

GREEN ECONOMY for SUSTAINABLE DEVELOPMENT: Policies, Regulations and Challenges

Adeola ADENIKINJU

**Professor of Energy Economics
Department of Economics,
University of Ibadan, Ibadan**





Table of Contents

Sections	Description
I	About Green Economy & Sustainable Development
II	International Efforts towards Sustainable Future
III	Analytical Framework for Green Economy
IV	Nigeria and Green Economy: Stylised Facts
V	Nigeria and Green Economy: Policy & Regulatory Framework
VI	Challenges
VII	Conclusion and Way Forward

Green Economy

Green economy is an economy that is low carbon emission, resource efficient, socially inclusive and innovative. It is an economy that results in improving human wellbeing and social equity while significantly reducing environmental risks and ecological scarcities (UNEP 2011)

Objectives of A Green Economy

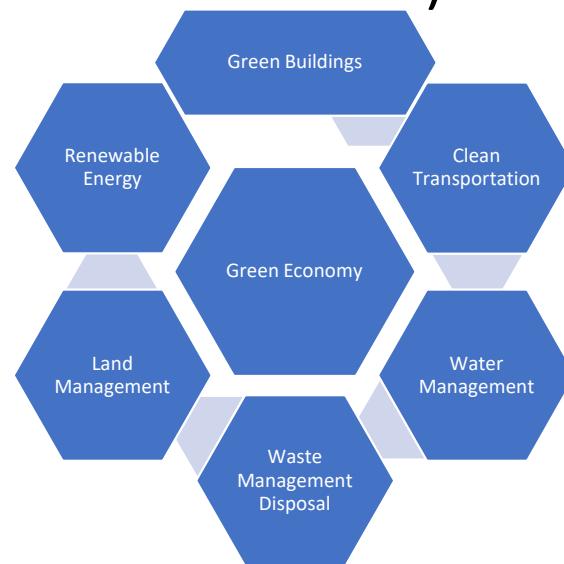
- Efficient use of resources
- Enhancement of social equity and
- Ensuring the resilience of the ecosystem
- All these objectives are to be achieved simultaneously during the process of “greening” the economy.

Benefits from green economy.

Economic benefits	Social benefits	Environmental benefits
<ul style="list-style-type: none"> 1 Reduced poverty and inequality.* 2 Increased economic growth and employment.* 3 Improved training and skills.* 4 Development of new markets and specialization. 5 Increased productivity, and increased commodity and agricultural yields. 6 Improved energy security. 7 Improved competitiveness and trade balances. 	<ul style="list-style-type: none"> 1 Reduced poverty and inequality.* 2 Reduced social inequality.* 3 Increased employment.* 4 Improved training and skills. 5 Better public services. 6 Improved health outcomes. 	<ul style="list-style-type: none"> 1 Sustainable management of natural assets and resources. 2 Reduced greenhouse gas and other emissions. 3 Better adaptation to climate change and resilience to natural disasters. 4 Improved environmental quality.

Components of A Green Economy

- Transitioning to a green economy is not about “greening” certain selective areas of the economy alone but setting a new system with its green market, green institution, green regulations and green behaviors (Burcu Unuvar 2019)



Green Economy and Sustainable Development Nexus

- Green economy is simply a means to achieving sustainable growth and development
- Green growth can assist in the achievement of virtually all the SDGs most especially:
- SDG 3 – Good health and well-being
- SDG 7 – Industry, innovation and infrastructure
- SDG 10 – Reduced inequalities
- SDG 11 – Sustainable cities and communities
- SDG 13 – Climate Action
- SDG 12 – Responsible production and consumption
- SDG 7 – clean and affordable energy.

Selected International efforts towards a sustainable future

Table 1: International initiatives for achieving a sustainable future

Initiatives	Lead organization(s)	Brief summary
The road to Rio + 20: for a development-led green economy.	UNCTAD; working with UNDESA, UNEP, UNDP, UN regional commissions, WTO, and ITC	A collection of articles discussing how to manage a transition towards a green economy
Towards a green economy	UNEP	A report covering many sectors and provides cases for green economy investment.
Green Jobs Initiative	ILO	“Towards decent work in a sustainable, low-carbon world”: promoting green jobs that contribute to preserving or restoring the quality of the environment.
Green Growth Initiative	OECD	Calls for adjustments in the agri-food supply chain that are economically and environmentally sustainable as well as equitable, in order to lead to green growth
Transition to a green economy	UNDESA, UNEP and UNCTAD	A summary of background papers to help establish a common vision on the green economy and concrete targets and timelines.
Greening the economy with agriculture	FAO	To contribute to the definition and implementation of the green economy, producing a GEA Roadmap for 2050 based on the findings of the FAO.

Selected International efforts towards a sustainable future

Table 1: International initiatives for achieving a sustainable future (Con't)

Initiatives	Lead organization	Brief summary
African Investment Initiative.	NEPAD and OECD	Calls for the need to mobilise green investment for growth and job creation in Africa
BASD 2012 (Business Action for Sustainable Development)	ICC, WBCSD and UN Global Compact	BASD is the official UN recognised business and industry channel for Rio + 20. It is a temporary coalition of business groups aimed at providing positive and constructive business input to the Rio + 20 process.
Global Green Growth Platform	World Bank, UNEP, OECD	A new global knowledge platform for governments, international aid agencies, and other development partners, aimed at fostering green Growth.
TEEB for Business Report.	UN Green Economy Initiative	A global study, initiated by the G8 and 5 major developing economies, to build an economics case for ecosystems and biodiversity conservation of ecosystems
COP26	United Nations	It is an annual event that brings together governments from around the world to discuss and review how the climate is managed.

