2032 when it will expire.

In January 2023, Pomegranate Nigeria Limited (PNL), a new generation third-party logistics company successfully raised 2.2 Billion Naira Al-Ijarah Sukuk three-year loan through Wealth Bridge Capital Partners Limited.

The Issuing Government is the Federal Government of Nigeria, which issues the Sovereign Al Ijarah Sukuk. The FGN Roads Sukuk Company is the SPV incorporated by the issuer / obligor which the trustee that is duly registered to hold the shares and management of the Sukuk holders asset on their behalf. The issuer / obligor in this case is the Federal Government of Nigeria which incorporates the SPV. The FGN Ministry of Works and Housing is involved with the payment and project delivery related to the Sukuk project. The Sukuk Holder is the investor that purchases Sukuk certificates; equal value of ownership shares in the project and becomes the real owner of the project the funds are used to finance which must be a real asset, and he is also the Lessor. The CBN is the fund manager / banker and the funds Trustee. The FGN is the Lessee of the project because it promises to rent the roads infrastructure to be constructed with the Sukuk funds and at such, pays the Lessor returns in form of rents on an agreed basis with rental rate and time clearly agreed to at the point of entering into the Sukuk contract (in this case which is the subscription of Sukuk shares contract).

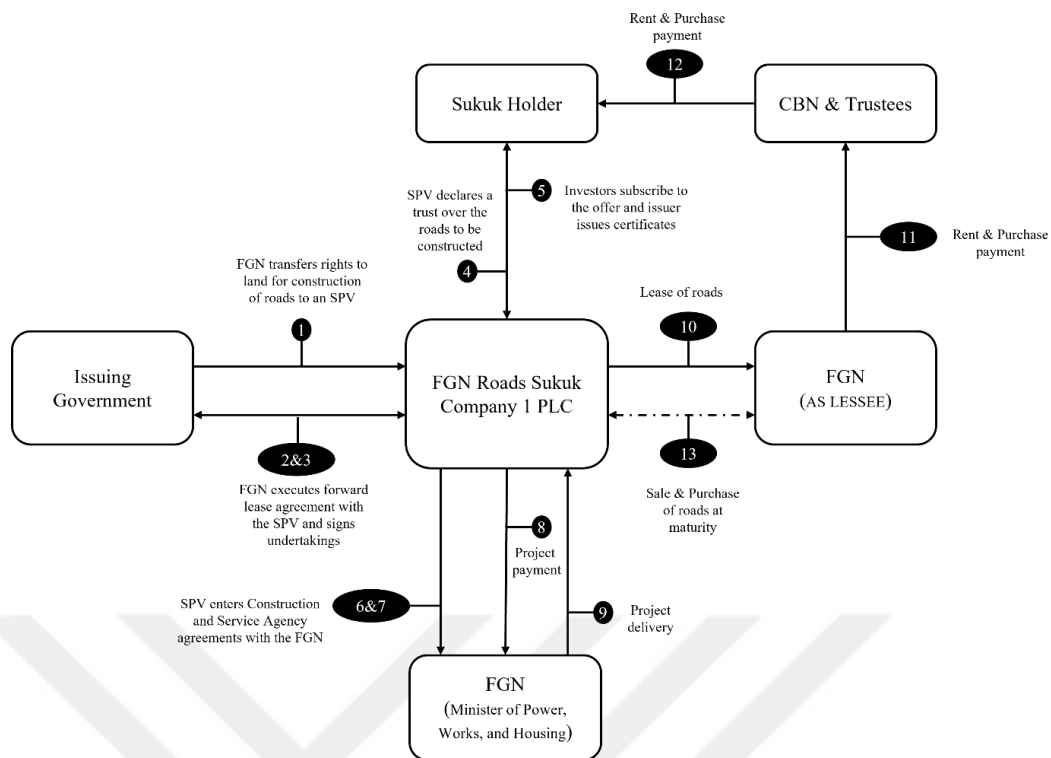


Figure 3.1: FGN Sovereign Al Ijarah Sukuk Structure

Source: DMO, 2017

Nigeria, according to Fitch Ratings, has the largest Sukuk market in Africa comprising of an outstanding issuance of 755.5 Billion Naira (USD1.6 Billion) as at January 2023, (Fitch Ratings, 2023). The Nigerian Islamic finance market is expected to be worth USD 2.9 Billion by the end of 2022, with outstanding Sukuk having 57% of total assets, Islamic banks 42%, Islamic funds and Takaful has the remaining 1% share. Nigeria having the largest Muslim population in Africa and a substantial size of unbanked population, the long-term potential is substantial. The DMO says it has a total Sovereign Sukuk issuance of 742.557 Billion Naira as at end of December 2022.

3.3 Key Players in Sukuk Issuance in Nigeria

The following are the key players in the various Sukuk issuance we have had in Nigeria, with each of them having had a key role(s) played in ensuring a successful management of the whole process. Some of the actors are government agencies, regulators, state governments, fund managers, investment houses, investment banks, merchant banks, etc.

- Debt Management Office: According to the DMO, “It is responsible for external debt negotiations, other forms of negotiations, and all other funding

operations. Its staff members are responsible for implementing short-term strategies related to bond issuances in domestic money and capital markets”. The office is therefore, fully in charge of raising Sukuk funds on behalf of the federal government.

- Securities and Exchange Commission: SEC is in charge of creating and enforcing capital market regulations in Nigeria as the Apex Regulator of the country's capital market. The Securities and Exchange Commission's role in Nigeria is to control the investment and securities industry. The capital market in Nigeria is where investments and securities transactions are made. Any economy's progress depends greatly on the capital market.
- Central Bank of Nigeria (Financial Regulation Advisory Committee of Experts; FRACE): The formation of an advisory council at the CBN on Islamic banking and finance is provided for in the CBN Guidelines for the Regulation and Supervision of Institutions Offering Non-Interest Financial Services in Nigeria. One of the duties of FRACE is to ensure that all Sukuk issuance are done in compliance with the Shari'ah. It is clearly stated in the CBN guidelines for FRACE that as its second duty and responsibility is to;
Give expert opinion and assistance on non interest (Islamic) banking and finance matters referred to it by other regulatory agencies in the Nigerian financial system, which shall include but not limited to: the Nigeria Deposit Insurance Corporation (NDIC), the Securities and Exchange Commission (SEC), the National Insurance Commission (NAICOM), the National Pension Commission (PENCOM) and Debt Management Office (DMO).
- Osun State Government: This is the first state to issue Sukuk in Nigeria in the year 2013. And it was also the first ever Sukuk to be issued in the country.
- Lotus Capital Limited: This is an ethical investment fund managers and are the pioneer lead issuing house for the Osun State Sukuk Al Ijarah 2013 (it won an Islamic Finance Award for Africa Deal of the Year category 2014 in Dubai for this), it is the lead issuing house for Federal Government Sovereign Sukuk Al Ijarah I, II, and III. Lotus capital is also a 2021 International Investor Award winner for Best Islamic Investment Company West Africa.
- FBN Capital Limited

- Greenwich Merchants Bank Limited
- Credent Capital and Advisory Limited
- Vetiva Capital Management Limited
- Stanbic IBTC Capital Limited
- Cardinal Stone Partners Limited
- Marble Capital Limited
- One17 Capital Limited
- Ava Capital Partners Limited
- Finmal Financial Services Limited
- Tidido Securities Limited

3.4 Nigerian Investor(s) Confidence in Sukuk

In the view of some researchers such as Sani, et. al., (2022:1-5), Sukuk in Nigeria has its related issues which include economy of details regarding the road projects being constructed, lack of awareness on Sukuk modalities, religious and ethnic discrepancies effect, with its implementation translated by some individuals and groups as an agenda to Islamizing Nigeria. While some others such as Arabi, (2019:1-10), recommend the use of Sukuk to finance the mining sector and infrastructure in the country, considering the tremendous success recorded by Sukuk issuance in the country. According to the study, the mining sector is less regulated and therefore, needs proper financing that has some form of in-built regulation tailored to it, and of which it is only the Sukuk that fits into the description. Also, in view of this research study and in consideration of the performance of all Sukuk issuance made in Nigeria as recorded by the affected agencies, the response of Nigerians to Sukuk is astonishingly tremendous with the investor market seeking an increase in the availability of the instruments both in primary and secondary markets.

The investors in Sukuk, according to the DMO, include: “Retail investors, Banks, Pension Fund Administrators (PFAs), Asset / Fund Managers, Insurance Companies, Ethical Funds, Takaful Operators, Non-interest Banks, Stockbrokers, Government Agencies. High Networth Individuals (HNI), Trustees, and Trust Support of FG Infrastructure Development”, (DMO, n.d.).

According to the DMO, there is a significant increase in the percentage of subscription of retail investors in the most recent Sukuk issuance compared to the ones issued earlier. This could be as a result of increased awareness, and publicity made by various groups, religious bodies, institutions, and advertisements by the office in charge of managing Sukuk issuance.

The performance of Sukuk issuances by the Federal Government and its agency that is contained in the percentages of oversubscription recorded in Sukuk issuance is seen below:

- FGN Sukuk 1 oversubscribed by 105%
- FGN Sukuk 2 oversubscribed by 132%
- FGN Sukuk 3 oversubscribed by 446%
- FGN Sukuk 4 oversubscribed by 346%
- FGN Sukuk 5 was oversubscribed but the exact rate of oversubscription not stated.
- Family Homes Fund Corporate Sukuk oversubscribed by 2.1 times.
- Taj bank Sukuk oversubscribed 113.6%

In view of the aforementioned issuances which have been presented, therefore, considering the oversubscription experienced in all the Sukuk issuance of both sovereign and corporate Sukuk in Nigeria, it is pertinent to say that Sukuk in Nigeria has been widely accepted across all religious and ethnic groups. Sukuk prospects right from the onset are believed to be highly positive when you look at the Nigerian debt market. According to Abdullahi, 2013:2-6), the positive impact of Sukuk in the Nigerian capital market is glaringly clear, and sees Nigeria standing to benefit much when Sukuk is used alongside the conventional bonds in the market.

The Director General of the DMO stated that “The level of subscription is evidence of investors’ confidence in the use and impact of Sukuk in the construction and rehabilitation of road infrastructure across the country. Sukuk is a product that Nigerians are demanding”, (DMO, 2022). The organization also expressed its amazement with the fact that despite several other local and international products being available for investment, Nigerian investors are more interested in Sukuk because it involves real activities of infrastructure financing, an all-encompassing investor involvement; financial inclusion of all investor classes, and also the

construction contractors because they know that whatever project related to Sukuk definitely has no payment and mobilization delay involved.

All Sukuk projects are physically seen and this encourages investors when they know what exactly their investments are put into use for and involved in the supervision of those projects by practically seeing them whenever they want to inspect. The quality and level of performance is also something which is assessed by anyone who wants to do so at any point in time. This, however, makes Sukuk a corruption-free kind of investment where transparency must be observed.

The DMO had to emphasize that the rate of oversubscription of Sukuk was incredibly very high in its 2021 issuance, and it was a practical indication of investor confidence in the product. It is also seen as the product that meets the needs of the ethically conscious investors who were financially excluded due to their abstinence from participating in interest-laden / conventional form of investment products. There is also diversification of source of funding which is another very important aspect for the DMO, (DMO, 2021).

3.5 Assessment of the Performance of the Sukuk Projects

According to DMO Press Release in 2018 (www.dmo.gov.ng), the staff of the DMO, Federal Ministry of Works and Housing, Federal Ministry of Finance, and Office of the Accountant General of the Federation, in a joint committee inspection tour, were able to do an assessment of the set of projects financed with the first sovereign Sukuk issuance (FGN Sukuk 1). The roads visited by the team were the Abuja – Abaji –Lokoja road, Kaduna Eastern Bye-pass road, Obajana – Okene road, Okene Bye-pass, and Suleja – Minna road. The level of project construction / rehabilitation was progressive and impressive to the team which made them commented that Sukuk is the best way to go in terms of financing infrastructure. The interactions between the team and the contractors they met on-site was rather too impressive whereby the contractors expressed their motivation to work more efficiently because of the prompt payments associated with Sukuk projects. Fascinatingly, the Sukuk projects of the FGN Sukuk 1 have been completed and handed over.

The President in his final Ministerial Performance Review Retreat, November 2022, said “... Sukuk was used to finance the construction of 2,499 KM of roads, and rehabilitation of 15,961 KM of roads across the country. 941 KM of the roads have

been handed over...” (This Day, 2022:1-3). This is a major win for Sukuk financing as it has been used to finance a total of 77 road projects and 23 bridges across the country, which constitutes a huge relief to the burden suffered by the yearly budgets of the country due to deficits encountered much frequently.

All major highways linking the 6 geo-political zones of the country are financed by Sukuk funding, and have majorly reached a high percentage of completion stage with many of them been fully completed.

The Sukuk project contractors are big construction companies among which are Julius Berger Limited, CCECC Nigeria Limited, Mothercat Limited, Setraco Nigeria Limited, CGC Nigeria Limited. These companies comprise of expatriates as management supervisory members, however, they employ local engineers in localities where the construction project is being carried out and only depend on the foreign engineers for supervisory roles. This is helping local professionals in obtaining employment and at the same time being part of the team that is actualizing developmental project(s) execution in the country.

3.6 Green Sukuk and its Inbuilt Environmental Compatibility and Sustainability with its Utilization in Electricity

The concept of Green Sukuk has gained considerable attention in the world of finance, particularly among those keen on investing in sustainable development. This chapter discusses an overview of Green Sukuk and its significance in achieving Sustainable Development Goals (SDGs) by supporting environmentally friendly projects. It further explores integrating Environmental, Social, and Governance (ESG) principles in Green Sukuk investments and its role in promoting Socially Responsible Investing (SRI). Furthermore, the chapter examines how Green Sukuk can play a crucial role in financing the power sector while adhering to sustainability principles.

3.6.1 Green Sukuk Overview

In recent years, there has been a significant increase in the utilization of Sukuk, an Islamic finance instrument with essentially, Sukuk representing an Islamic version of bonds that is structured in compliance with Islamic principles, prohibiting the receipt or payment of interest, also known as “Riba”. Instead of offering interest payments, Sukuk investors receive a proportionate share of profits generated by the underlying asset or project. This feature renders Sukuk an appealing alternative to conventional

bonds for investors seeking socially responsible investment opportunities (Bennett and Iqbal, 2013, pp. 211-225).

Green Sukuk, an innovative form of Sukuk, has emerged as a potential solution to the growing need for environmentally-friendly investments, which is structured in a manner that directs funds towards projects that promote environmental sustainability—e.g., renewable energy, energy-efficient buildings, or sustainable waste management systems. In other words, it is a novel financial instrument that has gained popularity in recent years, enabling issuers to raise funds for environmentally friendly projects while allowing investors to support these projects and earn a return on their investment. The Green Sukuk structure combines the principles of Islamic finance with the objectives of sustainable finance, including renewable energy, energy efficiency, and pollution control (Abdullah and Nayan, 2020:16). By investing in Green Sukuk, investors intend to support sustainable development initiatives while adhering to Islamic principles. Consequently, it represents a unique opportunity to align financial returns with environmental and social benefits, thereby promoting a more sustainable and responsible financial system.

