Regional Collaboration Centre – Lomé
Promoting Climate Action in Western and Francophone Africa

Department of Climate Change
Federal Ministry of Environment

ASSESSMENT OF CARBON PRICING INITIATIVES IN NIGERIA

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Abbreviations

AfCFTA	African Continental Free Trade Area
AFOLU	Agriculture, Forestry and Other Land Use
CH4	Methane
CiACA	Collaborative Instruments for Ambitious Climate Action
DCC	Department of Climate Change
DFFE	Department of Forestry, Fisheries, and the Environment
ECOWAS	Economic Community of West African States
ERGP	Economic Recovery and Growth Plan
ETS	Emission Trading System
FMEnv	Federal Ministry of Environment
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GMI	Global Methane Initiative
ICAT	Initiative for Climate Action Transparency
ICPF	International Carbon Price Floor
IMF	International Monetary Fund
IPPU	Industrial Processes and Other Product Use
LPG	Liquefied petroleum gas
MDAS	Ministries, Departments and Agencies
MID	Mauritius introduced the Maurice Ile Durable
MRV	Measurement, Reporting and Verification
MYTO	Multi-Year Tariff Order
NCCC	National Council on Climate Change
NCCRP	Nigeria Climate Change Response Programme
NDC	Nationally Determined Contribution
NERC	Nigerian Electricity Regulatory Commission
NGFCP	Nigeria Gas Flare Commercialization Program
NIPP	National Integrated Power Project
NUPRC	Nigerian Upstream Petroleum Regulatory Commission
O&G	Oil and Gas
OBPS	Output-Based Pricing System
OPEC	Organization of the Petroleum Exporting Countries
PSC	Production Sharing Contract
R&D	Research and Development
REDD+	Reducing emissions from deforestation and forest degradation
REF	Rural Electrification Fund
SLCP	Short-lived climate pollutants
tCO_2e	Tons of Carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

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Executive Summary

Carbon pricing is largely regarded as one of the most effective and simple methods for reducing greenhouse gas emissions (GHG). As a result, a rising number of nations (developed and developing) have adopted or are developing carbon pricing mechanisms as one of the measures to support the implementation of Nationally Determined Contributions (NDC).

While the overall goal of carbon pricing instruments is to reduce GHG emissions, its adoption in Nigeria would as well provide other benefits such as hastening the deployment of climate-friendly alternatives like renewable energy and energy efficiency, encouraging investment in these clean technologies lowering the country's reliance on imported energy, and reduction of local air pollutants like particulate matter, carbon monoxide, nitrogen oxide, sulphur dioxide etc. Initiating carbon pricing mechanism can be a valuable source of revenue for government.

Nigeria has over the years shown increasing interest in reducing its emissions and has in its 2018 Gas Flare Commercialization Programme, introduced the payment regime (polluters' pay) which mimics the Carbon Tax. Further to this is Nigeria's participation in various relevant partnerships and initiatives, Nigeria's current (and potentially future) NDC and potential long-term low emission development strategies and the country's interest to consider cooperative climate action under Article 6 of the Paris Agreement. In the updated NDC submitted in 2021, based on the new mitigation analysis, "Nigeria restates its commitment to its unconditional target to reduce GHG emissions by 20% below business-as-usual by 2030, and increases its conditional target to 47% below business-as-usual by 2030 on the condition of receiving appropriate support. All these initiatives are pointers to Nigeria's efforts in reducing its GHG emissions.

However, in view of achieving and implementing Nigeria's NDC it is timely to consider the different approaches for carbon pricing necessary to steer the country on the trajectory of low-carbon policies while considering national priorities such as socio-economic development. Considering this, the goal of this study is to examine carbon pricing design options that fits into Nigeria's context considering the current and future circumstances of the country to enable the government to make informed decision; should they decide to adopt a carbon pricing instrument as a means of GHG emission reduction and enhancing the overall goal of achieving the country's NDC.

The thrust of this study includes the identification and an analysis of high GHG emitting sectors with strong mitigation potential expected to be responsive to the application of carbon pricing in Nigeria. The updated 2021 NDC reveals that in 2018, the energy sector is the highest emitting sector in Nigeria (60%); followed by Agricultural sector, Forestry and Other Land Use (AFOLU) which contributed approximately 25% while waste and Industrial Processes and other Product Use (IPPU) sectors contributed about 9% and 5% respectively. In the energy Sector, fugitive emissions from oil and gas were the largest contributor to the sector's emissions (contributing about 36%), the transport sector had 21%, electricity generation (grid and off-grid) 24%, while energy consumption in residences and industries accounted for 19%.

It is also noteworthy that this report presents key elements in the national context that could support the introduction of carbon pricing instruments in Nigeria with an overview of Nigeria's socio-economic

context, regulatory framework relevant to carbon pricing, stakeholders' analysis, and an overview of responsibilities on climate and energy matters.

Carbon tax and the Emission Trading Scheme (ETS) are the two main approaches that were extensively evaluated. Following a holistic analysis and stakeholders' engagement, given Nigeria's context and circumstances, ***carbon tax*** *appears to be the most promising approach over the short term, there is great potential for an ETS over the long term. The ETS at the long run will allow managing GHG emissions particularly from some sectors such as the power as well as oil and gas where concrete targets have been set.*

Application of economy-wide tax to all businesses and individuals that consume fossil fuel for energy generation and adjustment of existing flare penalties to carbon tax are instruments that can be recommended for Government's consideration in the short term.

These recommendations considered existing structures and frameworks in the country especially within the oil and gas sector which could make the adoption of the instrument relatively easy to implement from a technical perspective, especially if it is based on tax collection systems that already exist in Nigeria. The current funding challenges in the country could be a driver for high level of support and acceptance for an economy-wide carbon pricing by the relevant government institutions.

The study provides the options for adopting an ETS. However, this can only be achievable after functional MRV framework (MRV systems and a functional Registry) have been put in place in the country. However, it is interesting to note that Nigeria has already created a national climate registry and has also taken early steps towards the development of MRV framework in the NDC priority sectors.

To allow a smooth process and transitioning, carbon pricing instruments that will be introduced should be adopted based on a short-to-long term ambition as this would allow a gradual introduction of the instrument and allow for monitoring of the acceptability of the instrument. The focus on the short term should be on the oil and gas sector, while power, transport, and the waste sectors could be considered in mid-long term.

1.0 Introduction

The term 'carbon pricing' refers to an instrument aimed at reducing carbon emissions, by capturing the external costs of Greenhouse Gas (GHG) emissions and passing them back to the emitters. The external cost of carbon in this context is a fee for emitting and/or an incentive for emitting less carbon. The approach of carbon pricing is mitigative and can be geared towards protecting the environment, addressing climate change from its sources, promoting technological innovation, generating revenue, and enhancing international agreement. Carbon pricing effectively shifts the responsibility (cost of pollution) from the public to the emitter of the pollutant, thus enhancing a sustainable pathway for consumption and investment and promoting a unified green growth. Carbon pricing encourages the producers to reduce or stop emitting to avoid payment or to continue polluting and pay heavily for the damages.

The concept of carbon pricing follows the "polluters pay" principle, whereby heavy emitters are obliged to pay for polluting the environment. The initiative through its instruments puts an explicit price on GHG emissions, expressed as a value per ton of carbon dioxide equivalent (tCO_2e).

Carbon pricing instruments are relevant in potential emission reduction and revenue generation for a nation through cost savings. Particularly, it has the potential of yielding both private and public finance. According to the World Bank carbon pricing dashboard, businesses use internal carbon pricing to evaluate the impacts of mandatory carbon prices on their operations, and as a tool to identify potential climate risks and revenue opportunities. Also, long-term investors use carbon pricing to analyze the potential impacts of climate change policies on their investment portfolios, allowing them to reassess their investment strategies and reallocate capital towards low carbon technologies.

In recent years, a growing number of countries have adopted carbon pricing instruments as an approach for achieving a low carbon development and the implementation of their current and future Nationally Determined Contributions (NDCs). To further provide a stronger foundation for designing an efficient carbon pricing Initiative, the world bank developed the FASTER principles.[1] The acronym represents; fairness, alignment with policies and objectives, stability and predictability, transparency, efficiency and cost-effectiveness, reliability, and environmental integrity. These principles are valid, based on economic principles and experiences from around the world. Also, the United Nations Framework Convention on Climate Change's (UNFCCC) Collaborative Instruments for Ambitious Climate Action (Ci-ACA) project was launched during the Conference Of Parties (COP 22) in Marrakesh in 2016 to assist parties in the development of carbon pricing instruments for implementing their Nationally Determined Contributions (NDC) under the Paris Agreement and foster corporative climate actions. The Ci-ACA project is implemented globally by the UNFCCC through its six Regional Collaboration Centers.

In Nigeria, Ci-ACA has been responsive through the capacity-building workshop held in 2021 in Abuja. The workshop was organized by the Department of Climate Change, Federal Ministry of Environment with the

[1]https://openknowledge.worldbank.org/bitstream/handle/10986/22641/The0FASTER0pri0n0initial0experience.pdf?sequence=1&isAllowed=y

support of the UNFCCC. The goal of the workshop was to raise awareness and build capacities on carbon pricing instruments that can be explored to curb GHG emissions in Nigeria to enable the country to meet its NDC commitments. Sequel to the workshop, the Federal Ministry of Environment had requested support from Ci-ACA to assess the possibility of setting up carbon pricing instruments for the country.

The major priorities of carbon pricing include reducing GHG emissions, lowering climate risks, and putting the global economy on a low-carbon pathway which aligns with the goals of the Paris Agreement. Article 6 of the Paris Agreement implores that parties can engage in voluntary cooperation toward their NDC implementation. This implies that the provision of Article 6 can allow countries to voluntarily cooperate with each other to achieve their emission reduction set out in their respective NDCs.

Paragraph 2 of Article 6 indicates that the Paris Agreement makes provision to facilitate cross-border transfers of mitigation outcomes. These provisions facilitate the transfer of carbon units across international borders thus enabling countries to enter bilateral and plurilateral forms of co-operation.

According to the Nigeria's updated NDC submitted in 2021 and based on the new mitigation analysis, "Nigeria restates its commitment to its unconditional target to reduce GHG emissions by 20% below business-as-usual by 2030 and increases its conditional target to 47% below business-as-usual by 2030 on condition of receiving appropriate support''. This commitment sets out Nigeria's obligation to support the implementation of the Paris Agreement. Another important part of this obligation is to "make finance flows consistent with a pathway towards low GHG emissions and climate-resilient development" (NDC, 2021[2]). In achieving these commitments, the NDC explored the key economic sectors which included the Energy Sector, Transport, Industrial Processes and Product Use, AFOLU. In view of achieving and implementing Nigeria's current and future NDC under the Paris Agreement, it is timely to consider the different approaches for carbon pricing necessary to steer the country on the trajectory of a low-carbon policies while considering national priorities such as socio-economic development.

Considering the above, this study is targeted at exploring and assessing carbon pricing initiatives most suitable for Nigeria. This assessment is contextual and gives cognizance to the local actors and policies, as it relates to carbon pricing. However, it must be emphasized that this study does not offer carbon pricing as the only tool for reducing carbon emissions but explores different approaches for carbon pricing initiatives.

2 NDC_Amended-_2021.pdf

1.1 Objectives

The objective of this study is to support the government of Nigeria through a stepwise approach, in identifying appropriate carbon pricing instruments to address GHG emissions, foster sustainable development, support the implementation of the NDC commitments that can steer the country towards a low GHG emission trajectory by focusing on mapping the domestic context. This report should guide policy makers to determine carbon pricing approach(es) that is most adequate for Nigeria and how it should be successfully adapted.

This study is fact-finding, it mapped out key elements that influences establishing of a domestic carbon pricing instrument in Nigeria and the type of instrument that is most suitable for the country.

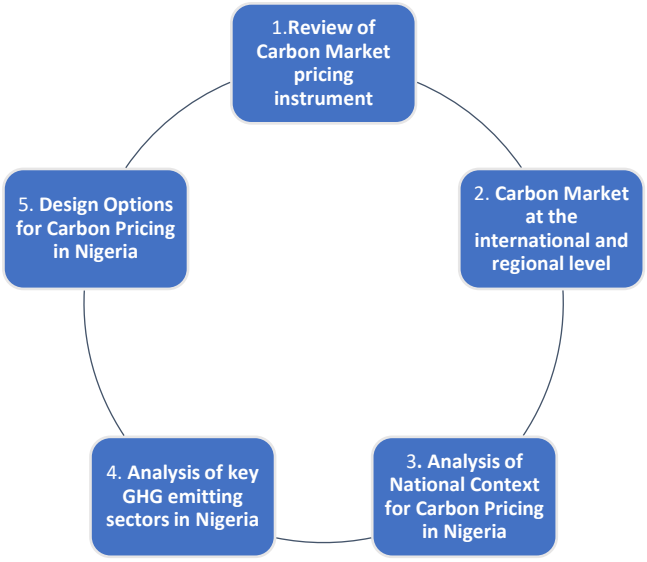
The principal objectives of the study include:

- Provide an overview of existing policies and fiscal/economic instruments in place or planned with relevance to carbon pricing.
- Identify key elements of the social, economic, regulatory, legal, and institutional aspects which may influence the feasibility and choice of carbon pricing instruments and their specific design.
- Assess the overall readiness for carbon pricing in Nigeria considering technical, legal, and institutional requirements.
- Assess how carbon pricing instruments may link to the country's NDC, domestic climate policy framework and potential cooperative action.

1.2 Scope of the study

The scope of this study is made up of five principal activities requiring in-depth review and analysis of policy documents, stakeholders' engagement, and validation workshops within the context of Nigeria as a country. These activities are shown in Figure 1 below.

Figure 1: Scope of Study for Carbon Pricing Initiative Assessment in Nigeria



1.3 Structure of the report

In line with the scope, the report is structured into seven main chapters covering the vital aspects that assess carbon pricing initiatives in Nigeria. While the first chapter is on the introduction and the general overview of the study, details of the other chapters are presented below.

Chapter 2: This chapter gives an overview of the rationale of the research work and its relevance.

Chapter 3: This reviews the Carbon Market pricing instrument. It gives an overview of the approaches to carbon pricing and the key features of Carbon Pricing Mechanisms.

Chapter 4: This chapter focuses on Carbon Pricing at the International and Regional Levels as guidance for the domestic context. It covers the following: an overview of the social and economic factors that are likely to affect or be affected by the consideration of carbon pricing instruments; an overview of development priorities of Carbon Pricing in Nigeria; an overview of related environmental goals and a quick analysis on criteria which carbon pricing policies would need to achieve. The international context focuses on reviewing Nigeria's participation in various relevant partnerships and initiatives, assessing Nigeria's current (and potentially future) NDC and potential long-term low emission development strategies and a review on Nigeria's interest to consider cooperative climate action under Article 6 of the Paris Agreement.

Chapter 5: This chapter, entails the identification and analysis of high GHG emitting sectors in Nigeria having strong mitigation potential and amenable to the application of carbon pricing. The chapter focuses

majorly on the energy sector which comprises of power, oil and gas, industry, and transportation as sub-sectors.

Chapter 6: Presents key elements in the national context that could support the introduction of carbon pricing instruments in Nigeria. The section starts with an overview of Nigeria's socio-economic context, regulatory framework relevant to Carbon Pricing, Stakeholders Analysis, and an overview of responsibilities on climate and energy matters.

Chapter 7: This chapter provides the consultant's opinion on the possible design options for carbon pricing in Nigeria.

Chapter 8: Following a detailed analysis carried out in this study, this chapter presents the recommendations and conclusions.

2.0 Rationale for the Work

Poor environmental practices and culture in Nigeria like most other developing countries have led to carbon pollution and ultimately contributed to the changing climate. This has led to myriads of impacts such as global warming, torrential rainfall, rise in sea level, drought, flooding, and diseases to mention a few. These human-induced activities and their impacts have largely affected the immediate environment, including economic and social development within countries globally where the developing countries stand to bear most of the brunt.

For current and future generations, climate change is predicted to have substantial environmental and economic implications. While it can be agreed that carbon emissions are cheap, and the market has failed to represent the costs and hazards of emissions-intensive economic activities, economists agreed that putting a price on carbon to internalize the social costs of emissions is the most cost-effective strategy to meet global mitigation goals and avoid catastrophic climate change.

Carbon pricing will raise the cost of carbon-intensive production and consumption, as such incentivizing economic players to pursue lower-carbon options, such as switching from the use of intensive fossil fuels for power generation to renewables. Carbon pricing systems, such as the European Emissions Trading System and carbon taxes in Scandinavian countries like Sweden[3], are substantial drivers of emission reductions. In developing countries, carbon pricing has not only been a mitigation instrument but has helped to spur technological innovation, generate revenue and protect the environment. This study is expected to provide a map of the domestic context within Nigeria to enable future efforts in determining which carbon pricing approach(es) could be the most suitable for the country.

The rationale of this study is therefore to examine carbon pricing design options that fit the Nigerian context considering the current and future circumstances of the country. This is to enable the government to make informed decisions should they decide to adopt a carbon pricing instrument as a means of GHG emission reduction and enhancing the overall goal of achieving the country's NDC targets.

[3] https://taxfoundation.org/sweden-carbon-tax-revenue-greenhouse-gas-emissions/

3.0 Carbon Market and Pricing Instruments

Carbon pricing as an economic instrument captures the external costs of GHG emissions while tying them to their sources through a price, usually in the form of a price on the CO_2 emitted[4]. In other words, carbon pricing is a method of reducing greenhouse gas emissions by imposing a tax on emissions and/or providing a financial incentive to emit less. When countries impose a quota on greenhouse gas emissions, they establish a valuable commodity: *the right to emit*. Countries or enterprises that reduce emissions below their cap have something to sell: *an unused right to release CO_2 equivalent in tonnes*. Countries and businesses that fall short of their targets can purchase these one-tonne units to make up the difference.[5] Carbon pricing helps to allow all stakeholders in society to adopt behaviour, operations, consumption, investment, and planning toward low-carbon solutions.

In June 2021, the International Monetary Fund (IMF) released their proposal for an International Carbon Price Floor (ICPF). A minimum price on CO_2 emissions (to be expanded to other GHGs in the future) is initially recommended by the framework among a select group of large polluting countries. Carbon taxes, emissions trading, hybrids[6] or other similar methods could be used to implement the price floor. The IMF has recommended a progressive schedule of price floors with a high-income country floor of $75/metric tonnes of carbon dioxide equivalent ($mtCO_2e$), a middle-income country floor of $50/$mtCO_2e$, and a low-income country floor of $25/$mtCO_2e$ (in 2018 dollars).

Direct and Indirect Impact of Carbon Pricing

Direct Impact: In the process of internalizing the cost of carbon emissions, carbon pricing has a direct effect on stakeholders (Large scale emitters, Investors, Government and Consumers). Some of the direct impacts include:

- Reducing GHG emissions in operations to save money as a direct incentive.
- Direct incentive to switch to less GHG-intensive inputs and more efficiently utilize inputs (e.g., energy/raw materials) to be more competitive.
- Direct financial incentives to invest in more environmentally friendly solutions, which will provide a competitive advantage.
- Avoid being locked in a GHG-intensive development model which could lead to stranded assets.
- Climate costs related to GHG emissions could be factored into planning and public investment decisions.
- More climate-friendly consumption and behaviour save money (e.g., by changing to less GHG intensive goods and services and/or lowering consumption of GHG intensive goods and services), thus, providing an incentive for people to minimize their carbon footprint.

[4] https://carbonpricingdashboard.worldbank.org/what-carbon-pricing
[5] https://unfccc.int/topics/what-are-market-and-non-market-mechanisms
[6] Combination of carbon tax and emission trading scheme

Indirect Impact: Aside from the direct impact of discouraging all types of actions, decisions, and behavior that contribute to GHG emissions, carbon pricing can also have an indirect impact if revenues are raised and reinvested in initiatives and programs that reduce emissions, fund low-carbon development, and/or encourage people to live more sustainably contributing to the adaption to climate change. As an example, a portion of the revenue from carbon pricing can be placed in climate-protection investment funds for funding climate-related projects and initiatives. In addition, revenues from carbon pricing could also be used for funding various development priorities.

Justification for Carbon Pricing in Nigeria

Carbon pricing is widely agreed not just the most effective strategy to cut emissions, but also the most cost-efficient way to do so[7]. Without emphasizing the importance of carbon pricing as a vital instrument for climate change mitigation, several parameters have been identified to justify the need for carbon pricing in Nigeria. Highlighted below are relevant parameters that call for the adoption of carbon pricing initiatives in Nigeria.

Stimulating Sustainable Development: In Nigeria, the advent of carbon pricing tends to simulate sustainable development; environmentally; It would efficiently drive GHG emissions, economically it would help generate revenue and economic benefits, and it would spur technological innovations.

