

Nigeria Energy Transition Plan

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Current context

While African countries account for ~10% of global emissions, stabilizing the climate and avoiding the worst physical risks is impossible without African countries also transitioning to net-zero emissions

However, Nigeria, like other African countries, faces a range of other imperatives, including:

- Lifting 100 million people out of poverty and driving economic growth
- Bringing modern energy services to the full population
- Managing the long term job loss in the oil sector that will result from reduced global demand as the global economy transitions to net-zero

This document brings together these various dimensions to help define a potential series of pathways and choices for Nigeria

Objectives

Develop a fact base on Nigeria's energy transition pathway and enable a decision on way forward:

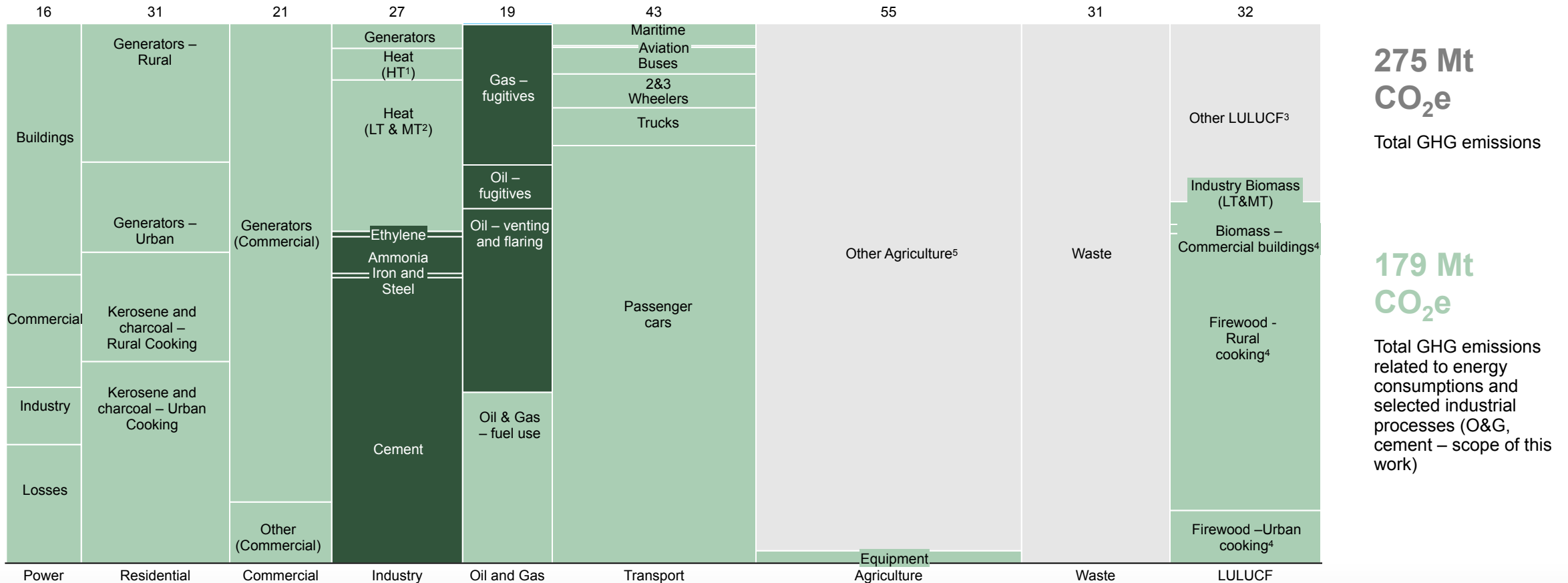
- What is required for Nigeria to achieve Net Zero by 2050?
- What would be a realistic timeline that balances emission reductions with economic development imperatives?