Besides, Green Sukuk signifies a nascent asset category amalgamating three prevalent investment movements: Islamic mutual funds, socially responsible investments (SRI), and Sukuk. In the era that followed the turn of the century, the evolution of Islamic mutual funds has enhanced the array of investment choices accessible to Islamic investors across various stock markets. The elements of Islamic mutual funds are chosen via a meticulous scrutinizing procedure that employs qualitative and quantitative screening that are analogous to those utilized for SRI. Nonetheless, in contrast to the choosing criteria used for SRI, these screening requirements do not encompass concerns regarding human rights or environmental protection (Alam et al., 2016, pp. pp. 167-185). The general Green Sukuk structure is as follows:

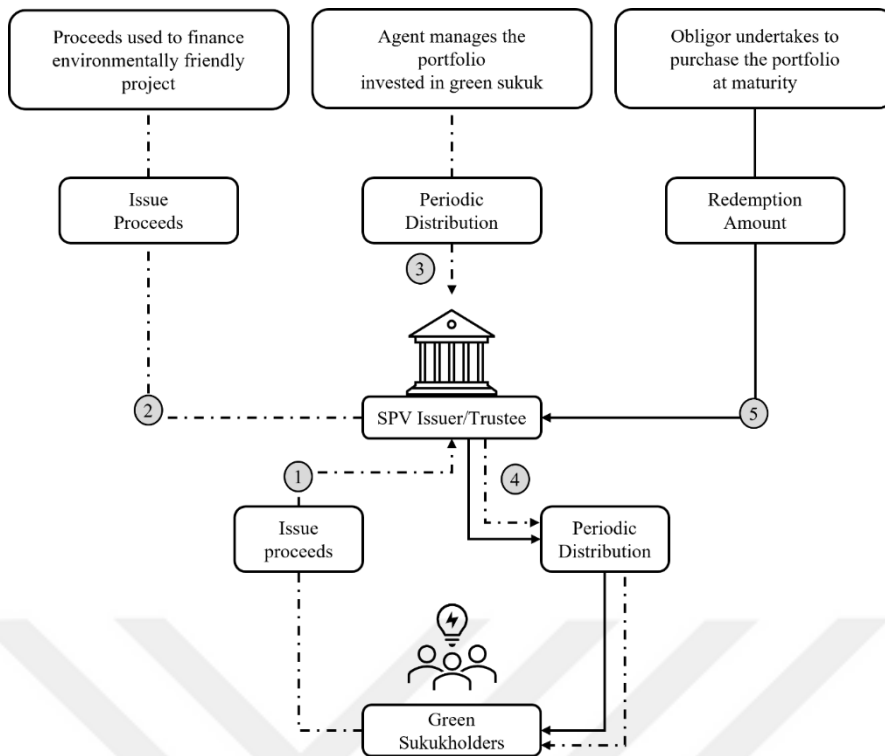


Figure 3.2: Green Sukuk Structure

Source: Mat Rahim and Mohamad (2018)

The issuance of a Green Sukuk involves similar processes to a regular Sukuk; both require the involvement of multiple parties, including the issuer, obligor, originator, Sukuk holder, primary subscriber, special purpose vehicle (SPV), Shari’ah advisor, regulator, credit enhancer, investment bank, trustee, facility agent, security agent or trustee, credit rating agency, and the legal advisor (ISRA, 2016). However, the issuance of the Green Sukuk requires the presence of a principal advisor to oversee the transaction. The principal advisor is responsible for various tasks such as selecting financing parties, drafting the terms and conditions agreement, conducting thorough investigations, obtaining Green Sukuk certification, securing Shari’ah approval and Sukuk ratings, marketing the instrument to investors, and ultimately releasing the Sukuk to the market. The process of issuing Green Sukuk is as follows:

The issuing process for Green Sukuk shares similarities with traditional Sukuk issuance; however, it involves additional step and conditions that must be considered to ensure compliance with green principles. In the primary Sukuk issuance process, the issuer seeks to raise funds by issuing Sukuk. The issuer engages a principal adviser or lead arranger who assists in structuring the Sukuk, and a solicitor who prepares the

legal documentation. Additionally, a Shari’ah adviser is appointed to ensure compliance with Islamic law. To assess the "greenness" of the Sukuk, an independent expert is highly recommended to evaluate the Sukuk issuance thoroughly. This involves assessing the environmental impact of the underlying project and ensuring that the Sukuk adheres to recognized green standards. It is essential that the Sukuk structure meets the necessary green principles and is in compliance with Islamic law. Once the Sukuk structure has been determined, a fatwa or religious ruling is obtained from the Shari’ah adviser to confirm compliance with Islamic principles. The issuer must also obtain an independent review or certification from a reputable third-party provider to verify that the Sukuk meets recognized green standards. Finally, the Sukuk is marketed to potential investors, and once there is sufficient demand, the Sukuk is priced, and the issuance is closed. The Sukuk holders receive regular profit payments or coupon payments throughout the tenor of the Sukuk, with the principal repaid at the end of the tenor.

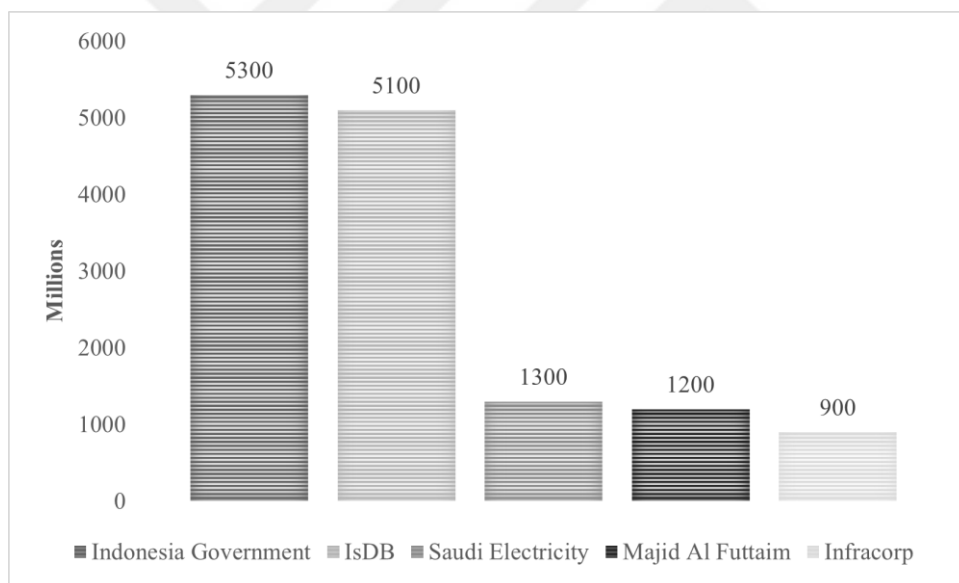


Figure 3.3: Top Issuers of Green Sukuk

Source: LSEG, 2022

The structure of general Green Sukuk heavily depends on Shari’ah compliance, using Sukuk contracts to establish financial commitments and connections between issuers and investors. The most common underlying Shari’ah contracts used in Sukuk structuring include those based on lease, agency, sale, and partnership. All Sukuk transactions must conform to Shari’ah principles and regulations. Regarding Green Sukuk, issuers are required to reveal any pertinent information about their goals,

approaches, policies, or procedures related to ecological sustainability, as well as the green criteria or certifications mentioned in a project selection. Issuers should emphasize these aspects to hasten the industry's education process in fulfilling investor demands (Ambrose et al., 2023: 145-170).

Malaysia is regarded as a leader in sustainable investment due to its introduction of the Islamic Green Sukuk SRI, a Shari'ah-compliant financing mechanism that supports environmentally responsible projects. Moreover, Malaysia has been recognized by the World Bank Group for its significant efforts in this regard. Tadau Energy created a landmark achievement in July 2017, issuing the world's first Green Sukuk. The RM250 million (USD58 million) Sukuk is designated to finance solar projects in Malaysia for a 16-year term (Abdullah and Nayan, 2020:16). On the other hand, Indonesia issued the first-ever sovereign global Green Sukuk, which amounted to USD 1.25 Billion in 2018. In 2019, Indonesia made another historic achievement by launching the first domestic Green Sukuk for retail investors through an online platform (IIFM, 2022).

3.7 Sustainable Development Goals and Green Sukuk

The Sustainable Development Goals (SDGs) are a set of global targets to promote sustainable development, addressing issues such as poverty, hunger, and environmental degradation. The UN adopted the SDGs in 2015 as a comprehensive framework for sustainable development. The goals are comprised of 17 targets, which include eliminating poverty, achieving gender equality, and promoting environmental sustainability. The SDGs are designed to be universal, meaning that they are applicable to all countries, regardless of their level of development. The goals are also integrated, meaning they are interconnected and require a coordinated approach to achieve them. The SDGs provide a shared vision and a common framework for action, bringing together governments, civil society, the organized sector, and individually to aim at sustainability and fairness for everyone. They provide a roadmap for countries and organizations to align their strategies, policies, and actions with a universal vision of sustainable development.

The importance of the SDGs lies in their ability to provide a clear set of goals and targets that become a guideline for sustainable development. They promote global cooperation and partnership, recognizing that addressing the world's most pressing challenges requires collaborative efforts across countries and sectors. Moreover, the

SDGs are inclusive and universally applicable, taking cognizance of the fact that every country irrespective of its developmental level, is expected to take part in attaining sustainable development. Another key feature of the SDGs is their recognition of the interconnectedness of economic, social, and environmental dimensions of sustainable development, (UN, 2015). This recognition is essential, highlighting the need for an integrated approach to sustainable development, considering the interplay between these dimensions. The SDGs offer a significant business opportunity, as companies that align their strategies with the goals can access new markets, improve brand reputation, and foster innovation (UNGC, 2018). In this way, the SDGs can catalyze private sector engagement in sustainable development.

Despite some progress towards achieving the SDGs, significant challenges remain in realizing the goals. While there has been improvement in reducing poverty and increase in clean water and sanitation accessibility, the pace of progress is uneven across regions and countries. Low-income countries, in particular, face significant challenges in achieving the SDGs due to their limited resources and lack of infrastructure. Additionally, political instability and conflicts continue to impede progress toward achieving the goals (UN, 2021). The COVID-19 pandemic has also pose significant challenges to achieving the SDGs, increased inequalities and poverty, limited access to education and healthcare, and the global hunger crisis (UN, 2021).

Nonetheless, some countries have made notable progress toward achieving the SDGs; many countries have reduced poverty rates and improved access to education and healthcare. Furthermore, several countries have significantly promoted renewable energy and sustainable infrastructure. The private sector has a vital role to play in achieving the SDGs. Many companies have aligned their strategies with the SDGs, investing in sustainable practices and contributing to achieving the goals (UNGC, 2021).

Green Sukuk has the potential to contribute to achieving the SDGs in several ways. Firstly, Green Sukuk can help to finance projects that promote environmental sustainability, such as renewable energy and waste management. These projects are aligned with SDG 7 (Affordable and Clean Energy) and SDG 12 (Responsible Consumption and Production), respectively. Secondly, it can contribute to achieving SDG 13 (Climate Action) by financing projects that reduce greenhouse gas emissions and reduce climate change adverse effects. Thirdly, Green Sukuk can help to promote

sustainable cities and communities, which is SDG 11, by financing projects that promote sustainable urban development, such as green buildings and public transport. Fourthly, this kind of Sukuk can help achieve the SDG 9 goal of building sustainable infrastructure through financing projects that promote sustainable infrastructure, such as green buildings, public transport, and waste management.

Additionally, Green Sukuk can contribute to achieving the SDGs by providing access to capital markets for sustainable projects where application of Green Sukuk will facilitate sustainable development efforts to promote environmental conservation, particularly in the utilization of renewable energy sources. Many sustainable projects face challenges in accessing finance due to their high-risk profile, long-term nature, and lack of collateral; it provides an alternative source of finance for these projects, which can support accelerating their implementation and scale-up. One of the main challenges is the lack of standardized guidelines for Green Sukuk issuance, which makes it difficult to measure the environmental impact of Green Sukuk projects and hinders the credibility of the instrument. Another challenge is the limited awareness and understanding of Green Sukuk among investors, who are not familiar with Green Sukuk, which limits its uptake.

3.8 Environmental, Social, and Governance (ESG) and Green Sukuk

Sustainable investing refers to investment strategies that incorporate factors perceived to have positive impacts on the environment, society, and the global community. These factors are collectively referred to as environmental, social, and governance (ESG) factors, and are integrated into investment processes to generate long-term financial returns alongside positive societal and environmental outcomes. This approach has garnered attention from the public and private sectors, with companies globally prioritizing activities and investment decisions aligning with these goals.

The concept of ESG has emerged in the business and investment landscape. According to a Global Sustainable Investment Alliance (GSIA) report, the global sustainable investment market grew to \$35.3 trillion in assets under management in 2020, reflecting a 15% increase from 2018 (GSIA, 2020). ESG is a framework for evaluating the sustainability and ethical impact of businesses. It consists of three components: environmental, social, and governance. Environmental factors include a company's impact on the natural world, such as its carbon footprint, water usage, and waste

management practices. Social factors consider a company's impact on people, including labor practices, community engagement, and diversity and inclusion policies. Corporate governance evaluates a company's leadership, management, and decision-making processes, including board diversity and executive compensation.

Currently, businesses and investors are placing greater importance on considering ESG factors. Companies that prioritize ESG factors are seen as more sustainable and responsible, which can enhance their reputation, attract talent, and reduce risks associated with environmental and social issues. In contrast, companies that ignore ESG factors may face reputational damage, regulatory action, and financial losses. Investors are also increasingly incorporating ESG considerations into their investment decisions. The Principles for Responsible Investment (PRI) report showed that the number of signatories to the PRI has grown to over 3,000, representing \$103 trillion in assets under management (PRI, 2021). The report further revealed that more than half of asset owners consider ESG issues in their investment decision-making process. Investors recognize that ESG factors can affect a company's long-term financial performance and sustainability. For example, companies with strong environmental policies may be better positioned to adapt to climate change regulations and reduce their carbon footprint. Similarly, companies prioritizing social issues such as labor rights and diversity may have a more engaged and loyal workforce, enhancing productivity and reducing turnover.

Table 3.1: ESG Sukuk from GCC-based Issuers 2019 - H1 2022

Issuer	Number of Issuances	Total amount issued (US\$ million)
Saudi Electricity Co	2	1,300
Majid Al Futtaim	2	1,200
Infracorp Sukuk Ltd	1	900
Saudi National Bank	1	750
Riyad Bank	1	750
Etihad Airways	1	600
Total	8	5,500

Source: LSEG, 2022

One of the reasons ESG has gained prominence in the investment community is its potential to determine those critical uncertainties and possibilities that ordinary economic analysis misses. For instance, a business's poor environmental practices can lead to supply chain problems, sanctions from the authorities, and harm to one's reputation, all of which could negatively impact its economic activities. Conversely, companies prioritizing sustainability and social responsibility may attract customers, employees, and investors who value these practices. This leads to competitive advantage and improved financial performance over the long run. Investors increasingly incorporate ESG factors into their investment decisions through various approaches, such as favorable checks, checks for adversely impactful practices, and active ownership. Adverse practices check relates to removing firms engaged in businesses considered to be doing unhealthy practices such as producing smoking substances, firearms and munitions. Favorable checks relates to investments in firms and businesses with excellent ESG performance, for instance businesses that prioritize sustainable energy sources or inclusivity or diversification. Active ownership on another hand deals with interacting with firms or businesses in order to encourage them improve on sustainable goals implementation and declarations.

Another way that investors incorporate ESG into their portfolios is through impact investing. Impact investing involves investing in companies or projects to generate a measurable social or environmental impact alongside a financial return. Green Sukuk is an example of impact investments that support environmental projects such as renewable energy, sustainable agriculture, and clean water. It is a way for investors to support sustainable development while earning a financial return.

Green Sukuk is a financial instrument that aligns with ESG principles. It is a type of Sukuk that raises funds for environmentally sustainable projects, such as renewable energy, water conservation, and waste management. The issuance of Green Sukuk aligns with the environmental aspect of ESG as it raises funds for sustainable projects that aim to reduce the negative impact on the environment.

The principles of social and governance are also considered in Green Sukuk. The projects funded by Green Sukuk must comply with social standards and benefit the communities in which they are implemented. Additionally, the issuance of Green Sukuk requires transparent governance practices, which include disclosing the use of funds, their impact on the environment and society, and the expected financial returns.

Thus, Green Sukuk ensures that investors' funds are used for environmentally sustainable projects that comply with social standards and transparent governance practices. It allows investors to invest in sustainable projects while supporting ESG principles and a new asset class aligned with the ESG investment goals, giving investors a chance to impact the environment and society positively. Green Sukuk also provides an opportunity for companies and governments to raise funds for sustainable projects while complying with ESG principles.

The issuance of Green Sukuk has been gaining momentum globally. In 2019, Indonesia issued the first Green Sukuk worth \$1.25 billion, raising funds for environmentally sustainable projects (Fitrah and Soemitra, 2022:232-237). The issuance of global ESG bonds was projected to exceed \$1 trillion in 2021, with an average increase of 70% since 2019, mainly due to the rise in sustainability bond issuance propelled by Covid-19 recovery measures. In contrast, green and sustainability Sukuk, which constitutes only 1% of ESG bond issuance and 4% of total Sukuk issuance, reached a new high of \$6.1 Billion in issuance (Refinitiv, 2022). The success of Green Sukuk issuances indicates that investors are increasingly interested in investing in sustainable projects that comply with ESG principles.

Despite the potential benefits of ESG and Green Sukuk, several challenges hinder their implementation and growth. One major challenge is the lack of standardized frameworks and definitions for sustainable investments, which can lead to limited investor confidence. Additionally, the scarcity of eligible green and sustainable projects and ensuring that funds are used for their intended purpose pose further challenges. The relatively small size of the ESG and Green Sukuk market compared to the overall bond and Sukuk markets may result in higher transaction costs. Finally, there is a lack of investor awareness and education regarding ESG and Green Sukuk, highlighting the need to increase awareness and provide investors with a greater understanding of these investment instruments. These challenges need to be addressed to promote the growth and adoption of ESG and Green Sukuk.

3.9 Socially Responsible Investments and Green Sukuk

Socially Responsible Investing (SRI) has its roots in religious movements in the 19th century; however, it did not gain popularity until the 1980s, with significant growth in the past decades. Notably, the meaning of the term "SRI" remains unclear despite its

growing importance. The Social Investment Forum identifies three SRI strategies, including screening, shareholder advocacy, and community investing; however, numerous other options are available. Various definitions of SRI emerge from the investment vehicle's composition, meaning that the definition depends on the types of assets included or excluded from an SRI fund. For example, many SRI funds are built on the principle of excluding companies that promote products deemed harmful to society, such as tobacco and alcohol.