Implementation and achievement of the current and future NDC: For the government, carbon pricing would be perceived as one of the instruments of the climate policy package relevant for the implementation and achievement of the current and future NDC; which primarily focuses on emission reduction.

Provisions to facilitate cross-border transfers: Carbon pricing aligns the national and international policies, particularly, the focus of the Paris Agreement, article 6, which encourages countries to cooperate on the transfer of emissions across the border to meet their mitigation commitments, and increase their ambition over time, Carbon pricing stands to be a mitigation instrument, which can be implemented at the regional, national, and subnational levels.

Sectoral MRV Development: Considering the ongoing structural changes in the development sectors in Nigeria (MRV development), carbon pricing would be a reasonable next step toward sustainable development. The MRV program recently adopted would provide the backbone for a successful carbon pricing system in Nigeria and ensures that the process of collecting, and organizing emissions data is complete, consistent, comparable, accurate and transparent as such enhancing public trust, transparency, and accountability.

[7] Studies have indicated that carbon pricing is the most cost-effective device for reducing emissions on both a theoretical and practical level, especially when compared to other alternatives.

3.1 Types of Carbon Pricing Instruments

Apparently, there are two main types of carbon pricing instruments: *carbon taxes* and the *emission trading scheme* (ETS).

3.1.1 Carbon Tax

Overview: A carbon tax can be described as a fee imposed by the government on any company that burns fossil fuels which are carbon-rich (coal, oil, gasoline, and natural gas). A carbon tax puts a price on CO_2 emissions by determining a tax rate on these emissions, which is usually dependent on the carbon content of the fossil fuels covered. In implementing a carbon tax, the objectives are primarily intended to raise money and reduce GHG emissions. To raise money, the tax should have a broad tax base and limit the potential for rebate and compensation measures that would diminish the tax's income, while to achieve reduced GHG emissions, the price signal should be maximized and applied to sectors with the greatest mitigation potential. Below are some parameters peculiar to the carbon tax system.

Scope: The scope of the carbon tax refers to the sources and types of GHG emissions that are taxed. A large coverage is often preferred since it provides an incentive for as many sources of emissions as feasible to cut emissions. Regulators can choose which GHGs to cover based on their relevance and mitigation potential. Also, based on emissions and ease to monitor and regulate emissions, the regulator can also choose which sector to cover. It should be mentioned that forestry, agriculture, cattle farming, and rural household energy are usually difficult to monitor and regulate.

Setting a Price: The tax rate could be represented in dollars per unit of CO_2 emitted (e.g., on a USD per tCO_2e basis). This gives certainty in terms of the marginal cost incurred by emitters per tCO_2e. It sends a price signal across the whole economy, creating incentives for emitters to transition to less GHG-intensive means of production, and eventually resulting in lower emissions.[8]

- **Point of Regulation:** A carbon tax can either be regulated upstream (at the point of supply of carbon-based fuels) or downstream (where the carbon is released into the atmosphere (point of purchase/consumption)).
- **A downstream carbon tax**: this can be viewed as a steppingstone toward the implementation of an ETS since it generally applies to large-scale emitters. Downstream regulation captures emissions at the source and is simple to implement for power plants and manufacturing plants.
- **An upstream carbon tax:** allows for broad coverage of dispersed downstream emission sources, like a fossil fuel tax.

Reporting and Verification: Carbon pricing is built on a solid foundation of Monitoring, Reporting and Verification (MRV) processes. While this necessitates the development or improvement of the MRV

[8] https://www.worldbank.org/content/dam/Worldbank/document/Climate/background-note_carbon-tax.pdf

system, it also implies that once in place, jurisdictions will have a reliable tool for quantifying and managing their emissions. As a result, the resulting MRV infrastructure allows for considerable synergies with national GHG emissions accounting.

Revenue Distribution: A carbon tax has the potential to generate substantial revenue. A government may channel carbon tax funds to other efforts to decrease emissions even more. For instance, subsidies for wind or solar installations, as well as energy-saving initiatives, could be provided by the government. Such subsidy would further widen the competitive advantage of clean energy. Alternatively, the government might channel monies to more politically attractive programs, increasing support for the carbon price, for example through targeted spending for social and economic development.

Acceptability: Carbon tax may meet strong criticism from taxpayers (households and enterprises), political parties, and even government agencies. As a result, the implementation of a carbon price may necessitate efforts in promoting knowledge and communication and then identifying the concerns of impacted actors through consultations, and addressing issues highlighted.

Table 1: Advantages and Disadvantages of Carbon Tax

Advantages of the Carbon Tax	Disadvantages of the Carbon Tax
Increased tax revenue	Corporations may choose to shift their manufacturing facilities or plants to a different country with less stringent climate actions.
Increased incentive for people to avoid using fossil fuels	Effectiveness is determined by the tax's design.
Businesses have a financial incentive to go green.	The cost of many products may rise.
The demand for a speedier energy transition is growing.	Some businesses may cease to exist.
People's consuming habits will change.	Businesses may oppose the carbon price.
Carbon dioxide emissions can be priced differently.	The general public's lack of acceptance due to perceptions of the effectiveness of such policies and lack of information
Measures that are effective in reducing global warming	Implementation might take a long time
Encourages renewable energy Research &Development investment	The cost of monitoring and management could be substantial.
People and businesses that generate more CO_2 are charged higher fees.	It won't be ideal for everyday items such as daily consumables and domestic items.
The international level of fairness and transparency would be raised.	Companies may conceal their genuine CO_2-emissions levels.

3.1.2 Emission Trading Scheme (ETS)[9]

The ETS is becoming a common choice globally. It has been adopted by several international jurisdictions.

Overview: An Emission Trading System (ETS) is a tradable-permit system for GHG, sometimes also known as "cap-and-trade." It establishes a limit (the cap) on the quantity of GHG that can be emitted, as determined by the regulator. For each tonne of GHG emitted, entities covered by the ETS must have one emissions permit (known as "allowance"). Entities, on the other hand, have the option of selling and buying emission units.

Scope: The scope of an ETS also refers to the sources and types of GHG emissions that are covered. These are large-scale emitting installations such as power plants and major industrial sites. There are trade-offs in terms of which gases to regulate, which sectors to regulate, whether to leave small emitters unregulated, and whether to regulate downstream or upstream. These decisions can be as political as they are also economic.

Cap Setting: ETS programs use a stepwise cap, in which an initial compliance period is enforced with an initial cap, and the cap is gradually reduced over time to create stringency while also giving regulated organizations time to alter their behavior to comply. Related to the cap is the process of allowance allocation. Government can choose to distribute allowance to entities at no cost, or allowances may be sold for a price through a government-regulated auction mechanism or hybrid which involves a share of the allowance given away for free with others being auctioned.

Point of Regulation: An ETS can also be regulated upstream (at the point of supply of carbon-based fuels) or downstream (where the carbon is released into the atmosphere). The point of regulation for an ETS is generally, "downstream," i.e., where emissions occur in quantities big enough to justify the expenses of adopting and operating an ETS (e.g., power plants, large-scale industrial facilities, etc.).

Reporting and Verification: To quantify the volume of GHG emissions a liable entity can emit, MRV of emissions[10] must be put in place. Administrative expenses must also be kept to a minimum as an ETS will incur higher administrative costs because the regulator must not only monitor emissions but also construct an allowance registry (national climate registry in the case of a national ETS) and manage trading and related allowance changes.

Revenue Distribution: Revenues could be used for a wide range of programs including climate infrastructure investment, research and development, and climate mitigation among others. Revenues from an ETS are less predictable compared to carbon tax regime due to fluctuations in the price of emission allowances.

[9] https://www.climaterealityproject.org/sites/climaterealityproject.org/files/HandbookonCarbonFinancing_Final_May16.pdf
[10] MRV of GHG emissions refers to estimating, reporting, and verifying actual emissions over a defined period. MRV of GHG emissions can be undertaken either at national level (top-down), organization level and/or at facility level (bottom-up).

Acceptability: The political acceptability of an ETS is often higher than that of a carbon tax because participants which are generally large-scale emitters have a greater degree of awareness and a solid knowledge of economic instruments for environmental reasons. Large-scale emitters covered are most of the time well-informed to comply with several environmental requirements. Moreover, the small number of entities covered reduces the complexity of outreach and consultations. As a carbon pricing mechanism, the ETS has no direct effect on end-users. However, it may have an indirect influence on them, such as if the cost of emissions is reflected in higher electricity costs. As a means of assuring acceptability, this may necessitate alleviation measures.[11]

[11] Study on the Introduction of Carbon Pricing Instruments in Pakistan

4.0 Carbon Pricing at the International and Regional Level

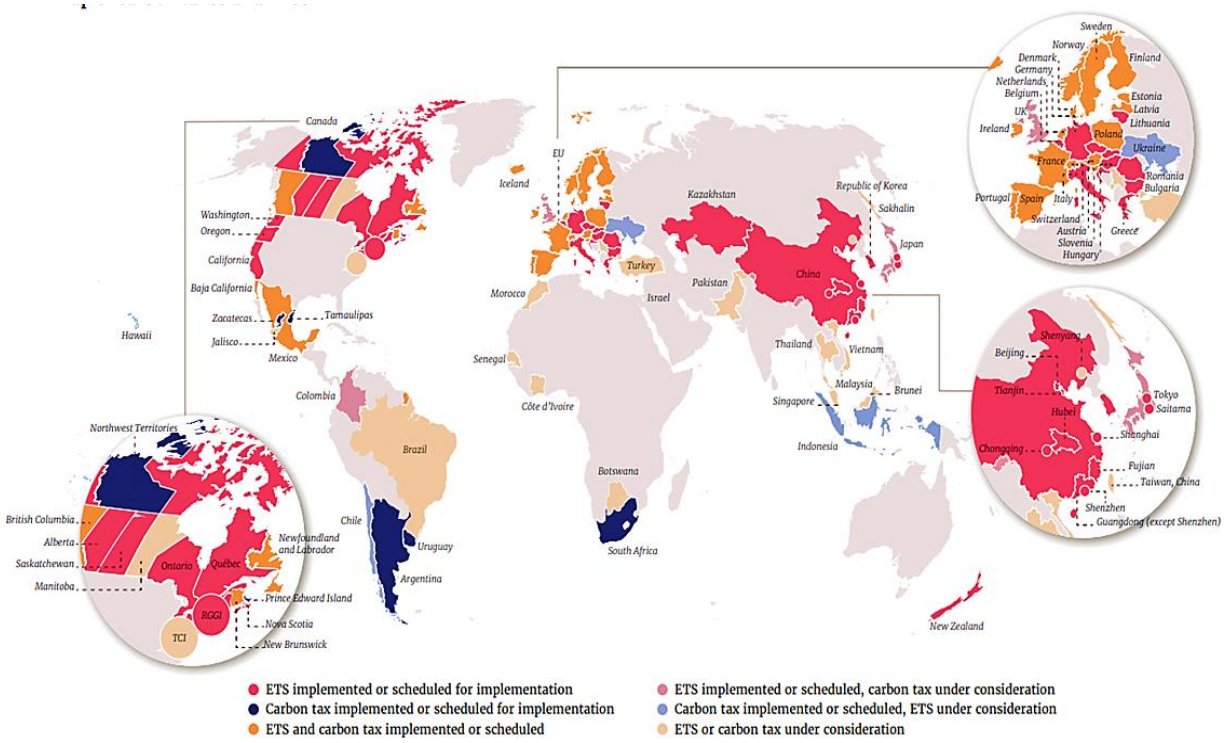
Over the years, carbon pricing is increasingly being adopted as a tool for combating climate change and economic development in some countries around the world, including in developing countries. Carbon pricing has been described as a cost-effective policy tool that governments and companies can use as part of their broader climate strategy. Positive benefits such as financial incentives to mitigate emissions, enhancing low carbon growth by encouraging changes in production and consumption patterns and even the ability to improve productivity and innovation have been documented in developed countries with no record of detrimental economic development[12]. The section also highlights Nigeria's international partnerships, initiatives and climate policy negotiations aimed at reducing its GHG emission levels across its sectors.

4.1 Global Overview

Carbon Pricing (Carbon tax) was first introduced by Finland in 1990 which was followed by Norway and Sweden in 1991 and Denmark in 1992. Over the last decades, other countries such as South Africa, Columbia, Argentina, Mexico etc., have also implemented carbon pricing, using different instruments. As of April 2022, there are 68 Carbon Pricing Instruments (CPIs) operating with three more scheduled for implementation. These instruments include 37 carbon taxes and 34 ETSs[13,14] covering approximately 23% of total global GHG emissions. In addition to implemented and scheduled carbon pricing policies, numerous countries especially developing countries are elaborating plans for introducing carbon pricing instruments (Senegal, Côte d'Ivoire, Vietnam, Pakistan, etc.). These included both carbon taxes and emissions trading schemes (ETS). However, of all the world's developed economies, only the U.S. and Australia do not have some form of nationwide carbon pricing in place. Albeit, in the U. S[15], states like California and the eleven Northeastern states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginias) have adopted carbon pricing instruments. These states make up the Regional Greenhouse Gas Initiative (RGGI) which is the first mandatory cap-and-trade program in the United States to limit carbon dioxide emissions from the power sector.

[12] J. Ellis, D. Nachtigall, and F. Venmans. (2019). Carbon Pricing and Competitiveness: Are They at Odds? OECD Environment Working Papers, No. 152, OECD Publishing, Paris, https://doi.org/10.1787/f79a75ab-en
[13] 'State and Trends of Carbon Pricing 2022' by World Bank https://openknowledge.worldbank.org/handle/10986/37455
[14] Chao-Fong, L. "Russian parliament approves law to curb greenhouse gas emissions." The Independent (02 Jun 2021)
[15] https://www.c2es.org/document/us-state-carbon-pricing-policies/

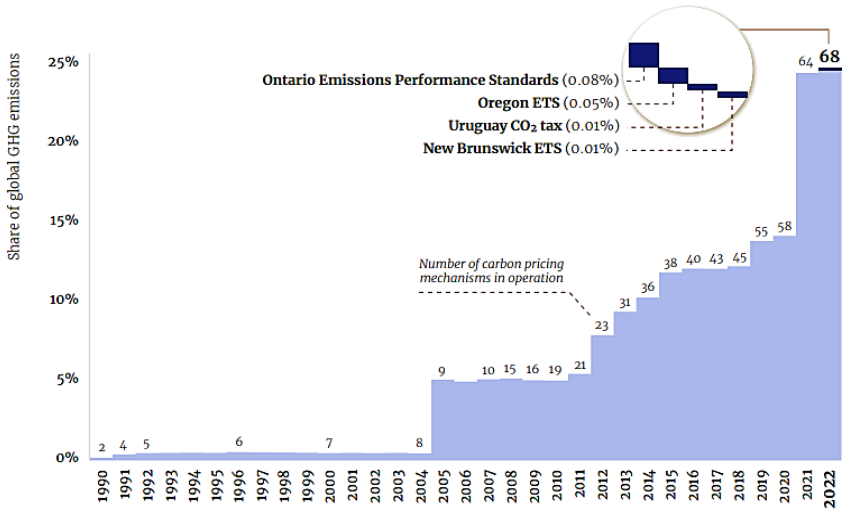
Figure 2: Map of carbon taxes and ETSs



Source: Adapted from state and trends of Carbon Pricing 2022[16]

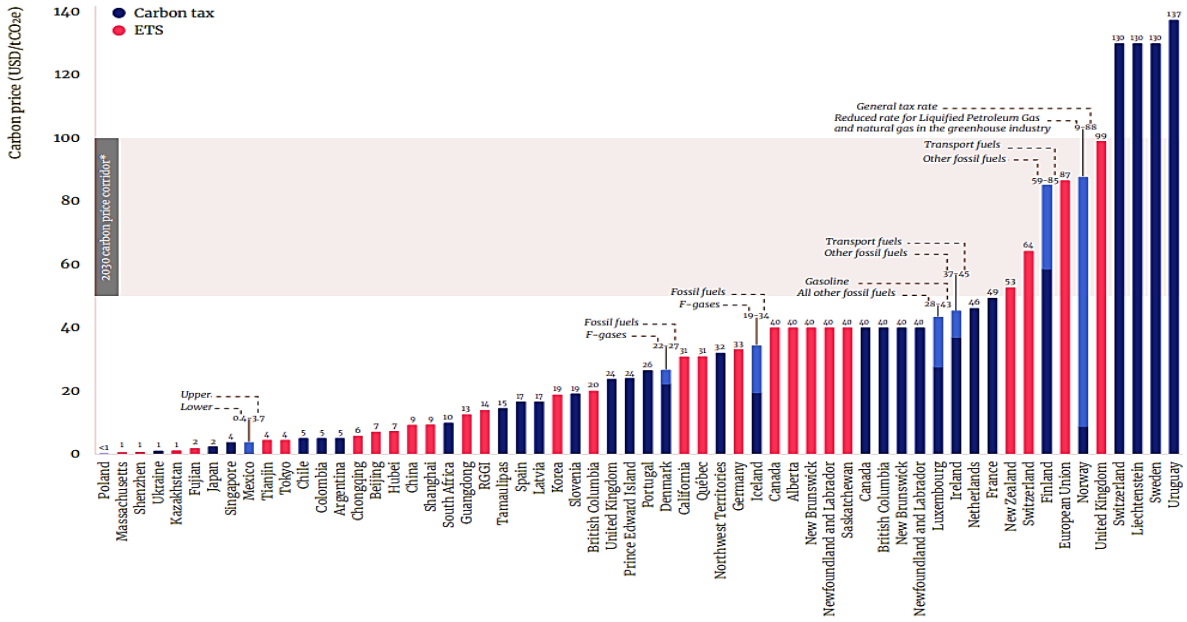
[16] Note: Carbon pricing initiatives are considered "scheduled for implementation" once they have been formally adopted through legislation and have an official, planned start date. Carbon pricing initiatives are considered "under consideration" if the government has announced its intention to work towards the implementation of a carbon pricing initiative and this has been formally confirmed by official government sources. TCI refers to Transportation and Climate Initiative. RGGI refers to the Regional Greenhouse Gas Initiative.

Figure 3: Share of global GHG emissions covered by carbon pricing instruments



Source: Adapted from state and trends of Carbon Pricing 2022

Figure 4: Carbon prices as of April 1, 2022



Source: Adapted from state and trends of Carbon Pricing 2022

Figure 4 above shows carbon prices as of April 2022. It is of interest to note that the prices are not necessarily comparable between carbon pricing initiatives because of differences in the sectors covered and allocation methods applied specific exemptions and different compensation methods.

4.1.1 Kazakhstan[17]

Kazakhstan relaunched its Emission Trading Scheme (ETS) on January 1, 2018, after it suspended it on April 8, 2016. The suspension was due to the impact of a drop in global oil prices on Kazakhstan's economy and accompanying industry protests. During the suspension period, Kazakhstan in response to the economic downturn made several amendments to the ETS demonstrating a redesign of the original ETS by introducing more flexibility measures. Changes include allowing installations to choose between two approaches for receiving free allowances; about a third of the covered installations chose free allocation based on historical emissions and two-thirds chose product-based benchmarks with the possibility of updating their free allocation with capacity changes. In addition, the cap is set to reduce by 5 percent sometime in 2020 compared to 1990. These developments in Kazakhstan underline the importance of including flexibility mechanisms in the design of a carbon pricing initiative in case of unexpected circumstances.

4.1.2 Mexico[18]

On October 19, 2018, the Mexican government released the draft regulation for establishing a pilot Emission Trading Scheme (ETS) for public consultation. In December 2018, a new administration took office and decided to review the draft to strengthen capacities in the government and start a series of consultations among civil society and the government. In January 2020, the Mexican Pilot ETS went into operation; governed by an implementing rule that was approved in 2019 and was necessitated by Transitional Article 94 of the "General Law on Climate Change" (as revised in July 2018). The two-year Pilot ETS will be followed by a year of transition to the fully operational ETS starting in 2023. The pilot phase, which covers power and industry sectors is designed to improve the accuracy of emissions data and increase covered companies' capability for emissions trading, ultimately bettering the operational phase's design. This phase currently uses free allocation of allowances with certain specifications based on the country's emissions. For instance, based on the most recent verified emissions, entities earn free allowances and new participants receive free allowances based on their verified emissions in the year in which they first crossed the 100,000 tCO_2 thresholds. Also, initial allocation is made for participants whose emissions have not yet been validated based on their previous emissions. The ETS would be part of a suite of measures—including its existing carbon tax—to enable Mexico to reach its NDC targets.