Source: <http://www.farmingfirst.org/greeneconomy>

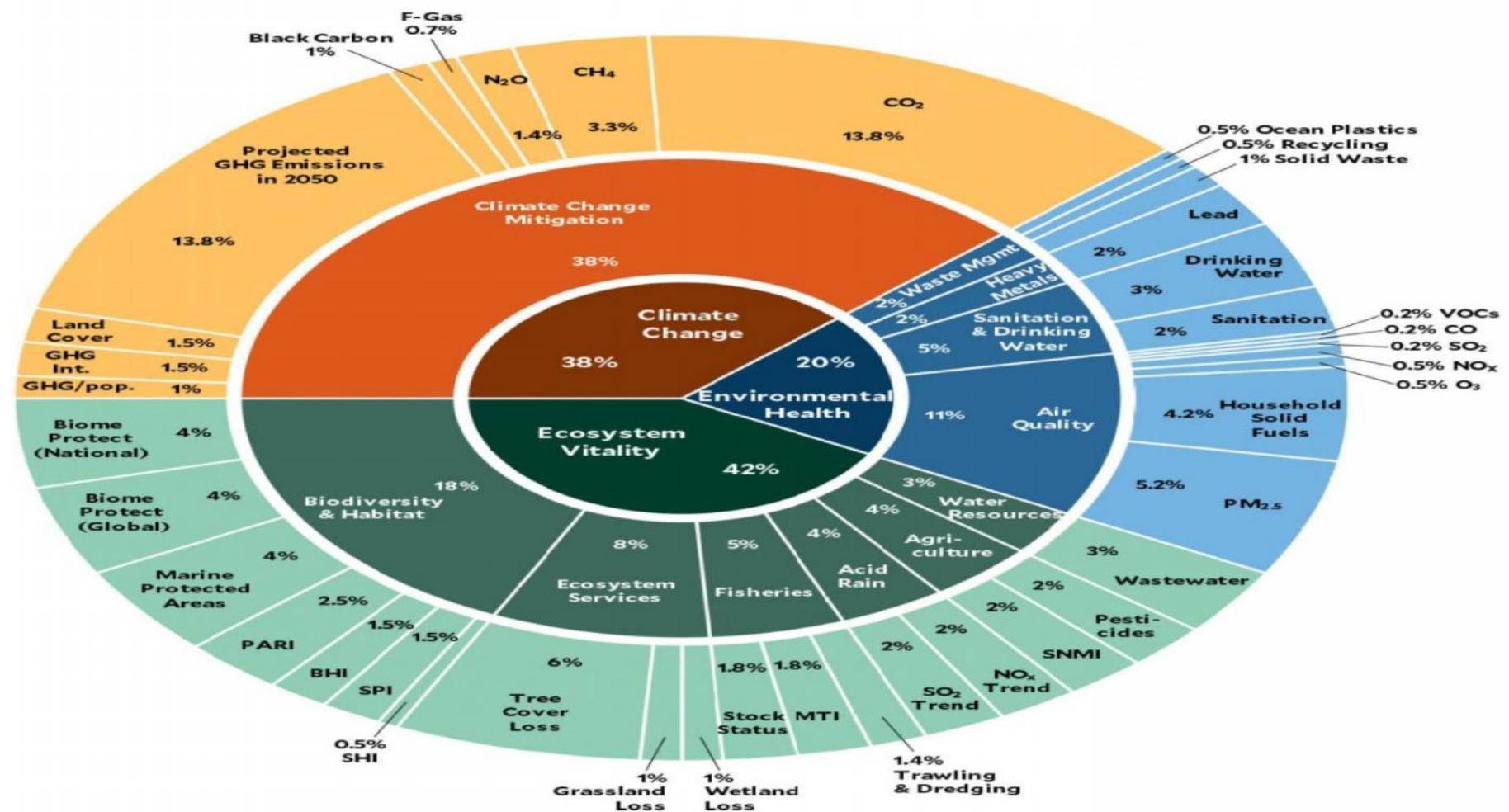
Priority areas COP26

- 1. Adaptation and resilience:** ♦?Helping people, economies and the environment adapt and prepare for the impacts of climate change.♦?
- 2. Nature:** ♦?Safeguarding ecosystems, protecting natural habitats and keeping carbon out of the atmosphere.♦?
- 3. Energy transition:** ♦?Seizing the massive opportunities of cheaper renewables and storage.♦?
- 4. Accelerating the move to zero-carbon road transport:** ♦?By 2040, over half of new car sales worldwide are projected to be electric.♦?
- 5. Finance:** ♦?We need to unleash the finance which will make all of this possible and power the shift to a zero-carbon economy.♦?

Performance Indicators of Green Economies

- Environmental Performance Index rank countries according to their environmental quality and progress towards sustainability using 40 performance indicators, across 11 issue categories.
- The EPI ranks 180 countries on climate change performance, environmental health and ecosystem vitality.

2022 EPI Framework



Top 10 Global Environmental Performance ranking

- The table shows the ranking based on the total EPI measure as well as rankings based on the performances of the countries in achieving the objectives of sustainability.
- The table shows that for an economy to have a high EPI score, the country must invest in all sectors as well as make policies that doesn't trade off one objective for another.

Country	Rank	EPI Score	Ecosystem Vitality Rank	Environmental Health Rank	Climate Change Performance Rank
Denmark	1	77.90	21	10	1
United Kingdom	2	77.70	16	12	2
Finland	3	76.50	18	2	3
Malta	4	75.20	5	24	4
Sweden	5	72.70	23	3	6
Luxembourg	6	72.30	4	7	11
Slovenia	7	67.30	2	31	19
Austria	8	66.50	1	17	46
Switzerland	9	65.90	25	5	23
Iceland	10	62.80	49	1	27
Nigeria	162	28.30	150	175	133

Analytical Framework for Green Economy

- Natural resource and its role in the development process has become an increasingly important issue even in the mainstream economics.
- Many economists have come to see natural resource as a productive input or as one that influences the productivity of other productive inputs in the generation and sustainability of a country's level of economic activity often measured by her gross domestic product (GDP).
- Some countries have taken steps to account for the use of natural resources in the process of generating economic activities.
- This is a major improvement on the standard measure of GDP which ignores environmental degradation and resource depletion.
-

Analytical Discourse contd..

- A nation's wealth consists not just of the quantum of goods and services it produces, but also its natural resource base – its stock of forests, fertility of its soil, freshness of its water and air, among others.
- According to Harris (2002), a nation that cuts its forests, depletes its soil fertility and pollutes its water supplies, is surely a poor nation, no matter the amount of materials goods and services it produces.
-
- The term environmental accounting now allows countries to explicitly account for the amount of natural resources they used up in the process of generating goods and services.

Analytical Discourse contd..

- However, to what extent does natural resource utilization matter for sustainable development?
- Should developing countries be overly concerned with conserving and protecting the natural environment or should they emphasize economic growth and poverty reduction?
- Many African leaders have argued that environment should not be a priority at this stage of development, and that more attention should be focused on creation of wealth and reduction of extant poverty in the continent.
- To these categories of people, development and the environment are mutually exclusive, in spite of the overwhelming evidence of the negative impact of climate change and unsustainable development trajectories on their economies and peoples.