SRI is an investment approach incorporating environmental, social, and governance (ESG) criteria into investment decision-making. This approach seeks to generate positive social or environmental impact and/or avoid harm to society and the environment by investing in companies that adhere to certain ESG standards or avoiding companies that violate them. SRI strategies can take many forms, including negative screening, positive screening, shareholder advocacy, and community investing. SRI has gained increasing attention in academic research due to its potential to reconcile financial and social goals and promote sustainable and responsible business practices.

SRI and ESG are two concepts that have gained significant attention in the investment world. While both approaches aim to integrate non-financial factors into investment decisions, there are notable differences between them. SRI is primarily focused on promoting positive social or environmental outcomes or avoiding negative ones by investing in companies that conform to some identified ethical or social standards, whereas ESG investing evaluates a company's performance on environmental, social, and governance factors to assess its long-term sustainability and identify potential risks and opportunities. While SRI strategies may involve negative screening, such as excluding companies that engage in activities deemed harmful, ESG analysis typically does not involve screening out specific companies or industries (S&P Global, 2021). Although ESG investing aims to identify financially significant environmental, social, and governance risks and opportunities, SRI strives to achieve specific social or environmental objectives through investments. It is important to note that the two investment strategies are not mutually exclusive, and investors can potentially integrate ESG and SRI approaches in their investment decisions (BIX Malaysia, 2021).

The emergence of global challenges such as climate change, alongside the growth of the Islamic finance industry and the increasing trend of socially responsible investing,

may highlight the significance of Green Sukuk as a crucial mechanism for funding sustainable development initiatives, such as the construction of environmentally-friendly infrastructure and clean energy projects, as well as promoting energy efficiency measures in the short term (Aassouli et al., 2018:4-9). Green Sukuk blends the principles of Islamic finance with the concept of SRI to provide an opportunity for investors to support projects that exhibit positive ESG practices while generating a financial return. It is a crucial tool for promoting the beneficial development of SRI, which primarily focuses on sustainability and environmental protection.

The impact of SRI on Green Sukuk and vice versa are mutually reinforcing. SRI has increased the demand for investment opportunities that align with social and environmental values; Green Sukuk provides a Shari'ah-compliant financing option that meets these requirements. Green Sukuk's issuance gained momentum as a means of financing environmentally sustainable projects; it is driven by the growing emphasis on investing in companies and projects that align with certain social and environmental values, making SRI increasingly relevant for investors seeking to align their financial portfolios with their personal beliefs and values. Green Sukuk provides a comprehensive framework for assessing the environmental impact of the projects being financed, ensuring that they adhere to certain sustainability criteria. Mandating issuers to meet SRI standards can attract a broader range of investors seeking to invest in environmentally sustainable projects. Furthermore, SRI is crucial in building trust and confidence in the Green Sukuk market, as it ensures transparency and consistency in evaluating the environmental impact of the financed projects. This can encourage more investors to participate in the market and enhance liquidity.

Green Sukuk offers several advantages for SRI investors, including a transparent framework for evaluating the environmental impact of the financed projects, which ensures adherence to sustainability criteria. The Sukuk's asset-based and risk-sharing structure also provides investors with a low-risk, fixed-income instrument with competitive returns. Furthermore, the issuance of Green Sukuk could help to enhance the credibility and visibility of SRI, attracting more investors to participate in socially responsible investments. Investing in Green Sukuk can contribute to the growth and development of the Islamic finance industry, which prioritizes ethical and socially responsible financial practices. Moreover, promoting environmentally sustainable

projects through Green Sukuk can contribute to achieving the United Nations' Sustainable Development Goals and developing a green economy.

3.10 Green Sukuk and Power Sector Financing

A disruptive evolution is being undergone by the global power sector as a result of the integration of many dispersed components, transmission frameworks, power supply distribution, smart automobile and more sophisticated meter systems for uninterrupted and undisruptive administration and security of power system posterity. The power sector refers to the energy industry segment that generates, transmits, and distributes electricity to end-users. It encompasses a wide range of technologies and infrastructure, including power plants, transmission lines, distribution networks, and meters. The sector includes various types of electricity generation, such as fossil fuel-based generation (such as coal, oil, and natural gas), renewable generation (such as solar, wind, hydro, and geothermal), and nuclear generation (International Energy Agency, 2020). Electricity generation experienced a growth rate of 6.2% in 2021, a similar trend to the bounce back observed in 2010 after the financial crisis. Wind and solar energy have surpassed nuclear energy for the first time by contributing more than 10% to the global power supply. Coal continues to be the primary source of power generation, with its share increasing to 36% in 2021. Additionally, natural gas use in power generation has grown by 2.6%, but its share has decrease from 23.7% in 2020 to 22.9% in 2021 (BP, 2022). Electricity is a fundamental input for many industries and is also used in households for lighting, cooking, and other daily activities. As such, the power sector plays a vital role in modern society. It plays a significant role in economic growth across all income-class countries, ranging from high-income to middle-income to low-income countries. Studies have shown that every 100% increase in energy consumption results in longer-term economic growth, ranging from 21.45% to 28.71%.

The issuance of Green Sukuk presents a promising avenue for financing the electricity sector's transition towards more sustainable energy production. It can be instrumental in providing an alternative funding source for electricity utilities and grid operators to modernize their infrastructure. This can encompass investments in innovative technologies such as smart grids, energy storage, and other novel solutions that increase the efficiency and reliability of the electricity grid. Sustainable energy production and carbon emissions reduction in the electricity sector can be effectively

promoted by Green Sukuk, which provides funding for renewable energy projects and grid modernization.

Additionally, Green Sukuk has the potential to play a vital role in financing renewable energy projects in the power sector. These types of Sukuk are designed to raise funds for environmentally-friendly and developmental projects, including renewable energy generation, energy effectiveness, and other eco-friendly initiatives. By issuing Green Sukuk, entities such as governments, corporations, and other organizations attract a new class of investors interested in investing in sustainable projects. These investors are environmentally conscious individuals, institutional investors, and funds specializing in socially responsible investing. Diversification of funding sources for renewable energy projects is achieved with the help of this kind of Sukuk, which is important considering the large capital investments required for such projects.

Table 3.2: Some Green Sukuk Projects related to Power Sector

Project Name/Issuer	Issue Date	Utilization of Proceeds	Type of Sukuk	Country
Tadau Energy Sdn Bhd	2017	Construction of a 50MW solar PV power plant	Corporate	Malaysia
Quantum Solar Park (Semenanjung)	2017	Construction of three 50MW solar PV power	Corporate	Malaysia
PNB Merdeka Ventures Sdn Bhd	2017	Real estate development in Kuala Lumpur complying with certain green building accreditations	Corporate	Malaysia
Sinar Kamiri Sdn Bhd	2018	Construction of a 49MW solar PV power plant	Corporate	Malaysia
UiTM Solar Power Sdn Bhd	2018	Solar power project	Corporate	Malaysia
Pasukhas Green Assets Sdn Bhd	2019	Hydropower plant	Corporate	Malaysia
Telekosang Hydro	2019	Hydro power	Corporate	Malaysia
Majid Al Futtaim Green Sukuk	2019	Financing and refinancing of new and existing green projects, including green buildings, renewable energy, sustainable water management, and energy efficiency	Corporate	United Arab Emirates
Majid Al Futtaim Green Sukuk	2019	Financing or refinancing renewable energy projects or projects related to energy efficiency	Corporate	United Arab Emirates

Republic of Indonesia (Sukuk Tabungan Seri)	2019	Financing projects related to renewable energy, energy efficiency, sustainable transportation, and waste and energy management.	Sovereign (Retail)	Indonesia
Leader Energy	2020	Renewable energy		Malaysia

Source: IIFM, 2016 & World Bank, 2020

The proceeds from Green Sukuk can be used to finance renewable energy infrastructure such as solar, wind, or hydropower plants. These projects help to reduce greenhouse gas emissions and provide cleaner energy to communities. Noticeably, it provides an opportunity for Islamic finance to contribute to the United Nations Sustainable Development Goals (SDGs), especially SDG 7, whose primary focus is ensuring accessibility to affordable, reliable, sustainable, and modern energy for all.

In a nutshell, Green Sukuk has the potential to facilitate private sector investment in the power sector, which is imperative for attaining universal access to clean and affordable energy. Moreover, the issuance of Green Sukuk has been identified as a prospective solution to the funding gap within the renewable energy sector, a challenge many countries face. As a result, the utilization of Green Sukuk can assume a crucial role in financing renewable energy projects in the power sector, and, consequently, contribute to the realization of the SDGs.

Green Sukuk and Nigerian Power Sector

Nigeria despite having electricity fluctuations which have led to the inability of government to provide adequate power supply to its citizens, has not been able to make any Green Sukuk issuance. Even though there are solar power projects being carried out by the Federal Government through the REA and NSIA.

CHAPTER IV

EVALUATION AND COMPARISON

4.1 What is the Suitability and Impact of the Present Power System Financing?

The FG launched the Power Sector Reform Program (PSRP) in 2017 to provide electricity to the citizens, enhance the reliability of electricity supply through improving the performance of the power sector, achieve financial and fiscal sustainability, and to implement policies to attract investors in the sector. The PSRP was created to tackle issues of inefficiency in the power sector, and to attract investors who will increase the level of electricity generation and transmission to the final consumers. It was able to come up with a Minimum Remittance Threshold (MRT) for Discos with immediate implementation, and Performance Improvement Plan (PIP) for Discos which was agreed and accepted by the stakeholders, (PSRP website). The World Bank approved a \$750 million PSRO loan for the implementation of the PSRP agenda.

Table 4.1: 2020 Generation Companies Tariff Shortfall Payments from Sources of Funds

Gencos	CBN Payment Assurance Facility	FGN Budgetary Contribution	Total
Kainji	7,477,973,423.89	4,307,224,576.60	11,785,198,000.49
Jebba	15,095,370,988.26	5,214,085,522.79	20,309,456,511.06
Shiroro	15,105,854,413.54	5,077,635,311.45	20,183,489,724.99
Egbin	48,303,706,201.63	16,492,147,850.48	64,795,854,052.12
Delta	29,499,273,471.47	7,328,539,739.36	36,827,813,210.84
Sapele	3,762,784,646.96	775,586,020.53	4,538,370,667.49
Geregu	24,267,263,371.96	6,745,195,650.88	31,012,459,022.85
Afam	4,419,914,104.62	2,437,677,270.58	6,857,591,375.21
Olorunsogo 1	17,523,569,338.47	3,560,573,613.04	21,084,142,951.52
Omosho 1	17,004,752,551.43	3,733,137,195.77	20,737,889,747.20
Alaoji Nipp	4,078,764,270.05	2,305,086,866.39	6,383,851,136.44

Geregu Nipp	6,503,945,245.60	2,577,657,160.39	9,081,602,405.98
Calabar (Odukpani)	17,799,746,498.51	6,545,497,124.50	24,345,243,623.02
Olorunsogo 2 (NIPP)	1,205,959,524.82	240,133,784.42	1,446,093,309.24
Omotosho 2	5,557,684,315.56	1,469,025,168.00	7,026,709,483.57
Sapele 2 (NIPP)	2,498,413,218.11	114,941,074.10	2,613,354,292.21
Ihovbor NIPP	1,805,986,120.03	216,217,639.30	2,022,203,759.33
Gbarain NIPP	5,316,507.76	779,206,788.80	784,523,296.56
Ibom Power	2,635,297,569.75	171,660,029.93	2,806,957,599.69
Omoku	4,548,844,578.19	1,872,082,629.34	6,420,927,207.53
Rivers IPP	8,895,773,054.84	3,033,421,845.99	11,929,194,900.83
Trans Amadi	5,206,739,175.97	1,090,490,021.54	6,297,229,197.51
Azura Edo Power	-	-	-
Afam Vi (Shell)	15,164,974,149.02	2,623,428,039.16	17,788,402,188.17
Okpai	16,646,520,364.99	2,427,687,324.51	19,074,207,689.51
Total	275,014,427,105.46	81,138,338,247.87	356,152,765,353.33

Source: NBET, 2021

** Please note that this data is in line with the World Bank requirement of sources and uses of funds in the Power Sector Recovery Operations (PSRO) financing plan. It does not include market payments*

Table 4.1 above shows the various payment shortfalls of the power generation companies which had to be paid with the combined efforts of the FG and the WB through budgetary allocations and CBN funding. The CBN funding is actually a WB loan which was obtained to enable the FG take care of such differences. However, it should be noted that the financing / funding is not here aimed at improving infrastructure in the Gencos, but rather, to pay the differences between the cost of production and the amount received as payment for selling what was sell-able. Sincerely for a government anywhere in the world spending as high as this for settling shortfalls in just 1 part of its power sector arms which is the Genco, is quite disastrous. This is because the electricity being paid for is just to carter for a small fraction of the population and is considered as a kind of subsidy. This is also not sustainable because the amount involved is also very huge, especially in comparison to the whole budget and other budgetary allocations to MDAs.

The present power system financing has not been able to make electricity generation in the country match the demands of the citizens considering the percentage of population that are living without access to electricity in the country. In the year 2014, the infrastructure deficit of the power sector was estimated at 21 billion USD funding requirement to meet 10,000MW demand of the country. Presently, the demand for electricity in Nigeria is glaringly seen to be a lot higher than supply when many hours are spent in a day without electricity in areas that have access to such amenity. According to the Energy Progress Report 2022 which was conveyed by Tracking SDG7, 92 million Nigerians out of the over 200 million Nigerian population do not have access to electricity. This report is in collaboration with the IEA, IREA, UN Statistics Division, WB and WHO, which also re-affirms the record presented by the World Bank report for Nigeria in 2020. Nigeria has reportedly been confirmed to have the lowest access to electricity rate globally. This is even after the EPSR Act of 2005 was passed 18 years ago, followed by the applicability of the various reform agenda and financing done to the sector in form of as discussed in chapter 2 of this work.

The PSRP despite being active for some years, has not been able to proffer a lasting solution to the electricity issues in Nigeria. The FG financing for electricity through its annual budgetary allocations and various interventions is not able to solve the very many issues of electricity shortage in the country. A more connected problems presentation tied to financing intervention are discussed in the next and a few other subsequent paragraphs.

The FG through the CBN provided funds to pay off legacy debts for suppliers of natural gas to the tune of 213 Billion Naira (see details in chapter 2), in one of its major financial interventions to the power sector. This financing was aimed at relieving the Gencos from the stress of having to source money to make payment for gas supplied to be used by the generation plants. This, however, has not paid off because the issue of gas supplier shortage is still very persistent within the sector.

Gencos are experiencing lack of funds to match the generation requirement of the consumers due to lack of funds to improve on their production infrastructure whereby the available infrastructure needs to be increased in capacity to allow for maximum efficiency of production.

CBN Payment Assurance Facility Expansion Balance of PAF I & II. 701.9 Billion Naira and 600 Billion Naira in 2017 and 2020. Payment Assurance Fund (PAF).

The Gencos despite having hindrance to generating electricity to their maximum ability, still have to deal with wasting part of it due to the inability of the TCN to accept all that is generated by the Gencos which is as a result of the low wheeling capacity of the TCN. This lowers the morale of the Gencos because they feel there is no encouraging factor to make them produce more electricity even in situations where there is an opportunity to do so. The TCN in its bid to increase transmission capacity, established Transmission Rehabilitation and Expansion Program (TREP) in 2017 which was designed to help it achieve a wheeling capacity of 22,000 MW by 2022, from 5,000 MW through creating new substations, and transmission lines from the various grids in the country. The program was also aimed at stabilizing the all forms of national grids by evacuating all produced electricity and eliminate idle generated electricity, then transmitting all of it to the Discos. Overhaul of the whole of TCN was aimed at with a vision to rehabilitate the organization for better operations expansion, and maintenance. There is still considerably yet to be such kind of expansion by the TCN going by the persistent electricity failure experienced by households and businesses in the country.

The metering intervention by the CBN was also a major form of financing made by the FG through the CBN. There were 2 successful metering programs with the FG aiming at installing another total of 5 million meters by the end of 2023, coming after the initial 1.4 million installations carried out. The government paid the companies that were selected huge money as agreed between the parties to ensure that they provide meters to the Discos for distribution to various customers. However, the meter supply companies diverted the monies and ended up being taken to court by the CBN, and the verdict or outcome still yet to be known by the citizens. This clearly shows lack of supervision on the part of the CBN to ensure that the monies were paid directly to the manufacturers in whichever countries the meters were produced. This is even despite the fact that a meter manufacturing company was launched by the FG which it said was to ensure that the meters are produced locally.