[17]http://documents.worldbank.org/curated/en/191801559846379845/pdf/State-and-Trends-of-Carbon-Pricing-2019.pdf
[18]https://icapcarbonaction.com/en/ets/mexico

4.1.3 Canada[19]

The two main ways of putting a price on carbon currently used in Canada are carbon tax and the cap-and-trade system. As of 2019, carbon pricing applies throughout Canada. The GHG Pollution Pricing Act, adopted on June 21, 2018, established a federal carbon pricing initiative—also known as the federal backstop system. This follows the Pan-Canadian Approach to Pricing Carbon Pollution announced by the Prime Minister of Canada in October 2016. The approach gave provinces and territories the flexibility to develop their carbon pricing initiative and outlined the criteria that all initiatives must meet, thus establishing a federal benchmark for carbon pricing. The government is also committed to implementing a federal carbon pricing initiative in provinces and territories that requested it or did not have a carbon pricing initiative meeting the federal benchmark. The federal backstop system is made up of components like a carbon tax and a baseline and credit ETS component.

The tax-like component is a regulatory charge on fossil fuels with rates set at CAN$20/tCO2e (US$15/tCO2e) in 2019, rising by CAN$10/tCO2e (US$8/tCO2e) per year to CAN$50/tCO2e (US$38/tCO2e) in 2022. It covers a broad range of fossil fuels—including various liquid, solid, and gaseous fuels—and combustible waste. The federal fuel charge does not generally apply to fuels used at industrial facilities whose emissions are covered by the Output-Based Pricing System (OBPS).

The ETS component is called the OBPS, which sets an emissions-intensity standard for each sector under the system. The OBPS applies to power generation and emissions-intensive and trade-exposed industrial facilities emitting more than 50 kilotonnes of carbon dioxide equivalent (ktCO2e) per year or any eligible facility that voluntarily chooses to participate.

Facilities with emissions above their standard must either pay a carbon price in line with the federal fuel charge, submit surplus credits purchased from facilities that performed better than their limit or submit eligible offset credits.

4.1.4 Argentina

Argentina's carbon tax was enacted in 2017 as part of a broader tax overhaul and went into effect in 2019. The tax replaced the ad-valorem tax system. The carbon tax applies to CO_2 emissions from all sectors and includes practically all liquid fuels and coal, accounting for 20% of total Argentine GHG emissions. The carbon tax in Argentina covers all major fossil fuels used as motor fuels or for heating purposes with the exemption of natural gas and Liquefied petroleum gas (LPG) used for heating purposes. The carbon tax exempts the use of fossil fuels in specific sectors and for purposes, such as international aviation and shipping, export of the fuels covered, the share of biofuels in mineral oils, and raw materials in petrochemical operations.

[19]https://ecofiscal.ca/carbon-pricing/?gclid=EAIaIQobChMI6JXP8raj5QIVjbHtCh0UAw3yEAAYASAAEgJl4PD_BwE

4.1.5 Columbia

The Colombian carbon tax was also implemented in 2017 as part of structural tax reform. With a few minor exceptions, the tax applies to all GHG emissions from all sectors. It includes all liquid and gaseous fossil fuels used for combustion, which account for 24% of all GHG emissions in Colombia. Natural gas consumers who are not in the petrochemical and petroleum industries are eligible for tax exemptions as well as consumers of fossil fuels who have been certified to be carbon neutral.

4.2 Carbon Markets at the Regional Level

Despite the adoption of carbon markets in over 50 jurisdictions across the globe, Africa has been slow to adopt the concept. This can be attributed to several challenges that include the lack of political will, ineffective regulatory oversight, and the complexity of some carbon pricing instruments. However, it should be noted that the concept has been adopted in South Africa while other regions across the continent have demonstrated willingness to participate in climate change initiatives under the multi-lateral regime in their submitted NDCs. While none of the NDCs from the countries explicitly mentioned carbon pricing, there has been some progress in the consideration of the introduction of carbon pricing and other economic-related instruments.

4.2.1 South Africa

South Africa is one of the world's most carbon-intensive developing countries. Recognizing this, the South African government is committed to substantially reducing GHG emissions by 2025 through the introduction of a carbon tax. The carbon tax in South Africa went into effect in 2019 and covers GHG emissions from industry, power, buildings, and transportation, regardless of the fossil fuel used. Under the Carbon tax, business entities that engage in activities that produce direct GHG are required to report under the 2017 National Greenhouse Gas Emission Reporting Regulations of the Department of Environment, Forestry and Fisheries (DEFF). The approach of the carbon tax is aligned to this mandatory emissions reporting to DEFF and any natural or juristic persons who exceed the DEFF thresholds for reporting, which also functions as the carbon tax threshold, are subject to the carbon tax. Emissions resulting from fossil fuel combustion, industrial processes and fugitive emissions are taxed in the equivalent of CO_2 at a rate of R120/tCO2e for 2019 and R127/tCO2e for 2020[20]. The Carbon offset allowance system provides flexibility to firms to reduce their carbon tax liability by either 5 or 10 per cent of their total GHG emissions. This is achieved by investing in projects that reduce their emissions. This system allows the reduction of GHG emissions in sectors or activities that are not directly covered by the tax.

The Carbon tax was gradually introduced in two phases: the first phase starting from 1 June 2019 to 31 December 2022 and the second phase from 2023 to 2030. Carbon tax rate increases annually by inflation

[20] http://www.energy.gov.za/files/COAS/2020/Carbon-Offsetting-under-the-Carbon-Tax-Act.pdf

plus 2 per cent until 2022 and annually by inflation thereafter. However, tax exemptions ranging from 60% to 95% in numerous industries are also available to allow significant emitters time to transition their operations to cleaner technologies through investments in energy efficiency, renewables, and other low-carbon measures. Generally, the exemptions offered to industries strongly reduce the compliance cost, while preserving the incentive to cut emissions.

Impacts of the Carbon Tax

The Carbon tax introduced in South Africa has presented considerable impacts. The sectors that are most affected are those closely tied to fossil-fuel-based energy (transport, iron and steel, and coal-generated electricity). Their output will decline relative to a business-as-usual baseline however the tax will be good for jobs and production in the agriculture and food sectors due to the exemptions for the sector. The short-term exemption for the agriculture and food sectors will support food security and some of the most vulnerable workers in South Africa. However, this will be phased out in the long term.

The tax will also have an impact on job creation as it provides an opportunity to create more jobs as energy sources shift from fossil fuels to renewables (solar and wind). It would also help farmers and low-income households while also improving air and water quality.

Other economic impacts of the carbon tax include:

- The tax serves as an economic signal to shift resources away from carbon-intensive sectors to greener sectors of the economy. These sectors are generally more labour intensive thus having a positive impact on employment.
- The taxes cause a marginal reduction in inequality. It reduces the profits of carbon-intensive sectors and hence the rents which accrue to the top deciles of the income distribution.

Challenges

The Carbon tax introduced in South Africa is faced with some of the challenges below:

- The tax applies only to Scope 1 emissions and excludes emissions from the production of electricity purchased (Scope 2), or induced emissions (Scope 3) thereby presenting an uncertainty about the effectiveness of having only a Carbon tax as an instrument to reduce carbon emissions.
- The process of the carbon tax has raised calls to the government for more transparency on what the taxes collected are used for.
- The shortage of skilled labour in South Africa continues to restrict the ability of the economy to expand output and employment.

Apart from the Carbon tax that is in operation in South Africa, a couple of other economic instruments have been introduced within the continent to stimulate a low carbon economy. These instruments are

briefly discussed below.

4.2.2 Mauritius

In 2008, Mauritius introduced the Maurice Ile Durable (MID) concept which is aimed at making the country a world model for sustainable development and increasing the use of renewable energy in the country. The concept imposes a levy of 30 cents on fossil fuels (litre of petroleum products, kilo of Liquid Petroleum Gas (LPG) and kilo of coal) and recycles the revenues to finance environmental-friendly and renewable energy projects such as solar water heaters. MID puts a price on fossil fuels and the instrument is only close to an explicit carbon tax. However, the current tax design in the country provides platforms to develop and implement an explicit carbon tax mechanism. Also, the country's National Environment Policy has a range of policy tools that can support the further development of carbon pricing instruments in the country.

4.2.3 Uganda

Uganda has stated in its NDC that it intends to meet its commitments and/or increase the level of its contribution using international market mechanisms where applicable[21]. NDC mitigation actions could increase credits which could be traded in an Internationally Transferred Mitigation outcome (ITMO) system that will attract foreign investment in the country. The country is considering the implementation of a carbon tax as part of its mitigation policy.

4.2.4 Ethiopia

There are frameworks already under consideration in the country for the introduction of a carbon tax for the transport sector in Addis Ababa.[22]

4.2.5 Kenya

The country announced in 2016 that it would be launching an emissions trading platform which would be aimed at providing companies with a platform to sell their carbon credit to foreign buyers.

4.2.6 Rwanda

As the case with Ethiopia and Kenya, Rwanda is a member of the Vulnerable Twenty (V20) Group which is a cooperation of economies vulnerable to climate change. The group has committed its members to work

[21]https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uganda%20First/INDC%20Uganda%20final%20%2014%20October%20%202015.pdf
[22] https://unfccc.int/sites/default/files/resource/Summary%20of%20East%20Africa%20carbon%20pricing%20report.pdf

towards putting in place "carbon pricing mechanisms by 2025" and has also called on the G20 to ensure all emissions are subjected to carbon pricing".

4.2.7 Senegal

Senegal in 2019 published a report on the study of the implementation of carbon pricing instruments.[23] The study aimed at assessing the various options for the introduction of carbon pricing instruments in the country. While the study provided a detailed analysis of the country's national context, it recommended that a carbon tax is preferable to an emissions trading scheme, if a generally acceptable redistribution of revenues can be achieved. The country is currently engaged in efforts to assess in a quantified manner the impact of a carbon tax under various parameters of the application and regarding the use of revenues.

4.3 Nigeria's International Partnerships

Nigeria is actively engaged in several international partnerships, initiatives and climate policy negotiations aimed at reducing its GHG emission levels across its sectors. To show the country's commitment level towards GHG emission reductions, the country became a Party to the United Nations Framework Convention on Climate Change (UNFCCC) in 1994. It ratified the Kyoto Protocol in 2004 and the Paris Agreement in 2017.

Nigeria has since then committed to reducing its GHG emissions and has transparently reported its emission levels in its national documents. In 2003, its First National Communication was submitted to the UNFCCC which was followed by the Second National Communication in February 2014 and the recently submitted Third National Communication submitted in April of 2020. In 2021 in line with the framework of the Paris Agreement, the country submitted an updated National Determined Contributions (NDC) after the initial submission of its Intended Nationally Determined Contribution in 2015.

The Federal Republic of Nigeria continues to engage actively and meaningfully in regional and international climate change negotiations, specifically under the UNFCCC negotiations to secure an equitable, inclusive, and binding multilateral international agreement.

Its engagements with international bodies have initiated emission reduction projects in the country and had led to the development of several policies and Measures, especially in the Oil and gas Sector.

Nigeria signed up for the global methane pledge, vowing to reduce emissions of the potent greenhouse gas by 30 per cent by 2030 in line with the Global Methane Initiative (GMI). GMI is an international public-private partnership focused on reducing barriers to the recovery and use of methane as a valuable energy

[23] https://www.perspectives.cc/public/fileadmin/user_upload/CI-ACA_Senegal_carbon_pricing.pdf

source. Nigeria is also a member of the Global Methane Alliance which aims to support countries that commit to ambitious methane reduction targets in their oil and gas sector.

In September 2012, the Federal Executive Council approved the Nigeria Climate Change Policy Response and Strategy. The overarching objective of the policy is to promote low-carbon, high-growth economic development and build a climate-resilient society.

In 2019, Nigeria's Finance Minister with 20 others across the globe at the Spring Meetings of the World Bank Group and International Monetary Fund, launched the coalition aimed at driving stronger collective action on climate change and its impacts. The newly formed Coalition of Finance Ministers for Climate Action endorsed a set of six common principles, known as the "Helsinki Principles". The principles will promote national climate action, especially through fiscal policy and the use of public finance. The Coalition is aimed at helping countries mobilize and align the finance needed to implement their national climate action plans; establish best practices such as climate budgeting and strategies for green investment and procurement; climate risks and vulnerabilities into members' economic planning.

Nigeria is also a key member of the Economic Community of West African States (ECOWAS). The Federal Government in September 2021 adopted the ECOWAS action plan on gender mainstreaming to tackle energy poverty, disparity, and non-inclusion in Nigeria. While the action plan will allow Nigeria to meet regional requirements of removing the barrier of equal participation of men and women in energy access, it will also align Nigeria's 30:30:30 electricity vision to SDG goal numbers 5 – Gender Equality, 7 – Affordable Energy and 13 – Climate Change[24]."

Recently, the Department of Climate Change (DCC) of the Federal Ministry of Environment partnered with the Initiative for Climate Action Transparency (ICAT) on the development of robust Measurement, Reporting and Verification (MRV) systems in line with the Paris Agreement Enhanced Transparency Framework (ETF). The project covered two major sectors which included the energy sector and AFOLU. The energy sector was sub-divided into Oil and Gas, Road Transport and Other Transport. It was recommended that to achieve a robust MRV system across the NDC sectors, data (mitigation and adaptation) will be collected from all operators/players (referred to as Data Providers) in the relevant NDC sectors. The data providers comprise all stakeholders directly involved with generating data. Data sources could be from public or private companies, it could also be sub-nationals such as state and local governments. However, data gathering would be carried out by the Agencies or Ministries at the sectoral level (*known as Responsible Entities/Project Data Compilers*). All data would be sent to the National Bureau of Statistics (NBS) and the Department of Climate Change (DCC) which is the national focal point after quality assurance and quality control (QA/QC) have been carried out. For transparency, it was emphasized that data QC should be carried out internally while QA should be carried out by a third party.

[24] https://guardian.ng/news/nigeria-adopts-ecowas-policy-for-better-energy-access/

Another critical intervention in the O&G sector by the government is the pledge by the government to end the burning of gas as a by-product of oil production by 2030, under its latest climate plan submitted to the United Nation. Also, through the Nigeria Gas Flare Commercialization Programme (NGFCP) launched in 2016[25], the government had set strategies to implement policy objectives of the government for the elimination of gas flares with potentially enormous multiplier and development outcomes for the country. The objective of the NGFCP was to eliminate gas flaring through technically and commercially sustainable gas utilization projects developed by competent third-party investors who will be invited to participate in a competitive and transparent bidding process.

The Federal Government presented a policy position indicating that routine gas flaring from production sites is unacceptable. The government also indicated that flared gas should be harnessed to stimulate economic growth, drive investments, and provide jobs in oil-producing communities and indeed for Nigerians through the utilization of widely available innovative technologies.

Article 6 of the Paris Agreement and carbon pricing

Article 6 of the Paris Agreement recognizes the possibility for countries to voluntarily engage in "cooperative approaches" for implementing their Nationally Determined Contributions (NDCs), and even though no explicit reference is made to "carbon markets", the article mentions the use of "internationally transferred mitigation outcomes" to support Parties meeting their voluntarily proposed targets as part of their NDCs (Article 6.2). Another section of Article 6 refers to other cooperative approaches; mechanisms for mitigation and sustainable development (Article 6.4) and a non-market mechanism (Article 6.8).

Considering this, a growing number of Parties have adopted the use of carbon markets and carbon credits to fulfil their mitigation pledges in the context of the Paris Agreement. To date, about 88 nations have indicated their intention to enact carbon pricing as part of their national climate policy among the nations that have officially submitted their Nationally Determined Contributions to the Paris Agreement[26] and the implementation of such instruments is being considered at both the domestic and international levels.

[25] https://ngfcp.dpr.gov.ng/
[26] https://ourworldindata.org/carbon-pricing-popular

5.0 Analysis of Key GHG Emitting Sectors as Indicated in NDC

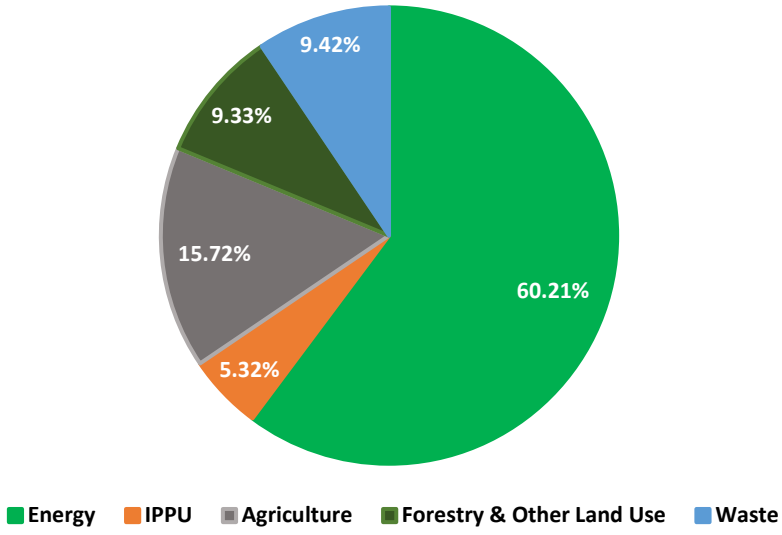
Four development sectors have been identified and prioritized in Nigeria's recently updated NDC report. These sectors include the Energy sector, Agricultural sector, Forestry and Other Land Use (AFOLU) sector, Waste sector, and Industrial Processes and Other Product Use (IPPU) sector. However, for the benefit of this study and considering sectors with potential for carbon pricing implementation, the various sub-sectors of the energy sector (Power, Oil and Gas, Industry, and transportation) will be analyzed. This is based on the premise that the energy sector is the major driver of all other sectors, and it forms the backbone of the economy, within Nigeria and globally.

In the updated NDC of 2021, with the base year of 2018, it was reported that the total emissions of GHG estimated between the years 2010 and 2018 range between 247 $MtCO_2e$ and 347 $MtCO_2e$ between 2010 and 2018 and the analysis of the NDC key emitting sectors revealed that the energy sector has the largest source of GHG emissions with 209 MtCO2e (approximately 60%) emitted in 2018, followed by AFOLU, which is the second largest contributor to total GHG emissions, contributing approximately 25% of national total GHG emissions in 2018, then the waste sector with about 9% of the national GHG, and Industrial Processes and Other Product Use (IPPU) having about 5% share of the national total GHG[27].

From the updated NDC, Figure 5 below shows the sectoral contribution to national total GHG emissions in Nigeria in 2018 (347 MtCO2e). It reveals that the energy sector contributed the highest amount; about 60.21% of the national total emission. The breakdown of AFOLU shows that Agriculture contributes 15.72%, Forestry and Other Land Use (9.33%) adding up to approximately 25% of national total GHG emissions in 2018, followed by the waste sector (9.42%), and Industrial Processes and Other Product Use (IPPU) (5.32%).

[27] Updated NDC 2021

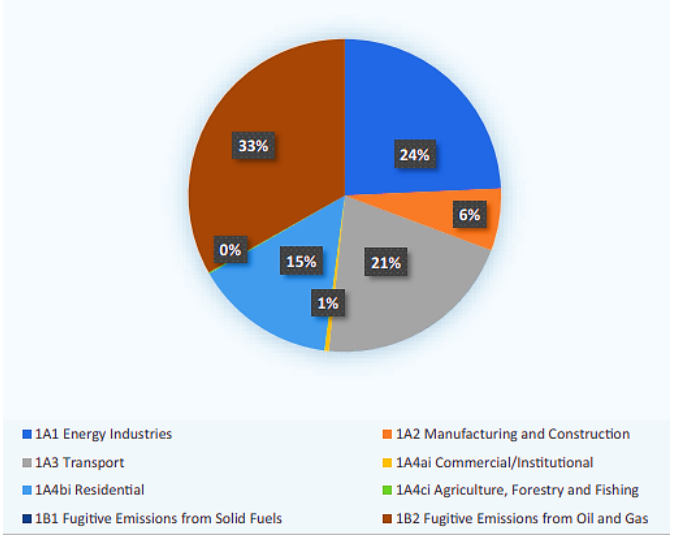
Figure 5: Sectoral Contribution to National Total GHG Emissions in Nigeria in 2018 (347 MtCO2e)



Source: Updated NDC, 2021/Revised CLN

Bearing in mind that the energy sector is the highest carbon-emitting sector, the updated NDC reveals that in 2018, emissions from the energy sector were 209 MtCO2e, where fugitive emissions from oil and gas were the largest contributor (36%) in the energy sector in 2018, followed by the transport sector, electricity generation (grid and off-grid), residential and industrial energy consumption. Figure 6 below shows the GHG emission within the energy sector in 2018, indicating the percentages of emissions within the various sub-sectors.