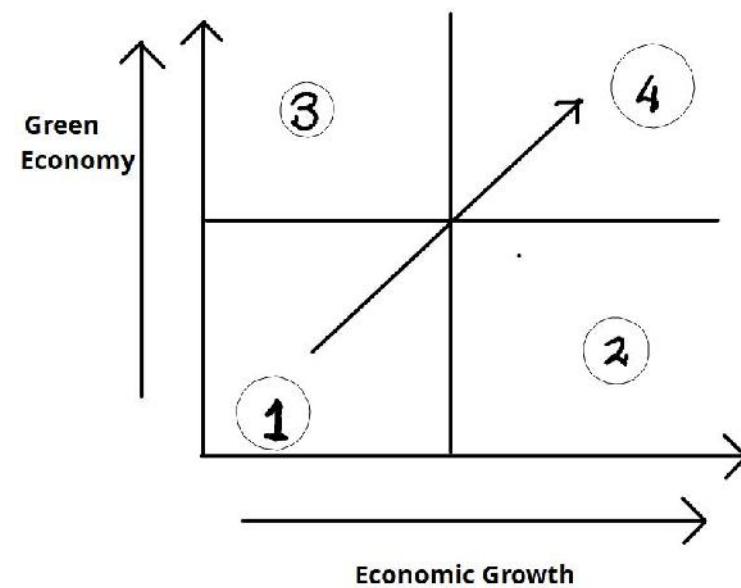
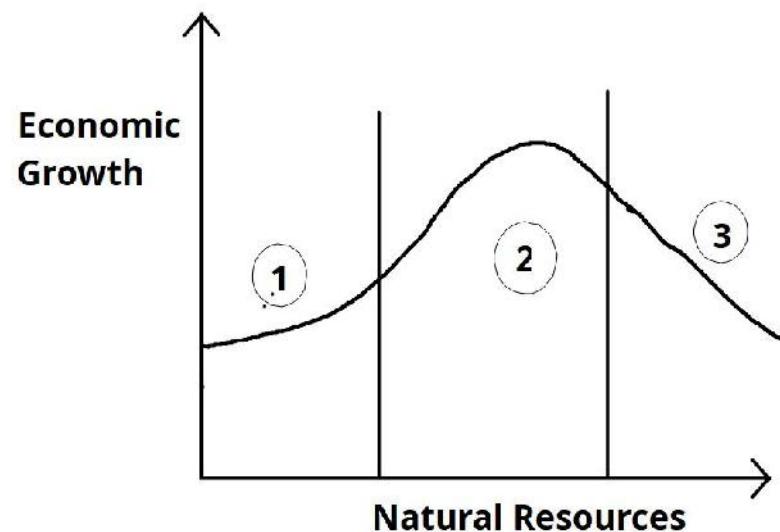
Neoclassical production function

- Using a simple production process, we have
- $$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha} \quad (-, \eta) \quad (1)$$
- Where:
- Y – Output
- A – Total factor productivity (proxy for technology)
- K – Composite capital
- L – Labour
- η – Distribution of wealth
- Following from above, we can divide composite capital into various components:
 - $Y = A \cdot (K_p^{\alpha_1}, K_h^{\alpha_2}, K_w^{\alpha_3}, K_s^{\alpha_4}, K_f^{\alpha_5}, K_n^{\alpha_6}, K_e^{\alpha_7}) \quad (2)$
 - K_p – Physical capital (function of savings and investment)
 - K_h – Human capital (function of education, health, fertility, etc.)
 - K_w – Foreign capital (function of trade, FDI, etc.)
 - K_s – Social capital (function of rule of law, sanctity of contract, leadership quality, etc.)
 - K_f – Financial capital (function of inflation rate, interest rate, etc.)
 - K_n – Natural capital (function of natural resources rents, environmental quality, etc.)
 - K_e – Energy capital (a function of access to electricity, etc)

Analytical Discourse contd..

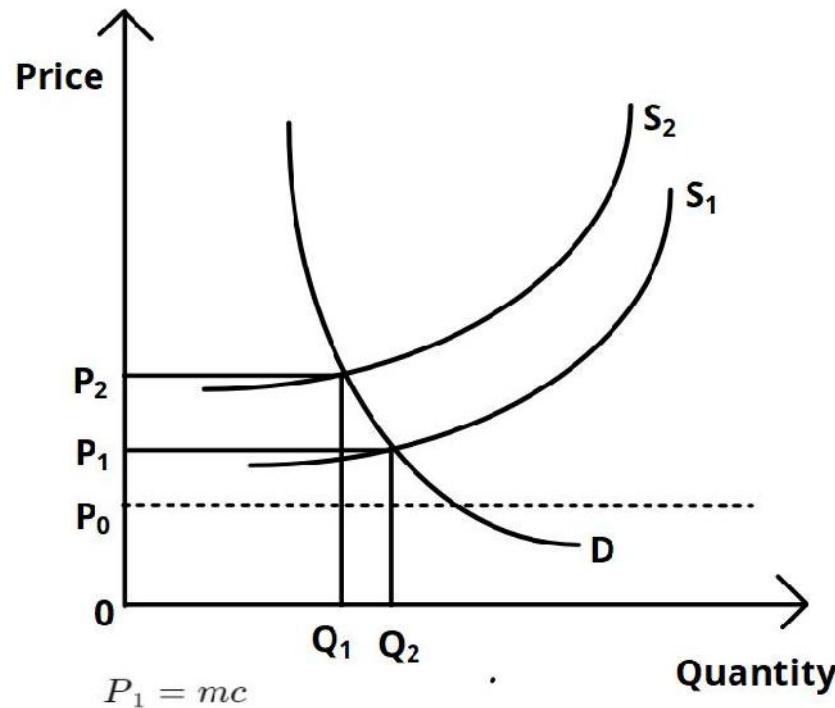
- The high intensity of natural capital in the production process has some implications:
 - first, they are not easily reproducible unlike the other forms of capital. Hence, their diminution may compromise future growth and development.
 - Second, their depletion also creates negative environmental consequences such as loss of forest covers, loss of biodiversity, pollution, among others.
- The development experience of developed countries with natural capital has been to transform the natural capital to augment their physical and human capital and over time reduce the intensity of natural capital in their production process: (weak sustainability vs strong sustainability debate)

Economic growth and Green economy



Pricing and market outcome

- Three pricing strategy possible for environmental goods:
- Regulated pricing below market price
- Market price
- Environmentally aware pricing