Discos are victims of circumstance they claim because they are always defaulting in paying their invoices to the Gencos, while NBET does not recognize any of the electricity lost in the course of supply to the Discos by TCN. The shortfall in remittance

payments to Gencos by the Discos had calls for the increase in purchase of meters made by the Discos who claim that customers underpay for electricity they serve them, but then it is yet to be implemented in full course to have all customers covered. The metering system is considered by many customers as being inefficient and very untidy because of the way and manner in which it is being implemented with the NERC saying there are over 4 million customers without meters, that means they have nothing to help them ascertain their electricity consumption independently. However, the billing system is very fraudulent with many customers finding themselves in situations whereby they are billed and charged outrageously for electricity that they never consumed. This has led to so many customers rejecting the billing system outright and others taking the laws into their hands by making illegal connections to sources of electricity. It is still very mind capsizing that despite so much that was spent by the FG on meter procurement and supply, there is still a big number of consumers that are unmetered.

The Minister of Finance in March 2022, lamented that despite the FG spending over 1.2 Trillion Naira intervention fund, the country is yet to see any considerable amount of improvement as a result of that effort and financing. Despite so much funds that have been pumped into the sector, it still needs an additional monthly financing of 85 billion naira required for gas payment, generation deficit, and distribution deficit cushioning.

Power generation in the country with a population of over 200 million people is 36.4 thousand gigawatt hours in 2021, compared to Ghana and Saudi Arabia that have 22,051 and 338,031 gigawatt hours respectively. And also with their population of 32.8 million and 35.9 million. The cost of electricity in Nigeria considered to be one of the highest in the world.

4.2 Is the Nigerian Power Sector Reform Effectively Applied? PPPs in Purview?

The latest power sector reform is under-implemented in Nigeria with government still sharing the burden of cushioning the costs of generating, distributing and consuming energy. The sector despite being the most heavily funded by the FG, has not been able to avert issues of electricity blackout in the country. Citizens have since been resorting to alternatives with the majority of their numbers using diesel / fossil fuel generators.

The Minister of Finance again in the year 2022 said that Nigeria was charged the sum of 137 million USD for nothing other than the ‘take or pay’ deal with investors in respect to Right-of-Way issues (State House Abuja, 2022) this is tantamount to sheer waste of money in a country where there is a significant poverty rate, and the investors also demand a sovereign guarantee to cover their business activities in the country considering the huge costs associated with their investments in the country. Therefore, the FG must pay any “stranded” electricity produced by the private investors and not being able to be wheeled out by the TCN. This waste is coming after several allegations are being made that the TCN accepts less electricity than the fully generated from the generation companies while ignoring the others, (Nigerian Power Sector Review, 2018). Summarily however, it is very important to note here that there is under-delivery of generated power attached to the treatment of the Gencos by the TCN as alleged; total generated electricity in 2023 is 36.4k GWh as against the total consumption of 35b KWh, (Statistics from Statista, 2024).

PPPs in the power sector are actually dealing with many unnecessary added costs and also abandoned energy after being produced. This is in relation to the inability of the TCN to wheel much capacity and causing the private investors wastage coupled with loss of resources used to produce that electricity. Most of the PPPs in the power sector are hydro and thermal, with only one 10MW solar plant launched in 2023 by the NSIA.

4.3 What is the impact of the issued Sukuk in Nigeria? (Impact on Infrastructure development, economy, corporate investors, retail investors, citizens)

4.3.1 The impact of Sukuk on infrastructure development

The President of Nigeria said in 2021 that the country needs 1.5 Trillion USD over a 10-year period to overcome the infrastructure deficit in the country, (COP26, 2021). According to the Institute of Directors of Nigeria (IDN, 2022), “Nigeria’s infrastructure deficit is estimated at \$100 billion yearly, a figure that is 100 per cent above our yearly infrastructure budget in the past few years.” While the Chartered Institute of Bankers in Nigeria (CIBN, 2022) believes that Nigeria has 3 trillion USD deficit which is a major cause of hindrance to development. All these assertions point to the fact that Nigeria has a huge infrastructure deficit. However, major infrastructure includes education and roads.

The FG roads construction and rehabilitation funding using Sukuk was meant to bridge infrastructure gap in the country. Developing 97 roads and bridges in construction and rehabilitation is sure a very big applause to Sukuk financing as Nigeria is seeing the best of infrastructure development which it last had over 30 years ago during the military regime.

Infrastructure development impact is involved in the Osun State Sukuk issued in 2013 where government-owned High Schools were constructed. 27 schools were constructed by the government using Sukuk funds. Osun state according to the NBS had 231 number of public schools. If 27 out of 231 were constructed using Sukuk, then that means out of the 77,818 students (NBS, 2016) enrolled in Senior Secondary School in Osun State, a good number of them make up the student number of the high schools constructed.

4.3.2 The impact of Sukuk on the economy

Using Sukuk to develop infrastructure in Nigeria such as schools built through Sukuk financing in Osun State, means developing the educational sector which impacts on students having where to learn and obtain knowledge from on a daily basis. The parents and guardians of children also have schools to engage their children and wards in. The society also has somewhere to look up to in terms of imparting knowledge to students within their communities. Students however, become more occupied with the art of studying and learning skills which is time consuming in beneficial activities. This preoccupation distances children from engaging in social vices and other crimes, thereby making the society free of crimes. A society that comprises of knowledgeable people is a developed society in terms of every aspect of life. Better economic life due to citizen contribution to the GDP as a result of making good use of the education learned in schools.

The second aspect of Sukuk implication on the economy is seen looking at the road construction work being carried out using Sukuk financing. As much as over 90 projects comprising of construction and rehabilitation of major roads across the 6 geopolitical zones of the country. This road construction means linkages between the various parts of the country (North-East to North-West to North-Central to South-East to South-West to Niger-Delta), and also business relationship. So many businesses are hampered by lack of good roads to transport raw materials and finished goods from

their source market to production places, finally to the consumer market for sale. This in turn also results in reduced cost of production and a reduction in the selling price to consumers. The consumers by obtaining reduced price of goods in the market will automatically increase their demand for the products due to the affordability / reduction in prices. Increase in demand, however, means an increase in increased production which leads to increase in economic activities through a GDP increase. The markets also tend to expand when there is easy flow of both raw materials and finished products, increased activities also accompany such market expansion.

The FG Ijarah Sukuk to an extent relieves the government of budgetary allocations to infrastructure where the construction of a huge number of roads and bridges construction are taken off the budget, and to be dealt with independently.

Increased activities in the capital market sector are another impact the Sukuk has on the economy. Sukuk share trading contributes to the stock market activities which also has a direct impact on the size of an economy. Invariably, Sukuk trading in the market boosts real economic activities impact rather than fictitious or unreal activities that are not of benefit to the society.

Sukuk financing helps the country in avoiding interest which accumulates indiscriminately and replaces it with rent which is a realistic and practical act. It could be seen later in this chapter how the country battles with interest servicing, which is too exorbitant in comparison to Sukuk rental payment. This also aids in boosting the financial economy of the country by avoiding unreal and unnecessarily wicked costs in form of interest.

4.3.3 The impact of Sukuk on corporate investors

Ethical investments are desired by so many corporate investors, which is vividly seen in the rate of corporate investors in all the Sukuk issuance done in Nigeria. There is always this group of investors that are interested in only ethical forms of investments in any engagements where their funds are being channeled to. The desire for ethical investment could be as a result of the investors' religious beliefs or moral upbringing which prohibits them to usurp any form of earnings except those which are earned through ways considered to be in compliance with manners that are humane, just, and committed to realism. Sukuk issuance in Nigeria therefore, gave these investors the

opportunity to get their funds invested in an ethical way, and impacted their form of investments.

Sukuk also has an impact on risk-averting group of investors who are not interested in very risky investments. These investors consider Sukuk safer because of their desire to avoid gamble in places they invest their funds. The risk associated with Sukuk is minimal compared to bonds because of the nature of Sukuk investment that makes it always tied to an asset or usufruct. This group of investors have felt the impact of Sukuk because they have had their funds invested in a secured way.

Investors seeking for diversification of portfolio had Sukuk in Nigeria made so much impact on them. This is due to the Sukuk being an additional form of investment especially for the fact that it was issued as a sovereign Sukuk by the FG. It is considered to be an addition to the many options available for investors to look into as a form of borrowing funds by the government.

4.3.4 The impact of Sukuk on retail investors

The retail investor also has the opportunity to invest with the FG in the form of Sukuk. A major benefit of Sukuk issuance by the FG according to DMO is the ability of the unbanked ethical investors to seize the opportunity of taking part in this kind of investment. Especially the Muslim investors in Nigeria that have not been able to engage and take part of any FG investment package as a result of it being interest laden, the Sukuk gave the opportunity to the individual investors to participate and feel the impact of this Islamic form of financing in a good way.

Retail investors increased tremendously in each issuance of Sukuk made by the FG from the first issued in 2017, until the last one issued in 2022. This indicates the acceptance of Sukuk by the investors that are interested in risk-free and asset-backed kind of investment. The impact on these investors is that they have gotten solutions to their desire for the investment that suits their individual needs.

4.3.5 The impact of Sukuk on citizens

The citizens of Nigeria have been benefitting from the huge impact of Sukuk issuance in the country. This is first seen in Osun State where the students are enjoying being educated in a serene and conducive environment which is helping them in their educational journey.

The roads construction and rehabilitation also impacts on citizens by giving them safety of driving on the roads which were previously unsafe for travel. This is due to the fact that the roads were mostly very bad and had led to a vast number of accidents on many occasions, with many leading to loss of lives.

Improved security is another impact of Sukuk issuance because where the roads are well constructed and smoothly being used, it is easier for commuters to drive without unnecessary delays and avoiding traps by armed robbers or kidnappers being set on the roads as traps. A road that has lots of pot-holes and patches must be driven on carefully to avoid damage to vehicles, this aided robbers and kidnappers in attacking their victims easily through traps they set on the road. But with a smoothly constructed road, it seems more difficult for men of the underworld to easily attack their preys because there is provision for drivers to evade and escape from traps which must be visibly seen on smooth roads. Citizens therefore, are benefitting from an improved security impact.

The cost of transportation is reduced owing to the fact that when the roads were dilapidated, there was so much damage on cars commuting them especially heavy trucks that convey raw materials and finished products. But now transporters do not experience the extra costs of having to repair damages caused by bad roads. This has impacted on the cost of raw materials transportation and invariably the selling price of raw materials, so also does it affect the cost of finished goods on their transportation for delivery to their various distribution points.

Citizens benefit from Sukuk financing by escaping to deal with the burden of interest on loans which the government takes and then passes down to the people to bear durations that are mostly long and passed from generation to generation.

Other impacts of Sukuk in Nigeria are on the real estate development in which it is being used for the development of mass housing through Ijarah Sukuk funding. The Katsina state Sukuk funding to finance its budget is also another example of the impact of Sukuk financing. The people of the state benefitted from the Sukuk where it was used to supplement the capital expenditure budget of the state. Taj bank which is an Islamic bank also raised funds through Mudarabah Sukuk financing for increased bank funds for financing projects which will have impact on the citizens of the country that are banking there and seek for funds to expand their businesses. The impact here is

two-way which involves job creation and also productivity in the form of businesses in the society.

4.4 What is the probable outcome on the development of the power sector using Green Sukuk financing option?

In the course of my data collection where I conducted interviews to 6 different categories / groups of people, 100% of the respondents agree to the Green Sukuk financing option as a solution to the power sector. They totally have the belief that Sukuk financing is a corruption proof system that ensures financing is completely done on only the intended projects and also ensures implementation of the intended project for which the Sukuk is aimed at. This therefore, confirms that the subscription to Sukuk issued for the power sector is guaranteed fully and wholly provided the electricity being desired to be produced is going to be made available to the consumers in an efficient and effective way and manner.

The willingness of consumers to accept an alternative form of financing that we are concerned with which is mainly Green Sukuk financing, will depend on the factors enumerated below that must be put into consideration:

As presented and discussed in chapter 6.1 very closely, the failure of the power reform program is established and it woefully could not be implemented accordingly to ensure that electricity is available & accessible in the country. This therefore, throws to the citizens an option of either sticking to that same system of obtaining electricity through a partially functional system, or choosing a better option that could provide them with access to electricity always to cater for their needs either as individuals or as businesses.

Households all have the desire to live within the fulfilment of enjoying a basic amenity of electricity. Electricity is not considered a luxury, but rather a basic amenity that is more or less of a necessity. Households basically need lighting in their houses, so also do they need as a form of luxury necessities in the form of appliances such as fridge, freezer, television, air conditioners, fan, etc. depending on individual desire and ability. But the absence of electricity makes it impossible to enjoy any of these appliances. They resort to buying generators to use in powering electricity in their houses for those that have the means to do so, but for others it is impossible considering the cost involved.

The demand for electricity by industries and manufacturers to carry out their productive businesses. Consumers of electricity that are in the manufacturing and production sector pay a huge price for power to use for their businesses where they majorly depend on diesel generators because of the inconsistency of the FG power supply system. This cost definitely affects their running cost and production cost, leading to an increase in the price of the final goods. This is the reason why maintaining a manufacturing or production company in Nigeria is too costly, and affects the number of such companies in the country. It is being presented that many Nigerians now prefer going to neighboring African countries especially Ghana to establish companies with one of the attracting factors mentioned to be availability of electricity.

The demand by other sectors of the economy such as healthcare, educational, and so many others is also soaring by the day with so many of them being shut out of business due to shortage of electricity supply. The REA is doing a great job by providing solar hybrid and gas-fired IPP to government-owned tertiary institutions and teaching hospitals. Healthcare centers / hospitals are also catered for. However, those institutions and hospitals which are not owned by the government stand the risk of being faced with restrictions in the use of electricity in their institutions. These institutions barely manage the cost of diesel and fuel to run their affairs. This is the reason why so many of these businesses hardly survive for long due to aggravated cost of running, majorly coming from covering the cost of power supply. This makes the managers of these organizations yearn for alternatives to their present source of power, a cheaper option that is sustainable and more reliable to use for business that will result in yielding profits.

The success rate of Sukuk financing in Nigeria and the investor appetite it is enjoying from able citizens in the country is a reason why Sukuk financing for power will win the hearts of investors. Respondents to the interview conducted in this research have fully convinced themselves of their interest in Sukuk financing for power.

The sky-rocketing cost of diesel and petrol used in financing other options of electricity supply is another reason to consider Sukuk financing for power sector so that an option or alternative is created to cater for the needs of the different sectors of the economy. According to the NBS, the average retail price of diesel by consumers is 828.82 naira per liter in January 2023. The price of PMS according to the report in January is 263.76 naira per liter as against the approved government rate of 185 naira

per liter. This is a 54.52% increase from the price as at the same time in the previous year.

The continued enlightenment and advocacy for using energy sources that are environmentally friendly and not hazardous to nature in any way is another reason why individuals and companies now demand for a renewable energy option of electricity. This is also in cognizance of the UN, EU, and so many other international bodies that are calling for the abolition of environment polluting sources of energy. This is another cogent reason for users of electricity to embrace the solar system which is climate friendly and ensures that pollution is reduced in the environment, and affects climate change effects in the long-run.

4.5 Green Sukuk financing for Solar Energy Vs Debt Servicing for Power Sector Loans

Energy is necessary for us to live our daily lives and to enhance human development, which promotes economic activities, economic growth, and production, (Owusu, & Asumadu – Sarkodie, 2016:991-995). Energy is considered to be in two forms which are the renewable energy and non-renewable energy. In a description made by the UN, renewable energy is defined as energy that is gotten from natural sources that are restocked/restored faster than they are consumed which makes it self-reviving, and they are also known as green or clean energy. Renewable energy (RE) sources comprise of biomass, geothermal, hydro-electric (water cycles), solar rays, and wind power. RE are in abundance in our environment and are therefore, unlimited and can be replenished in a human time-scale because it renews itself easily in as much as it comes into contact with its source. On the other hand, non-renewable energy which is also known as fossil fuel is limited and cannot be replenished in a human time-scale because it takes several millions of years for fresh unused ones to emerge. The non-renewable sources comprise of coal, oil, nuclear, and natural gas, (UN, n.d.).

Energy is highly important for the satisfaction of fundamental human necessities and requirements. It is necessary for human health, daily activities, communication, movement, and, in general, the growth and well-being of the economy and society, (Halkos & Gkampoura, 2020:3-7). The world's energy needs have risen quickly in recent years, and as the population increases, along with economic and technical advancements, it is anticipated that they will rise even further. By 2050, it is

anticipated that there will be about 9 billion people on the planet. The U.S. Energy Information Administration (EIA) projects that the global energy consumption will increase by almost 50% between 2018 and 2050.

Fossil fuels have a detrimental effect on the ecosystem, which has long been understood. Their use and burning result in significant emissions of greenhouse gases into the atmosphere, which are a primary driver of climate change and global warming. The US Environmental Protection Agency states that 65% of the world's greenhouse gas emissions are caused by carbon dioxide (CO₂) emissions from industrial processes and fossil fuels. 1992 marked the establishment of the United Nations Framework on Climate Change (UNFCCC), which stated that a decrease in GHG emissions was imperative to avert a global environmental disaster. Additionally, in 2015 there was the adoption of the 17 Sustainable Development Goals by the UN, which included a timeline for putting policies, laws and plans in place to reduce greenhouse gas emissions which include, among other things, the issues of renewable energy, climate change, and GHG emissions. Limiting the use of fossil fuels and switching to renewable energy sources is one of the primary reduction tactics because energy is thought to be a crucial component of sustainable development.

