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POLICY BRIEF

The Role of Natural Gas as a Transition Fuel in Nigeria's Hydrogen Future

How Nigeria's gas endowment, flared-gas resources and pipeline infrastructure can anchor a phased, commercially credible pathway to a domestic hydrogen economy.

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Key Findings

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Foundation for a Phased Hydrogen Economy

Nigeria's substantial natural gas reserves provide a strong foundation for developing a phased hydrogen economy. With 215.19 TCF of proven gas reserves and an estimated reserves life of 85 years, gas can support Nigeria's immediate energy access needs while providing feedstock for hydrogen production. The 2024 Energy Transition Plan projects 404 PJ of hydrogen demand by 2060, comprising 176 PJ of blue hydrogen and 228 PJ of green hydrogen, indicating that both pathways can play complementary roles in Nigeria's transition.

215.19 TCF
Proven gas reserves

85 years
Reserves Life Index

404 PJ
Projected 2060 hydrogen demand

Flared Gas: An Immediate Opportunity

Nigeria's flared gas presents an immediate opportunity to connect gas-sector reform with hydrogen development and emissions reduction. Between 2021 and 2025, approximately 1.02 trillion scf of gas was flared, with an estimated commercial value of $2.22 billion. Redirecting a portion of this gas into steam methane reforming with carbon capture and storage could support blue hydrogen production while reducing methane emissions and gas waste. Existing and planned gas infrastructure, including the AKK pipeline, could also be designed for future hydrogen blending or repurposing, reducing the cost of developing dedicated infrastructure later.

A Deliberate Sequencing Approach

However, the viability of this pathway depends on addressing significant structural constraints. Gas supply reliability, methane leakage, the absence of commercial-scale CCS deployment, domestic gas pricing and limited site-specific assessment of CO_2 storage capacity could undermine the economic and climate case for blue hydrogen. Nigeria therefore needs a deliberate sequencing approach: use gas and flared-gas resources to establish early hydrogen capacity while strengthening methane management, CCS capability, renewable power and green hydrogen production.

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1 Nigeria's Gas Endowment: An Asset, Not a Liability

Nigeria's 215.19 TCF proven gas reserves (114.98 TCF of non-associated gas and 100.21 TCF of associated gas)[1] positions it uniquely to address the sustained historical energy access challenge it has suffered over the years, improving the country's power generation. It also provides a viable pathway in its energy transition ambition, particularly in the production of hydrogen, consequentially reducing the methane emissions associated with the extraction and production of crude oil. Between 2021 and 2025, Nigeria's total gas production stood at 12.9 TCF with an average gas production of 2.6 TCF annually[2]. This provides a substantial and reliable feedstock for long-term hydrogen planning.

1. Nigerian Upstream Petroleum Regulatory Commission (NUPRC). (2026, April 1). *Media release on the national annual petroleum reserves position as at 1st January 2026.* nuprc.gov.ng