Total GHG emissions of Nigeria in 2020 are estimated at ~275 Mt CO₂e, with 65% related to energy consumption and industrial processes

GHG emissions in Nigeria (2020), MtCO₂e

Differs from the latest NDC intermediary publication – see back up page⁶

■ Mostly emissions related to energy consumption
 ■ Mostly process emissions
 ■ Out of scope/not modeled



275 Mt CO₂e
Total GHG emissions

179 Mt CO₂e
Total GHG emissions related to energy consumptions and selected industrial processes (O&G, cement – scope of this work)

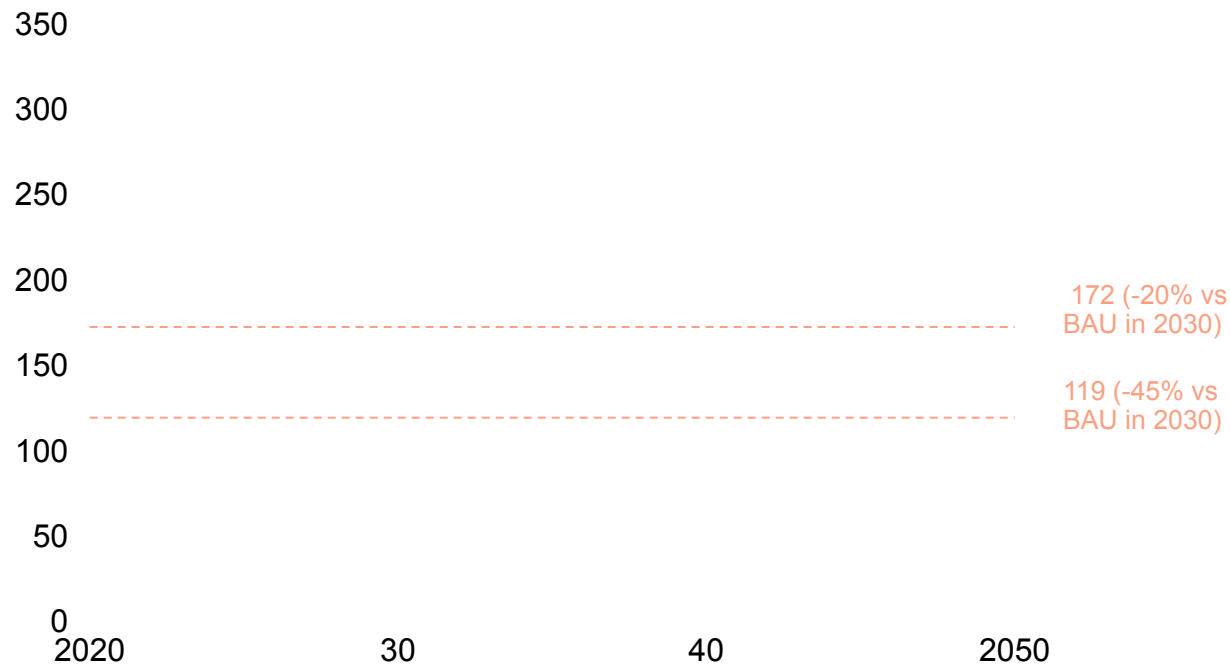
1. High Temperature Heat; 2. Low-Medium Temperature Heat; 3. Land use, land use change and forestry; 4. Will be modelled as part of their end-use sector; 5. Emissions from livestock and soils 6. Slight discrepancy with NDC Intermediary 2020 due to lower emissions considered for O&G

Nigeria has recently announced the NDC guided plan which represents a good start for the medium term to 2030, but it will not result in a net zero pathway by 2050

ONLY ENERGY AND INDUSTRIAL PROCESSES INCLUDED

GHG emissions trajectory, MtCO₂e

— BAU — NDC-guided — Net zero



BAU (Business As Usual)

Projects emissions based on current pathway for macroeconomic development and without decarbonisation effort

Energy transition scenarios



NDC²-guided

Incorporates current national programs with decarbonisation effects:

- Strong gas up take – 80% of vehicles to be CNG by 2050
- >50% of population using LPG for cooking



Net Zero 2050

Explores what it would take to get to Net Zero by 2050 to be aligned on 1.5°C pathway; main focus is a transition to full electrification of economy by 2050:

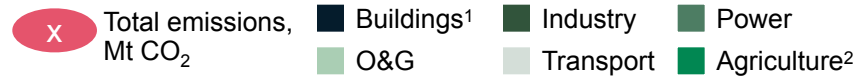
- ~250 GW of installed capacity; >90% renewable
- Electric vehicles making up 80% of fleet
- Clean cooking for >80% of the population

1. Out-of-scope emissions reduction have not been modelled (e.g., agriculture, waste and other LULUCF) and account for 137Mt CO₂e of residual in 2050, based on a standard GDP growth applied to the 2020 amounts

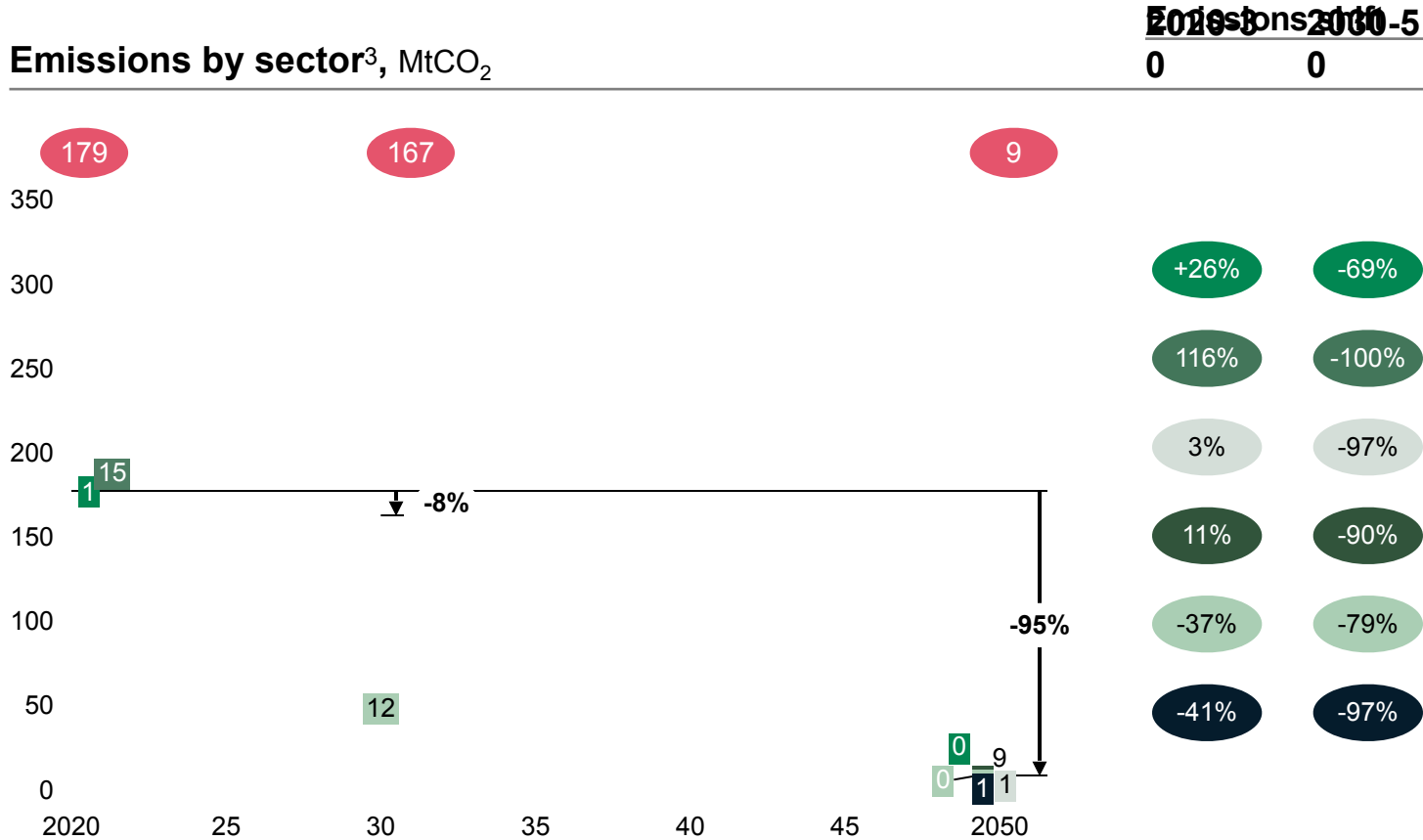
2. Nationally Determined Contribution

We have developed a Net Zero pathway aligned with the rest of the world (i.e. Net Zero 2050)

Preliminary



Emissions by sector³, MtCO₂



Key drivers of emissions

- For each sector, Net Zero focuses on the technology that will maximise emission reduction
- **Buildings: emissions decrease by ~98%** by 2050, is primarily driven by shift to electric and biogas-based cooking
 - **Oil & Gas: emissions decrease by ~87%** by 2050 primarily driven by global response to climate change⁴
 - **Industry: emissions decrease by ~97%** despite **~100% growth in industrial sector** due to decarbonisation efforts in cement and ammonia production and 100% shift to zero emission fuels for heating
 - **Transport: emissions decrease by ~97%** due to uptake of EVs in passenger car segment
 - **Power: emissions increase of ~116%** by 2030 as gas use increases due to higher electricity demand. Post-2030 solar increases and starts to replace gas leading to 100% emission reduction by 2050

1. Includes LULUCF emissions from firewood removal
 2. Energy emissions only
 3. Non-energy agriculture, waste and other LULUCF emissions are outside scope and not shown here
 4. Model for Net Zero scenario uses Nigerian oil production trajectory under a global 1.5°C scenario

A more realistic pathway for Nigeria to deep decarbonization could land on Net Zero by 2060

Energy-related GHG emissions trajectory, MtCO₂e