$$P_1 = mc$$

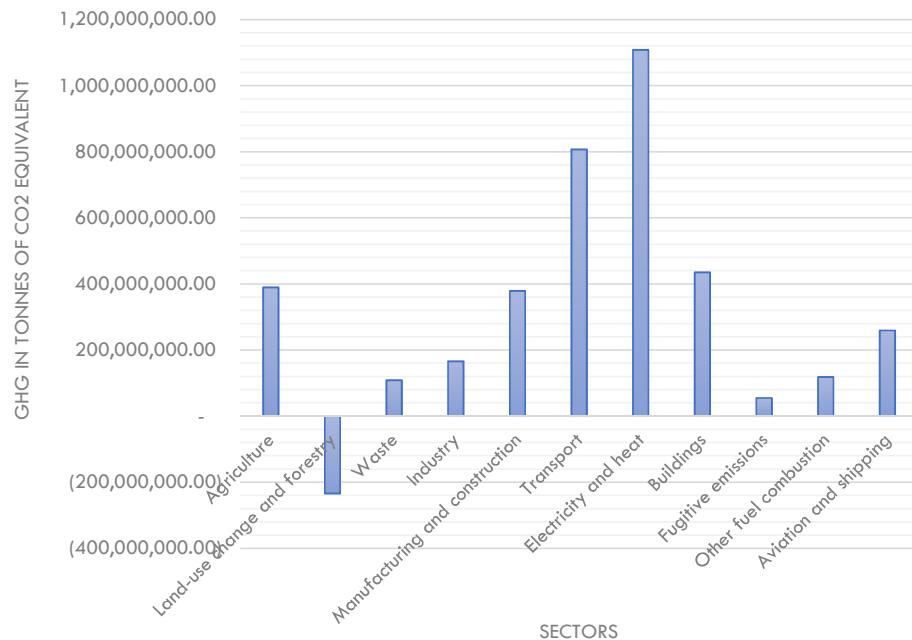
$$P_2 = mc + \delta + \alpha$$

$$P_0 = \text{Regulated Price}$$

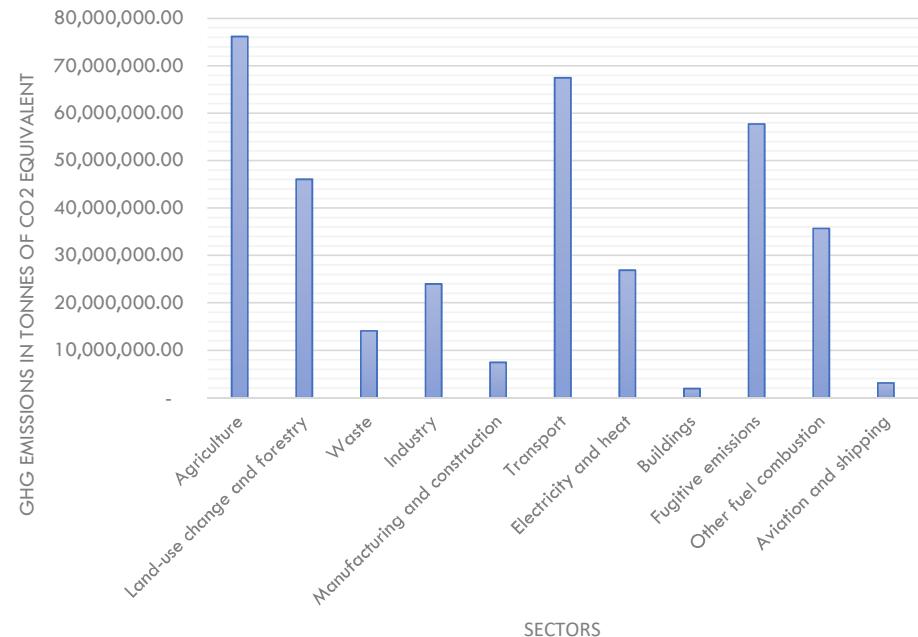
Nigeria and Green Economy: Some Stylised facts

(source: PUTTRU, 2022)

Sources of GHG Emissions in The European Union



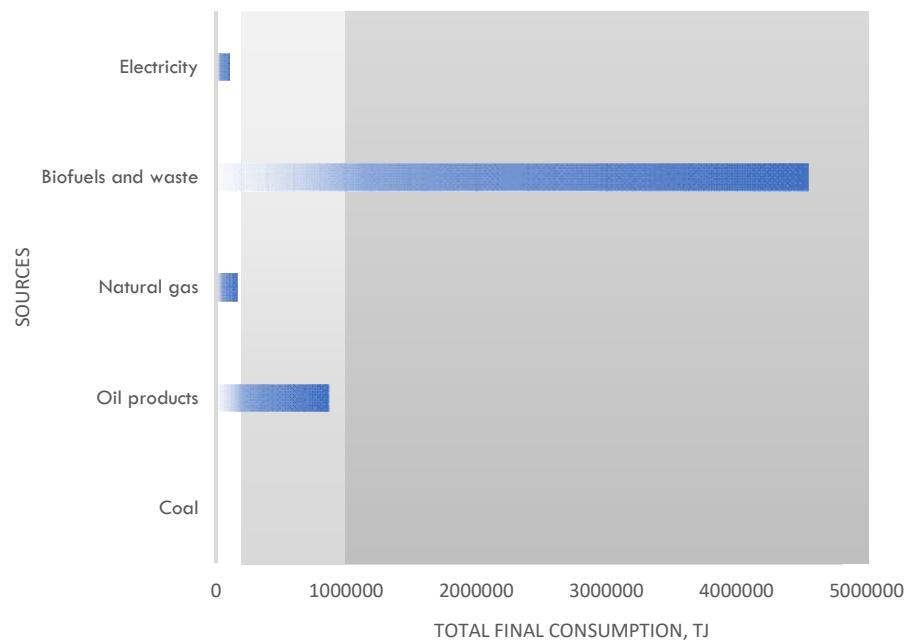
Sources of GHG Emissions in Nigeria



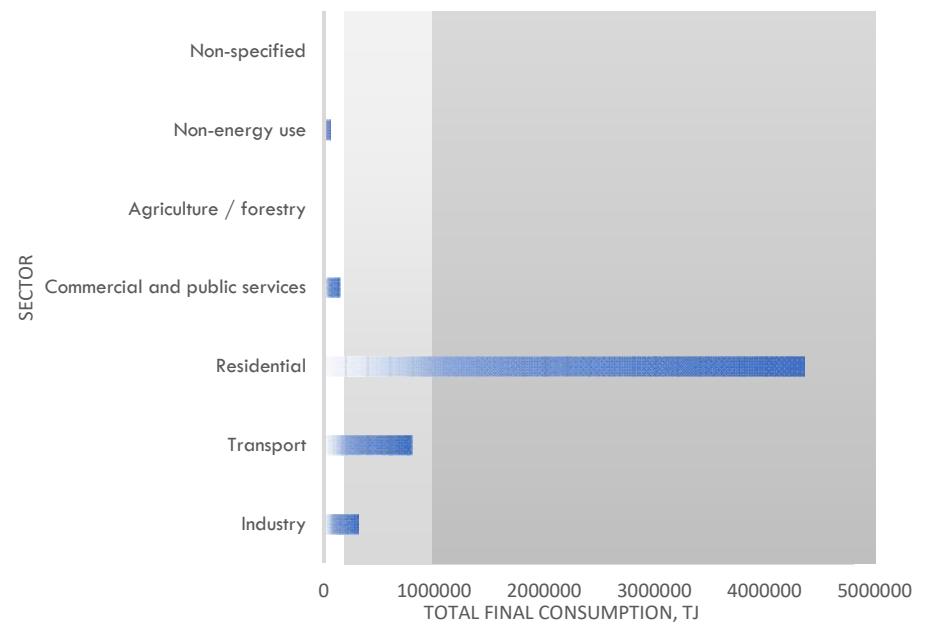
Stylised facts contd..