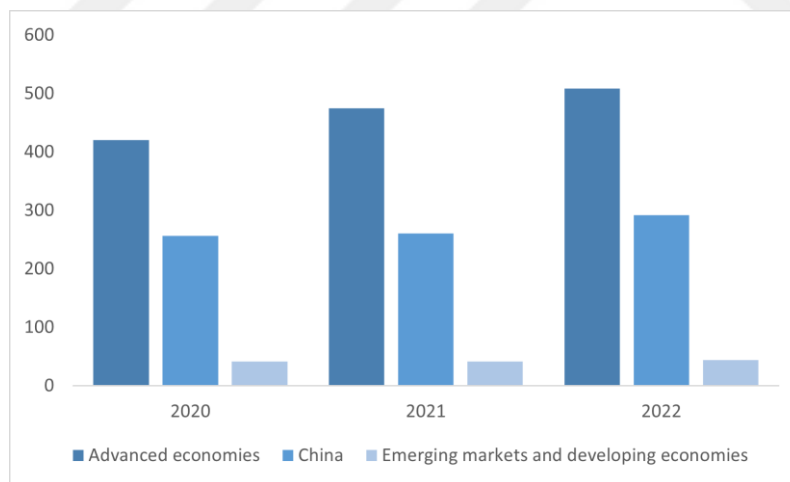


Figure 4.1: Per Capita Clean Energy Investment (Billion USD)

Source: IEA, 2023

Figure 4.1 shows the huge amounts in billions of USD per capita clean energy investment leadingly made by advanced economies between the year 2020 to 2022, followed by China, and then emerging markets and developing economies follow lastly. However, the huge difference between the last and the first, second categories

is too wide considering the fact that it is an investment per capita. This also points out to the fact that there is need for the countries in this category to buckle-up in ensuring that they follow suit with investments of clean energy tied to the per capita.

Renewable energy has a number of realizable importance and applications. GHG emissions are considerable low or zero, which improves the purity of the environment through eliminating pollution. Its availability almost everywhere on earth makes it a more reliable source of energy than fossil fuels, with energy distributed evenly and addresses issues of energy security and energy poverty. Furthermore, they have economic edge, considerably low operating cost, offers more employment opportunities and balances prices of power energy while positively impacting general economic factors. Renewable energy improves living conditions of families by providing consistent energy to enable them meet their needs. Additionally, low GHG emissions result in good quality of life through quality health as against fossil fuels, which is confirmed in several studies

The major affecting factor for renewable energy realization is its initial cost of acquisition or installation which tends to be too much for potential consumers and also the cost of storage systems which is relatively high. The dependence of renewable energy on weather makes fluctuations in weather that are negatively impactful have adverse effect on the energy realized from that source. Expansive land requirement is very important in installations of renewable energy to enable effective installations of the required technologies.

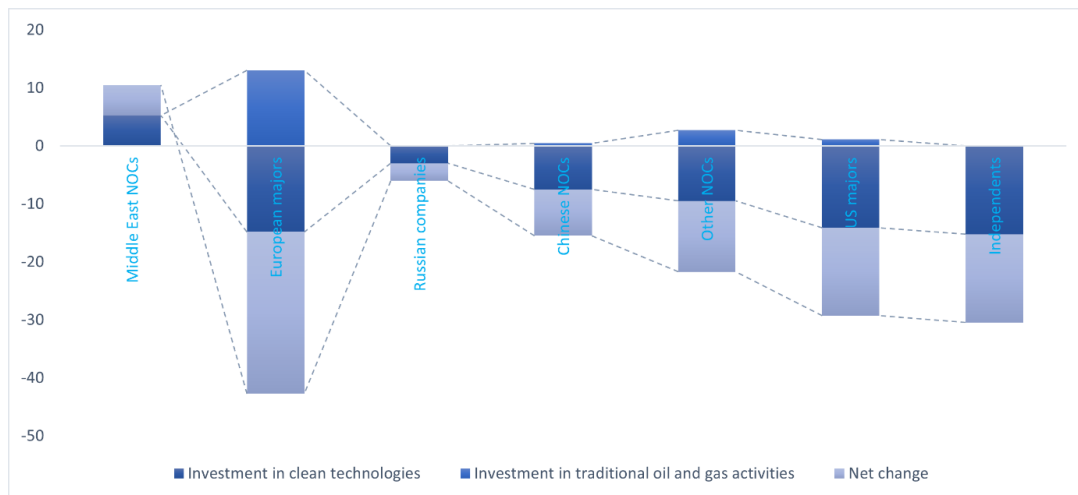


Figure 4.2: Change in Investment by Different Grouping of Oil and Gas Companies, 2022E vs 2019 (Billion USD)

Source: IEA, 2023

In the figure 4.2, it is seen that only the Middle East NOC's planned to spend more in 2022 than in 2019 among the many sectors of the oil and gas industry, which has a wide range of investment methods. Other countries are aimed at reducing usage of fossil fuels and focus more on movement towards clean energy production.

Renewable energy sources are thought to be the best alternative to meet global energy demands, replace the overly consumption of fossil fuels, and achieve the 7th Sustainable Development Goal (SDG) for accessible, affordable, and clean energy, even in consideration of the issues that need to be solved.

- ⇒ Biomass Power
- ⇒ Hydro – Electric Power
- ⇒ Geo-thermal Power
- ⇒ Wind Power

Solar Power: This is generated through the capturing of sun rays through solar radiation and transforming it directly to energy by the use of solar photovoltaic (PV) panels. Solar power is therefore, a form of RE that is not associated with any form of pollution, no CO₂ emissions, and has an inherent fast-paced nature of growth, (Stram, 2016:730-732).

Nigeria as a country endowed with many natural resources and a very large number of sunlight per day as one of its blessings (as presented of solar radiation mappings in

Chapter 2 of this writing), embarked on the journey of Renewable Energy Master Plan (REMP). The REMP was aimed at generating an increased renewable electricity from the 13% of total electricity generated in 2013 to 23% in 2025, and 36% in 2030, (IEA). The installed capacity set to be achieved by the government according to the REMP was as follows:

- ⇒ Small hydro power plant with a capacity of 600MW power generation by 2015.
- ⇒ Small hydro power plant with a capacity of 2000MW power generation by 2025.
- ⇒ Solar PV power plant with a capacity of 500MW power generation by 2025.
- ⇒ Biomass-based power plant with a capacity of 50MW in 2015 and 400MW by 2025.
- ⇒ Wind power plant for 40MW wind energy generation capacity by 2025.

The REMP encouraged investment in RE which the government considered in order to protect the climate from adverse effects of other sources of energy that are pollutant thus reducing negative health implications, reduce poverty by making electricity available and accessible to rural/urban areas, RE is also technologically developmental accompanied by drastic reduction of unemployment through massive opportunities for jobs which leads to an increased positive economic impact with rural areas advancing in their level of basic infrastructural development, (Akuru, & Okoro, 2010:168-170).

The Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC) 1998 made a resolution to replace fossil fuels with RE and an increment in energy productivity. But the transition affects fiscal policy of a country due to its associated costs, however, the non-transition as well has its own associated costs which are also heavy on the country, (Agu, & Ogbeide-Osaretin, 2017: 246-249). The major reasons for the lack of swift transition by the Nigerian government at both federal and states level are identified to be lack of political will to execute also the effects it will have on the economy thereby creating negative effects as a result of the policies adopted, (Emodi, 2015:347-349). Transitioning also implies that the country's revenue reduce due to the huge contribution of oil revenue to the total revenue inflow of the country, with the CBN receiving revenues from oil amounting to 60% to 70% in 2012.

Solar power is considered the most ideal for Nigeria considering the long hours with sunshine experienced in a vast majority part of the country on a daily basis. According

to the UN, the earth captures from the sun through solar radiation 10,000 times above the energy consumption needs of man. This is then converted to electricity through PV panels or other technological gadgets that absorb solar radiation. These energy are then transferred for use through cooling, heat, lighting, and other energy needs, (UN). The normal lifespan of an average solar panel is 30 years, although this depends on the composition of the components from which it was made.

Solar is considered to be from a source that cannot be exhausted, because it only ceases to generate energy when the sun dies. Therefore, its function continues until when man is unable to tap and absorb radiation using the panels in a prolonged time. Solar is also considered to generate power that is three (3) times more than fossil fuels.

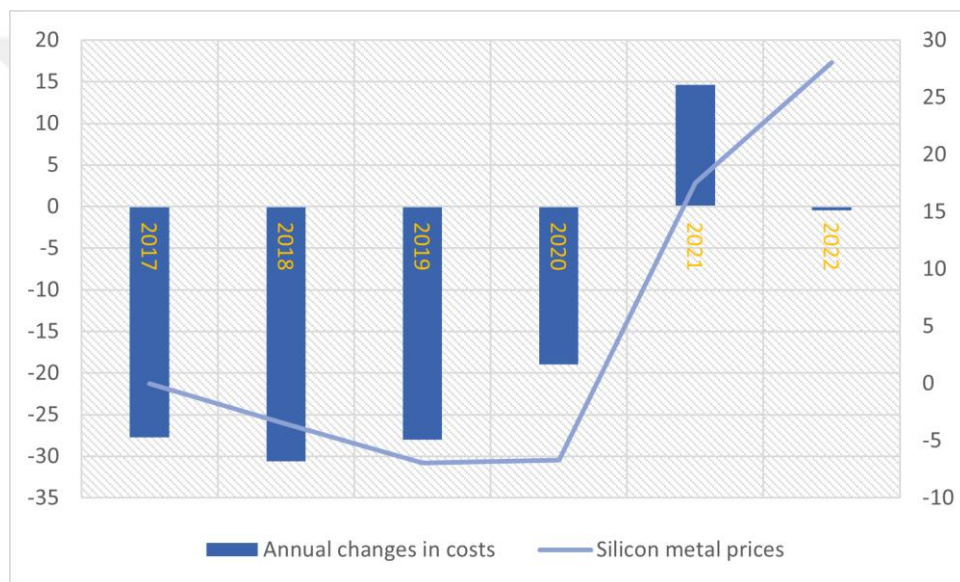


Figure 4.3: Technology Cost Trends and Key Material Prices for A Solar PV Module, 2017-2022E (Billion USD)

Source: IEA, 2023

Figure 4.3 shows that although the silicon metal prices tend to have increased in the year 2022, the annual changes in cost is very minimal. This makes the price stability to be contained by the consumers to an extent considering the fact that there are little changes to prices even when the cost of production materials increases, the changes in cost of solar remains reasonably insignificant.

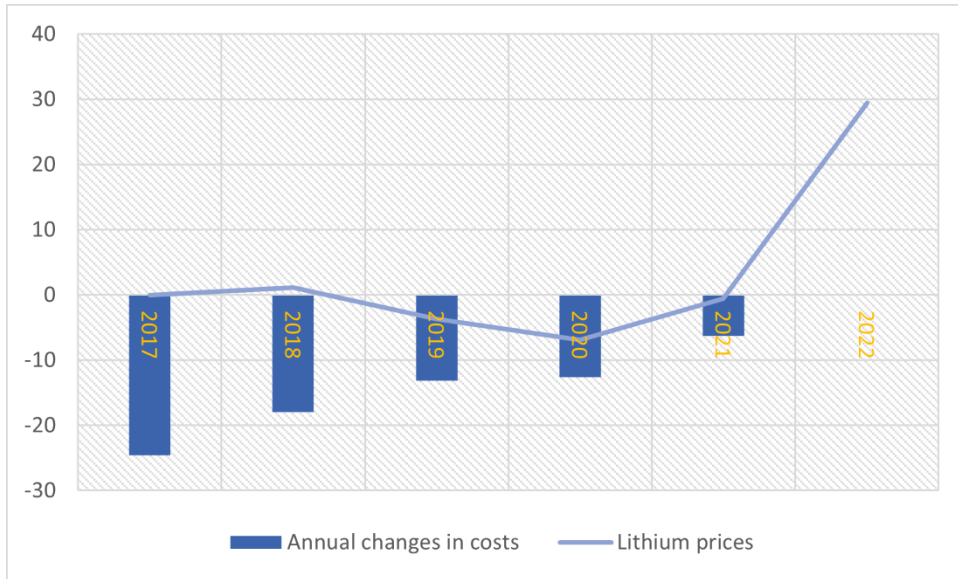


Figure 4.4: Technology Cost Trends and Key Material Prices for a Lithium-ion battery, 2017-2022E (Billion USD)

Source: IEA, 2023

The data in figure 4.4 shows that although the prices of lithium went high from the year 2021 to the month of March in 2022, however, there was no change in the cost throughout the year. This indicates some level of reliability on the prices of lithium-ion batteries. These batteries are very important in using solar energy because they are used to store energy captured from the sun through solar radiation. This stored energy in the batteries is used at a later period by the consumer.

Green Sukuk for solar power therefore is a total alignment of the means of financing towards one of the UN goals of providing clean energy. This is also to be used in providing electricity sources to various sectors of the country, at the same time mitigating climate change related issues which are caused by GHG emissions and other pollutants.

4.6 Debt – Servicing for Power Sector Loans

The FG is already engrossed in so much debt servicing as a result of the long listed debt profile which the country is managing. This could be seen and explained in the following tables containing the major necessary data related to Nigeria’s debt profile:

Table 4.2: Nigeria's Debt Profile

Year	External Debt (US\$, billion)	Domestic Debt (₦, trillion)	Fx Rate
2015	7.35	8.84	197
2016	7.84	11.06	253.5
2017	14.8	12.59	305.8
2018	21.04	12.77	307
2019	23.11	14.27	326
2020	28.57	16.02	381

Source: CBN, 2021

Nigeria's external debt profile as seen in Table 4.2 is 28.57 Billion USD on an exchange rate of 381 naira per dollar, while the domestic debt is 16.02 Trillion Naira in that year.

Table 4.3: Nigeria External Debt Profile, Budget Deficit, FGN Sukuk Issuance

Year	Nigeria External Debt (US\$, billion)	Budget Deficit (US\$, million)	Year	FGN Sukuk Issuance (₦, billion)
2017	14.80	20,395.00	2017	100.00
2018	21.04	18,207.00	2018	100.00
2019	23.11	21,019.00	2019	150.00
2020	28.57	24,880.00`	2020	250.00

Source: CBN, 2021

Table 4.3 shows the deficit in the country's budget with the highest according to available data to be reported as 24,880 Million USD as at 2020, and considered to be the highest between the year 2017 to 2020. The FG also issued the highest sukuk within the reported period which is 250 Billion Naira FG sovereign sukuk issuance. All these borrowings were aimed at cushioning the budget deficit to manage the various national expenditures that were at hand during the period.

Table 4.4: Nigeria's Total Public Debt Portfolio as at December 31, 2022

Debt Category	Amount Outstanding (US\$, million)	Amount Outstanding (₦, million)	% of Total
Total External Debt	41,694.91	18,702,251.88	40.44
FGN Only	37,238.54	16,703,347.12	36.12
States & FCT	4,456.37	1,998,904.76	4.32
Total Domestic Debt	61,415.93	27,548,116.06	59.56
FGN Only	49,515.92	22,210,364.60	48.02
States & FCT	11,900.01	5,337,751.46	11.54
Total Public Debt (A+B)	103,110.84	46,250,367.94	100

Source: DMO, 2023

This Table 4.4 shows that the FG as at the end of December 2022, have an outstanding of around 89.3% of the total external debt and 80.62% of total domestic debt. While the states and FCT have 10.7% of the total external debt and 9.38% of total domestic debt. In each case, the FG is highly indebted much more than the combination of states and FCT put together. However, the percentage is same both in USD and in Naira.