2. Nigerian Upstream Petroleum Regulatory Commission. *Gas production status reports.* nuprc.gov.ng

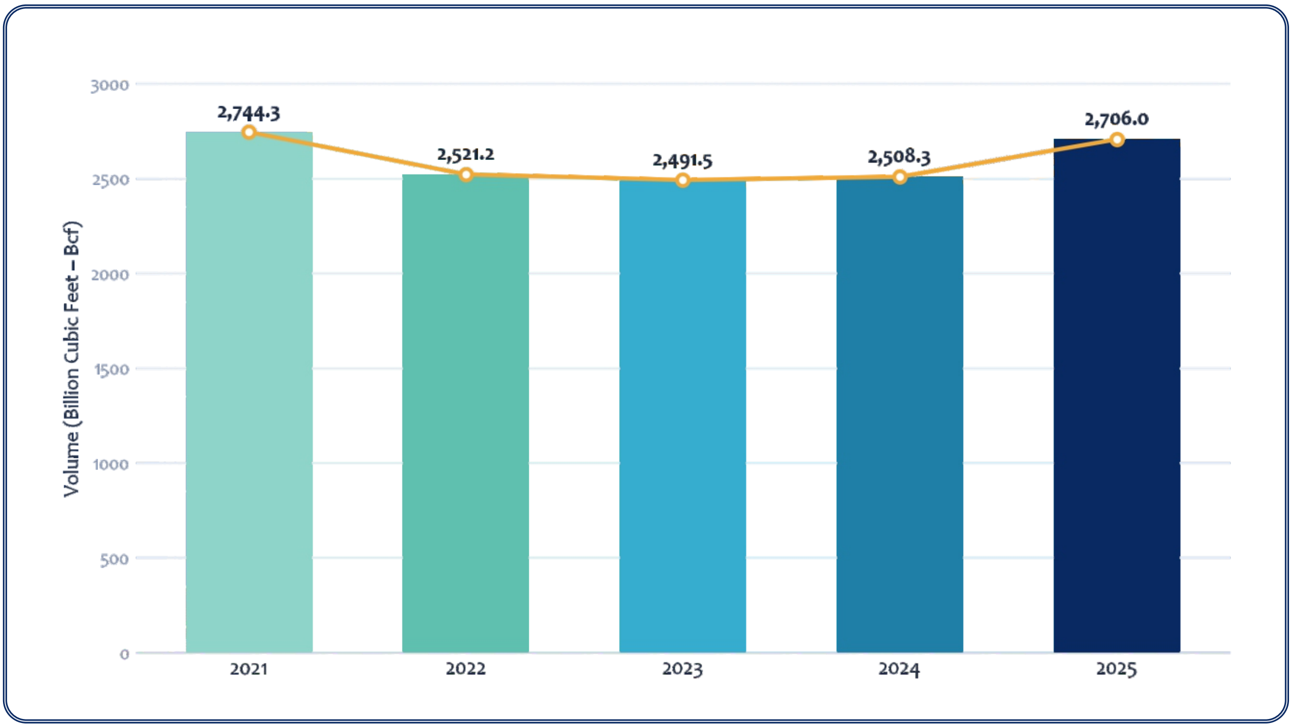

Fig. 1 — Nigeria Annual Gas Production, 2021–2025 (Billion Cubic Feet)

NUPRC reported in January 2026 that the Reserves Life Index – a measure of the estimated number of years that proven reserves will last at current production rates – stands at 85 years at current production levels and a 2.2% increase in Nigeria's proven gas reserves.[3] This consequently puts the Reserves Replacement Ratio (RRR) above 1.56 which was estimated when the reserves was at 210.54 TCF[4]. The RRR value implies that Nigeria discovers more gas than it extracts each year. As of 2024, the utilization split – 36.5% export sales, 26.5% domestic sales, 19.3% gas re-injection, 7.6% gas flared, 5.6% fuel gas and 4.4% gas lift[5] – reflects a gas sector that still dedicates the majority of production to exports rather than domestic development.

3. Nigerian Upstream Petroleum Regulatory Commission (NUPRC). (2026, April 1). *Media release on the national annual petroleum reserves position as at 1st January 2026.* nuprc.gov.ng

4. Addeh, E., & Uzoho, P. (2025, December). NUPRC: Nigeria attracted over $4.9bn in non-associated gas investments in four years. *ThisDay.* thisdaylive.com