(source: PUTTRU, 2022)

Total Final Consumption of Energy in Nigeria by Sources, 2019



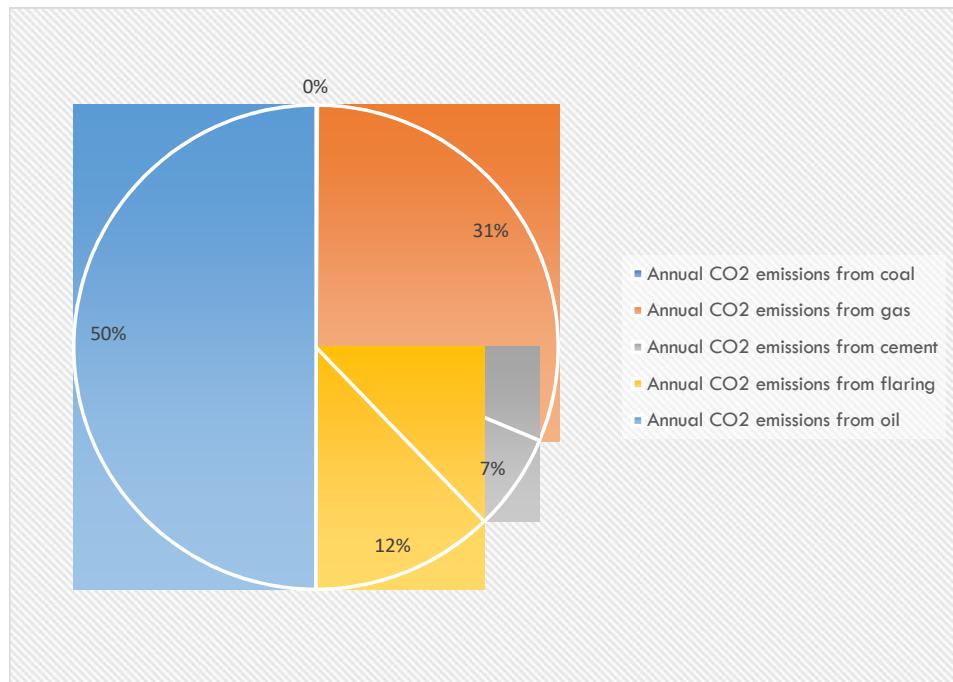
Total Final Consumption of Energy in Nigeria by Sector, 2019



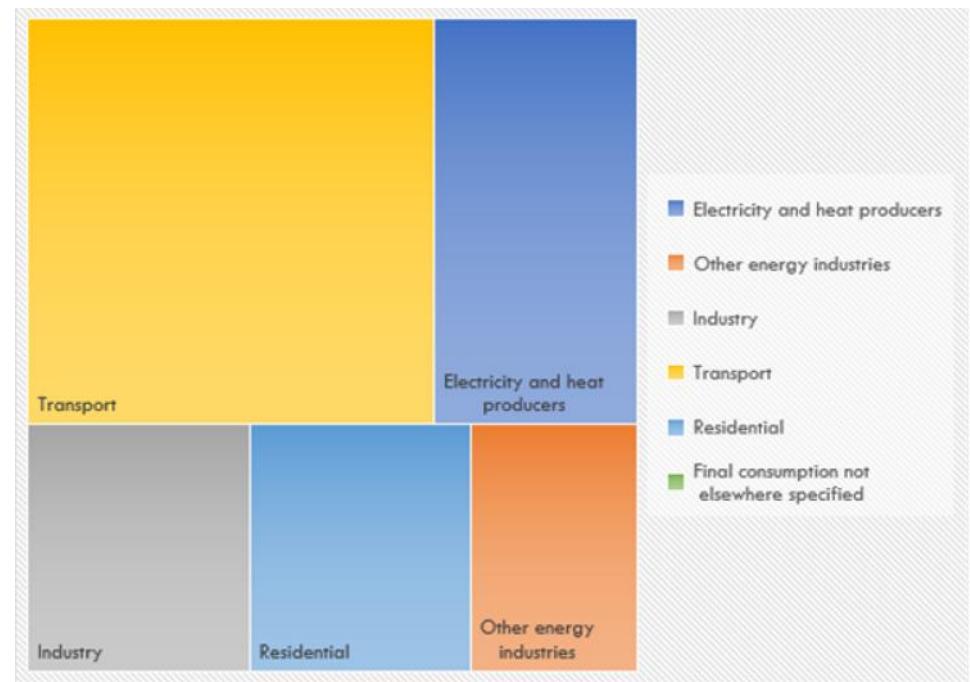
Stylised facts contd..

(source: PUTTRU, 2022)