Table 4.5: Actual Domestic Debt Service for (January - December) 2022 (Amounts in Naira, Million)

Instruments	Jan uary	Feb ruar y	Mar ch	Apri l	Ma y	Jun e	July	Aug ust	Sept emb er	Oct ober	Nov emb er	Dece mber	Total
NTBs (Interest)	3220 .89	7231 .91	1918 9.40	2280 5.10	256 28.4	327 88.1	3281 9.18	2923 0.05	3294 8.68	2874 6.86	2409 2.90	5705 .81	2644 07.44
Federal Govt. Bonds (Interest)	1850 26.8 9	9652 7.95	3489 80.9 4	2290 75.9 0	324 48.5 9		2157 96.5 5	9495 4.13	3748 63.5 8	2702 86.7 5	3298 6.41		1880 947.6 8
Treasury Bonds (Interest)								3125 .00	3125 .00	3248 .50			9498. 50
Treasury Bonds (Principal)							2500 0.00						2500 0.00
FGN Green Bonds (Interest)						180 3.05						1812 .96	3616. 01

FGN Sukuk			8167			331			8302			3331	8291
Bonds			.32			33.6			.68			5.72	9.38
(Rentals)						7							
FGNSB	117.	123.	100.	103.	120.	151.	108.	135.	182.	133.	164.	235.	1675.
(Interest)	00	33	10	98	50	10	33	34	34	53	22	90	66
Promissory				2778	877							6041	2927
Notes				96.1	3.82							.82	11.79
Principal				6									
Total Interest	1883	1038	3764	2519	581	678	2487	1274	4194	3024	5724	4107	2243
	64.7	83.1	37.7	84.9	97.5	75.9	24.0	44.5	22.2	15.6	3.53	0.39	064.6
	7	8	5	8	8	6	7	2	9	4			7
Total				2778	877			2500				6041	3177
Principal				96.1	3.82			0.00				.82	11.79
				6									
Total	1883	1038	3764	5298	669	678	2487	1524	4194	3024	5724	4711	2560
Domestic	64.7	83.1	37.7	81.1	71.4	75.9	24.0	44.5	22.2	15.6	3.53	2.21	776.4
Debt Service	7	8	5	4	0	6	7	2	9	4			7

Source: DMO, 2023

The figures spent on servicing the actual domestic debt of the FG are presented in Table 4.5. It shows that there was payment to Sukuk holders every quarter of the year which made the payment to be made 4 times in the year as reported. But then, it is very crucial to look at the total interest payment during the period under review. The domestic debt service is seen to huge which is as a result of the government increased payments for the cost of borrowing interest based instruments.

CHAPTER V

PROPOSED MODELS

5.1 Overview

This chapter contains the final part of this study where it aims to present two distinct developed Ijarah Green Sukuk financing models which are suitable for Nigerians in addressing the lingering electricity power failure in the country. The chapter firstly discusses the reason for the choice of Ijarah Green Sukuk as a means of financing and presents the edge it has over other options of Sukuk available. Then it goes ahead to present the models developed in financing the Ijarah Green Sukuk whereby the modus-operandi are all explained with detailed analysis of the models using SWOT analysis, and risk assessments of the developed models.

5.2 Why Ijarah Green Sukuk?

Sukuk issuance in Nigeria has made history severally of being the most oversubscribed in all aspects, this has been seen in the most unprecedented numbers. This clearly shows acceptance of Sukuk form of financing by the general public irrespective of culture, faith and class. The choice of Ijarah Green Sukuk can then be seen in this research as the most favorable with this being one of the major reasons for that choice.

Ijarah Sukuk is established to be the most improved form of Sukuk (Ibraheem Alani & AbdulFattah, 2020:1-5), also the most globally common and popularly used form of Islamic financing with no debt financing involved thereby giving the lessee the opportunity to preserve capital which results in excellent debt rating. Ijarah Green Sukuk therefore, is the most perfect way of financing the power sector in Nigeria by use of solar grids and farms. This means a community and socially responsible form of investment which is totally in conformity with responsible investment.

Ijarah Sukuk returns are exempted from taxes and are recorded as operating expenditures in the books of the issuer. The sukuk investor here has his returns and profits being tax-free, which in turn makes it an attractive form of investment. People want to invest in areas that are tax exempted and receive their returns in full, this is a more reason why majority of investors would rather go for Sukuk investments.

It is a means of securitizing projected (future) assets; solar farm in mini-grid development or solar panels, to generate revenues in the form of cash flows for that solar project development. In this way, the funds for developing the project are being raised through investors willing to partake in the business, and who become owners of that project to enjoy the returns of the project by actually sharing in the ownership risk of the solar project.

The major potential benefit of this Green Ijarah Sukuk in the power sector is that of attracting Islamic investors in their multitudes who are already aware of the potential benefits of investing in the Ijarah Sukuk financing.

The Green Ijarah Sukuk is also a means of diversifying funding sources where the government does not have to worry about obtaining funds through interest-laden conventional loans, but rather through promising financing ways that have the records even in Nigeria of non-interest and ethically conscious form of financing.

The Green Ijarah Sukuk is perfectly a means of promoting sustainable infrastructure development where the funds realized are meant for financing a critical infrastructure area which is negatively affecting the livelihoods of all citizens and inhabitants of the country. Infrastructure development is extremely critical for development of any country, and it is exactly what this Sukuk addresses.

5.3 Proposed Ijarah Sukuk Model

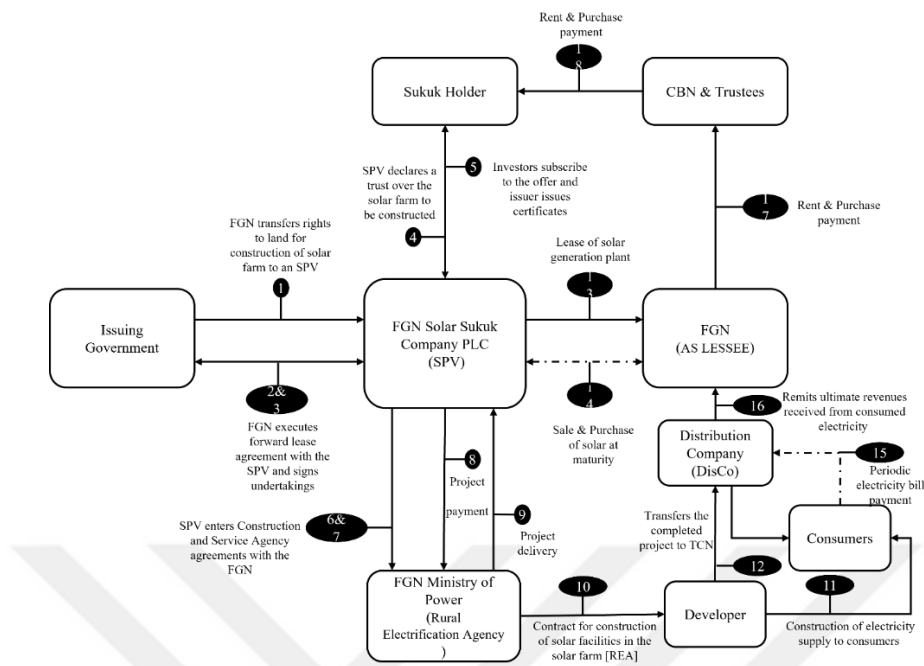


Figure 5.1: Solar Ijarah Sukuk Model I

Source: Author

Modus operandi and the role of parties involved

- 1 The 'Issuing Government' which is to be the Federal Government of Nigeria (FGN). This makes the Sukuk a Sovereign Ijarah Green Sukuk because it is issued by the government and carries the full backing, full faith and credit of the same government.
- 2 The Special Purpose Vehicle (SPV) which is to be incorporated by the FGN through the Federal Ministry of Finance and the Debt Management Office, all guided by the SEC
- 3 The SPV is formally to be registered by the government as FGN Solar Sukuk Company Plc as a Trustee under the Deed of Declaration of Trust
- 4 Federal government of Nigeria provides land and transfers the right to the land which will be used for construction of the solar farm considered for development / construction to the SPV
- 5 SPV now declares a trust over solar farm project to be constructed
- 6 Investors subscribe to the offer and the issuer gives certificates

- 7 SPV enters into development, construction and service agency with the FGN; Federal Ministry of Power which will use the Rural Electrification Agency (REA) as this is a major area of expertise of the agency
- 8 SPV pays for the solar project
- 9 REA appoints a developer who delivers the project construction; Mini grid extension
- 10 The developer does installation of the solar farm along with its accompanying components to ensure electricity generation is stable and then electricity is supplied
- 11 Electricity is provided to interested parties / consumers by the REA based on the terms and conditions of their contract with both rates and maturity clearly stated in the contract. However, electricity is provided through the TCN via DisCos since the generated electricity is to be injected into the national grid
- 12 FGN is considered to be the 'Lessee' and is to be represented by the Honorable Minister of Power since his ministry is responsible for ensuring power gets to the people by managing all agencies that oversee generation, transmission and distribution of electricity in the country. FGN being the Lessee makes it pay for rent due for the usage of the solar panels\ farms as at each agreed period which is the return paid to the Sukuk investors
- 13 Sale and purchase of completed solar project (in the future) undertaking is done by the FGN to the investors where FGN is obliged to buy the Solar project upon maturity of the Sukuk
- 14 Rent and purchase payment are both made to the Central Bank of Nigeria and Trustees which is the main body responsible for payment of returns to the investors, this payment to the CBN is made directly by the federal ministry of power because it is also saddled with the responsibility of collecting payments coming as bills from consumers of electricity
- 15 Maturity and redemption of Sukuk: The Sukuk certificates have a predetermined maturity date, upon which investors are entitled to receive the principal amount invested. The redemption is backed by the sale proceeds of the underlying assets or through refinancing. Rent and purchase to be paid to the shareholders
- 16 Rent and purchase payment to the Sukuk holders is made by the CBN and Trustees.

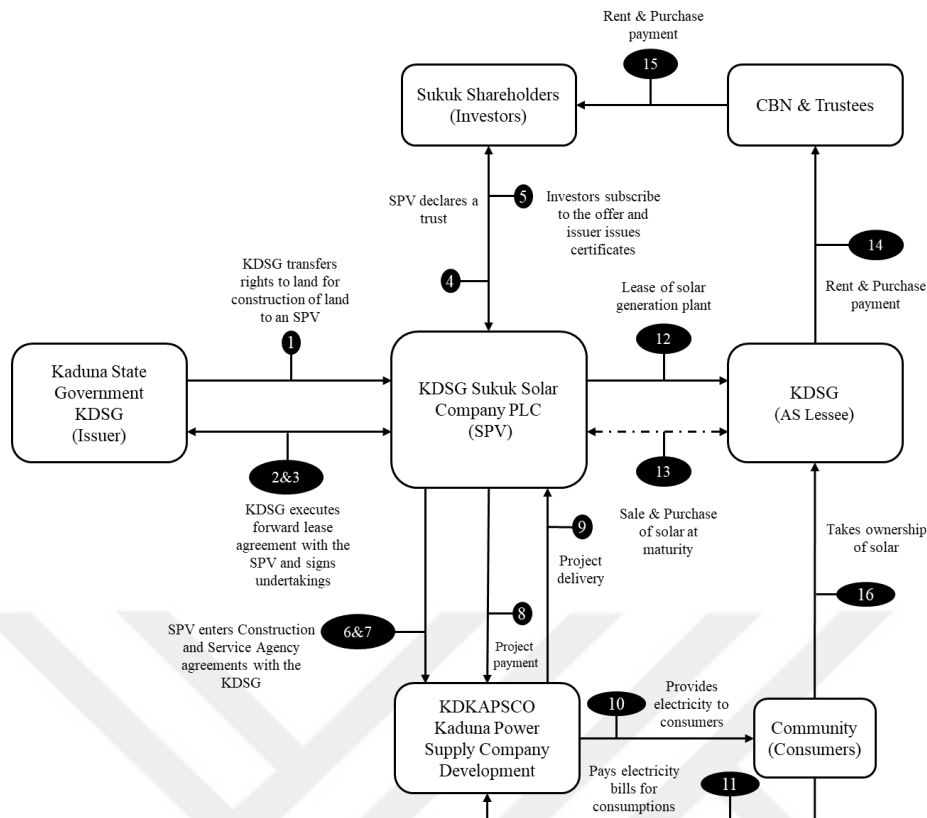


Figure 5.2: Solar Ijarah Sukuk Model II

Source: Author

Modus operandi and Role of Parties Involved

1. The 'Issuing Government' which is to be the State Government in Nigeria for instance, the Kaduna State Government (KDSG). This makes the Sukuk a state guaranteed Ijarah Green Sukuk because it is issued by the state government and carries the full backing, full faith and credit of the same government.
2. The Special Purpose Vehicle (SPV) which is to be incorporated by KDSG through the State Ministry of Finance and the Debt Management Office, guided by SEC
3. The SPV is formally to be registered by the government as KDSG Solar Sukuk Company Plc as a Trustee under the Deed of Declaration of Trust
4. KDSG provides land and transfers the right to the land which will be used for construction of the solar farm considered for development / construction to the SPV
5. KDSG assigns KAPSCO as Project Developer to develop off-grid power extension

6. The SPV is the Project Manager and supervises the work done by the Developer
7. Developer builds solar farm & generates electricity to be managed by him on behalf of KDSG
8. Electricity is supplied to the areas and utility charged, bills paid by the developer
9. KDKAPSCO continues to manage the project
10. KDSG is considered to be the 'Lessee' and is to be represented by the Director General of KAPSCO which is responsible for ensuring power gets to the communities in the state through providing alternative power supply to off-grid communities and to enable growing amount of access to electricity power to those communities. KDSG being the Lessee makes it pay for rent due for the usage of the solar power generated as at each agreed period of time which is the return paid to the Sukuk investors
11. Sale and purchase of completed solar project (in the future) agreement is done between the KDSG and the investors where KDSG is obliged to buy the Solar project upon maturity of the Sukuk
12. Rent and purchase payment are both made to the Central Bank of Nigeria and Trustees which is the main body responsible for payment of returns to the investors, this payment to the CBN is made directly by the state ministry of power because it is also saddled with the responsibility of collecting payments coming as bills from consumers of electricity through KAPSCO
13. Maturity and redemption of Sukuk: The Sukuk certificates have a predetermined maturity date, upon which investors are entitled to receive the principal amount invested. The redemption is backed by the sale proceeds of the underlying assets or through refinancing. Rent and purchase to be paid to the shareholders
14. Rent and purchase payment to the Sukuk holders is made by the CBN and Trustees at the end of the contract years. This marks the official purchase and takeover of the project by the government, which will continue to operate it according to its own arrangements.

6.1 Ijarah Solar Sukuk I and II

The models although different in nature, but are similar in terms of applicability except for a few steps. This makes their usage of proceeds similar because the proceeds are channeled to the same use of developing the solar power project. Also their SWOT characteristics / analysis is the same, making it a kind of combined description of the aforementioned factors. The analysis examines both internal and external factors that are involved, also could affect the developed Sukuk models.

6.2 Use of Sukuk Proceeds

The proceeds would be used to wholly finance the solar power project of the government involved through the REA that is under the ministry of power in the first model, and in the second model for KAPSCO which is an agency of KDSG that is saddled with the responsibility of providing electricity power to communities in the state which are off-grid. The proceeds categorically will be used for the following activities accordingly:

Construction of new solar power plant (solar farm) to be constructed in compliance with international standards and to be used for generation of electricity power.

Integration of renewable energy sources; the means through which renewable energy sources are injected / incorporated into the electrical grid is known as renewable energy integration. The funds derived through the Ijarah Green Sukuk are to be used in Model I in ensuring that the solar power generated is injected into the national grid and thereafter distributed to the consumers in their various communities.

Implementation of transmission and distribution network is also expected to be done by the TCN which is actually the body in charge of giving out energy. The transmission and distribution nonetheless also involve making some installations which help in conveying electricity to the consumers. This also depends on the type of consumer community involved; households, manufacturers, businesses, industries, health centers, schools, and so on.