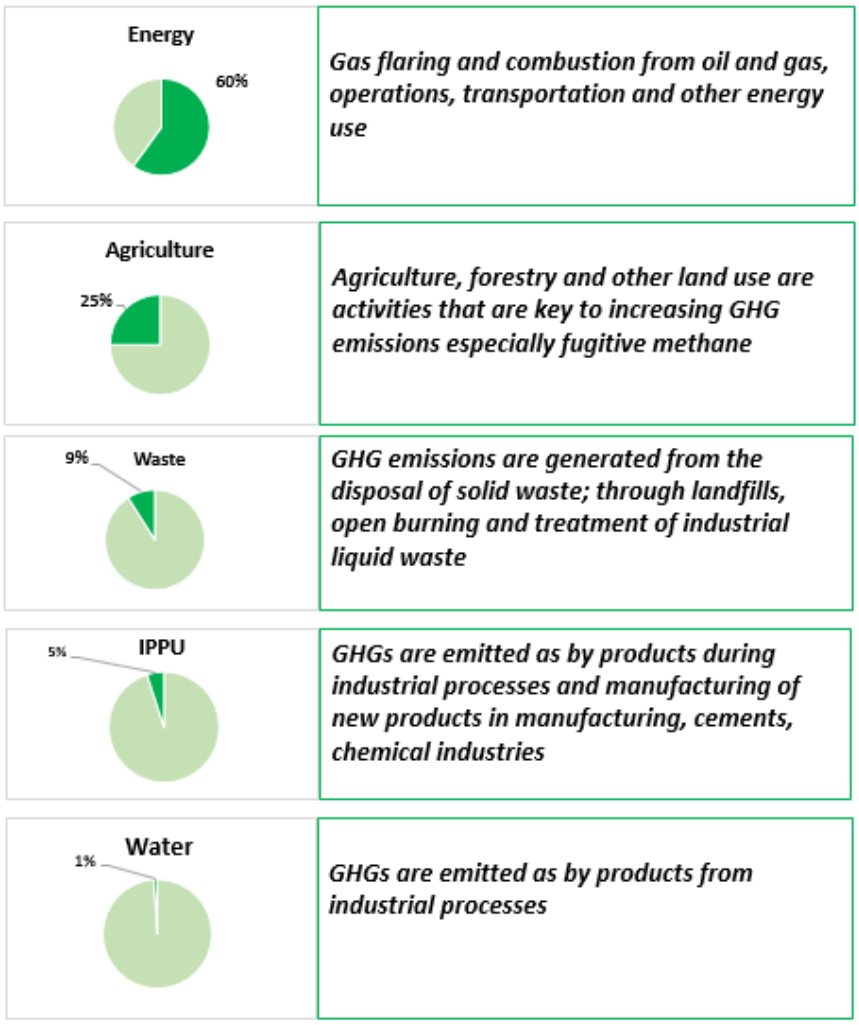
Figure 6: GHG Emissions for the energy sector in Nigeria in 2018 (209 MtCO2e)



Source: Updated NDC, 2021

Various development activities have contributed to the increase in carbon emissions in the various sectors. Primarily, activities from the energy sector which contributed most, includes gas flaring and combustion from oil and gas operations, transportation and other energy uses. The second major contributors were activities from the Agriculture, Forestry, and other land uses. In the waste sector, GHG emissions were generated from the disposal of solid waste through landfills, open burning, and industrial liquid waste. The IPPU's GHG emissions were by-products produced during industrial and manufacturing of new products. Lastly, in the water sector, GHG are emitted as by-product from water provision. From the analysis, activities from the energy sector takes the lead, having a percentage of 60% when compared to emissions from the other sectors. Figure 7 below shows the share of the total GHG emissions in the various NDC sectors and the identified activities producing these emissions.

Figure 7: Total share of GHG emissions per sector in Nigeria in 2018



Source: Revised NDC 2021/CLN Review

5.1 Overview of the NDC Key Emitting Sectors

The key emitting sectors in Nigeria as shown by the NDC revision of July 2021 and the BUR2 are the Energy and AFOLU. These two sectors constitute more than 80% of the total emissions in the country.

5.1.1 Energy Sector

The energy sector in Nigeria, is strategic to the economy of the nation. As applicable in all other countries, the energy sector drives Nigeria's economic productivity and industrial growth and is central to the operation of every other sector. The energy sector has an important role to play in delivering Nigeria's many developments objectives spanning from infrastructural development, health care development, efficient transportation, smart agriculture, electricity generation (grid and off-grid), residential energy consumption, oil and gas production and industrial energy consumption.

The Nigeria updated NDC document showed that the energy sector had the highest emission of (60%) and this emanates from activities such as gas flaring, combustion and fugitive methane from oil and gas operations (36%), transportation (21%), electricity generation (grid and off-grid) (24%), and energy consumption in residences and industries which emits about 19%. The energy sub-sectors (Power, Oil and Gas, Industry, and transport) are analyzed below for their potential for carbon pricing.

Major emissions from the sector comes from the oil and gas, electricity generation, transport, and industry. The sector provides most of the nation's revenue and the driver for development in the country. However, Nigeria's energy sector is faced with challenges causing setbacks, affecting the environment as well as the economy. Most of these challenges are peculiar to Nigeria and are highlighted below:

- **Regulated domestic fuel prices and petrol subsidy system:** The prices of domestic fuel particularly petrol motor spirit (PMS) is regulated and subsidized, which is a disincentive for building of refineries to replace the moribund refineries in the country. Similarly, low gas prices[28] are paid by power companies in Nigeria which is a discouragement to foreign and local investors in gas gathering and processing facilities. The reluctance of investors commitment to the energy sector could be attributed to the failure of government to deregulate domestic fuel prices and completely remove subsidy on PMS.
- **Myriads of challenges across the electricity value chain:** The power sector in Nigeria is ravished with challenges across the entire value chain (generation, transmission, and distribution) which inhibits the economic growth of the nation. Although Nigeria has 12,522MW of installed grid generation capacity, only an average of 3,879MW of the capacity is operational. In 2020, the Transmission Company of

[28] The price of gas for the power industry was set lower to those for other consumers to help cushion the effect of high electricity tariffs. Recently the prices were reduced from $2.50 to $2.18.

Nigeria attributed the country's epileptic electricity system to a scarcity of gas, which constrained the generating companies' ability to produce energy.[29]

- **Metering Gap:** Of the 10 million active energy users in Nigeria, only 38% have meters that can track real usage and quality. The remaining 62% of customers were invoiced based on estimates. To lessen the impact of over-estimated bills on consumers through more metering, NERC, DisCos and meter providers are making effort on changes to regulations and service level agreements. The COVID-19 outbreak put a stop to the metering plan and affected the supply of imported parts for local meter assembly.[30] While the 11 DisCos committed to metering of 1.75million customers annually upon their acquisition of the distribution assets, the metering capacity of the DisCos remains constrained by the limited allowable capital expenditure ("CAPEX") in the Multi-Year Tariff Order ("MYTO"). If the MYTO's total annual CAPEX provision of N46.3 billion were used only for metering, it would still fall short of the DisCos' projected annual metering commitment of N52.5 billion.[31]
- **High levels of unpaid electricity bills:** As of July 2021, the International Center for Investigative Reporting (ICIR) found that Federal, State and Local Government MDAs owe the distribution companies up to N202 billion. Despite cautions from the Nigerian Electricity Regulatory Commission (NERC) on DisCos' rights to disconnect MDAs that fail to pay bills, the DisCos have continued to fail to collect these debts or turn off the defaulting MDAs and institutions from the electricity supply. The MDAs have used a tactics of challenging the debts and requesting audits and bill reconciliation over a period of years rather than making payments. The MDA's, Armed forces, and Security Agencies' failure to pay their electricity bills have had a negative impact on Nigeria's power industry. [32]

  On the flip side, DisCos have also deployed projected billing and other unethical tactics, to pass on unrecoverable cost to their customers while they (the DisCos) are still owing other power sector stakeholders within the value chain.

  Other critical issues affecting the electricity sector include poor revenue collection[33], insufficient and poor supply of gas to thermal power plants, frequent grid collapse, poor maintenance of the power plants, dilapidated transmission and distribution infrastructure has led to transmission and distribution losses which allow a low capacity of electrical energy to be delivered to consumers.

  Due to all these issues culminating in unstable power supply, Nigerians are forced to rely on self-generation of energy from environmentally inefficient and costly alternative fuels (diesel, petrol, kerosene). This directly impacts on the livelihood of consumers (as the cost of electricity generated

[29] https://nerc.gov.ng/index.php/home/nesi/404-transmission#:~:text=At%20an%20average%20of%20approx,to%20a%20few%20last%20year.
[30] https://www.energyforgrowth.org/memo/what-will-cost-and-service-reflective-tariffs-mean-for-the-nigerian-electricity-sector/
[31] https://www.pwc.com/ng/en/assets/pdf/bridging-the-metering-gap-part-1updated.pdf
[32] https://www.icirnigeria.org/mdas-debts-to-discos-worsen-financial-stability-for-power-sector/
[33] https://punchng.com/fg-plans-3863mw-to-boost-power-grid-report/

by private generators is twice more than that of grid-based power) as well as increases carbon footprints.

There can be huge improvement in power supply if the regulations guiding the industry is reviewed objectively to ensure full deregulation and improvement of liquidity. This will also enable natural gas stakeholders in the country to ensure adequate security of supply of natural gas to the power plants to drive electricity generation in the country. While an improved and adequate supply of gas to the generating companies is not enough to break the jink in Nigeria's electrical system, the transmission and distribution infrastructure can be widely improved with technical and non-technical losses drastically reduced to provide clean energy to the populace through grid, mini-grid and off-grid electricity supply. This will reduce the carbon footprint of Nigerians through inefficient self-generated electricity.

The cross-cutting features of the energy sector and its influence on other sectors has made it a point of urgent attention to focus on carbon pricing. The ongoing effort might lead the country to be better positioned towards setting up a carbon pricing instrument. When carbon pricing is applied to the electricity sector, it will discourage the ambition to use carbon-intensive generators, like coal-fired power plants, in favor of lower- or zero-emitting generators, like efficient combined-cycle natural gas plants or renewables. However, carbon pricing tends to increase wholesale electricity prices, which then causes an increase in retail prices for consumers. Potential solutions may include using approaches to return the proceeds of carbon pricing to impacted consumers.

5.1.1.1 Oil and Gas sub-sector

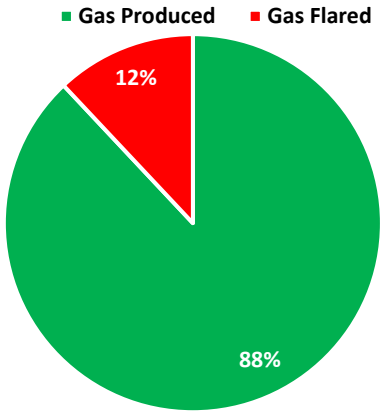
In 2019, the oil and gas sector accounted for about 5.8 percent of Nigeria's real GDP and was responsible for 95 percent of Nigeria's foreign exchange earnings and 80 percent of its budget revenues[34]. However, the benefit accrued from this sector is marred by increasing carbon emission. It has been reported that the fugitive emissions from oil and gas are the largest contributor to overall energy sector emissions (33% of total energy sector emissions in 2018), followed by transport, electricity generation (grid and off-grid), and residential and industrial energy consumption. This gives an indication that the energy sector and its resources are major contributors to GHG emissions and as such requires urgent attention for mitigation and implementation of the carbon pricing tool, to reduce emission, improve the environment and possibly generate revenue.

Nigeria is one of the main producers of natural gas in Africa and there is the projection that the production will double before or by 2030. Despite associated gas production as of 2018 put at about 1.7tcf (equivalent to 48 billion m^3)[35] a significant amount of these gas that could be used to meet energy demand in the

[34] Nigeria's Petroleum Industry Act: Addressing old problems, creating new ones https://www.brookings.edu/blog/africa-in-focus/2021/11/24/nigerias-petroleum-industry-act-addressing-old-problems-creating-new.
[35]DPR NOGIAR 2018

country is still currently flared (burned off) in some of the country's oil fields, due to unavailability of required infrastructure and proper incentive to capture the associated natural gas. Also, in 2018, Nigeria flared about 321Bscf of gas (equivalent to 9.1 billion m^3)[36] of its associated gas production, or about 12% of its gross production and ranked as the world's fifth-largest gas flaring country, accounting for 8% of the total amount flared globally in 2014.

Figure 8: Ratio of Gas produced to gas flared in Nigeria in 2018



Source: DPR 2018 & CLN

Considering emissions accrued from the O&G sector, the newly assented Petroleum Industry Act (The Act, 2021) seeks to introduce far-reaching reforms in the Nigerian Oil and Gas Industry, giving cognizance to tax. The Act demands strict adherence to a gas flaring plan in accordance to fulfil UNFCCC obligations which states that:

> ***"A licensee or lessee producing natural gas is expected to, within 12 months of the effective date, submit a natural gas flare elimination and monetization plan to the Commission, which shall be prepared in accordance with regulations made by the Commission under the Act. A Licensee or Lessee who fails to adhere to the provision shall pay a penalty prescribed pursuant to the Flare Gas (Prevention of Waste and Pollution) Regulations".***

In addition, the Act seeks to establish a progressive fiscal framework that encourages investment in the Nigerian Petroleum Industry, balancing rewards with risk and enhancing revenues to the Federal Government of Nigeria. It also seeks to simplify the administration of Petroleum Tax in Nigeria engaging the Federal Inland Revenue Service (FIRS), and the Nigerian Upstream Regulatory Commission (The Commission).

[36] DPR NOGIAR 2018

Nigeria's petroleum industry Act includes tax changes to spur investment, increase revenue and create optimum opportunities for local and international investors. The Act revamps the oil and gas industry by amending some legislation within the industry. The government had split the Act into four separate segments: the petroleum industry governance segment, fiscal regime segment, upstream/midstream segment, and the petroleum host communities' segment. The benefit of the tax changes integrated in by the petroleum industry act is to establish a fiscal arrangement to provide incentives for investors, clarity, and increased revenue for the government.

- The PIA introduces a dual tax regime under which the FIRS now collects a hydrocarbon tax at 15%–30% on profits from crude oil production. In addition to the companies' income tax at 30% and education tax at 2%.
- The hydrocarbon tax applies to crude oil, condensates, and natural gas liquids from associated gas. However, it is not payable on associated and non-associated natural gas, condensates and natural gas liquids produced from non-associated gas in fields or gas plants regardless of whether the condensates or natural gas liquids are subsequently mixed with crude oil.

Table 2: New Hydrocarbon Tax regime and Rates[37]

Area	Date of Grant of Leases/ Licenses	Rate
Onshore	Pre-PIB	42.5%
	Post PIB & Marginal Fields	22.5%
Shallow Water	Pre-PIB	37.5%
	Post PIB & Marginal Fields	20.0%
Deep Offshore	Pre-PIB	5.0%
	Post PIB	10.0%

Table 2 above shows the new hydrocarbon tax regime and rates. These rates are lower than the former rates obtainable in the Petroleum Profit Tax Act and Deep Onshore and Inland Basin (Amendment Act) which are: 50% for Production Sharing Contracts (PSCs), 85% for non-PSCs, and 65.75% for companies in the first five years of commencement. For Production Sharing Contracts (PSCs) executed prior to the commencement of the Act, Hydrocarbon Tax shall be charged and assessed separately on the profits from each Petroleum mining Lease.[38] Other efforts are evident in Nigeria's national action plan for short-lived climate pollutants (SLCPs) which calls for regulation of methane and black carbon from the oil and gas sector. The plan has set a target of a 50 percent reduction in methane leakage and "flare out" by 2030, at which time all but emergency flaring must cease. Also, Nigeria being a member of the Global Methane Alliance, pledging to further cut methane emissions from the oil and gas sector by 60-70%. Other

[37]Nigeria's petroleum industry bill includes tax changes to spur investment, increase revenue https://mnetax.com/nigerias-petroleum-industry-bill-includes-tax-changes-to-spur-investment-increase-revenue-45414
[38] The tax implication for the oil and Gas companied under the Petroleum Industry act, 2021 file:///C:/Users/IT/Desktop/Carbon%20Pricing%20Docs/Tax-Implications-for-Oil-and-Gas-Companies-pdf.pdf

significant efforts in the reduction of carbon emissions have been recorded in the areas of MRV development, policy implementation and the implementation of tax payment at the upstream and downstream of the oil and gas industries.

Penalties and incentives are attributes to carbon emissions in Nigeria. As stated in the Flare Gas (Prevention of Waste and Pollution) Regulation, 2018, penalty in form of payment for gas flaring are as stated:

- ***Section 13 (1) -Where 10,000 barrels or more of oil is produced, per day in any oil mining leases or any field designated as Marginal fields, the producer shall be liable to the Federal Government for a flare payment of $2.00 (two United States Dollars) per 28.317 standard cubic meters (1000SCF) as gas flared within such oil mining lease area or marginal field (this is equivalent to 10$/tCO2e), irrespective of whether the flaring is Routine or Non- Routine flaring, provided that there shall be no liabilities for the payment where the flaring was caused by an act of war, community disturbance, insurrection, storm, flood earthquake or other natural phenomenon which is beyond the reasonable control of the producer.***

- ***Section 13 (2)- Where less than 10,000 barrels of oil per day is produced per day in any oil mining lease area or any field designated as a Marginal field, the producer shall be liable to the Federal Government for a flare payment of $0.50 (fifty United State Cents) per 28.317 standard cubic meter(1000SCF) as gas flared within such oil mining lease area or marginal field , irrespective of whether the flaring is routine or non- routine flaring, provided that there shall be no liabilities for the payment where the flaring is routine or non- routine flaring, provided that there shall be no liabilities for payments where the flaring was caused by an act of war, community disturbance, insurrection, storm, flood earthquake or other natural phenomenon which is beyond the reasonable control of the producer.***

  In addition, it is important to also note that;

- ***Section 21 (1) – Where a Producer fails to –***

  - ***provide Flare Gas Data further to a request made under regulation 4 of the Regulations***
  - ***supply accurate or complete Flare Gas Data further to a request made under regulation 4 of these Regulation***
  - ***provide a Qualified Applicant with access to any Flare Site or to Flare Gas as provided in the Permit and in regulation 6 of these Regulations.***
  - ***provide a Permit Holder with access to any Flare Site or to Flare Gas as provided in the Permit and in regulation 8 of these Regulations.***

- ***prepare, maintain, or submit the logs or records or reports required in regulations 16, 17 or 18 of these Regulations within the time required to do so by the Department of Petroleum Resources.***
- ***install metering equipment within the time required to do so by the Department of Petroleum Resources; or***
- ***agree to enter into a Connection Agreement with a Permit Holder.***

The Producer shall, notwithstanding the provisions of regulation 13 of these Regulations, be required to pay an additional sum of $2.50 (two United States Dollars and fifty cents) per 28.317 standard cubic meters (one thousand standard cubic feet) of gas flared or vented within the Oil Mining Lease or Marginal Field for each day that the Producer fails to meet these requirements.[39]

It should be noted that actual measurement and reporting of the volume of gas flared is done by the operator (oil & gas companies) and reported to the regulator (NUPRC). The regulators are regularly on the oil fields to monitor and ensure compliance with all requirements.[40]

5.1.1.2 Residential and Industrial sub sector

The energy type mostly consumed in residences in Nigeria is the biomass, which is used predominantly for cooking. Research has shown that in Nigeria, about 66.3% of households depend on biomass as fuel for cooking[41], its result also showed significant statistical differences between rural and urban households' type of cooking fuel, varying according to regions, educational level, and wealth index. However, most industries make use of the diesel and natural gas for their activities. Nigeria is the third world's largest producer of bioenergy, after China and India and in 2010, the share of bioenergy of total primary energy supply in Nigeria was over 80 per cent (WEC, 2013). Seemingly, over 70% of the population in Nigeria still rely on biomass for fuelwood.

[39] https://ngfcp.dpr.gov.ng/media/1120/flare-gas-prevention-of-waste-and-pollution-regulations-2018-gazette-cleaner-copy-1.pdf

[40] https://www.nuprc.gov.ng/government-steps-up-sale-of-crude-gas-assets-with-96-flare-sites/

NUPRC accounts for gas flared in the country by deploying production meters, fiscal meters and allocation meters to oil and gas fields. The fiscal meters are used to measure the volume of gas flared at routine and non-routine level. NUPRC also enforces an accuracy of 3% accuracy level on the frequency of the meter. With this, NUPRC monitors field locations, collates, and revalidates flare reports and ensures all the provisions of the Flare Gas regulations of 2018 are adhered to.

[41] Ifegbesan, Ayodeji & Rampedi, Isaac & Annegarn, Harold. (2016). Nigerian households' cooking energy use, determinants of choice, and some implications for human health and environmental sustainability. Habitat International. 55. 10.1016/j.habitatint.2016.02.001.