5. Nigeria Upstream Petroleum Regulatory Commission (NUPRC). (2025). *2024 annual report* (pp. 15–16). nuprc.gov.ng

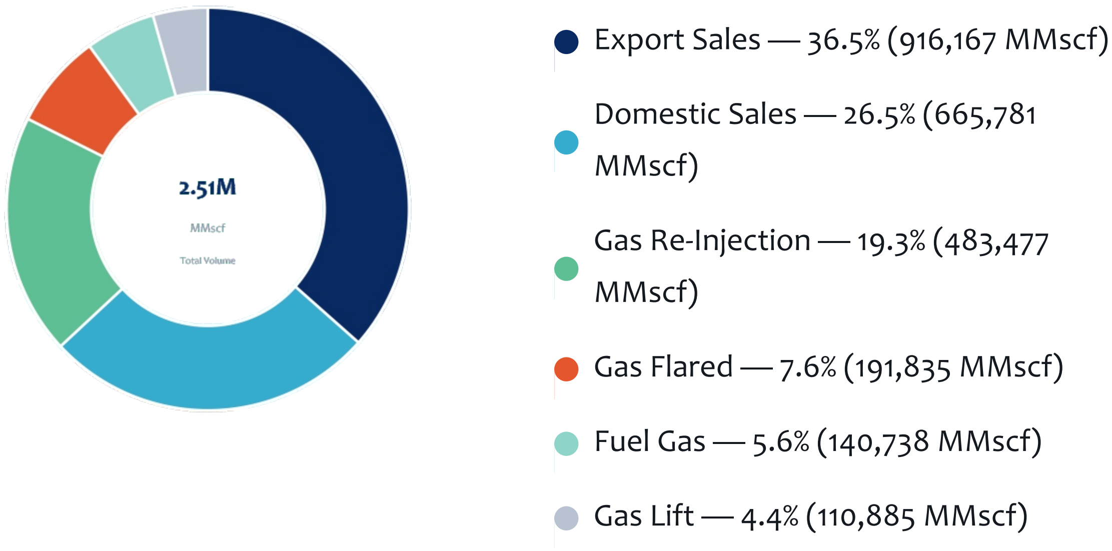

Fig. 2 — Nigeria Gas Utilization by Destination, 2024

2 The Energy Transition Context: Gas in Nigeria's 2060 Pathway

Nigeria's Energy Transition Plan (ETP), unveiled in August 2022 and updated in 2024, is explicit: gas will play a critical role as a transition fuel, particularly in the power and cooking sectors[6]. The plan acknowledges the dual imperative Nigeria faces: nearly 90 million citizens live without reliable electricity, and the country must simultaneously decarbonize. The ETP deems gas to be the only fuel currently able to serve both needs during the transition window. The 2024 ETP update identifies hydrogen as a key component of the energy mix, not immediately, but with a clear 2030 inflection point[7]. By 2060, the ETP models total hydrogen demand at 404 PJ (176 PJ from blue hydrogen and 228 PJ from green hydrogen)[8] suggesting that both pathways will be complementary. The total investment requirement to reach net zero by 2060 is estimated at $1.9 trillion, with $410 billion above projected baseline spending (about $10 billion annually)[9]. Blue hydrogen which leverages existing gas assets and infrastructure, offers a lower initial capital barrier than green hydrogen and can generate early revenues to fund the broader transition.

6. *Nigeria energy transition plan.* energytransition.gov.ng

7. *Industry – Nigeria energy transition plan.* Retrieved May 21, 2026, from energytransition.gov.ng/industry-sector

8. *Power – Nigeria energy transition plan.* Retrieved May 21, 2026, from energytransition.gov.ng/power

9. Sustainable Energy for All. (2024). *Nigeria energy transition & investment plan update (2024)* (p. 6). seforall.org

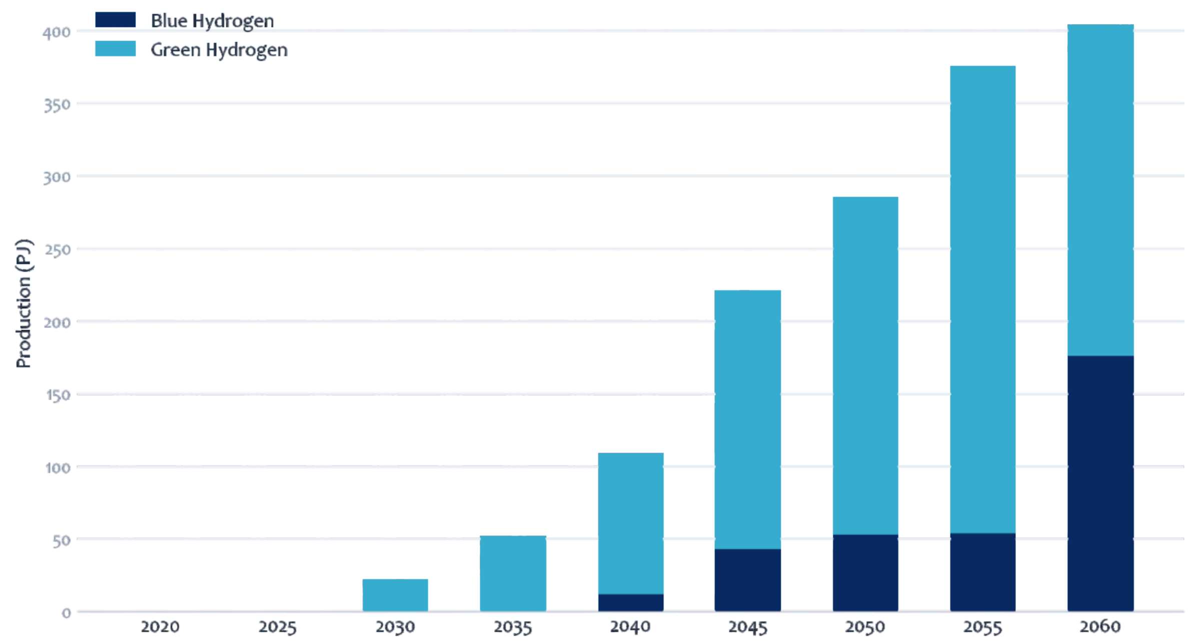

Fig. 3 — Nigeria's Hydrogen Production Projection (2020–2060)[10]