Carbon dioxide Emissions by Sources

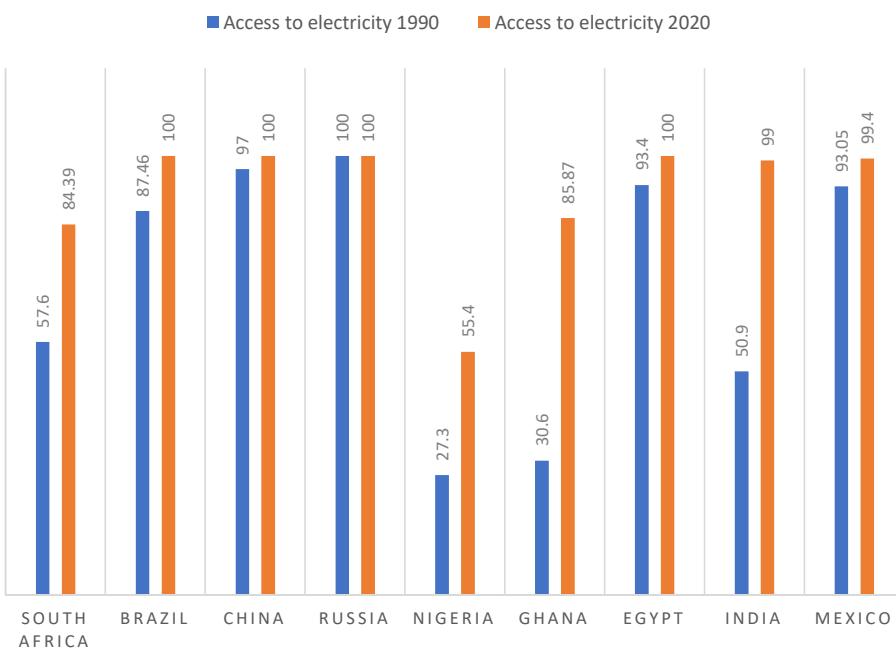


Carbon dioxide Emissions by Sector in Nigeria, from 1990 -2019

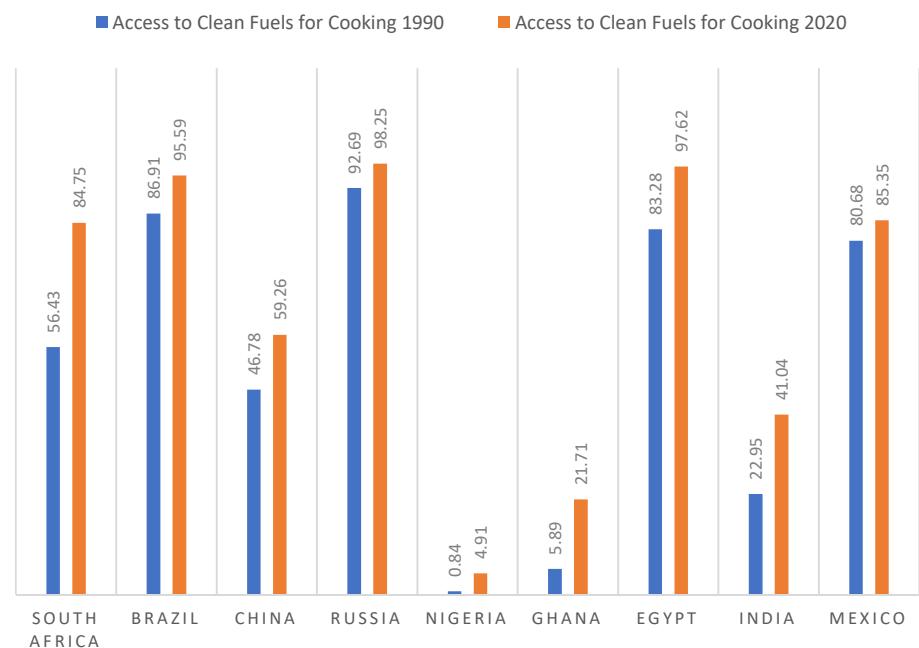


Stylised facts contd..

Access to electricity (%)

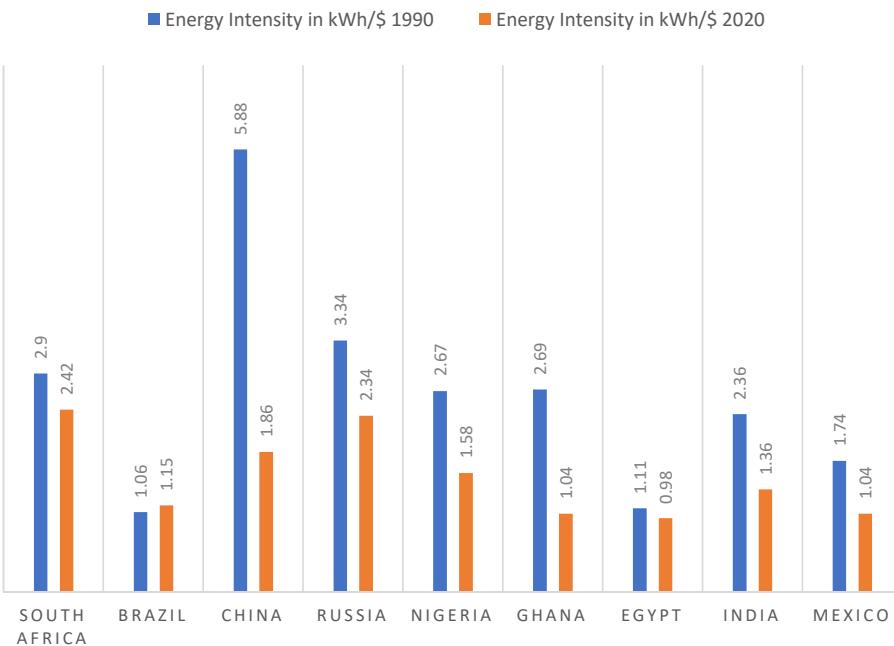


Access to clean fuels for cooking

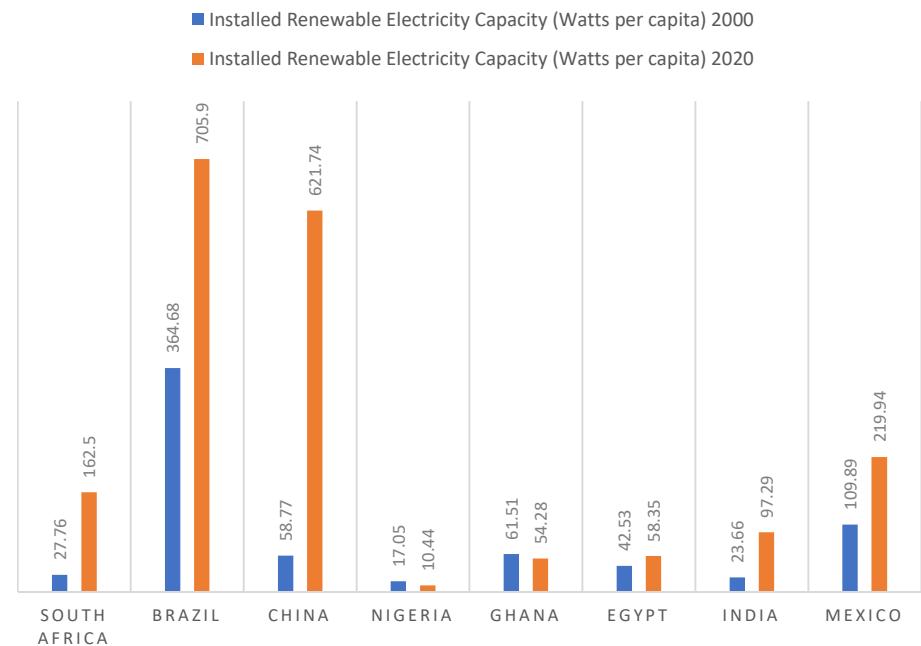


Stylised facts contd..

Energy Efficiency



Installed renewable electricity capacity



Structure of the Nigerian economy based on the 2019 SAM

Indicators	%
Sectoral contribution to GDP	
Agriculture	22.1
Mining	9.0
Manufacturing	11.5
Health	0.6
Services	54.8
Public administration	2.0
Composition of aggregate demand (% GDP)	
Consumption expenditure	75.0
Investment expenditure	24.9
Government consumption expenditure	5.9
Net export	-5.6
Stock variation	1.7
Share of trade in GDP	
Import	19.6
Export	14.1
Composition of imports (% of GDP)	
Agriculture	0.8
Mining	1.9
Manufacturing	9.1
Health	0.0
Services	8.2
Public administration	0.0
Composition of exports (% of GDP)	
Agriculture	0.2
Mining	11.6
Manufacturing	1.5
Health	0.0
Services	1.1
Public administration	0.0

Sources of government income	
Corporate income tax (firms)	49.4
Inter-governmental transfer	1.6
Production tax	4.7
Indirect tax	0.9
VAT	7.1
Subsidy	-0.2
Import duties	9.3
Personal income tax (household)	27.2
Other macroeconomic indicators	
Government budget balance (% of GDP)	2.7
Current account balance (% of GDP)	3.8
Savings (% of GDP)	26.6
Government expenditure (% of GDP)	5.9
Government revenue (% of GDP)	11.1

Source: Authors' computation from 2019 SAM

Impacts and Vulnerability of Nigeria under business as usual

Sector	Cost Dimension
Economy	<ol style="list-style-type: none">1. Btw 2-11% of Nigeria's GDP was to be lost by 2020 according to DFID 2009.2. 1.4% of real GDP was lost to Flooding in 20123. Economic losses due to poor air quality is estimated to be around 1% of the country's GDP
Agriculture and Food Security	<ol style="list-style-type: none">1. Agriculture productivity could decline by 10-25% by 20802. Could reduce GDP by 4.5% by 20503. Increase in net imports of rice by almost 40%
Energy	Increase in demand for energy due to soaring heat
Water, flood and drought, soil erosion and sea level rises	<ol style="list-style-type: none">1. A considerable increase in no of people at risk of water stress

Nigeria and Green Economy: Policy and Regulatory Framework

- Nigeria has so many policy frameworks aim at transitioning the economy to a green economy:
 - National Energy Policy 2003,
 - Renewable Energy Master Plan 2005,
 - Electric Power Sector Reform Act 2005,
 - National Biofuel Policy and Incentives 2007,
 - National Renewable Energy and Energy Efficiency Policy 2015, e.t.c
- At the recently held COP 26, Nigeria pledged her commitment to achieve a net zero emissions by 2060 making use of clean and low carbon alternative energy resources to meet its energy needs.