This unsustainable consumption of biomass has pushed the rate of deforestation to an alarming level. However, Nigeria stands out with renewable energy potential as it has an estimated reserve of 11 million hectares of forest and woodland. Energy resources regarded as biomass in Nigeria include crop residues, forage grasses, shrubs, animal wastes and wastes arising from forestry, municipal and industrial activities, as well as aquatic biomass.

The continuous use of biomass for cooking in homes has contributed to both air pollution and carbon emissions. It is important that incentives are provided to discourage burning of biomass and increase support for efficient biomass cookstoves (in rural areas) and fast track the use of LPG (in peri-urban and urban areas) which would further serve as efforts to reduce GHG emissions.

Also, an increase in prices of the household fuel has been experienced in Nigeria and this has been consistently documented by the Nigerian Bureau of statistic.

Household Kerosene (HHK): Kerosine is a combustible hydrocarbon liquid which is derived from petroleum and is widely used as a fuel in aviation and commonly used in the households for cooking and lightening. Its major disadvantage is the incomplete combustion leading to emissions of carbon. According to report by the Nigeria Bureau of Statistics, the average retail price per liter of Household Kerosene (HHK) paid by consumers in May 2022 increased by 15.21% on a month-on-month basis from N589.82 in April 2022 to N679.54 in May 2022. On a year-on-year basis, the average retail price per litre rose by 86.94% from N363.50 in May 2021.

Liquefied Petroleum Gas (LPG): LPG a highly efficient cooking fuel. It is the most economical and its excellent heating capacity helps in cooking food in less time, saving cost. It undergoes complete combustion, produces no residue and particulate matter, which means minimum maintenance cost and lesser carbon footprint. It other uses is in industrial applications, in vehicles and as a propellant and refrigerant. According to the Nigerian Bureau of Statistics, the average price for refilling a 5kg cylinder of Liquefied Petroleum Gas (cooking gas) stood at N3921.35 in May 2022 from N3800.47 recorded in April 2022 showing an increase of 3.18 percent month-on-month. However, on a year-on-year basis, the average retail price for cooking gas increased by 89.28 percent from N2071.69 in May 2021.

In industrial and commercial buildings, energy consumed is mostly diesel and Liquid Pour Fuel Oil (LPFO) which are higher emitting fossil fuels albeit this is changing as most industrial facilities in the country are now switching to consumption of gas either through distribution pipelines where it is available and virtual pipelines[42] where the gas pipeline network does not exist. Nevertheless, several industries continue to utilize cheap and accessible energy resource which needs to be checked should the country be determined with its mitigation drive. Energy efficiency and transition to low carbon fuel sources (green

[42] Virtual pipelines bring regular deliveries of gas to customers lying outside the reach of existing gas distribution infrastructure using technologies such as compressed natural gas, liquified natural gas or liquified petroleum gas.

technology) was indicated in the country's NDC ambition. The high energy intensive industries are principal areas of focus in effort towards achieving mitigation targets.

A typical example of highly intensive energy industry is the cement producing companies. In a study that evaluated the energy consumption of both wet and dry processes in the cement manufacturing plant in Nigeria, using energy consumption data collected for the period 2003 to 2011, it was revealed that the total estimated energy intensities were 6545 MJ/ton and 4197 MJ/ton for wet and dry processes respectively. The estimation covered the following processes: crushing, milling, agitation, burning, grinding, and bagging operations. The estimation aligns with international best performance, where from the list of the key performance indicators, the specific heat consumption of clinker production was shown to be between the ranges of Ranges 2,800 - 9,000MJ/ton for plant with kiln operation. The energy consumed predominantly was traditionally diesel and LPFO. Recently, it has switched to gas but this is sadly backed up with consumption of coal which is even more carbon intensive compared to diesel and LPFO.

5.1.1.3 Transport Sector

In Nigeria, like most other countries, the transportation sector is one of the main drivers of economic growth. Economic growth resonates with adequate transport infrastructure and facilities. However, this sector has been linked to principal source of environmental issues particularly noise and air pollution. As with any other country in the world, it is an important sector in promoting economic and social development. The road-based transport is the most common type of transportation in Nigeria while others include the sea, air, and railway. The World Health Organization[43] claimed that some of the pressing issues associated with road transportation include crude oil dependence, air pollution, as well as traffic injuries and fatalities. A carbon pricing approach would be an instrument for reducing emissions from the transport sector especially for vessels which relies on the use of conventional fuel (petrol and diesel).

In accordance with the 2021 NDC update, the transport sub sector of the energy sector as shown in Figure 9 above, accounted for 21% of the GHG emissions in (MtCO2e) in 2018. According to the updated NDC, mitigation measures required to deliver the NDC target in the transport sub sector are shown in Table 3 below.

Table 3: Mitigation measures required to deliver the NDC target in the transport sub sector

Measures	Target Year
Introduction of 100,000 buses	2030
Bus Rapid Transport (BRT)	22.1% of passenger-km by 2035
Introduction of Compressed Natural Gas trucks and buses	25% of trucks and buses by 2030
Vehicles meet EURO standards	EURO III by 2023 and EURO IV by 2030

[43] World Health Organization (WHO) Report 2012

Electrification of public vehicles; changing petroleum fuel vehicle to fuel cell technology, keeping cars in top conditions, good road maintenance culture, walking or biking instead of driving and putting more electric cars on the road are among the suite of available strategies that would help to minimize road transport pollution in Nigeria[44].

5.1.1.4 Electric Power Industry in Nigeria

The power industry in Nigeria has undergone several phases of transformation since the return of civilian government in 1999. This started with the Electric Power Sector Reform of 2005 by unbundling of the power industry into three segments of the value chain (generation, transmission, and distribution) and later in 2013, the privatization of the generation and distribution segments while the government upholds the transmission company.

Electric Power Sector Reform Act (EPSRA): This act was made a law in 2005, which allowed the private companies to participate in electricity generation, transmission, and distribution. PHCN was unbundled into eleven electricity distribution companies (DisCos), six generating companies (GenCos), and a transmission company (TCN). The act also created the Nigerian Electricity Regulatory Commission (NERC) an independent regulator for the sector.

Privatization of the Generation and Distribution Companies: The federal government in November 2013 privatized the government owned six generating companies, while 60% of its shares in the eleven (11) distribution companies has been sold to private operators. The only generating assets in government's custody are the ten (10) Niger Delta Power Holding Company gas fired power plants which are in the process of being privatized[45]. It should be noted that these set of power plants when fully commissioned forms a good basis for an ETS.

To increase the power generation, the Niger Delta Power holding company (NDPHC) was incorporated in 2004. The company has a mandate of managing the National Integrated Power Project (NIPP) through the construction of critical infrastructure in the generation, transmission, distribution, and natural gas supply sub-sectors. Ten (10) new gas fired power stations were planned to be added to the grid some of which have already been completed and commissioned, while others are at different stages of construction in different parts of the country. In total, the NIPP power stations were expected to add about 4,774MW of power to the national grid network after completion.

Despite government efforts of increasing generating capacity by privatizing the assets including the distribution network, the transmission and distribution losses remain high when compared with other countries within the region. According to NERC, an average of approximately 7.4% transmission losses

[44] Transport Pollution: A Research of the Nigerian Transport Sector
https://www.ijitee.org/wp-content/uploads/papers/v8i11S/K108309811S19.pdf
[45] http://www.ndphc.net/generation

occurs across the network which is very high compared to other emerging countries' benchmarks of 2 - 6%.

The industry is partly liberalized as the price of electricity in the industry is regulated through the Nigerian Electricity Regulatory Commission using the multi-year tariff order (MYTO) approach. The MYTO is adjusted slightly last year in its application to be based on level of service delivered to consumers. It should be noted that a framework for feed-in tariff was to be put in place for electricity supply from renewable sources but still with several bottlenecks. About 14 solar power plants signed a power purchase agreement since 2016 yet to take off due to tariff as well as poor grid infrastructure among other issues[46].

Table 4: Components of Price Structure in the Power Sector

Variables	Applied Rates
Nigeria Inflation Rate	16.97%
Exchange rate	412.17
US rate of inflation	4.68%
Gas Price	$2.18 + $0.80 (transport) per mmbtu
Transmission Losses	7.5%
Available Capacity	
Energy Delivered	

Considering a gas price of about $2.98/mmBtu and noting the fact that gas turbine efficiency is averaged at 33%, this implies that value of energy for power generation is about $9/mmBTU$_{elec}$. Improving efficiency of electricity generation can therefore be incentivized by carbon price. Should carbon price be introduced in the power sector, it will be easier to apply such on the gas price as that is the only charge that can easily reflect carbon component.

Instruments/Policies to favor climate-friendly investments such as feed-in tariffs, auctions for green electricity, use of renewable energy certificates (RECs) are not currently in place in the country. However, rural electrification funds (REF) available in the country tends to prioritize renewable electricity generation. Several mini grids have been developed with support from REF.

Table 5: The generation company created from the unbundling of PHCN[47]

Generation Companies	Installed Capacity (MW)	Type	Privatization Status
Afam Power Plc	776MW	Gas	100% sold
Sapele Power Plc	414MW	Gas	51% sold
Egbin Power Plc	1,020MW	Gas	100% sold

[46]https://www.thecable.ng/the-insider-fg-set-to-guarantee-1bn-new-solar-projects-despite-choking-under-take-or-pay-deals
[47] https://nerc.gov.ng/index.php/home/nesi/403-generation

Ughelli Power Plc	900MW	Gas	100% sold
Kainji + Jebba Power Plant	760MW + 578MW	Hydro	Long term concession
Shiroro Power Plc	600MW	Hydro	Long term concession

Source: NERC website

The Federal government of Nigeria on October 30, 2020, flagged off the first phase (Phase Zero) of the National Mass Metering Programme (NMMP) 2 which was completed in 2021 and the subsequent phases are lined up for implementation. The key objective of the Programme was to increase Nigeria's metering rate, eliminate arbitrary estimated billing, and to strengthen the meter value chain; by increasing local manufacturing, assembly, and deployment capacity. The Programme was also targeted at:

- Job creation in the local meter value chain
- Reducing collection losses
- Increasing financial flows to achieve 100% market remittance obligations of the electricity distribution companies (DisCos).
- Improve network monitoring capability and availability of data for market administration and investment decision making.

According to Nigerian Electricity Regulatory Commission (NERC) about 980,000 electricity customers were metered across the country under the Phase Zero[48] of the National Mass Metering Programme (NMMP) It as anticipated that the second phase (Phase One) of the scheme would commence in the first quarter of 2022 with about four million meters to be supplied strictly by local manufacturers.

Challenges in the Power sector

- Lack of maintenance of power infrastructure,
- Decommissioned Power plant(s)
- Low revenues,
- High losses from electricity transmission and distribution
- Power theft and non-cost reflective tariffs[49]
- Inadequate Funding

Subsidy in Fossil Fuels

In Nigeria, petrol motor spirit (PMS) consumed majorly in the transport sector and for captive power generation by homes is subsidized. These subsidies exist because the price of gasoline or PMS is fixed by the government for consumers, and this is well below the international price. However, the government then utilizes its own resources to pay for the difference in the form of a subsidy. Subsidy came into

[48] https://www.cbn.gov.ng/out/2020/ccd/mass%20metering%20financing-procurement_guidelines_updated_18-10-20.pdf

[49] It should be noted that the non-cost reflective tariffs is now replaced with service-reflective tariffs and thus far there has been improvement in revenue collection in the power sector albeit not sufficient to turn around the challenges in the sector (see annex)

existence in Nigeria in the 1970s as a response to the oil price shock in 1973. However, despite numerous attempts at reform, it has been almost impossible for Nigeria to successfully remove gasoline subsidies, primarily because of strong popular opposition to the petroleum reform. Research[50] has shown that subsidies come at great cost: resulting to poor investment on other development objectives, inadequate distribution of resources to the state governments and the subsidy renders Nigerian PMS to be cheaper as compared to other countries thus encouraging greater pollution, congestion, and climate change. From 2006 – 2018, Nigeria spent about 10 trillion Naira (or US$24.5 billion at the current official exchange rate of 411 Naira = US$1) on petroleum subsidies.[51]Similarly, report shows that the Federal Government has announced immediate reduction in domestic base price of natural gas to power plant producers from $2.50 to $2.18 per mmbtu in July 2021[52]. As compared to what is currently obtainable from Henry Hub gas price (over $6/mmbtu), the current gas price in Nigeria is roughly about 67% less. Table 6 below, shows the Nigerian fuel prices per liter as at the month of May 2022.

Table 6: Nigerian fuel prices per liter as at the month of May 2022

Fuel Price per liter	NGN	USD
Gasoline	172.61	0.416
Diesel	654.46	1.577
Kerosene	589.92	1.420
Jet-A1-Fuel (Aviation Kerosene)	408.36	0.984
LPG (per kg)	752	1.81

Internationally, the price of gasoline in the international market is about $1.46 as compared to $0.416 in Nigeria (about 67% less). This subsidy increases the carbon footprint from consumption of fossil fuel and affects development as most of the country revenue goes to payment of subsidy.

Tariff Allocation in the Power Sector

The Multi-Year Tariff Order (MYTO) is a tariff model for incentive-based regulation that seeks to reward performance above certain benchmarks, reduces technical and non-technical/commercial losses, and leads to cost recovery and improved performance standards from all industry operators in the Nigerian Electricity Supply Industry. Tariff is used to set wholesale and retail prices for electricity in the industry by employing a unified way to determine total industry revenue requirement that is tied to measurable performance improvements and standards. According to the revised version on the MYTO (2020), there are various indices to be considered when evaluating the tariff application. These includes:

[50] Fuel Subsidy Reform and the Social Contract in Nigeria: A Micro-economic Analysis,2000 https://www.ictd.ac/publication/fuel-subsidy-social-contract-microeconomic-analysis-nigeria-rib/
[51]https://theconversation.com/fuel-subsidies-in-nigeria-theyre-bad-for-the-economy-but-the-lifeblood-of-politicians-170966
[52] https://guardian.ng/news/fg-slashes-domestic-base-price-of-gas-by-0-32/

- ***Nigerian rate of Inflation****: The Nigerian rate of inflation for November 2021 as obtained from the National Bureau of statistics (NBS) was 15.40%. This rate was adopted based on Nigerian inflation rates for the period of 2022 - 2026. The actual average monthly inflation rate for the period January 2021 to November 2021 of 16.97% was applied for the retroactive reviews of tariffs for 2021.*
- ***Exchange rates:*** *In accordance with the provision of the MYTO Methodology, CBN official exchange rates were used in this review. The MYTO Methodology, provides for a premium of 1% above the CBN rate as transportation cost and this was applied in the current review, the applicable NGN/ USD exchange rate for the period of 1st of January 2021 to 30th November 2021 and beyond is computed as NGN412.17/$1 was applied for the retroactive reviews of tariffs for 2021.*
- ***US rate of inflation****: Based on the data obtained from the website of the United States Bureau of Labour statistics[53], the US inflation rate for the month of November 2021 was 6.8%. This was adopted for the purpose of the review based on the US inflation rate for the period of 2022 - 2026. While the actual average monthly inflation rate for the period January 2021 to November 2021 of 4.68% was applied for the retroactive reviews of tariffs for 2021.*
- ***Gas Price:*** *The price of natural gas for the power sector has been regulated since the inception of MYTO in 2008. The power industry has enjoyed gas price of US$2.18/MMBTU and gas transportation cost of US$0.80/MMBTU. Other grid generation companies with contracted gas prices outside the regulated rates as provided in their respective Gas sale Agreements (GSAs) are also provided for in the MYTO model as a pass-through cost.*
- ***Other Considerations:*** *Capex Adjustment, Available generation capacity, Review of transmission loss factor.*

Table 7 below shows the electricity rates per kWh, which was calculated using the average annual household electricity consumption and business, as 1,000,000 kWh annual consumption.

Table 7 : Electricity prices per KWh as at the month of May 2022

Electricity price /KWh	₦/KWh	$/KWh
Household	41.74	0.1
Business	60.33	0.145

The electricity rate in Nigeria is very low compared to others in the region. Electricity prices in the time past was subsidized but the subsidy is largely taken off except for those who consume less than 50kWh. It should be noted that while the tariffs are low, solar power can be generated at $0.115 ct/kWh with some ready to accept as low as 0.075 ct/kWh.

It should be mentioned that despite the challenges of the power sector, the establishment of the Rural Electricity Fund (REF) by the Rural Electrification Agency (REA) has been transformational. The REF was established in 2005 to provide support for the development of the on and off grid generation by achieving

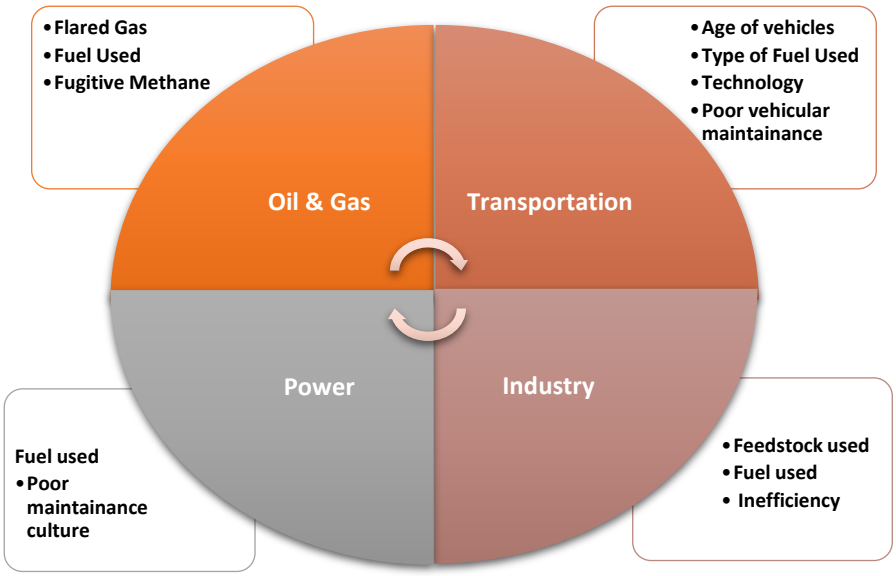
[53] http://www.bls.gov

more equitable regional access to electricity, maximizing the economic, social, and environmental benefits of rural electrification subsidies, promoting expansion of the grid and the development of off-grid electrification among others. REF in recent times tend to favor electricity generated from renewable energy resources.[54]

Mitigation Measures in the Energy Sub-Sectors

To have a functional energy sector that will focus on GHG emission reductions, there are certain mitigation measures that must be actioned. The Figure 10 below presents the factors that enhance GHG emissions in the energy sub-sectors while the

Figure 10: Energy Sub-sector: Factors Enhancing GHG emissions in the Energy Sector



Error! Not a valid bookmark self-reference. shows the conditional mitigation measures that are inherent in the sub sector of the Nigeria energy sector, thus reflecting the relevance of energy in the society.

[54] https://rea.gov.ng/rural-electrification-fund

Table 8: Mitigation measures in the energy sector (conditional)

Sector	Measures
Residential	48% of population (26.8 million households) using LPG and 13% (7.3 million households) using improved cookstoves by 2030
	Elimination of kerosene lighting by 2030
Energy efficiency	2.5% per year reduction in energy intensity across all sectors
Transport	100,000 extra buses by 2030
	Bus Rapid Transport (BRT) will account for 22.1% of passenger-km by 2035
	25% of trucks and buses using CNG by 2030
	All vehicles meet EURO III emission limits by 2023 and EURO IV by 2030
Electricity generation	30% of on-grid electricity from renewables (12 GW additional large hydro,3.5 GW small hydro, 6.5 GW Solar PV, 3.2 GW wind)
	13 GW off grid renewable energy (i.e., mini-grids 5.3 GW, Solar Home Systems and streetlights 2.7 GW, self-generation 5 GW)
	Reduce grid transmission and distribution losses to 8% of final consumption of electricity in 2030, down from 15% in 2018.
	100% of diesel and single cycle steam turbines replaced with combined cycle
	Elimination of diesel and gasoline generators for electricity generation by 2030
Oil and gas	Zero gas flaring by 2030
	60% reduction in fugitive methane emissions by 2031

Source: Updated NDC, 2021[55]

6.0 Analysis of National Context

This section of the report presents key elements in the national context that could serve as support for the introduction of a carbon pricing instrument in the country. A brief overview of the country's socio-economic context is presented which is followed by an assessment of available national policies that are relevant to climate change in the country. Furthermore, an overview of the relevant policies in the country and how they could serve as support for the implementation of carbon pricing instruments in the country is discussed. This will give an appropriate understanding of the country's specific circumstance and how it fits in exploring carbon pricing instrument tailored to the country's scenario.