Main changes in alternative Net Zero scenario



Buildings

- Slower replacement of firewood stoves by less emitting technologies³
- Delayed take-off of electric and biogas stoves (+10 years)



Transport

- Lower penetration rate of EV passenger cars in 2050 (60% vs 80% in Net Zero scenario)



Industry





- Delayed installation of H₂ furnaces (+10 years) and of zero-emissions low/mid temp heat (+5 years)

1. Out-of-scope emissions reduction have not been modelled (e.g., agriculture, waste and other LULUCF) and account for 278 Mt CO₂e of residual in 2070




2. Nationally Determined Contribution

3. Incl. LPG, efficient firewood, electric and biogas cook stoves

Several key decisions will necessitate key actions across sectors (1/2)

	Decision	Comments
Overall ambition 	Nigeria to target Net Zero by 2060	<ul style="list-style-type: none">• Buildout of ~5 GW p.a. solar capacity;• Total energy transition cost of ~\$400bn; or approximately ~\$10bn p.a.
Power 	Nigeria must have a joint focus on both the short term and the long term in the power sector, to ensure a large scale build out of both gas and solar capacity	<ul style="list-style-type: none">• 42 GW of centralized capacity, including 8 GW of utility-scale solar and 14 GW of gas-fired generation by 2030;• 6.3GW of decentralized renewable capacity build up required by 2030
Buildings 	Nigeria should continue to drive the Nigeria Gas Expansion Program Track 2 (LPG penetration), to allow gas utilization through medium term; prior to transitioning to carbon neutral cooking	<ul style="list-style-type: none">• LPG is the cheapest and most pragmatic energy source for cleaner cooking, but not carbon neutral• Net Zero 2060 pathway creates additional 10-year runway for gas utilization via LPG through 2040s
Transport 	Nigeria should prioritize laying the foundation for electric vehicles vs. CNG conversion	<ul style="list-style-type: none">• Recent World Bank reviews of CNG conversion plan suggests costs may be considerably higher than expected to support scale-up• In a Net Zero scenario, 80% of passenger cars transition to EV, presenting risk of having a high cost, stranded CNG infrastructure base