Policy and Regulatory Framework contd...

- The Climate Change Act was signed into law on 18th of November 2021, the act sets targets to attain a net-zero greenhouse gas emission level for years 2050-2070
- The act set up a National Council on Climate Change (NCCC) vested with the power to make policies and decisions on climate change in Nigeria:
 - to see to the implementation of the 5 years duration National Climate Change Action Plan,
 - administer the climate fund provided by the act,
 - ensure that climate change is mainstreamed into national development plans,
 - collaborate and work hand in hand with the Federal Inland Revenue Service to set up and implement a carbon tax and carbon emissions trading mechanism
- The NCCC is chaired by the president of Nigeria and the vice president as the vice chairman and consists of Ministers in charge of environment, budget, national planning, power, transportation, petroleum resources, representatives of private entities, civil societies, women, youth and persons with disabilities.

Policy and Regulatory Framework contd...

- The act establishes a climate change fund which is the major source of funding for the NCCC. it is to be funded by funds from the national assembly, international organizations, funds allocated to the country for meeting her National Determined Contributions and from fines for flouting climate change mitigation obligations by both the private and public entities
- The proceeds from the fund are to be utilized for funding initiatives regarding climate change mitigation, incentives for private and public entities that meet their emission reduction target, administration of the NCCC and for conducting assessments on the target's attainment
- The law also provides that a 5-year carbon budget should be developed by the ministry of environment. The council in collaboration with the ministries is also required to develop a National Climate Action Plan in every 5-year cycle

Policy and Regulatory Framework contd

- The act imposes climate change obligations on MDAs, private and public entities
- The MDAs are to establish a climate change desk that ensures that the carbon emission target is being adhered to, failure to adhere to the targets attracts fines and sanctioning of principal officers
- The private entities are also obligated to designate a climate change officer to submit reports on the organizations efforts in meeting the carbon emissions reduction targets annually to the council
- The act provides for the integration of climate change into the education curriculum at all levels, it also gives room for partnership between public and private entities as well as civil societies and organizations on climate change.

Key aspects of Nigeria's Intended Nationally Determined Contributions (INDC)

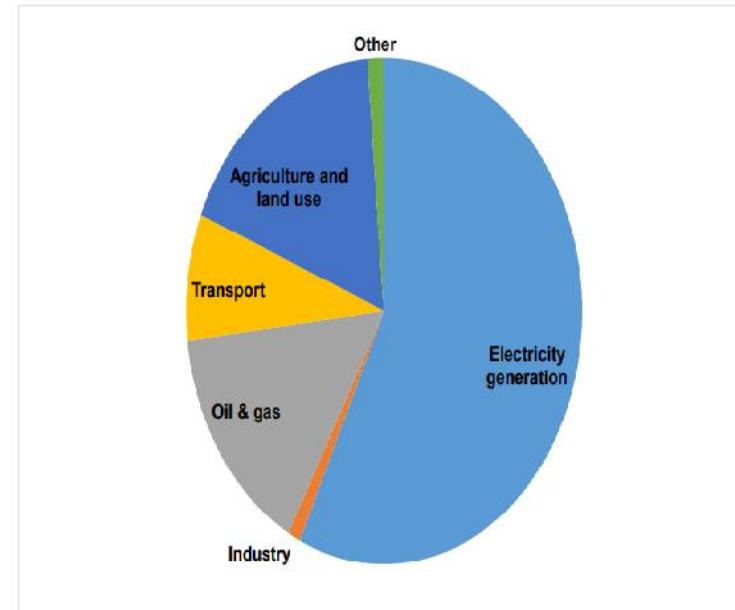
Aspect	Detail	
Type of objective	Reduction from Business as Usual (BAU)	
Target year	2030	
Implementation Period	2015-2030	
Base data period	2010-2014	
Summary of objective	Economic and social development: grow economy 5% per year, improve standard of living, electricity access for all	
Unconditional and conditional mitigation objectives	20% unconditional, 45% conditional <ul style="list-style-type: none"> • Work towards ending gas flaring by 2030 • Work towards Off-grid solar PV of 13GW (13,000MW) • Efficient gas generators • 2% per year energy efficiency (30% by 2030) • Transport shift car to bus • Improve electricity grid • Climate smart agriculture and reforestation 	
Key measures		
Trajectory [update figure once agreed]		
Emissions per US\$ (real) GDP	0.873 kg CO ₂ e (2015) [0.491 kg CO ₂ e (2030)]	
GDP per capita (US\$)	2,950 (2014) 3,964 (2030; real 2015 US\$)	
Estimated emissions per capita	Current: around 2 tonnes CO ₂ e 2030 BAU: around 3.4 tonnes CO ₂ e 2030 Conditional: around 2 tonnes CO ₂ e	
Global Warming Potentials used	IPCC Fourth Assessment Report	
Cost Estimate Data	National Cost = \$142b; National Benefits = \$304b (World Bank report "Low Carbon Development Opportunities for Nigeria" (2013))	
Gases covered	CO ₂ , N ₂ O, CH ₄	
Emissions as % of global total	<1% (2010)	
Historical emissions (1850-2010)	2,564.02 million tonnes	

Nigeria's Planned GHG Reduction by 2030

Key Mitigation Measures (376 million tonnes per year)

Measure	Potential GHG reduction (million tonnes per year in 2030)
Economy-wide energy efficiency	179
Efficient gas power stations	102
Work toward ending of gas flaring	64
Climate smart agriculture	74
Reduce transmission losses	26
Renewable energy	31

Sectors of emission reductions by 2030



Measures to achieve INDC

1. Energy
 - o Renewable energy, particularly decentralized
 - o Multi-cycle power stations
 - o Scalable power stations of 20-50MW
 - o Enforced energy efficiency
 - o Use of natural gas rather than liquid fuels
2. Oil and Gas
 - o Improved enforcement of gas flaring restrictions
 - o Development of Gas-to-Power Plants at Gas Flare Sites (micro grid)
 - o Blending 10% by volume of Fuel-Ethanol with Gasoline (E10) and 20% by volume of Biodiesel with Petroleum Diesel (B20) for Transportation Fuels.
3. Agriculture and Land Use
 - o Climate Smart Agriculture
 - o Stop using charcoal
4. Industry
 - o Benchmarking against international best practice for industrial energy usage
 - o Adoption of green technology in industry
5. Transport
 - o Modal shift from air to high speed rail
 - o Moving freight to rail
 - o Upgrading roads
 - o Urban transit

11

-
- o Toll roads/ road pricing
 - o Increasing use of CNG
 - o Reform petrol/ diesel subsidies

Lessons from strategies implemented or in progress in other countries:

- Canada identified how much each sector contributes to the country's emissions and they proposed an individualistic approach for each sector.
- Significant focus on the transportation sector: mass transit, electric and alternative –fuel infrastructure, and incentives to purchase eligible zero-emission vehicles.
- China also promoted energy-saving renovation of existing buildings and improved the energy efficiency of public buildings.
- China adjusted the mix of transport by increasing the proportion of rail and water transport for bulk goods and decreasing that of highway transport.