6.1 Social Economic Context

Nigeria is located North of the equator in Western Africa and is the continent's largest nation by population and economy, covering an area of 923,769 square kilometers. Nigeria accounts for approximately one-quarter of West Africa's people and the United Nations project that the overall

[55] Updated NDC, 2021

population of Nigeria will reach about 401.31 million by the end of the year 2050. It is one of the world's most ethnic and multicultural countries and the country is a federal republic with 36 states and a Federal Capital Territory located in Abuja.[56] The largest city of Nigeria is Lagos, which is also the largest city in all Sub-Saharan Africa. Abuja, the Capital City of Nigeria, counted about half a million inhabitants in 2021, ranking 15th among the largest cities of Nigeria.[57]

Energy Information on Nigeria

Nigeria has the largest economy in sub-Saharan Africa. The country is Africa's largest oil producer, which according to OPEC, has about 37 billion barrels of proven oil reserves and 187 trillion cubic feet of proven natural gas reserves. Between 2009 and 2013, Nigeria was ranked the seventh largest OPEC crude oil producer with an average production of approx. 1.8 to 2.4 million barrels of oil per day. However, one of the major constraints to growth is the slow productivity in the energy sector. Nigeria is endowed with oil, gas, hydro, and solar resources, and it has the potential to generate 12,522 MW of electric power from existing plants. On average, the country dispatch around 4,000 MW, which is insufficient for the country's teeming population. Nigeria's population is estimated to be above 200 million based on World bank estimate[58] and according to trading economics global macro models and analysts' expectations, its GDP was expected to reach 440.00 USD billion by the end of 2021.

Nigeria's electricity generation reveals that 80% of power generation comes from gas, while others come from hydro. Also, the country is the largest user of oil-fired back-up generators in the continent and as reported in the energy outlook of 2019, the share of population with electricity access was 60%, while the share of population that have access to clean fuel for cooking was 10%. From the Nigerian energy report of 2020, Nigeria had a CO_2 emission of 0.43 tCO_2/capita, and the rate of transmission and distribution power losses was 15.4%.[59]

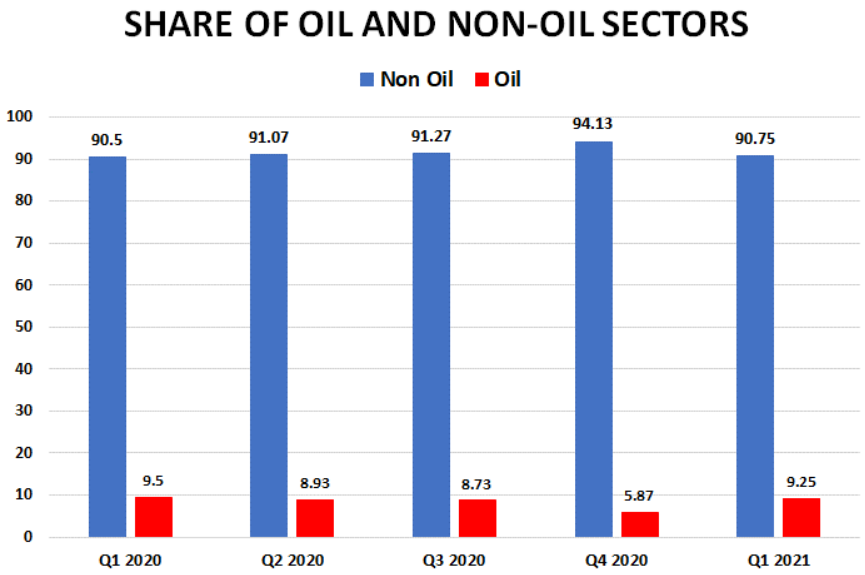
Nigeria is a member of the Economic Community of the West African States (ECOWAS) and the Organization of the Petroleum Exporting Countries (OPEC). It is also a co-founding member of the African Union. In 2019, Nigeria signed the African Continental Free Trade Area (AfCFTA) to promote tariff-free trade in Africa.

The size of the country's economy stood at N40 trillion (US$ 105.5billion) in the first quarter of 2021[60]. Despite the COVID-19 pandemic, improvement in economic activities took place. This was largely driven by the non-oil sector which accounted for 91% of the total real GDP[61].

[56] https://climatechange.gov.ng/wp-content/uploads/2021/08/NDC_File-Amended-_11222.pdf
[57] https://www.statista.com/topics/6477/demographics-of-nigeria
[58]https://www.worldbank.org/en/country/nigeria
[59] https://www.enerdata.net/estore/energy-market/nigeria/
[60] https://www.nesgroup.org/download_resource_documents/Q1%20Draft_1623320173.pdf
[61] https://www.nigerianstat.gov.ng/download/1241027

The Figures 10 and 11 below shows the share of Oil and Non-Oil Sectors and Contribution to Real GDP Q1 2021 (%) respectively.

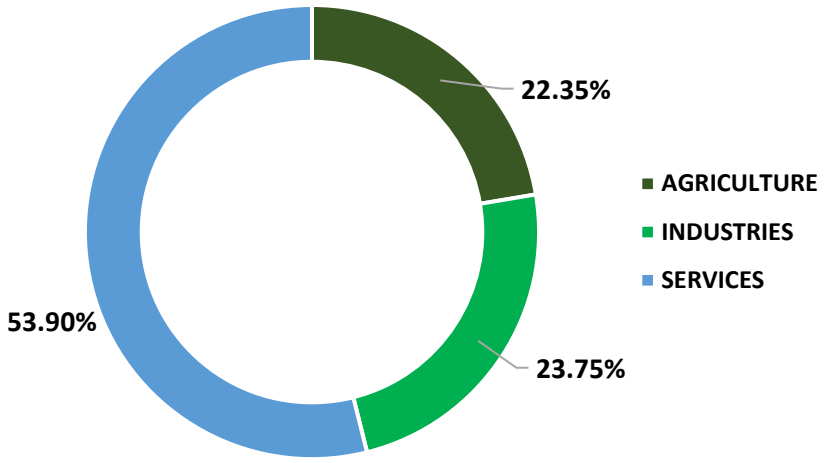
Figure 11: Share of Oil and Non-Oil Sectors



Source: Nigerian stat/CLN Review

Key contributors to the growth were the agricultural and industrial sectors which produced a combined share of 46% of total GDP. Also, the oil and gas sector, which is the largest source of revenue for the country accounted for 9% of real GDP.

Figure 12: Contribution to Real GDP Q1 2021 (%)



Source: Nigerian Stat

Nigeria has had a relatively long experience in planning and developing priorities beginning with the Colonial Development Plan (1962-68)[62]. The National Economic Empowerment and Development Strategy; the Strategy for attaining the Millennium Development Goals; the 7-Point Agenda, the Economic Recovery and Growth Plan (ERGP; 2017 -2020),[63] the Nigeria Vision 20:2020, the National Economic Sustainability Plan[64], the Medium-Term National Development Plan (2021-2025), Agenda 2050[65] (Currently under preparation by the Federal Ministry of Finance, Budget, and the National Planning) and other long-term plans all show the intention of the Nigeria government in improving the economy of the country.

The Nigeria Vision 20:2020 expressed the aspiration for Nigeria to become one of the top 20 economies in the world as of 2020. Attainment of the vision would have enabled the country to achieve a high standard of living for its citizens. It was developed for the Nigerian people and involved a process of thorough engagement with all stakeholders across all levels of government and society.

Vision 30:30:30 aims at achieving 30,000MW of electricity by the year 2030 with renewable energy contributing 30 per cent of the energy mix. This target will see Nigeria undergo a renewable energy transformation. Recent activities in the sector to ensure that these targets are met included commercial

[62] https://www.iarconsortium.org/article/articleID=100
[63] https://statehouse.gov.ng/policy/economy/economic-recovery-and-growth-plan/
[64] https://budgetoffice.gov.ng/index.php/nigeria-economic-sustainability-plan
[65]https://www.premiumtimesng.com/news/headlines/413477-agenda-2050-buhari-inaugurates-committee-to-lead-nigerias-new-development-plan.html

utilization of associated gas that was previously flared, alongside a massive roll-out of clean, renewable energy such as the 700 MW Zungeru hydroelectric power project, the Ashama 200MWh Solar PV Farm located on about 304 hectares of land in Ashama village, Aniocha South Local Government Area of Delta State and the Kwale Gas Plant Flare Down Project by the Nigeria Agip Oil company (NAOC). The aim of the project is to reduce the amount of carbon dioxide produced by the facility by 1,496,934 metric tonnes of CO_2 a year. However, there are still range of other measures that will be needed to deliver the NDC targets in the energy sector (see Table 8).

The National Climate Change policy for Nigeria (2021-2030) had highlighted measures that will further enable the achievement of the vision. These policies are highlighted below.

- Expand the production and use of renewable energy, particularly solar and small hydro, both for on-grid and off-grid. The current tariffs in the country are still abysmal compared to other countries which therefore underscores the price of solar PV electricity in the country. Currently, tariffs can be agreed and signed off with the 'would-be' consumers by the off-taking communities for mini-grid renewable electricity supply. However, other notable instruments such as feed in tariff, auctions and renewable energy certificates are yet to be put in place.
- Promote energy efficiency and management activities. These includes new and innovative energy efficiency methodologies and techniques in power generation, the use of gas-fired power stations, as well as retrofitting buildings and other infrastructure.
- Reduce transmission and distribution losses.
- Facilitate full transition to clean cooking fuel.
- Provide sustainable incentives and financial mechanisms to encourage and support the use of renewable sources of energy.
- Support cities in the country to undertake ambitious climate change mitigation actions.

Nigeria is vulnerable to some economic challenges such as food insecurity, poor access to energy and high unemployment, amongst others, remain principal constraints on economic development. The country is also affected by variations in world oil prices as it depends significantly on export revenues. In addition to these challenges, the country is also faced with impacts of climate change which include extreme weather events, such as floods, droughts, sandstorms, and heatwaves.

Environmental policies and strategies in Nigeria's economic sectors significantly take into cognizance the vulnerabilities mentioned above. This is evident in the country's climate policies, measures and actions that will be highlighted in Section 6.2. The section below presents an overview of Nigeria's national policy documents on climate change and further provides insights on how this could support the introduction of carbon pricing initiatives in the country.

6.2 Regulatory Framework Relevant to Carbon Pricing

This section highlights key existing laws, policies, and initiatives both at the federal as well as state levels that could provide the basis on which a carbon pricing mechanism could be developed and implemented in the country.

6.2.1 Nigeria Constitution – 1999

The 1999 constitution of the Federal Republic of Nigeria[66] makes provision for environmental protection, a state objective. In Chapter 2 of the constitution document on fundamental objectives and directive principle of state policy in section 20, it was expressly stated that:

"*The State shall protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria".*

Apart from ensuring a healthy environment, the significance of this clause in the constitution also implies an environment that is less vulnerable to climate change for the citizens of Nigeria. This is expected to help safeguard the air, water, land, plants, and animals in accordance with section 20 of the 1999 constitution.

6.2.2 Climate Change Act – 2021[67]

The government in recognising the need to enhance its response to addressing climate change passed the Climate Change Act, 2021, which was further assented to by the President on the 18th of November 2021.

The Act 2021 aimed at addressing climate change issues in the country. The Act is to provide the mainstreaming of climate change actions, establish the National Council on Climate Change (NCCC) as a body saddled with the responsibility of implementing Nigeria's climate change action plan. It provides a framework for achieving low GHG, inclusive green growth and sustainable economic development. This will be applied to the Ministries, Departments and Agencies (MDAs) of the Federal Government of Nigeria. It will also apply to public and private entities within the territorial boundaries of Nigeria for the development and implementation of mechanisms geared towards fostering low carbon emission, environmentally sustainable and climate-resilient society.

It is important to note that the Act establishes the NCCC as the council vested with the powers to make policies and decisions on all matters concerning climate change in Nigeria.

In line with part III of the Act (formerly a bill); *administration and control of the NCCC*, paragraphs 8 (a)to (j), states the functions of the secretariat to include (notably (b) and (c)) which states that the secretariat shall:

[66]https://publicofficialsfinancialdisclosure.worldbank.org/sites/fdl/files/assets/law-library-files/Nigeria_Constitution_1999_en.pdf
[67] http://www.parliament.gov.fj/wp-content/uploads/2021/08/Bill-31-Climate-Change-Bill-2021.pdf

- *be responsible for the monitoring, verification, and reporting on the extent to which the national emission profile is consistent with the carbon budget.*
- *be responsible for the monitoring, verification, and reporting on the progress of the implementation of the Action Plan.*

This mandate gives the Council the powers to manage all actions and policies towards reducing GHG emissions in the country.

As stated in the draft version of the Climate Change bill, 2021, the Council is empowered to perform several functions which amongst others include: collaborate with the Federal Inland Revenue Service to develop a mechanism for carbon tax in Nigeria; establish Climate Change Fund to be maintained by the Council into which shall be paid carbon tax and emissions trading, overseeing the country's carbon tax regime, among others[68].

6.2.3 NESREA Act – 2007

The National Environmental Standards and Regulations Enforcement Agency (NESREA) was established in 2007 (as amended) by an act of parliament as the NESREA Establishment Act. The Agency is charged with the responsibility for the protection and development of the environment, biodiversity conservation and sustainable development of Nigeria's natural resources in general and environmental technology, including coordination and liaison with relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulations, rules, laws, policies, and guidelines.

The Mandate of NESREA:

NESREAs by the provision of this act, is mandated to amongst others:

i. Enforce compliance with laws, guidelines, policies, and standards on environmental matters.
ii. Coordinate and liaise with stakeholders, within and outside Nigeria, on matters of environmental standards, regulations, and enforcement.
iii. Enforce compliance with the provisions of international agreements, protocols, conventions, and treaties on the environment, including climate change, biodiversity, conservation, desertification, forestry, chemicals, hazardous wastes, ozone depletion, marine and wildlife, pollution, sanitation, and such other environmental agreements as may from time to time come into force.
iv. Enforce compliance with policies, standards, legislation and guidelines on water quality, environmental health, and sanitation, including pollution abatement.

[68] https://www.pwc.com/ng/en/assets/pdf/decarbonising-nigerias-economy.pdf

v. Enforce through compliance monitoring, the environmental regulations and standards on noise, air, land, seas, oceans, and other water bodies.
vi. Enforce environmental control measures through registration, licensing and permitting systems.
vii. Conduct environmental audit and establish data bank on regulatory and enforcement mechanisms of environmental standards.
viii. Create public awareness and provide environmental education on sustainable environmental management, promote private sector compliance with environmental regulations and publish general scientific or other data resulting from the performance of its functions.

Provisions for Air Quality Protection in Act

With Regards to Air Quality and atmospheric protection the Act mandates the Agency specifically make regulations setting specifications and standards to protect and enhance the quality of Nigeria's air resources. This is carried out in particular by establishing the following:

i. Minimum essential air quality standards for human, animal, marine or plant health.

ii. The control of concentration of substances in the air which separately or in combination is likely to result in damage or deterioration of property or of human, animal, marine or plant health.

iii. The most appropriates means to prevent and combat various atmospheric pollution.

iv. Control of atmospheric pollution originating from energy sources, including that produced by aircraft and other self-propelled vehicles, industries, factories, and power generating situations or facilities.

v. Standards applicable to emission from any new mobile or stationary source which in the Agency's judgment causes or contributes to air pollution which may reasonably be anticipated to endanger public health or welfare.

vi. The use of appropriate means to reduce emission to permissible levels; and

vii. The Agency may establish monitoring stations or networks to locate sources of atmospheric pollution and determine their actual or potential danger.

6.2.4 National Climate Change Policy – 2021-2030

The National Climate Change Policy[69] was put together to address climate change issues in the Country. The vision of the National Policy on Climate Change is:

> ***A low-carbon, climate-resilient Nigeria, and gender-responsive sustainable socio-economic development.***

Prior to the National Policy on Climate Change, Nigeria already has several policies and strategic initiatives that serve as mitigative climate change measures. These documents contain policy options for climate change response in the country.

Some of the guiding principles in the Policy indicate the need for integration of climate change response into all MDAs which gives room for institutional arrangements within the various sectors. For example, two points from the guiding principles state:

- *Climate change policy is integrated with other interrelated policies towards promoting economic and environmental efficiency.*
- *Climate change is cross-cutting and demands integration across the work programmes of several government Ministries/Agencies/Parastatals and stakeholders, and across sectors of industry, business, and the community.*

The principal goal of Nigeria's response to climate change is to ensure a low-carbon, high growth economic development path and build a climate-resilient society. To achieve this goal, the following objectives are set:

- Implementing adaptation and mitigation measures that promote low carbon development.
- Strengthening capacities and synergies at local, sub-national and national levels and at individual and institutional levels to implement climate change response.
- Promoting scientific research, technology, and innovations to address the challenges of climate change.
- Developing and implementing appropriate strategies and actions to reduce the vulnerability of Nigerians to the impacts of climate change across all sectors.
- Promoting sustainable land-use systems that enhance agricultural production, ensure food security, and maintain ecosystem integrity.
- Promoting climate-proofing of construction and infrastructural development.

[69] https://climatechange.gov.ng/wp-content/uploads/2021/08/NCCP_NIGERIA_REVISED_2-JUNE-2021.pdf

- Enhancing national capacity to mobilize international and national resources, both technical and financial, for investment in climate change. This will allow climate change related activities to gain preference in the country.
- Developing an effective climate change communication and information management system that facilitates access by all stakeholders to climate information.
- Strengthening national institutions and mechanisms (policy, legislative and economic) to establish a suitable and functional system for climate change governance.

The last point is very important and supports the objective of setting up a functional carbon pricing mechanism in the country. Therefore, achieving climate change goals require setting up proper governance and the climate change policy had already set targets on activities that need to be pursued which include:

- Development, amendment and perfection of the legal normative documents and system concerning climate change response and other related policies to ensure that appropriate legislation is in place for the implementation of the activities of the National Climate Change Response Policy (NCCRP).
- Mainstreaming of climate change issues into strategies, plans and planning for socioeconomic and sectors development.
- Establishing a functional climate change governance structure and mechanism to encourage coordination of NCCRP implementation at all levels.

It was further made clear that a legal framework will be established through an Act of Parliament with provisions for:

- The establishment of the National Climate Change Agency/Commission and all other Climate Change Management structures and committees.
- The powers and functions of the Climate Change Commission/Agency.
- The consistent implementation of the plan to make the Nigerian economy carbon-efficient and the society climate-resilient.

The National Climate Policy recognises significance of the international cooperation and had clearly stated that as a Party to the UNFCCC, the Kyoto Protocol and recently the Paris Accord, Nigeria will continue to demonstrate its relevance through international cooperation by evolving a system for tracking international trends and effective participation in negotiations.

Importantly, the policies considered Finance and Finance Mobilization as one of the elements, which should be properly harmonised to promote climate-resilient development. Mitigation and adaptation to

climate change is costly and would compound the country's socio-economic development. Estimation in the implementation of the country's NDC will require about $142bn in the next decade. Thus, this has led to strengthening frameworks for attracting domestic and international financing for low carbon and climate resilient development is critical. The government of Nigeria has issued Green Bonds as innovative means and alternative way of raising climate finance and has released the guidelines for the Green Bonds that target about $248 million in climate finance to support national projects which includes Renewable energy (solar, wind, hydropower, and energy efficiency) over the next decade.

The country recognises the huge opportunity the need for a more robust climate finance mechanism, and thus takes advantages of its global networks and linkages. This climate policy has been directed to mobilize and align national climate financial mechanism with global ones, including the Green Climate Fund and others available through private sector arrangement (national, regional, and international financial institutions). It is planned and articulated that Nigeria will embark on an intensive climate finance mobilization and greater investment for sustained climate financing.

6.2.5 Nationally Determined Contribution (2021 Update)

Nigeria as part of its commitment to address the global issue of climate change submitted its NDC in 2015, ratified the Paris Agreement in 2017[70] and submitted a revised first NDC in 2021. The NDC submitted by the country provides a more recent update of the country's emission using the base year of 2018, with further details on the emissions level by 2030 under a business-as-usual scenario. The updated NDC provided a possible enhanced ambition objective with the inclusion of fugitive methane in the oil and gas sector and emission from the waste sector. This presents the country with the opportunity to increase its emission reduction targets. Priority sectors for mitigation are energy, industry, and waste. A further breakdown of the sector's GHG emission was discussed in section 5 above.

6.2.6 National Gas Flare Commercialization Programme

The Federal Government of Nigeria (FGN) is committed to its policy position that gas flaring is unacceptable and the FGN has continued to support initiatives and actions that buttresses its commitment to ending the practice of gas flaring in our oil fields. In demonstration of its commitment, the FGN ratified the Paris Climate Change Agreement, and is now a signatory to the Global Gas Flaring Reduction Partnership (GGFR) principles for global flare-out by 2030.