From Wasted Gas to Hydrogen Feedstock: The Flaring Problem

Nigeria's most immediate hydrogen opportunity lies in its single greatest waste stream: flared gas. The Nigerian Upstream Petroleum Regulatory Commission (NUPRC) in its gas production data disclosed the total volume of gas flared between 2021 and 2025 to be 1.02 trillion scf[11] with a commercial value of $2.22 billion benchmarking it against the updated Domestic Base Price (DBP) of natural gas at $2.18/MMBtu[12]. A study in 2026 estimated that if Nigeria redirected its flared gas through steam methane reforming (SMR) processes, the pathway alone could deliver a net CO_2 reduction of 26.77 Mt CO_2/year and avoid 10.67 Mt CH_4/year of methane emissions[13].

10. Ibid.

11. Nigerian Upstream Petroleum Regulatory Commission. *Gas production status reports.* nuprc.gov.ng

12. Aduloju, B. (2026, March 31). FG increases gas price to $2.18 per mmbtu for GenCos. *TheCable.* thecable.ng

13. Jegawa, M. G., Agboola, B. O., Ibewuike, I. A., Gidado, S. M., & Mohammed, M. L. (2026). Strategic decarbonization of flared gas: A quantitative framework for Nigeria's emerging blue and green hydrogen economy. *Energy Conversion and Management: X, 30*, 101655. doi.org/10.1016/j.ecmx.2026.101655

1.02 Tscf
Gas flared, 2021–2025

$2.22bn
Estimated commercial value

26.77 Mt
Potential annual CO_2 reduction via SMR

3 Blue Hydrogen: The Technology Case

Steam methane reforming (SMR) is the world's dominant hydrogen production method, accounting for more than 60% of global hydrogen supply[14]. The process adds steam to methane which is the primary component of natural gas, producing hydrogen-rich syngas. The stoichiometry is clear: 2,000 kg of methane yields approximately 1,005 kg of hydrogen. Without carbon capture, SMR produces grey hydrogen which is cheap but carbon-intensive. When the CO_2 output is captured, compressed and stored in geological formations, the product becomes blue hydrogen. Nigeria possesses an estimated 10,700 gigatonnes (Gt) of geological CO_2 storage capacity, primarily in the subsurface formations of the Niger Delta and offshore basins[15].

14. Szablowski, L., Wojcik, M., & Dybinski, O. (2025). Review of steam methane reforming as a method of hydrogen production. *Energy, 316*, 134540. doi.org/10.1016/j.energy.2025.134540

15. International Finance Corporation (IFC). (2025). *Nigeria CO_2 Storage Atlas.* templars-law.com

1 Methane + Steam	2 Hydrogen-Rich Syngas	3 CO_2 Captured & Compressed	4 Stored in Geological Formations	5 Blue Hydrogen Output

Cost Comparison Across Hydrogen Pathways

In 2026, blue hydrogen production costs between $2.0 and $3.5/kg, compared to $3.5 to $6.0/kg for green hydrogen which depends mostly on renewable electricity and electrolyzer technology[16]. For an economy with about 90 million energy-poor citizens and no reliable grid, blue hydrogen is not a compromise; it is the only commercially viable entry point into the hydrogen economy at scale this decade. The cost differential narrows beyond 2030 as electrolyser costs fall and Nigeria's solar potential is better utilized. This is not a binary choice between blue and green hydrogen. The credible pathway runs through blue first, then progressively green, with gas infrastructure serving both.