5.4 Ijarah Muntahiya bit Tamlik Solar Sukuk III Model

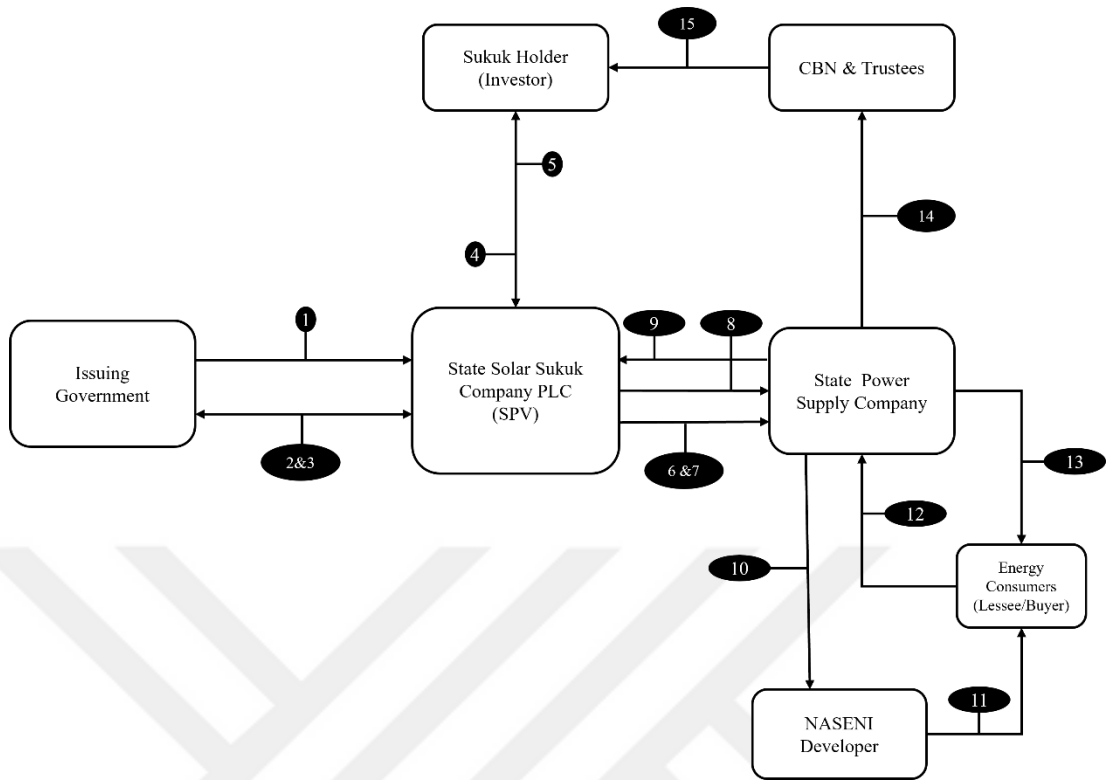


Figure 5.3: Solar Ijarah Sukuk Model III

Source: Author

Modus Operandi and Role of Parties Involved

1. The 'Issuing Government' which is to be the State Government in Nigeria that will embark on the issuance of the Sukuk for the development of the individualized solar system for businesses, manufacturers, households, hospitals and schools. This makes the Sukuk a state guaranteed Ijarah Green Sukuk because it is issued by the state government and carries the full backing, full faith and credit of the same government.
2. The Special Purpose Vehicle (SPV) which is to be incorporated by the state government through the State Ministry of Finance and the Debt Management Office, guided by SEC
3. The SPV is formally to be registered by the government as 'State Government Solar Sukuk Company Plc' as a Trustee under the Deed of Declaration of Trust
4. The Sukuk holders (investors) invest in a project for the provision of solar system to prospective consumers. They lease the solar system to the government (issuer) for periodic returns and also gradual periodic sale of the

solar system in bits until the whole is sold in a way that transfers ownership from the Sukuk holders to the respective actual lessees (consumers). Coupons are introduced to encourage massive investments whereby the investors that decide to take the lease get some form of discounts and at the same time they are consumers.

- 6 &7. SPV enters into development, construction and service agency with the state agency for power supply.
8. The state power supply agency will ensure that it advertises to prospective users and also capture their data readings for electricity consumption. Authorization (this is the contract agreement) must be received from the solar recipient (consumer) to enable the kick-off of the project followed by data reader installation to assess the consumption rate and determine projected consumption solar system capacity.
9. SPV pays for the solar project to the state agency for power supply using the proceeds of the Sukuk. The payment involves all expenditures related to the enlistment, evaluation, production, installation of the solar system as planned by the SPV.
10. The state power supply agency appoints a developer; NASENI which will develop quality and guaranteed solar PV systems locally, delivers the project by making full appropriate installation to all enlisted and accredited customers (lessees). Audit, design and installation is a summary of the core responsibility of the developer (NASENI).
11. The developer starts installation work immediately by embarking on putting up solar systems for the lessees. This enables tradability of the Sukuk. The solar system is installed with the determined capacity and electricity is provided to the listed parties / consumers based on the terms and conditions of their contract.
12. The state power supply agency is also saddled with the responsibility of signing a PPA agreement with the lessees. The consumption rates of the consumers is being monitored by the state agency for power supply which also presents the bills periodically to the consumers. Part-payment for ownership of the solar system is also made by the consumers through the same state agency until maturity as clearly stated in the contract. Therefore, the agency is entrusted by the state government with collections of monthly payments for electricity

consumption (lease), recurring payment for ownership from the consumers (part purchase payment). Operations and maintenance is the core responsibility of the state power supply company. This is all embodied as management.

13. The agency in turn is in charge of service and maintenance of the solar system until maturity of the Sukuk as per agreed in the contract document.
14. The agency remits both lease payment and part purchase payment to the CBN / Trustees. This payment is done immediately it is received from the agency periodically as per the agreement where lease payment is done from the monthly bills payment, and the solar system purchase done in bits as part-purchase until it is fully paid.
15. The CBN / Trustees ensures payment of returns on lease and part purchase payments made on the ownership of the solar system made by the lessees to the investors. This continues for the prescribed and agreed tenure of the Sukuk presumably 10 years in this illustration, ending upon maturity of the Sukuk where the solar system (asset) ownership is transferred to the lessee / buyer.
16. The Seller will transfer the ownership of the Asset to the Buyer at the end of the extended term of 15 years with the payment of a residual fee of \$1 by the Buyer to the Seller

PPA contains the following:

The PPA will contain market standard Seller and Buyer representations and warranties, will contain clauses that forbid both the lessor and the lessee/buyer to assign or transfer any of its rights or obligations under the PPA without the written approval of both Parties.

5.4.1 The Lessor / Seller

- The Seller will undertake to install all the necessary equipment required to generate power at the appropriate voltage.
- The Seller shall design, finance, build, own, commission, operate and maintain the Solar PV Plants. The Seller shall also prepare, negotiate and execute all contracts and documents required to undertake the Projects.
- Maintenance schedules for the Solar PV Plant to be co-ordinated and agreed in advance and to be conducted by the Seller through the state agency for power supply.

- The Solar Energy Output shall be supplied to and purchased exclusively by the Lessee / Buyer during the term of the PPA.
- The Seller shall be responsible, at its cost, to apply for, obtain and maintain all approvals, consents, licences, permits, authorisations and/ or other permissions required in terms of any applicable laws in relation to the operation and maintenance of the Solar PV Plants as may be applicable.

5.4.2 The Lessee / Buyer

- The Buyer shall provide suitable space for the PV system: roof top space and ground space enough for the panel installation.
- The Buyer shall provide adequate load equal to or greater than the installed capacity of the PV system when in operation.
- Purchase the power which is supplied and delivered by the Seller to the Buyer at the Delivery Points and in which solar power produced must be prioritised.
- Pay the invoices delivered to it monthly in advance, on the agreed day of the preceding month the invoice relates to, by the Seller in accordance with the PPA within a period of days of receipt of each such invoice clearly specified.

The monthly service fee is subject to the following conditions:

- Buyer's load shall at all times be equal to or greater than the installed capacity of the Seller's PV System to ensure the solar committed kWh is met every month.
- Service fee shall not include roof reinforcements, repairs, or the construction of an equipment room where applicable.

This model has its features and characteristics almost the same with the previously developed Model I and Model II, except for some very important and critical points which are its distinct difference(s) identified as follows:

1. The model is more personalized with performance tied to individual usage and management of it.
2. Termination of the PPA agreement is almost impossible and makes events mismanagement more difficult to overcome.
3. The use of covers in form of guarantees are required to ensure that all avoidable risks are mitigated.

4. Insurance covers are also applied to ensure security of the investments of sukuk holders.
5. Monitoring of the solar systems will have to involve the use of trackers for more security.
6. This model has the most potentials of reviving MSMEs as it aims at providing systems that will provide electricity power to producers, manufacturers and businesses thereby increasing output production.

5.4.3 Example of Model III

- 1 The project consists of 120 companies, each equipped with a 50 kW solar system.
- 2 Project length is 10 years, with payments to investors structured on a monthly basis over this period.
- 3 A 50 kW system is installed in each company's facility, assuming a total installation cost of \$50,000 per system.
- 4 Total project cost amounts to \$6,000,000. This cost includes all installation expenses for the 120 solar systems.
- 5 Each company's system is expected to produce approximately 70,000 kWh of electricity annually, leading to a total production of 8,400,000 kWh annually for all companies combined.
- 6 Solar Sukuk Company's payment rate is \$0.09 per kWh, which represents the compensation for the electricity supplied to the grid.
- 7 Annual incentive provided to each company amounts to \$37,800 in total, calculated as 5% of the total annual electricity production valued at the Solar Sukuk Company rate.
- 8 Maintenance and commission costs are calculated as 1% of the total project cost annually, equating to \$60,000 each for maintenance and financial intermediary commission.
- 9 Ijarah rental rate is set at 7.5% per annum, with the monthly payments calculated based on this rate.
- 10 Installation cost is a one-time payment made in the first year of the project,

covering the entire cost of installing the solar systems.

- 11 Net cash flow is designed to be positive starting from the second year, ensuring that after covering the initial year's installation costs, the project's income from Solar Sukuk Company payments and incentives sufficiently cover operational expenses and Ijarah payments.

Total Project Cost

$$\begin{aligned} \text{Total Project Cost} &= \text{Number of Companies} \times \text{Cost per Installation} \\ &= 120 \times \$50,000 \\ &= \$6,000,000 \end{aligned}$$

Total Annual Production

$$\begin{aligned} \text{Total Annual Production} &= \text{Total Annual Production per System} \times \text{Number of Systems} \\ &= 70,000 \text{ kWh} \times 120 \\ &= 8,400,000 \text{ kWh} \end{aligned}$$

Periodic Payment

$$\begin{aligned} \text{Periodic Payment} &= \text{Total Annual Production} \times \text{Solar Sukuk Company payment rate} \\ &= 8,400,000 \text{ kWh} \times \$0.09/\text{kWh} \\ &= \$756,000 \end{aligned}$$

Periodic Payment

$$\begin{aligned} \text{Periodic Payment} &= r \times (\text{Total Investment}) / 1 - (1+r)^{-n} \\ &= 0.075 \times 6,000,000 / 1 - (1+0.075)^{-10} \\ &= \$874,115.56 \end{aligned}$$

Table 5.1: PV Solar Roof-top Ijarah Sukuk Cash Flows Estimation

Years	1	2	3	4	5	6	7	8	9	10
CASH IN										
Sukuk	\$6,000,000									
Solar Sukuk Company payment	\$756,000	\$756,000	\$756,000	\$756,000	\$756,000	\$756,000	\$756,000	\$756,000	\$756,000	\$756,000
Incentive	\$37,800	\$37,800	\$37,800	\$37,800	\$37,800	\$37,800	\$37,800	\$37,800	\$37,800	\$37,800

Total Cash In	\$6,793,800	\$793,800	\$793,800	\$793,800	\$793,800	\$793,800	\$793,800	\$793,800	\$793,800	\$793,800
CASH OUT										
Installation Cost	\$6,000,000									
Maintenance cost	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
Commission	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
Ijarah payment	\$491,508	\$491,508	\$491,508	\$491,508	\$491,508	\$491,508	\$491,508	\$491,508	\$491,508	\$491,508
Total Cash Out	\$6,611,508	\$611,508	\$611,508	\$611,508	\$611,508	\$611,508	\$611,508	\$611,508	\$611,508	\$611,508
Net Cash Flow	\$182,292	\$182,292	\$182,292	\$182,292	\$182,292	\$182,292	\$182,292	\$182,292	\$182,292	\$182,292
Ending Balance	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes:

- Installation Cost is a one-time payment in Year 1.
- Solar Sukuk Company Payments and Incentives are consistent throughout the 10 years, providing a steady income stream.
- Maintenance and Commission are recurring expenses calculated as a percentage of the total project cost.
- Ijarah Payments are the periodic payments made to Sukuk holders.
- Net Cash is calculated as Total Cash In - Total Cash Out.
- Ending Balance is set to zero each year by ensuring that the cash flows are balanced, reflecting a stable financial project structure.

Table 5.2: Purchase Schedule for PV Solar Roof-top Ijarah Sukuk

No. Payment	Payment	Value of Asset at Beginning of Year	Rent (7.5% p.a.)	Payment to Purchase	Value of Asset at Year End
1	\$874,116	\$6,000,000	\$450,000	\$424,116	\$5,575,884
2	\$874,116	\$5,575,884	\$418,191	\$455,924	\$5,119,960
3	\$874,116	\$5,119,960	\$383,997	\$490,119	\$4,629,842
4	\$874,116	\$4,629,842	\$347,238	\$526,877	\$4,102,964
5	\$874,116	\$4,102,964	\$307,722	\$566,393	\$3,536,571
6	\$874,116	\$3,536,571	\$265,243	\$608,873	\$2,927,698
7	\$874,116	\$2,927,698	\$219,577	\$654,538	\$2,273,160
8	\$874,116	\$2,273,160	\$170,487	\$703,629	\$1,569,531
9	\$874,116	\$1,569,531	\$117,715	\$756,401	\$813,131
10	\$874,116	\$813,131	\$60,985	\$813,131	(\$0)

Source: Author

This Model III actually pinpoints the cheaper cost of having a constant reliable power supply using individualized solar system compared to the present hydro-electric power being distributed by the government. This is in consideration of the long life-span of solar system being internationally considered to be an average of 25 years.

5.5 Analysis of the Models (I, II & III)

The major difference between the 3 models is that Model I is designed to be issued by the FGN with the developer being REA which is its agency and actually constructs the solar generation plant, the revenues generated through bills payment are used to pay Sukuk holders whom are the investors and owners of the project. Model II on the other hand is designed to be carried out by the state governments with an example of Kaduna State Government (KDSG) used for the development of the model, KDSG issues Sukuk and then assign its agency KAPSCO to be the developer and manager and revenues generated here are treated same with that of Model I. Model III is entirely different from the other models in that its developed to be issued by the government but to be individualized through providing individual solar systems unlike the previous models which are general power plants whose power is to be distributed to individual consumers.

5.5.1 Strength

Asset-backed Nature: A very unique characteristic of the Ijarah Green Sukuk is the fact that it is not a debt obligation as it is with bonds, rather it is an undivided representation of ownership in an asset which is either tangible or visible. The models are a form of security for investors in an encouraging way where realism is involved in its detailed aspect. This makes these models have an edge against the conventional borrowings because these are investments against real assets with real value. Here the concept of realism also plays a very significant role, and a core of Islamic finance.

Diversification: The models are attractive to investors because they provide them with a form of divestment of their funds. This reduces reliance on interest-laden investments and improves the patronage of ethical investors towards Islamic finance products. We have seen this in Nigeria where the growing demand for Sukuk products has made it the most highly successful form of mobilizing financing in the country presently. It therefore, offers the chance to diversify one's asset holdings

Liquidity: The models are also highly liquid as a result of their being able to be traded in the stock market as per CBN and SEC approvals as a result of them being government issued. This is good for especially corporate investors that are looking out to having their liquidity management properly taken care of to avoid encountering excessive losses. The Central Bank of Nigeria has classified Sovereign Sukuk as a liquid asset and approved for it to be traded and listed on the FMDQ Securities Exchange Limited and the Nigerian Exchange Limited, giving holders of Sukuk access to liquidity options. This also makes it a negotiable instrument at the same time.

Risk-sharing Concept: The concept considers the Islamic finance concept of ownership which involves sharing in the risk associated with any asset or strive for earnings in Islam, thus making it mandatory for any business engagement to involve sharing in the risk associated with it; accompanying risk. The risk sharing nature of Ijarah Green Sukuk is an advantage for the investor whereby he/she is assured of not single-handedly shouldering the burden of risk and also greater chances of risk mitigation actions by the issuer to the best of their ability.

Fixed Return: Semi-annual or quarterly payments will be made to investors which makes the investors have a sort of fixed return which is also income that is tax-free. This encourages investors to put in their money in the investment because they have assurances of payments to be made for off-take and usage of the assets they are investing in. It provides holders of the Sukuk additionally with very competitive returns as profits, which is as a result of competitive offers made by the government.

Shari'ah Board Oversight: The models are to be reviewed and approved also by the shari'ah board of the CBN, the Shari'ah board reviews Sukuk issuance to ensure it is in conformity with the principles of Islam. This involves avoiding the prohibitive activities and ensuring only the permissible are engaged in all Sukuk projects. This has a tremendous impact on the environment where all toxic activities cannot be engaged in this Ijarah Green Sukuk, and also the society in general where all dangerous emissions are avoided, in turn many diseases inflicted by the emissions are avoided. Environmental hazards are totally impossible in this Sukuk model, making it a completely environmental friendly kind of financing.

Shari'ah Compliance: For investors seeking to adhere to Islamic principles, these Sukuk models provide an attractive investment alternative. They are designed based

on the principles of Shariah, therefore, guaranteeing investors that their funds are not engaged in activities related to Riba (interest) and gambling but are tied to real assets or services, in compliance with the prohibition of pure monetary speculation and grabbing what does not belong to one legally; not earned but collected under mischief.

Socially Responsible Investment: These models are an investment / project that is laden by non-prohibited activities that are positively impactful to the environment and society / community at large. This is certainly what this Sukuk stands for; socially responsible by providing power via electricity to the people.

Stability: The asset-backed nature of the models and their underlying contract which is mainly leasing (Ijarah), provides a form of stable stream of returns over the agreed time period. Its returns are however, predictable which makes it inviting to the traditional investor. It is a safe investment supported by the government(s)' entire faith and credit.

The models are structured in such a way that they are acceptable as security for loans from banks and other lending organizations as per the consideration of such and permissibility by the CBN on previous issuances of the Sovereign Ijarah Sukuk issued in Nigeria. This makes it highly encouraging to borrow against the Sukuk certificates used as collateral thereby encouraging utilization of the securities in enhancing other business endeavors.