6.2.7 Nigeria's Decade of Gas (2020 – 2030)

Nigeria's 'Decade of Gas' is a government-led initiative targeted at harnessing the country's gas reserves to drive economic growth and development. It was launched by President Muhammadu Buhari in Abuja. Nigeria, as part of the plan will collaborate with other stakeholders, ramp up gas use in the decade from 2020 to 2030. The 'Decade of Gas' initiative is built on the premise that gas is a key driver of economic growth and development and will help to switch from high carbon intensive fossil fuels LPFO, Diesel etc) to low carbon fossil fuels (natural gas).

6.2.8 2050 Long Term Vision for Nigeria (LTV 2050)

This document is geared at the development of Nigeria's Long-term low emissions development strategy (LT-LEDS). The vision states that by 2050, Nigeria is a country of low-carbon, climate-resilient, high growth circular economy that reduces its current level of emissions by 50%, moving towards having net-zero emissions across all sectors of its development in a gender-responsive manner. The Long-Term Strategies (LTS) is a veritable tool and approach with which countries explore the GHG emissions implications of their development aspirations options which can decouple economic growth from emissions to bridge sustainable development and climate goals. The Paris Agreement recommends that all Parties should strive to formulate and communicate LT-LEDS by 2020 as long-term vision/strategy for responding to climate change. Leveraging its NDC, Nigeria is integrating into its national development agenda, a

[70] https://unfccc.int/node/61130

transition to a low-carbon development pathway because of the tremendous benefits it holds for sustainable national development. In the long run, an LT-LEDS is important for Nigeria to

- *Carve out a national vision for climate-resilient society that will help in the integration and coordination of critical action programmes on economic, environmental, health, and other sectors, as well as turning programmes, strategies, and plans into concrete actions.*
- *Establish a clear trajectory for achieving a low carbon development, the pillars for such a vision and the policies and measures that will help in the actualization of the vision.*
- *Realign national policy on climate change to meet the overarching goal of the country's LT-LEDS by 2050.*
- *Build on partnerships for the Economy and Climate, bringing together government, business, and economic leaders to enhance global and national understanding of how climate action can and drive economic, social and development objectives.*
- *Set Nigeria on a low-emission, green growth and climate-resilient development pathway that will not only help the country to meet its international climate commitments with appropriate actions but also establish implementable policies and financing priorities for low emission economic growth and support buy-in and ownership across numerous* stakeholders around a shared vision.
- *Nigeria's energy sector shall be decarbonized by halving emissions in the sector relative to current levels and increasing the contribution of renewables to the country's energy mix by 50% with a view of achieving net zero carbon emission by the end of the century. Achieving this would need an instrument (carbon pricing) to curb emissions as power output is expected to substantially increase while the sector is to cut emissions by half. Also, it would require implementation of renewable energy technologies to displace fossil fuel power generation.*

6.2.9 Energy Transition Plan

The Nigeria Energy Transition Plan (ETP) is the country's commitment to attain net zero by 2060. It is a data-backed, multi-pronged strategy developed for the achievement of net-zero emissions in terms of the nation's energy consumption.

The Nigeria ETP sets out a timeline and framework for the attainment of emissions' reduction across 5 key sectors: Power, Cooking, Oil and Gas, Transport, and Industry. Within the scope of the ETP, about 65% of Nigeria's emissions are affected.

6.3 Assessing synergy of national policy with carbon pricing

It is evident from the above review of the policy relevant to climate change in the country that there is an established framework in place that could aid the implementation of both mitigation and adaptation initiatives.

The Climate Change Act supports the creation of a carbon pricing instrument and states explicitly the need to use a market-based mechanism such as carbon taxes and emission trading in enhancing mitigation actions in the country. This is supported by the creation of a climate change fund with the purpose of warehousing amounts paid by way of:

- Carbon taxes or emission trading.
- Appropriations from the National Assembly.
- Funding from international organisations.
- Fines and charges issued to private and public entities, subventions, grants, donations, fees etc.

The proceeds are to be disbursed towards funding climate change mitigation initiatives, incentivising private and public entities that meet their GHG emission reduction targets, conducting climate change impact assessments, and running the NCCC.

6.4 Stakeholders Analysis: Overview of Responsibilities on Climate and Energy Matters

Table 9 below presents an overview of the responsibilities of relevant institutions on climate and energy. These highlight the respective responsibilities of the stakeholders that will be relevant in the introduction of Carbon Pricing instruments both at the federal and state levels.

Table 9 : Key highlight of responsibility of various entities on climate issues

Respective Entity	Responsibilities
Federal Ministry of Environment (FMEnv)	Coordinate activities on issues related to climate change and the environment. The Department of Climate Change (DCC) is under the ministry.
Department of Climate Change (DCC)	Coordinate activities towards national implementation of the Climate Change Convention, its Kyoto Protocol, and the Paris Agreement.
National Council on Climate Change	National Focal Point to the UNFCCC and coordinating entity on MRV system in the country. To monitor, verify and report on the extent to which the national emission profile is consistent with the carbon budget and track the country's progress on the implementation of the country's climate action plan.
Ministry of Petroleum Resources	Responsible for coordinating activities within the oil and gas sector. It has two regulatory bodies that are the Nigeria Upstream Petroleum Regulatory Commission (NUPRC) and the Nigeria Midstream and Downstream Petroleum Regulatory Authority (NMDPRA)
Federal Ministry of Finance	Responsible for managing the finances of the Federal Government of Nigeria, including managing, controlling, and monitoring federal revenues and expenditures.

Respective Entity	Responsibilities
Federal Inland Revenue Service	The Federal Inland Revenue Service is the agency responsible for assessing, collecting, and accounting for tax and other revenues accruing to the Federal Government of Nigeria. Will play active role in coordinating efforts as regards carbon tax.
Federal Ministry of Transport	Responsible for coordinating all transport-related activities at the federal level.
State Ministry of Transport	Coordinate activities on transport within the level of the states.
Federal Ministry of Power	It's the policy arm of the government responsible for all activities within the power sector.
Ministry of Industry	Responsible for formulating and implementing policies within the industrial sector
National Bureau of Statistics (NBS)	National Agency is responsible for the development and management of official statistics including energy, the authoritative source and custodian of official statistics in Nigeria.
National Environmental Standards and Regulations Enforcement Agency (NESREA)	The environmental regulator and enforcement agency for assuring compliance with the provisions of all national and international policies, regulations, standards, guidelines, treaties, protocols, and conventions on the environment.

It should be noted that Nigeria has developed a Climate Investment Fund plan for an expected $250 million to contribute to national strategies for sustainable, low carbon development. Some of the projects focused on including bus-based urban transport improvements in the cities of Lagos, Kano, and Abuja, and a financing facility to catalyze private sector investment for renewable energy and energy efficiency across various industries[71]. Nigeria is also a partner on the Green Climate Fund dedicated for climate projects within the country. Similarly, the Climate Change Act of 2021 in part IV makes financial provisions for a Climate Change Fund, which collects sums, subventions and grants and donations, funding from international organisations, fines and charges from private and public entities, carbon tax and emission trading. In developing a carbon pricing for the nation, an institution of this repute can be set up to handle revenues and proceeds from the carbon markets in the country.

Existing MRV Structure in the relevant Sector

Currently, there exists a validated MRV framework for some of the NDC priority sectors. This MRV framework was developed by the Initiative for Climate Action (ICAT). The focus of the ICAT project supervised by the Federal Ministry of Environment was to prioritize MRV for the oil and gas, transport, agriculture, Forestry, and other land use (AFOLU), and an overall framework was necessary for all sectors based on IPCC (Intergovernmental Panel on Climate Change) classification. Hence, the MRV structure was harmonized to include the priority sectors and allow for effective monitoring and coordination of the country's climate ambition while actively engaging identified sector stakeholders.

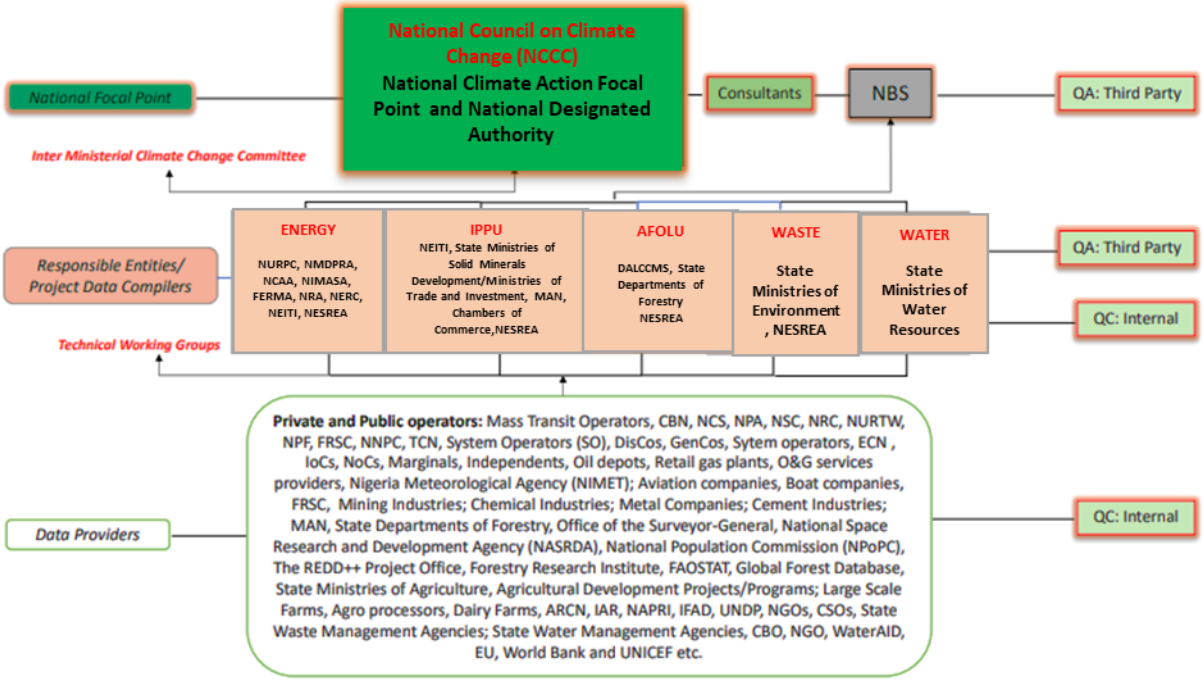
The hybrid model proposed by the sector experts was mainstreamed into the MRV design in which the management and co-ordination of the inventory preparation and compilation are carried out in a

[71] https://www.climateinvestmentfunds.org/country/nigeria

centralized manner by the DCC, but sector-specific mandates on data for both inventory and mitigation are designated to specific MDA(s) within the relevant sector to coordinate the sectoral inventory activity. The DCC under FMEnv was expected to be responsible for the coordination and compiling of the national GHG inventory thus acting as a data repository center. However, with the new institutional arrangement for Climate Change, the overarching coordinating institution (NCCC) has taken over the responsibility of the DCC. Also, under the auspices of the Ministry of Environment, the Climate Change Registry was recently developed for the compendium of mitigation and adaptation projects.

Seemingly, the MRV structure extends to other site based MRV structures such as the data repository center under the NUPRC for the oil and gas sector. In the electricity industry, the National Control Centre under the Transmission Company of Nigeria (TCN) monitors real time on the power generation on grid while the gas suppliers (majorly Nigeria Gas Company, NGC) monitor the volume of gas supplied to each power generating facilities. The NCCC (formerly DCC) is expected to continue in the role of data control and coordination among all sectors. Also, the compilation of the GHG inventory is coordinated by the NCCC inventory division with support from sector experts (consultants). However, the coordination of mitigation activities will be at the sector level while communication to the NCCC will also be required for close monitoring of progress to have a registry on mitigation outcome. It should be mentioned that the establishment of the climate change council, has currently e replaced the DCC.

Figure 13: Overarching Institutional Arrangement for MRV in Nigeria



Source: Nigeria ICAT Overarching Institutional Arrangements Report

7.0 Design Options for Carbon Pricing

This chapter discusses design options for carbon pricing for the consideration of the government and other concerned MDAs. The chapter highlights the two main approaches for putting a price on carbon emissions which were discussed in Chapter 3 (Carbon tax and Cap-and-trade).

The analysis of the design options considers the Nigeria's context and current situation, keeping in mind that the introduction of a carbon pricing instruments should not jeopardize social and economic development goals, the international competitiveness of Nigerian companies, or the population's access to modern, affordable, and reliable energy sources but carbon price instruments should, to an extent be practicable, complement and reinforce these goals. The principle of "fairness" which states that the costs and benefits of carbon pricing should be dispersed equitably while avoiding a disproportionate burden on the most vulnerable people was considered in the analysis of the Carbon Pricing design options for Nigeria.

7.1 Establishment of Carbon Tax in Nigeria

Establishing a carbon tax in any jurisdiction requires that the tax is framed within the jurisdiction's socio-economic and fiscal context. Therefore, to enhance a smooth run of the process and allow for easy compliance to the instrument in Nigeria, these options must be in line with the context and circumstances of the country. Below presents opportunities and basis upon which a Carbon Tax can be established in Nigeria.

- A form of tax has been recognized in the NGFCP as an instrument that could be deployed to foster the reduction of GHG emissions as well as other co-benefits. The introduction of the 2018 new payment regime (penalties) for gas flaring which adopts the ''polluter pays' principle mimics the carbon tax.
- Existence of institutional structures which could enable a relatively quick and smooth introduction of carbon tax in Nigeria especially in the Energy Sector.
- The ease and flexibility of the instrument, which can be swiftly introduced and readjusted based on the results achieved.
- Carbon taxes have been introduced by other jurisdictions in the region (Carbon Tax in South Africa) with several other countries in Africa considering its implementation. This could serve as reference for Nigeria to introduce a Carbon tax.
- As a country that has faced budgetary constraints in recent history, the introduction of a carbon tax could bring additional revenues to the government.

However, some of the potential challenges and the solutions in introducing a carbon tax in Nigeria are presented in Table 10 below:

Table 10: Potential challenges and the solutions of introducing Carbon tax in Nigeria.

S/N	Challenges	Solutions
1	The public beliefs on the misappropriation of funds raised from taxes by government in Nigeria	• A specific dedicated fund with transparent use of revenues/proceeds (including if revenues are redistributed to those affected) is needed. • Proper utilization of the taxes collected.
2	Low support base and general resistance to the introduction of taxes, charges, or levies of any kind, multitude of taxes are believed to exist e.g., regime of taxation on diesel	• Transparency in the tax system. • Proper utilization of the taxes collected. • Potentially: targeting only large-scale emitters which are entities which are used to being regulated
3	Difficulties to establish continuity within different government regimes and agencies on the opportunities and potential benefits from adopting a carbon tax.	Establish frameworks that will enhance continuity with different government regimes.
4	Concerns related to the "fairness" of a tax on carbon emissions, i.e., the risk and perception that it may disproportionally affect poor individuals in society and hence hindering the access to essential energy services.	This has already been addressed by Nigerian Electricity Regulatory Commission (NERC) with adjustments to electricity tariff regime across ten electricity distribution companies with increases ranging from 5-12 percent. The adjustment to the Multi-Year Tariff Order (MYTO) took effect from February 1, 2022, however, the adjustments came with a consideration for poorest consumers (Lifeline: R1) with energy consumption of not more than 50kWh per month. Such consumer's tariff will remain frozen at N4[72].
5	Remaining fossil fuel subsidies on gasoline. On one hand, these subsidies may be politically difficult to remove. On the other hand, the relatively low demand elasticity in the transport sector may mean that the reduction in emissions brought by such a removal may be limited	Consider instead changing taxation around vehicle import tax and vehicle ownership fees to favor fuel-efficient vehicles since these may have a higher impact on the type of vehicles purchased

[72] https://www.vanguardngr.com/2022/05/nerc-confirms-electricity-tariff-hike-across-10-discos/

Having highlighted the opportunities, challenges, and solutions in introducing a carbon tax in Nigeria, the two options to be considered should the government of Nigeria decide to introduce a Carbon Tax are presented below.

- Introduction of an Economy-wide Tax
- Downstream carbon tax can also be introduced targeting key emitters who represent substantial share of Nigeria's GHG emissions. This could subsequently pave way for a potential ETS. With growing number of facilities present in Nigeria, this could overtime be sufficient for a viable ETS.

It should however be noted that while Nigeria may have the scale for a viable ETS[73], a burden sharing in line with the NDC may call for limited domestic effort while being open to the funding of more ambitious action by international actors.

7.1.1 Introduction of an Economy-wide Tax

This option for Nigeria implies that a tax is paid on GHG emissions both by the producers/importers of fossil fuels (Oil and Gas companies) and the end-users. The end users will include all businesses and individuals purchasing or using fossil fuel in any form in the country to generate energy. It is charged at the petroleum "downstream" sector i.e., at the point of purchase by end-users (at the fuel stations).

Conceptualizing a carbon pricing instrument for Nigeria in line with this option will not only promote the goal of carbon pricing – to expressly establish an economic signal in the form of a price on GHG emissions – but also provide the government with a new stream of revenue.

This option is close to what is operational in Columbia where taxes are levied on energy use[74]. For instance, the National Gasoline Tax (Impuesto Nacional a la Gasolina) which is adjusted annually to inflation applies to gasoline, diesel and all other liquid motor fuels that are used in vehicles and in stationary combustion engines. There is also the National Carbon Tax (Impuesto Nacional al Carbono) which is set to a nominal rate of COP (conferences of parties) 15764 (~EUR 5) per tonne of CO2, and it is also adjusted annually to inflation plus one percentage point. This national carbon tax applies to liquid and gaseous fossil fuels that are used as propellant, in stationary combustion engines, or as heating fuels. It does however not apply to coal and other solid fossil fuels nor to natural gas unless used by refineries or in the petrochemical industry. Emitters have the option to meet their carbon tax liability by using offset credits generated from domestic projects[75].

[73] https://www.vanguardngr.com/2022/08/nigeria-moves-to-partake-in-usd175bn-carbon-trade-market/
[74] The model is not necessarily round fit as taxing coal remains a good idea as it may discourage potential plans for coal-based power generation as well as incentivize the use of alternative fuels (e.g., biomass) in cement production.
[75] https://www.oecd.org/tax/tax-policy/taxing-energy-use-colombia.pdf

It must be mentioned that as good as this option looks adoptable to the Nigeria context, the main challenge anticipated with the adoption of a tax of this type could be on the expected opposition and low level of acceptability by the different stakeholders involved, business entities and the public.

However, should the Nigerian Government opt for this instrument, key success factors in design will be in ensuring it does not disproportionally affect the most vulnerable in the society and importantly that the proceeds from the tax can be returned to those most "negatively" affected by it. This could be done through the provision of incentives by the Government and the development of clean energy projects. It will be critical to consider international good practice should the Government decide to explore this option. The experiences of South Africa, and that of Canada's Province of British Columbia could be a good reference point for the Nigerian Government. For example, gas for clean cooking should be exempt to encourage the shift to gas-based fuels in cooking.

7.1.2 Adjustment of Existing Flare Penalties to a Carbon Tax.

The adjustment of existing flare penalties in Nigeria to a Carbon Tax will involve the introduction of a gradual adjustment on the already existing penalties on flares as stated in the NGFCP for producing oil and gas companies into a carbon tax, whereby an amount would be charged per ton of CO_2e that is flared different from the current $2.00 per 1000SCF of gas for producers of 10,000 barrels of oil or more and $0.50 per thousand standard cubic feet of gas for producers of less than 10, 000 barrels of oil per day[76].

The consideration of this option for the country will to a large extent generate additional revenue for the government. However, a challenge with this option will be compliance by the companies and effective monitoring by the relevant agencies. A way to drive compliance would be to set up a default conservative emission factor for flare gas in the country.

Should the government decided to explore this option, one critical design element that must be considered is the level at which the tax rate is set. It is advisable that rates are gradually introduced and later increased to improve acceptability of the option by the operators and to encourage easy compliance with the option. This can also include operators with small flares and good option could be the use of offsets at the domestic level to compensate for their remaining emissions. Similarly, sources of flaring could be included in the ETS to provide much flexibility on how to achieve the environmental goal.

Alternatively, the including of sources of flaring into an ETS could provide much flexibility on how to achieve the environmental goal.

[76] https://ngfcp.dpr.gov.ng/resources/regulations/ngfcp-regulations/

It should be stressed that what will encourage further compliance to any of the option is for Government to transparently demonstrate that it will properly channel the proceeds from the charges to a specific purpose vehicle for instance, ensuring that the proceeds are used to reinvest on climate change activities.

7.2 Establishment of Cap-and-Trade System in Nigeria

Cap and trade or emissions trading system (ETS) is one of the main approaches of explicitly pricing GHG emissions. It should be noted that Nigeria may be one of the few countries in the region with the necessary number/range of large-scale emitting facilities to enable a well-functioning ETS.