Several key decisions will necessitate key actions across sectors (2/2)

	Decision	Comments
 Oil and Gas	FGN should encourage decarbonization of the oil and gas sector and prioritize the successful delivery of the Decade of Gas initiatives to support utilization of gas through 2030	<ul style="list-style-type: none">• Current production in Nigeria is ~1.7mmbbls/d, with a target to increase to 3mmbbl/d• The sector accounts for 11% (19MT CO2e) of in-scope emissions, at current production levels• LPG and gas-to-power are near term levers for gas utilization and decarbonization, and should be prioritized during Nigeria's Decade of Gas• Upstream gas projects supporting Nigeria's Decade of Gas (2030) should be prioritized; post 2030 many upstream projects may become stranded as country moves to Net Zero• Blue hydrogen is a potential option for provision of future fuel and continued gas demand
 Industry	FGN should focus on ensuring that new industrial capacities be built with least carbon intensive processing (high-heat processes, cement and ammonia)	<ul style="list-style-type: none">• Industry accounts for 16% of GHG emissions• Need to incentivize industrial companies to change processes (financial and regulatory)• High CAPEX for creating alternative fuel sources at scale required potentially requiring financial support to improve energy efficiency• Need to build out hydrogen market post-2030
 Financing	FGN will need to finance a portion of the transition , but will need the support of key funding partners to fund the balance	<ul style="list-style-type: none">• Financing the energy transition will entail significant public investment.• It is estimated that ~\$5 – 6Bn p.a. of public funding would be required to achieve Net Zero targets, in comparison to Nigeria's 2020 federal budget of ~\$35Bn• Significant potential financial support available from donors / DFIs

There are a number of important implications of Nigeria's Net Zero 2060 pathway

NOT EXHAUSTIVE

Key implications

Costs



- **~\$410bn** in incremental funding required to fund the transition between 2021 – 2060, translating to an average of **\$10bn p.a.** over the time period
 - Public sector funding requirement estimated to be **\$5 – 6bn p.a.**
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Gas



- Gas commercialization by 2030 to expand by **+30%** vs. 2019, driven by LPG penetration for clean cooking and gas to power
 - By 2060, gas commercialization to fall by **~50%**, driven largely by decreasing global fossil fuel demand, increasing contribution of renewable power, and shift to carbon neutral cooking
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Jobs



- Net Zero 2060 expected to create **840K** net jobs by 2060
- Job creation mainly driven by **power and buildings sectors** due to deployment of decentralized solar and clean cook stove distribution
- **Transport creating significant amount of jobs only after 2030** due to late uptake of EVs and low infrastructure needs for CNG/LPG fueling stations

Nigeria could leverage this work in two complementary ways to build international leadership regarding energy transition

Set the example for African countries

Opportunity to establish a clear narrative around what a developing-country-specific “ambitious yet feasible” decarbonization goal and pathway looks like (factoring in overall socio-economic development journey, institutional capabilities, public balance sheets etc.)



Re-set the discussions around international support to transition and build a “new deal on climate finance”

Opportunity for Nigeria to re-set the discussions around climate finance commitments from developed world for developing countries, by providing a clear commitment to an emission reduction journey, backed up by robust decarbonization pathway and translated into near-term action commitments / milestones, “in exchange” for clear commitments from development partners



These opportunities can be seized by Nigeria alone or by mobilizing other African countries to lead the region in a coordinated / single voice manner