Pathway	Feedstock	2026 Cost Range	Primary Constraint
Grey Hydrogen	Natural gas (SMR, no capture)	Lowest cost	Carbon-intensive
Blue Hydrogen	Natural gas + CCS	$2.0 – $3.5/kg	CCS deployment at scale
Green Hydrogen	Renewable electricity + electrolysis	$3.5 – $6.0/kg	Grid reliability & electrolyser cost

16. Electricity Trader. (2026, January 27). Hydrogen power costs: Green vs. blue hydrogen. *Electricity Trader.* electricaltrader.com

4 Gas Infrastructure as Hydrogen Infrastructure

The Ajaokuta-Gwagwalada segment of the $2.8 billion Ajaokuta-Kaduna-Kano (AKK) 614 km long pipeline is expected to deliver its first gas to Abuja by July 2026[17]. The pipeline is designed to transport over 2.2 Bcf/d of gas supplying feedstock to industries and power plants across Northern Nigeria[18]. The AKK pipeline is not merely an energy project; it is also a potential hydrogen backbone infrastructure. Gas pipelines designed for methane can, with appropriate material upgrades, carry hydrogen blends or be repurposed over time for pure hydrogen transport. Building the AKK with future hydrogen compatibility in mind in terms of materials specifications, pressure tolerances, compressor siting would cost a fraction of retrofitting later. With the Niger Delta sitting above naturally existing geological formations which can potentially serve as CO_2 sequestration zones, Steam Methane Reforming and Carbon Capture and Storage (CCS) hubs located alongside gas processing facilities can be situated in states like Rivers, Delta and Bayelsa. This could form the first commercial blue hydrogen production cluster in West Africa.

614 km
AKK pipeline length

$2.8bn
AKK project investment

2.2 Bcf/d
Designed transport capacity

17. Addeh, E. (2026, February). FG: First gas from $2.8bn AKK pipeline project expected in July 2026. *ThisDay.* thisdaylive.com

18. Azubuike, E. (2026, April 14). Nigeria's $2.8 billion AKK pipeline to begin gas supply to Abuja by July. *Nairametrics.* nairametrics.com

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A Potential West African First

Co-locating SMR-CCS hubs alongside existing gas processing facilities in Rivers, Delta and Bayelsa – states that sit above prospective CO_2 sequestration formations – could establish the first commercial blue hydrogen production cluster in West Africa.

5 The International Dimension: Export Revenue and Climate Finance

The global hydrogen market is projected to reach $556.56 billion by 2034 at a 7.82% CAGR[19]. European and Asian demand for both blue and green hydrogen is growing as decarbonization mandates tighten globally. Nigeria's proximity to European markets via liquefied natural gas (LNG) corridors that could be adapted for hydrogen carriers, combined with its established gas export infrastructure, positions it as a natural supplier. In February 2025, Nigeria's federal government, domestic firm APPL Hydrogen Limited (AHL), and Chinese manufacturer Longi signed a EUR 7.6 billion preliminary deal to build a green hydrogen project on Nigeria's southern coast[20]. It signals international investor appetite, but it also demonstrates the risk of bypassing the blue hydrogen foundation step. Green hydrogen at that scale requires reliable baseload power that Nigeria's grid cannot yet supply but gas potentially bridges that gap. Blue hydrogen also offers a faster route to carbon market revenues under Nigeria's National Carbon Market Framework (NCMF) 2025. Flare gas monetization with carbon capture and storage (CCS) generates certified emission reductions that can be traded internationally, creating a revenue stream that directly funds further transition investment.

6 Structural Constraints and Limitations

Acknowledging this transition pathway requires acknowledging its constraints. None of them are fatal but all are real.

19. Precedence Research. (2025). *Hydrogen market growth fueled by clean energy demand and emerging technologies.* precedenceresearch.com

20. Abisola, S. (2025, February 23). FG pledges support as APPL Hydrogen, LONGi seal €7.6 billion deal for green hydrogen project in A'Ibom. *Independent.* independent.ng

i

Gas Supply Reliability

Gas-fired plants routinely operate below installed capacity due to pipeline vandalism, gas payment defaults, and regulatory pricing structures that make domestic supply less attractive than export. A hydrogen economy built on gas feedstock would inherit these supply risk problems unless they are structurally resolved.

ii

CCS Maturity in Nigeria

While Nigeria's geological storage potential is enormous, commercial CCS deployment at scale has not yet occurred anywhere in sub-Saharan Africa. The technology exists; the regulatory framework and capital deployment do not yet.

iii

Methane Leakage Risks

Blue hydrogen's climate credentials depend on upstream methane not leaking during extraction and transport. Nigeria's flaring intensity is a proxy for poor methane management. Without parallel methane leak detection and reduction programmes, blue hydrogen's lifecycle emissions may undermine its climate case.

"None of these constraints are fatal – but all of them are real, and each must be structurally resolved for the blue hydrogen pathway to hold its climate and commercial credibility."