Setting up an ETS in Nigeria that fits into the national circumstances of the country can trigger the generation of multiple benefits. Some opportunities for ETS in Nigeria may include:

- Accelerate the deployment of cleaner forms of energy, including energy efficiency, which hold a significant untapped potential in Nigeria.
- Use resources more efficiently and expand the energy mix by favoring renewable power generation.
- Increase Nigeria's attractiveness to international investments based on environmentally sound Technologies.
- Could be a major opportunity to generate revenue from the sale of allowances for Nigeria as the country needs as much revenue it could generate and selling allowances could enable Nigeria to benefit from the triple benefit of (i) selling allowances, (ii) benefiting from externally funded investment in its mitigation potential while (iii) capturing sustainable development co-benefits.
- Track GHG emissions to the point where they occur, providing a basis of support to monitor progress at a more granular level in the implementation of NDC goals.
- Enabling the effective control of emission level for major sectors, such as the power sector for which concrete emission goals have been set in the LT-LEDS.

Should the government decided to opt for this option, the two main criteria to be considered are:

- Contribution of different economic sectors to national GHG emissions. Since ETS is an instrument to support the curbing of GHG emissions, sectors to be prioritized are those accounting for the largest share of national emissions. An important point to note aside the contributions by the heavy polluters such as the energy sector to GHG emissions, they are amenable to an emission trading scheme (ETS). For example, agriculture related GHG emissions are made of a very large number of small-scale actors which is very difficult to track and monitor. This underscores the reason why ETS have so far not been implemented in this sector. This is applicable to forestry. The merit of big industries inclusion in ETS is the fact that their emissions are the result of a limited number of large-scale emitters whose emissions are highly concentrated at few points and relatively easy to monitor, report and verify. To some extent, the same applies to selected large industrial sites – and explains why nearly all ETS include the power sector and most include the

largest industrial sources of direct emissions. As discussed in Chapter 5 of this report, the energy sector in Nigeria represents the largest emitting sector accounting for about 60.2 per cent of the total emissions, while the AFOLU, Waste and IPPU accounted for 15.7, 9.3, 9.4 and 5.3 per cent respectively.

According to 2018 Nigerian Oil and Gas Industry Annual Report by the then Department of Petroleum Resources (DPR), the total number of fields (producing) as at the end of December 2018 stood at two hundred and thirty-two (232) for the forty-seven (47) oil producing companies and these are made up of two thousand, six hundred and sixteen (2,616) wells producing from two thousand, nine hundred and thirty-nine (2,939) strings[77]. This large number of producing wells in the sector attributed to its 33 per cent of total emissions within the energy sector followed by Energy industries with 24 per cent and the transport sector with 21 per cent.

- The effectiveness of an ETS strongly depends on strong and functional MRV systems (the ability to measure and monitor GHG emissions) with a "reasonable" level of accuracy, which implies that the setting-up of a system to measure, report and verify (MRV) emissions cannot be overemphasized. While the Nigeria oil and gas sector can be said to have these frameworks put in place, some economic sectors for instance the transport, waste, and even the water sectors currently have little, or no structures in place. At best, they are at their infant stage.

  Since the ETS also allows for the trading of emissions, there is also the need for a functional national ETS registry where all mitigation actions and the amount of emission reductions from the mitigation actions across the sectors can be reported. The registry should be designed in a way that it can be tracked, report emissions as well as hold allowance units.

  It is important to note that Nigeria through the FMEnv and relevant agencies has taken early steps in the direction of setting up frameworks to establish a national climate registry and MRV systems within the NDC priority sectors especially the large-scale emitting facilities. However, there is still a long way to go in achieving a functional process.

  Energy consumed by facilities need to be tracked and reported. Meters at facility level should be properly calibrated such that energy consumption is tracked and reported.

[77] https://www.nuprc.gov.ng/wp-content/uploads/2020/01/2018-NOGIAR-1.pdf

7.3 Summary

Table 11 below presents a summary of the various carbon pricing options discussed above. It also presents the pros and cons and the potential for acceptance of the instrument. These options are also ranked qualitatively with regards to their level of political feasibility, technical feasibility, corporate sector acceptance, public acceptance, and overall expected impact in terms of GHG emission reductions. Based on this summary, a recommendation has been provided in Chapter 8 below.

Table 11: Carbon pricing options for the consideration of the Government of Nigeria

Mechanism /Instrument	Main Design Features	Main Pros	Main Cons	Political feasibility	Technical feasibility	Corporate acceptance	Public acceptance	GHG Reduction potential
Economy-wide Carbon Tax	i) Introduction of an economy-wide instrument that puts a price on CO_2 emissions that would apply to all users of fossil fuel. ii) The point of regulation would be downstream. (i.e., at the point of fuel purchase)	i) Ease of understanding for all stakeholders involved ii) Low implementation cost iii) Creation of revenue source due to price certainty	i) General resistance among different government agencies and the public to a tax ii) Risk of the poorest being disproportionally affected by the tax unless impact mitigation measures are established iii) Emission reduction outcomes depend on how high the tax is set	**Low**	**High**	**Low**	**Very Low**	**Very High**
Flare Penalties to a Carbon Tax	i) Adjustment of flare penalties to payment per ton of CO_2	i) Relatively low administrative cost ii) Generation of additional revenue iii) Ease of understanding for all stakeholders involved iv) Already existing structures to initiate the option	i) Risk of low influence in changing end-use behaviors towards less carbon-intensive fuels ii) Revenue generated from the tax may be used for purposes other than climate change mitigation or adaptation iii) Limited scope which does not support other NDC and LT-LEDS goals	**Medium**	**Very High**	**Very Low**	**Very Low**	**Very High**
Domestic emissions trading scheme	i) Initial targeted sectors: Energy Sector (Oil and Gas Sector, electricity) ii) Possibility of future expansion to other sectors iii) Possibility for offset use in sectors not covered by the emissions cap (e.g., agriculture Sector)	i) Certainty in emissions reductions based on the cap defined and opportunity to directly link with NDC targets ii) Opportunity to trade emission allowances.	i) Functional MRV frameworks required ii) High costs of development and implementation iii) Need to set up from scratch. iv) Operational, administrative and legal	**High**	**Low**	**Low**	**Low**	**High**

Mechanism /Instrument	Main Design Features	Main Pros	Main Cons	Political feasibility	Technical feasibility	Corporate acceptance	Public acceptance	GHG Reduction potential
		iii) Strong potential for linkages with international markets and selling mitigation outcomes	infrastructure (e.g. functional ETS registry, legal frameworks etc.) needed. v) Strong need for capacity building of all relevant stakeholders. vi) Requires long term for full implementation.					

8.0 Recommendation and Conclusion

This study analyzed the potentials for the introduction of carbon pricing instruments in Nigeria. The evaluation was based on an examination of existing structures and frameworks as well as international best practices. In this study, the specific national circumstances of Nigeria were also considered and examined in depth.

This study shows that Nigeria can implement carbon pricing which might open a slew of new opportunities and benefits. Carbon pricing in Nigeria might drive investments in low-carbon technologies, particularly renewable energy, and energy efficiency, as well as spur technical innovation, international knowledge transfer, and increase Nigerian companies' competitiveness.

Importantly, adopting a carbon pricing instrument will contribute to the reduction of GHG emissions hence providing a robust platform for managing emissions and supporting the implementation of the NDC and LT-LEDS. The study also established that adopting Carbon pricing instruments in Nigeria could be an important source of revenue to the government.

Considering the benefits and opportunities identified in this study, it is recommended that the government of Nigeria should take further steps towards the development of a carbon pricing instrument.

Some other key recommendations are presented below:

- There should be consideration for the development of an ETS on the mid to long term, prioritizing over the short-term steps. The ETS should be developed after robust and functional frameworks have been put in place in the country (MRV systems and functional Climate/Carbon Registry). The ETS should cover large-scale emitters in the sectors with a high mitigation potential.
- Emissions from Oil and Gas as well as Industry sectors are recommended to be initial priority for inclusion under scope of carbon pricing instrument.
    - This is due to existing frameworks and structures within the O&G sector and easier MRV framework for heavy Industries.
    - Flare penalties should henceforth be accessed as carbon tax paid for in units of CO_2 emitted.
- The carbon tax should be expanded beyond O&G to include transport sector and other high emitting Industries in the energy sector.
- Waste and Power sectors can be considered in midterm session.
- AFOLU sector could be considered as target for incentive based.
- Carbon market is already in the process in the country hence the need to consolidate efforts to have robust carbon market.
- **Carbon Tax** would be a suitable instrument for the short-term while the ETS should be developed within the midterm to long term. Analysis shows that the level of support and acceptance for an economy-wide carbon tax – among government institutions, corporate sector and the public is low; this can be attributed to low awareness and poverty among the people.
- Carbon Tax could be in the form of an economy-wide carbon tax or an adjustment on the existing flare penalties to a carbon tax in the case of Oil & Gas industry. The tax can also be applied on a

modest level specifically on large-scale emitters as these would enable the road-testing of the corresponding MRV which could, later, be used for an ETS.

- It is recommended that a carbon pricing instrument that will be introduced should be adopted based on a short-mid-to-long term ambition. This would allow a gradual introduction of the instrument and allow for monitoring of the acceptability of the instrument. Focus of the short term should be on the oil and gas sector and other heavy polluters in the industrial sector, while the mid-long term can introduce the power and waste sectors. The waste as a sector, does not currently have sufficient frameworks that will enhance the introduction of a functional carbon pricing instrument. The transport sector in its case, still lacks approved national transport policy document.
- The AFOLU sector is not recommended as priority for carbon pricing instrument, however, the sector could be considered as target for incentive-based initiatives.
- It is highly recommended that a comprehensive awareness, sensitization, and definition of scope is carried out among all relevant stakeholders and to the public. The importance of this is to enable broader support for the introduction of carbon pricing instruments.
- Strong recommendations are given for capacity building of the stakeholders that will be involved in the process of introducing the carbon pricing instrument.
- "It is recommended that the National Council for Climate Change (NCCC), the National Environmental Standards and Regulations Enforcement Agency (NESREA), the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) of the Ministry of Petroleum synergize to work out best modalities to ensure an effective introduction of a carbon pricing instrument. On the other hand, the Federal Ministry of Finance, Budget, and National Planning as the entity responsible for receiving taxes for the country must ensure the appropriate utilization for the proceeds from the taxes generated.
- A short-term priority which is irrespective of the type of instruments applied (carbon tax or ETS) should be the establishment of an MRV infrastructure requiring large-scale emitters to report on their GHG emissions on an annual basis, with a proper structure in charge of organizing this MRV and ideally a legal mandate for requiring the monitoring and reporting from covered entities. Performing such an MRV could have the added benefit from enhanced granularity in assessing and reporting GHG emissions for transparency purposes, and could also benefit mitigation activities, whether driven by climate finance or by carbon finance.

8.1 Conclusion

This study is concluded on the premise that carbon pricing instruments in Nigeria is a welcoming initiative, necessary to mitigate carbon emissions. The justification put forward in the earlier chapter reflects the urgency and viability for action.

With the review and assessments put forward, it can be concluded that:

- Carbon Tax in the energy sector in the short term is a good option. Specifically, the oil and gas sector and other heavy polluters (manufacturing industries) should be prioritized, however, the Power sector should be initially excluded based on challenges associated with the sector and included only at a later point of time, noting however that MRV in the power sectors should be launched and conducted.
- Gradually, as the transport and waste sector grow and approaches profitability, carbon pricing should be considered for implementation in the midterm, while the agricultural sector should be incentivized.
- Process towards the mid to long term emission trading scheme should begin and be considered for about 50 top polluters in ranking, which would build upon the carbon tax in the long term. An immediate opportunity exists for mapping these large-scale emitters and establishing their MRV which would constitute an important foundation of a national ETS.
- Adequate awareness raising as well as capacity building of stakeholders should be considered before the deployment of carbon instrument with appropriate communication on the benefits and challenges of the instrument. This will give a clear understanding of the initiative and promote inclusiveness and ownership.

Annex 1: Grid Connected Power Plants in Nigeria[78]

S/N	Power Plants	Fuel	Type	Capacity (MW)	Ownership	Location
1	Kainji Power Station	Hydro	Hydro Power	760	Concession	Niger
2	Jebba Power Station	Hydro	Hydro Power	576.8	Concession	Niger
3	Shiroro Power Station	Hydro	Hydro Power	600	Concession	Niger
4	Egbin Thermal Power	Gas	Steam	1320	Private	Lagos
5	Sapele Thermal Power	Gas	Steam	1020	Private	Delta
6	Transcorp -Ughelli	Gas	OCGT	972	Private	Delta
7	Afam I-IV	Gas	OCGT	977	Private	Rivers
8	Geregu I	Gas	OCGT	414	Private	Kogi
9	Omotosho I	Gas	OCGT	335	Private	Ondo
10	Olorunsogo	Gas	OCGT	335	Private	Ogun
11	Kwale – Okpai	Gas	CCGT	480	Private	Delta
12	Afam VI	Gas	OCGT	642	Private	Rivers
13	Ibom Power	Gas	OCGT	190	State govt	Akwa Ibom
14	AES Barge	Gas	OCGT	270	Private	Lagos
15	Omoku Power Station	Gas	OCGT	150	Private	Rivers
16	Trans Amadi	Gas	OCGT	180	State govt	Rivers
17	Rivers IPP	Gas	OCGT	180	State govt	Rivers
18	Aba IPP	Gas	OCGT	140	Private	Abia
19	Geregu	Gas	OCGT	434	NIPP	Kogi
20	Sapele	Gas	OCGT	450	NIPP	Delta
21	Alaoji Power Plant	Gas	CCGT	1074	NIPP	Abia
22	Olorunsogo II Power	Gas	CCGT	675	NIPP	Ogun
23	Omotosho II Power	Gas	OCGT	450	NIPP	Ondo
24	Omoku II Power Plant	Gas	OCGT	225	NIPP	Rivers
25	Ihovbor Power Plant	Gas	OCGT	450	NIPP	Edo
26	Calabar Power Plant	Gas	OCGT	561	NIPP	Cross river
27	Azura Power Plant	Gas	OCGT	450	Private	Edo
28	Paras Energy	Gas	Gas Engines	132	Private	Lagos
29	Kashimbilla Power Plant	Hydro	Hydro	40	Federal Govt	Taraba

Annex 2: Under Construction Power Plants in Nigeria

S/N	Power Plants	Fuel	Type	Capacity (MW)	Ownership	Location
1	Mambilla Power Plant	Hydro	Hydro Power	3050	Federal Govt	Taraba
2	Itobe Power Station	Coal	Steam	1200	Private	Kogi
3	Kano Power Station	Hydro	Hydro Power	100	Federal Govt	Kano
4	Qua Iboe Power Station	Gas	Gas Power	540	Private	Akwa Ibom
5	Zungeru Power Plant	Hydro	Hydro Power	700	Federal Govt	Niger
6	Kaduna Power Plant	Diesel/Gas	OCGT	215	Federal Govt	Kaduna

[78] https://infoguidenigeria.com/power-stations-nigeria/

7	Gurara Power Plant	Hydro	Hydro Power	40	Federal Govt	Kaduna
8	Dadin Kowa Plant	Hydro	Hydro Power	39	Federal Govt	Gombe
9	Okpai Power Plant	Gas	CCGT	480	Private	Delta
10	Egbema Power Plant	Gas	OCGT	338	NIPP	Imo
11	Gbarain Power Plant	Gas	OCGT	225	NIPP	Bayelsa

Annex 3: Cost- and Service-Reflective Tariffs

Reform on electricity tariff is a necessity and long overdue in the Nigeria power market. In March 2020, NERC issued an order to transition from demand-based to cost-reflective and service-reflective tariffs. Unlike the former tariff, consumers are now to pay based on how long they receive electricity daily, divided into groups commensurate with the quality of services offered. This new tariff suffered several delays due to COVID-19; the change finally took effect in September 2020.

The thrust of the Nigeria's new tariff structure include:

Financial sustainability: Reduced tariff shortfalls are expected during the transition. In 2020, the Federal Government reportedly spent about ₦380 billion (US$960 million) on electricity subsidies to cover the shortfalls but was reduced to ₦60 billion in 2021[79].

Improved service quality: Distribution companies (DisCos) will be assessed based on availability (hours of supply), reliability (frequency and duration of interruptions), and quality (voltage and operating frequency).

The re-designed tariffs aim to ensure that consumers who receive fewer than 8 hours of electricity per day do not see tariffs increase until quality improves. The more hours of service provided, the more cost-reflective, meaning DisCos are incentivized to improve service and transition to full cost recovery. DisCos are required to cluster customers with an agreed quality of service and a service-reflective tariff for each tariff band.

The revised service level agreement will also include compensation to consumers if DisCos fail to meet performance targets.

[79] Service-reflective tariff for power sector begins July 1. Here's what it means - Business Day NG

Figure 14: Projected Revenue Requirement, Allowed Revenue Recovery and Tariff Shortfall in 2020 (Data was sourced from NERC, 2020).

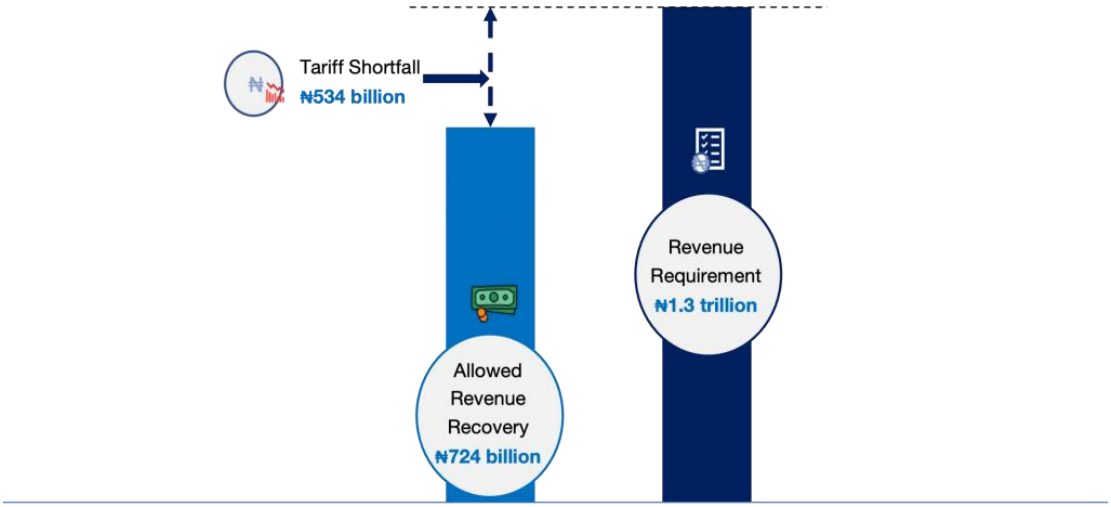


Table 12*:* The new service-reflective tariff bands (Data sourced from NERC, 2020).

TARIFF BAND	ELECTRICITY SUPPLY (HOURS PER DAY)	TARIFF REVIEW
A	Minimum of 20 hours	Highest tariff band
B	Minimum of 16 hours	Second highest tariff band
C	Minimum of 12 hours	Moderate tariff increase
D	Minimum of 8 hours	No tariff increase
E	Minimum of 4 hours	No tariff increase

Despite the service reflective tariff implementation, there are some challenges that remains, they include as follows:

Huge metering gaps: As at early this year, 38% of Nigeria's 10 million active electricity consumers have meters that measures actual consumption and quality. The remaining 62% have been billed on estimations. Those on estimated billing receives capped bills to encourage DisCos to install more meters and reduce the risk to consumers of over-billing. NERC is discussing, with DisCos and meter providers, revisions to regulations and service level agreements to reduce the burden of over-estimated capped bills on consumers through more metering. The COVID-19 pandemic stalled the metering scheme and impacted the availability of imported components for local assembly of meters.

Need for stronger transmission and distribution (T&D) infrastructure: the old ageing T&D infrastructure is a persistent issue in Nigeria. Constant faults and outages are big problems to the supply quality and the consequence is a drastic lower revenues and customer confidence. DisCos are required to provide smart

meters to their 11kV and 33kV feeders to send real-time data to the TCN for monitoring purposes. New tariff-quality linkages aim to provide a push to these measures.

Impacts of the COVID-19 pandemic: financial strain from COVID-19 has impacted on the purchasing power of consumers and decreased electricity demand across the economy. All operators along the electricity value chain are impacted by the effects of inflation and exchange rate volatility. While service-reflective tariffs are a step in the right direction, broader macroeconomic crisis are bound to impact negatively on the sector for the next couple of years until it is contextually addressed.

Adopted from write up by Chigozie Nweke-Eze[80]

[80] https://www.energyforgrowth.org/memo/what-will-cost-and-service-reflective-tariffs-mean-for-the-nigerian-electricity-sector/