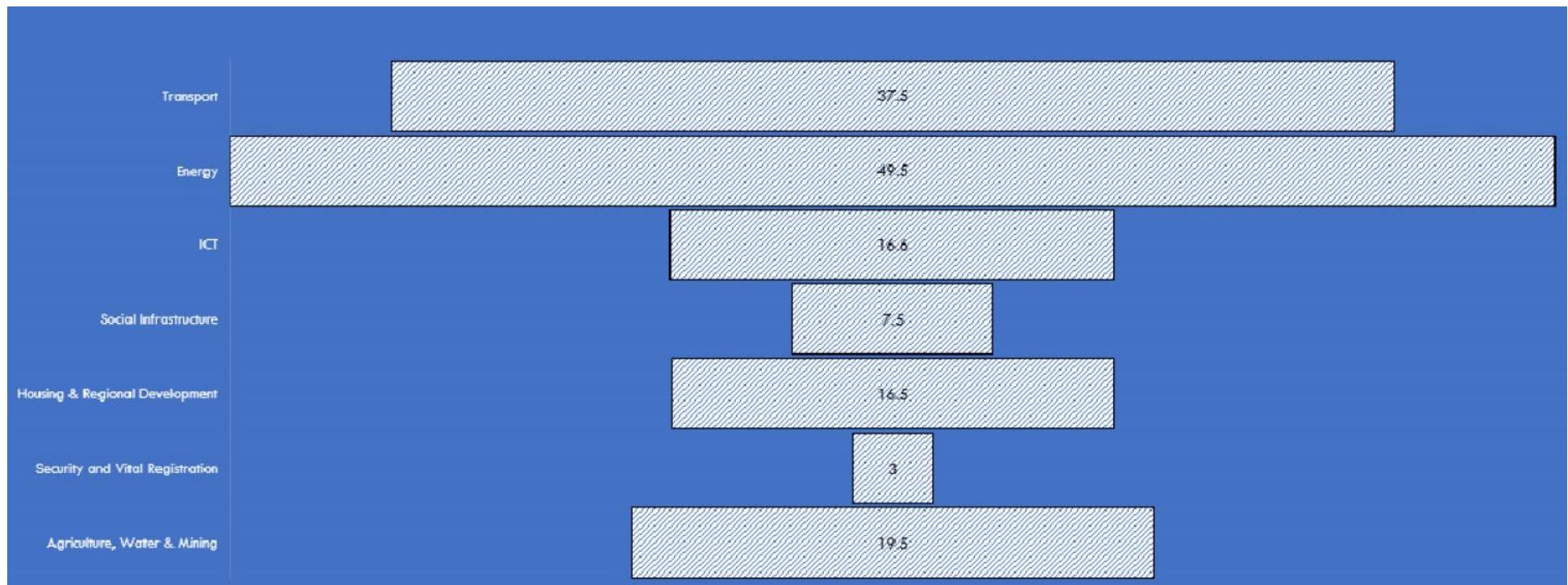
Lessons from strategies implemented or in progress in other countries:

- High Investment in clean technologies and developing energy solutions
- Carbon related taxes – carbon tax, road fuel tax, gasoline excises, emission taxes, traffic congestion tax, etc
- Create incentives for electric vehicles
- Strong institutional systems that develops, implements and monitor environmental policy initiatives and report on progress made

Challenges to Transitioning to Green Economy



Infrastructure Investment Needs in Nigeria in Five Years (US\$ 150.3Billion) Or 34.78% of 2020 GDP



Source: National Integrated Infrastructure Master Plan of Nigeria (2021 – 2043) (PUTTRU, 2022)

Challenges In Transitioning to Green Economy

- Funding: limited fiscal space and competing demand
- Unfavorable local and global macroeconomic conditions
- Financial and human resources constraint; economic prosperity facilitates investment in research and development, policies and programs that will promote green economy
- Unfavorable policy, regulatory and institutional environment
- Inefficient pricing policy and lack of political will to implement carbon and emission related taxes
- High rate of poverty and inequality
- Low government effectiveness

What is The Way Out?

- According to IEA, 2021c, the cost of capital for energy transition in developing economies is 7 times more than that of the advanced countries
- Government expenditures should be cut down in areas of the economy that deplete natural capital, and this can be achieved through taxation and the reduction in environmentally harmful subsidies
- Sound regulatory framework that facilitate the transition to a green economy in all sectors of the economy should be put in place
- Prioritizing science and technology education that supports green economy development

What is The Way Out?

- Public and private partnership investment in energy and social infrastructure such as gas transmission infrastructure, electricity interconnections, transportation, housing and telecommunication that supports investments from abroad
- Adopt a structured multilayer-phased transformational approach:
 - The shift from traditional to modern commercial energy sources like gas, oil, nuclear, coal
 - The adoption of efficient energy such as gas, renewable energy in the overall energy mix.
 - The adoption of efficient end-use energy technology such as energy efficient bulb, nuclear power plant, gas power plant
 - Replacement of old inefficient capital stock with newer efficient energy stock in both residential and non-residential sectors.

What is The Way Out?

- Appropriate energy pricing is fundamental to an efficient allocation and use of energy resources by ensuring that the economic, social and environmental costs, including the costs of the externalities associated with its use, are reflected in the price. Low energy prices lead not only to an excessive demand for it, but also contribute to discouraging research and investment in cleaner and renewable energy.
- Pursue global support through multinational platforms like the AU

Conclusion

- Nigeria may not be able to unplug from her fiscal dependence on fossil fuel in the short to medium terms.
- Nigeria could continue with her fossil fuels usage whilst investing in climate resilient infrastructure that are well equipped to withstand the effects of climate change and cut down green gas emissions.
- Consciousness of political leaders and citizenry on the imperative of integration of green economy into the development blue-print of Nigeria.
- Readiness for trade offs among social, environmental and economic development in the short- run in order to ensure that the net-zero emissions pledge is achieved in the long-run.

Thank You

adeolaadenikinju@yahoo.com, af.adenikinju@ui.edu.ng