7 Policy Recommendations

Seven specific actions can accelerate Nigeria's gas-to-hydrogen transition without compromising either energy access or climate commitments.

i

Formalize a National Blue Hydrogen Strategy

Nigeria has a hydrogen roadmap in development but no dedicated blue hydrogen framework. A standalone strategy, anchored to the Petroleum Industry Act (PIA) 2021 and National Carbon Market Framework (NCMF) 2025, should define production targets, CCS regulatory standards, feedstock allocation from flared gas, and a fiscal incentive framework for SMR-CCS developers. The Ministry of Petroleum Resources (Gas) should lead, with NUPRC and Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) as co-regulators.

ii

Mandate Hydrogen Compatibility Standards for AKK and TNGP Infrastructure

The AKK pipeline is still being commissioned. Material specifications, compressor station siting, and pressure tolerances should be reviewed now and not after commissioning to enable future hydrogen blending or repurposing. The incremental cost of hydrogen-readiness at construction is a fraction of retrofitting cost. Nigerian National Petroleum Company Limited (NNPCL) and NUPRC should jointly commission a technical review before the delivery date.

iii

Redirect the NGFCP Towards Blue Hydrogen Production Clusters

The 38 National Gas Flare Commercialization Programme (NGFCP) contract-holders represent the physical starting point for blue hydrogen production. The federal government should introduce a supplementary regulatory instrument that rewards NGFCP operators who install SMR-CCS units at flare sites, rather than simply flaring less. Tax holidays, carbon market access, and offtake guarantees for hydrogen produced from captured flare gas would make this commercially viable.

iv

Implement Real-Time Satellite-Based Methane Monitoring

Blue hydrogen's climate integrity depends on upstream methane control. Nigeria should implement mandatory satellite-based monitoring of all flare and well sites above a production threshold, with public data reporting. This is both a climate imperative and an investor credibility requirement. The World Bank's Global Flaring and Methane Reduction (GFMR) Partnership already provides the satellite infrastructure; Nigeria needs only the regulatory mandate to use it.

v

Establish a Gas-to-Hydrogen Financing Facility

The ETP's $410 billion additional investment requirement will not come from government budgets alone. A dedicated financing facility with a target of at least $2 billion, structured as a blended finance vehicle with Development Finance Institution (DFI) participation such as the African Development Bank (AfDB), Proparco, British International Investment (BII), United International Finance Corporation (IFC) and anchored by sovereign guarantee, should be established to de-risk first-mover blue hydrogen projects in the Niger Delta.

vi

Develop a Gas Pricing Reform for Domestic Transition Fuels

The current regulated domestic gas price structure creates a perverse incentive: producers prefer LNG exports to domestic supply. A differentiated pricing tier for gas supplied to certified transitional fuel uses such as blue hydrogen production, LPG, gas-to-power for underserved communities would improve supply security without compromising overall sector economics. NMDPRA should publish a domestic transition gas pricing framework by mid-2027.

vii

Commission Geological Surveys for Niger Delta CCS Sites

Nigeria's 10,700 Gt geological storage estimate is a modelled figure, not a site-specific assessment. Bankable blue hydrogen projects require certified storage reservoirs. The government should commission detailed seismic and geological surveys of two to three priority CCS sites in the Niger Delta basin, co-funded by oil majors as part of their energy transition obligations under the PIA 2021.

Reading These Seven Actions Together

Together, these seven actions sequence Nigeria's transition: formalize the strategy and standards first, redirect existing flare infrastructure and financing next, then close the credibility gap with monitoring, pricing reform and site-specific geological certainty.

CONCLUSION

"The question is not whether gas plays a role in Nigeria's hydrogen future. the plan already says it does. The question is whether Nigeria will build the policy, regulatory and financing structures to capture that role deliberately."

The argument for natural gas as a transition fuel in Nigeria's hydrogen future is notideological but structural. The country holds Africa's largest gas reserves, hasinfrastructure under construction that can be adapted for hydrogen, wastes billions ofcubic meters annually through flaring, and faces an energy access deficit that onlydispatchable power can solve in the near term. Renewables are the destination but gas is anecessary part of the route.The ETP's own modelling makes this clear: blue hydrogen at 176 PJ accounts for nearly halfof Nigeria's projected hydrogen supply even in the 2060 net-zero scenario. The question isnot whether gas plays a role in Nigeria's hydrogen future, the plan already says it does. Thequestion is whether Nigeria will build the policy, regulatory and financing structures tocapture that role deliberately, or allow the opportunity to erode through inaction,continued flaring and infrastructure misalignment.