Solar generated power is cheaper and less costly than gas generated power in Nigeria. This makes it more cost effective to use and as a result get a large number of customers / consumers compared to the traditional electricity generation company. This is a major advantage for these models.

Solar system has a long life span and is easy to maintain. The models then actually come along with a cheap cost of maintenance for the government where it would not be overburdened by the unnecessary costs of maintenance and repairs.

The models provide more reliable source of electricity and will solve the problems of unnecessary power failure(s) experienced in the country. The stability of power in the long run means stability in production and ultimately the GDP of the country. This will lead to more access to electricity for educational purposes, healthcare, industries, businesses, manufacturers, agricultural producers and households. Availability of electricity power means more qualitative life (better standard of living), more

productivity, reduced mortality rate, better educational quality, and an average cost of living.

The models involve training people in the communities involved that will be saddled with the responsibility of maintenance and repairs, which is done by the REA as part of its engagement for bringing up a communal responsibility being imbibed by people settling in common habitations. This again creates communities that are technically educated to carry out the work required of them to ensure smooth usage of the solar systems installed and overcome any unstoppable issue that could arise. At the same time it provides solutions to unemployment issues that are considerably high in the country especially among the youth.

The Sukuk models also stand to decrease the level of environmental pollution of noise as a result of a very wide usage of generators as alternative to failed electricity supply by the Nigerian electricity power companies. This pollution actually affects a good number of people where many of them have developed psychological issues and also respiratory challenges due to the emissions that come from them.

The models also benefit the country in giving it the opportunity to gain in monetary aspects from various international dividends of climate conservation profits from global bodies. This involves carbon trade opportunities, and it would also encourage the government(s) to do more of green projects especially Ijarah Sukuk so as they benefit tremendously from those rewarding programs.

The models completely cut down the costs associated with the use of generators as an alternative source of power. The use of generators has become extremely expensive due to the hike in the prices of petrol and diesel in the country. These fuels are now exorbitantly costly thereby leaving people and businesses with no other option other than to wait for the national power companies and rely on them too for power.

5.5.2 Weaknesses

Asset Risk: As a result of the reliability of the Ijarah Sukuk on the asset that backs it, this makes any negative effect on that asset correlative to the performance of that Ijarah Sukuk investors. Any damage on the solar system installed would affect the investors negatively because it means a damage to the stream of revenue meant for them as profits. Likewise if the assets depreciate or face legal or regulatory issues, it could negatively impact the sukuk holders as well.

The models are likely to face issues with government laws and regulations which is as a result of the negative political will among some classes in the country. This is considered a setback if it is not tackled with utmost sincerity and zeal; commitment to serve the people.

Complexity in Structure: The complex nature of Ijarah Green Sukuk model structure which involves various parties with legal binding contracts, makes investors not familiar with Islamic finance consider it as complicated. The involvement of a developer and contractor in this case is an addition to parties involved and requires additional legal terms. This requires a lot of educational sensitization from all angles of enlightenment to ensure there is massive success in the spontaneous growth of the Sukuk market in Nigeria.

The models could also face the issue of socio-cultural barriers that could result in a kind of negative attitude towards the acceptability of the solar usage by some sectors of the uneducated societies in the country. This could result in some hesitations and resistance by a sector of the consumers and likely have an effect on the returns of the Sukuk.

Market Size Limitation because the Ijarah Sukuk market size is not as big as the conventional bonds market. This is considered a hindrance to its growth because it limits liquidity and in the long-run investor interest. Investors, especially corporate investors are interested in instruments that are highly liquid.

5.5.3 Opportunities

Innovative Finance due to the fact that the models have the most potentials of more financial engineering products which could be extended to other sectors that need to be developed. This involves infrastructure development due to the deficit being experienced in the country lately. This would attract a larger investor base both within and outside the country, and in the long-run solve the problems of particular financing needs in various sectors / industries.

Enlarging Islamic Finance Market because the global demand for financial products that adhere to Shariah is growing, which presents a chance for the Ijarah sukuk market to grow and draw in additional issuers and investors.

Infrastructure Development is closely intertwined in these Sukuk models. The issuance of the Ijarah Green Sukuk to finance infrastructure development projects is made

possible by the necessity for infrastructure development in many nations with a majority of Muslims.

There is a very big opportunity for the models to be duplicated and implemented in all the states of Nigeria including the federal government. This is owing to the fact that the new Electricity Act 2023 allows states to generate their own electricity in whatever form they may wish to and using an approved source of financing. Ijarah Sukuk being a familiar form of financing to the government has the most likelihood to get instant approval. This is also coming at a time when the government(s) at all levels are being cautioned and prevented to take loans. Sukuk being a form of financing completely investor ownership laden, is the most perfect consideration for projects like these for the benefit of the citizens and communities.

5.5.4 Threats

Regulatory Shifts: The viability or allure of the models as an investment instrument may be impacted by modification to the laws governing Islamic finance or taxation.

Economic Instability: National, geopolitical unrest or economic downturns may impact the performance of underlying assets or reduce demand for the models.

Competition: The market share and development potential of the models' (Sukuk) issuances may be restricted by competition from other Islamic financial products or conventional bonds.

Threats in terms of vandalism and infrastructure destruction are mainly issues that relate to the investors and consumers of the Sukuk project. Vandalism is an issue that is constantly posing danger to the functionality of power companies in Nigeria.

Failure of consumers to pay for power consumed is a major discouraging factor to the prospect of the models. If consumers refuse to pay for power consumed, it'd be difficult for the government / SPV / CBN to actually pay their bills as at when due. This is evident in the challenges faced by the government presently in managing debts owed.

Power theft is also an issue which could arise with the application of the models. This is in view considering the experiences of the distribution companies presently where electricity is stolen by some people and utilized without their data being recorded on the consumers list. This means they won't pay for what they have consumed, leading to income leakages to the government / SPV.

5.6 Risks Analysis

5.6.1 Business risk

Credit risk is arrived at due to the characteristics of Islamic financial instruments that form the basis of the Sukuk asset because Islamic finance carries particular credit and counterparty risks. The credibility (credit rating) of the issuer will be negatively impacted by unfavorable fluctuations in market rates. A default on the payment of returns in form of rent in the case of fixed-return investments lead to highly serious credit risk.

Foreign exchange risk is caused by unfavorable variations in exchange rates which inevitably impact the assets inside the Sukuk pool as well as the currency denomination used to raise the Sukuk funds. Mismatch between the Naira and the reserve denominated currency which is USD in a time duration that is long actually affects Sukuk pricing. Short-term Sukuk and those Sukuk that are liquid have a minimal effect from foreign exchange fluctuations, as compared to long-term Sukuk.

Infrastructure inflexibility risk is a risk that arises as a result of poor institutional structure put in place for the management of the Sukuk.

Interest rate risk and the value of fixed-income Sukuk relate in an opposite direction because the value of fixed-income Sukuk decreases as market interest rates increases. Reinvestment risk and the opportunity cost of investing at the new rate are additional factors to consider, especially if the asset is not liquid, as in the case of the non-tradable zero-coupon Sukuk.

Because Sukuk certificates mostly use LIBOR as a benchmark for their financing activities, they are indirectly subject to changes in interest rates. This translates to the fact that majority of sukuk issuances have fixed payments, and investment return is correlated with benchmarked interest rates. This risk however tends to be high as a result of the fixed-return associated with the Sukuk and is tied to the investment until the maturity period of the Sukuk elapses.

Liquidity risk is inherent considering the fact that majority of Sukuk certificates issued are held until maturity without trading them. Another reason for holding them till maturity is also because there isn't a secondary market that is sufficiently liquid and well-structured.

Price risk is directly related to the value of the underlying asset of a Sukuk structure in comparison to its market value. The values of existing assets depreciate by the day and are therefore less valuable monetarily as compared to their market prices. Maintenance of assets is therefore very important to avoid the effect of price risk in a Sukuk issued.

Shari'ah compliance risk exists and affects all parties. In a situation where the issuer violates the rules governing trust, confidentiality in their relationship all in compliance with shari'ah. The Sukuk prospectuses are developed with input from Shari'ah jurists; the termination clauses of these prospectuses specify the circumstances that render the Sukuk deed voidable on account of non-compliance with Shari'ah. Non-adherence of issuer to rules and regulations in the duration of the Sukuk period is also another risk that the Sukuk is exposed to leading to its collapse.

5.6.2 Marketing Analysis

A market analysis of the proposed Sukuk models based on the data (interview results) derived in the study indicate that the potential customers that will be end users of the electricity generated through the solar system cut across different sectors of the country in terms of usage. The respondents' buying habit is also ascertained considering their willingness response to pay their bills as at when due. The respondents have also shown that they have just one option of electricity supply at their disposal right now, and are willing to pay more for a befitting constant supply and availability of power to cater for their individual needs.

CHAPTER VI

CONCLUSION

The concluding part of the chapter includes recommendations to enable the implementation of the research developed models in this study to be used by the Federal Government, State Governments and Local Governments in Nigeria, to ensure that the lingering electricity power problems faced in the country are solved in a sanitized way which is beneficial to the citizens and its environment.

In this vein, the conclusion includes possible obstacles to the implementation of the models and the ways to overcome them which are market acceptance, structuring complexities and stakeholder engagement.

Future opportunities of using financial engineered products are also discussed with accompanying recommendations on how the models can contribute to the development of infrastructure in the country.

The chapter ends with implementation strategies hope to be used for achieving solar electricity power through the Ijarah Green Sukuk models that have been developed.

6.1 Summary of the Study

The developed models fulfil the distinct financial requirements of renewable power project development, encompassing funding for grid absorption and infrastructure required for the effective installation and use of the solar project, while at the same time maintaining full compliance with Shari'ah principles. A possible obstacle to implementation of the Green Ijarah Sukuk Model could be the regulatory hurdles. This is because there has not been any previous Sukuk issued in Nigeria that is related to electricity power project development. This therefore, poses a challenge for the regulators to ensure that they develop laws that protect all parties in the project and at the same time ensure execution of the whole contract in full without violations or failures. This is especially for the fact that it involves the development of solar farm which is an asset that is actually movable. The regulators will have to put in place measures that would ensure that all parties are protected in all ways possible. There is however the need for regulatory reforms that would ensure that there is provision to safeguard the Sukuk models developed. This should mainly be in the promulgation of laws and regulations that see to safety of investments,

generation of power to be supplied to consumers, and payment of returns to investors, bills to the authorities designated to collect them.

The market acceptance of the Sukuk models is another area that needs to be worked on because the investor needs to be convinced beyond reasonable doubt that his / her investments are safe and do not face any avoidable risk arising from issues such as theft, vandalism, destruction, etc. This calls for mass education of the people to enlighten them more on the level of investor protection imbibed in the laws as per regulations. This education involves the use of all forms of media awareness, enlightenment through mass mobilizations that involve both physical and non-physical engagements with potential or prospective investors.

The structuring complexities are those arising from the development of the Sukuk contracts in itself. These complexities affect Sukuk projects if not properly placed. Therefore, there is need for the governments and responsible offices to actually ensure that the structuring is done in a yet simplified way to enable the investors easily understand what parties and steps are involved in the investment they are expected to commit themselves into.

Stakeholder in Nigeria should be engaged at all levels in a way to ensure that they are involved in Sukuk processes that relate to their offices. This is very important because the involvement of government agencies, regulatory bodies, financial institutions, and project developers, in the development and implementation of the Green Ijarah sukuk model is the only way of ensuring that the project gets successfully implemented. There is an absolute need for collaboration between agencies and institutions related to the project in ensuring the success and sustainability of Shariah-compliant financing initiatives in the Nigerian power sector which is in dire need of salvation due to its inability to cater for the electricity needs of the populace in all aspects.

6.2 Future Opportunities and Recommendations

There is high prospects that is expected for the Ijarah Green Sukuk in Nigeria. This is evidenced by the fact that majority of the population irrespective of class is in dire need for an alternative to the traditional government system of electricity supply. Nigerians need a solution that is affordable, transparent, beneficially inclined to the society and community. The solution to the needs of the people is seen in the developed models. There is an opportunity for the power sector to be fully taken over in an

efficient and effective way through the use of solar electricity power. This is found majorly in the interest of people to switch to solar system usage, and the willingness of the investors to invest in Ijarah Sukuk issuances made previously.

The interview I granted to a number of sector players and workers is also an evidence of the willingness of people to pay any amount irrespective for them to just get power available for their homes, businesses, offices and manufacturing companies. This owes to the fact previously mentioned which is high cost of fuel and diesel consideration, environmental pollution, community and society development factors.

Policymakers, investors, and industry stakeholders are hereby encouraged to as a matter of topmost priority and urgency engage in all activities towards supporting the growth of Islamic finance and sustainable development in Nigeria. This should be done through engagement of experts in Islamic finance field to engage in financial engineering and ensure that solutions are provided to the lingering infrastructure crisis in Nigeria and not only the power sector.

Future opportunities for expanding the use of Ijarah Green Sukuk in Nigeria involve scaling up infrastructure investments through a deep consideration of the government at all levels to improve the other infrastructure which is critical to every national development through expansion of other sectors like the aviation sector, agricultural sector, industrial sector, financial sector, and some other sectors of the economy.

Another opportunity in the use of Ijarah Green Sukuk is the fostering of innovation in project financing by the government, and of which the Nigerian Sovereign Ijarah Sukuk is a testament to that. However, there are other sectors of the economy apart from power and transportation which are in dire need of project financing in an ethical way. These sectors could get financing through the developed Sukuk models.

The models could be used to leverage international partnerships in various sectors and across industries in the country. This in turn would definitely lead to a spontaneous increase in the activities in the country which would again positively impact the productivity and economy of the country.

Ijarah Green Sukuk has that potential to contribute to the development of the Nigerian power sector and at the same time promote sustainable and inclusive growth. This showcases the contribution of creative finance methods in solving infrastructure issues and furthering the nation's socio-economic goals. This raises the hopes of ethical

individuals and make them expectantly await a time when Islamic finance will significantly contribute to Nigeria's progress and prosperity in the shortest near future.

The investor benefits of Ijarah Green Sukuk are tremendously encouraging and impressive, because the returns generated are merely revenues gotten from rental income produced by the leased power assets that are highly competitive and reliable. There is also diversification of portfolio by investing in long-term growth potential infrastructure projects with steady cash flows. The investment opportunity being undertaken by the investor is that which is socially responsible and helps Nigeria create vital infrastructure.

My final thoughts are however, that in order to close the funding gap in the Nigerian power sector, there is need for a fierce competition in engineering creative financing options like Ijarah Green Sukuk to address the vacuum created by their unavailability. These developed Ijarah Sukuk models are positively impactful contributions to Nigeria's economic expansion considering the various aspects of the economy and human lives it stands to impact. Sectors such as the industrial and health sectors are heavily reliant on qualitative electricity supply to enable them function well. This is the more reason why a failure in power quality affects the economic performance and efficiency directly. This makes sustainable development squarely dependent on availability of stable electricity supply.

6.2.1 Implementation Strategies

The actual implementation of the developed models require the following:

- a) Legal consideration
- b) Financial consideration
- c) Regulatory consideration
- d) Stakeholder engagement
- e) Due diligence.

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APPENDIX A

The questions contained in the Questionnaire are as follows:

Q1. What is the average number of hours you get electricity supply in a day?

- 0 to 5 hours
- 6 to 10 hours
- 11 to 15 hours
- 16 to 24 hours

Q2. In the last one month, how do you rate electricity supply in your environment?

- Excellent
- Good
- Fair
- Poor
- Bad

Q3. How satisfied are you with the services of your Electricity distribution Company?

- Extremely Satisfied
- Somewhat Satisfied
- Neutral
- Somewhat Dissatisfied
- Extremely Dissatisfied

Q4. What do you rely on as means of electricity supply?

- Electricity Distribution Company
- Fuel Power Generator
- Diesel / Gas Power Generator
- Solar Power Generator

Q5. What do you think could be the reason for the rampant use of power generating machines (majorly diesel and fuel operated) that are being used as alternative power sources in the country?

- Epileptic Power Supply
- Lack of Access to Electricity
- Lack of Interest in National Electricity Power Sources
- High Cost of National Electricity Supply
- All of the Aforementioned
- None of the Above

Q6. How likely are you to consider a renewable energy option to your electricity needs through a National Program?

- Strongly Interested
- Somewhat Interested
- Neutral
- Somewhat Disinterested
- Strongly Disinterested

Q7. What do you think is the most favorable means of payment for power supply to ensure a sustainable system?

- One-off Payment
- Installment Payment; Individual Acquisition Arrangements
- Billing System; Post-paid System
- Pre-paid System

Q8. Are you as an individual willing to participate in a financing arrangement for the power sector, considering the fact that the arrangement is environmentally and socially friendly?

- Yes
- No

Q9. What is your consideration in terms of the government financing initiative with previous experiences put at the back of your mind?

- External Loans
- Bonds
- Islamic Finance Instrument (Sukuk)