Report Presenting the Inclusion of the IPPU Sector Overarching Institutional Arrangements and Recommendation for National Reporting System and Design

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Report Presenting the Inclusion of the IPPU Sector Overarching Institutional Arrangements and Recommendation for National Reporting System and Design

Initiative for Climate Action Transparency – ICAT

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Acronyms And Abbreviations

Acronym	Full Name
AFOLU	Agriculture, Forestry and Other Land Use
BTR	Biennial Transparency Report
BTR1	First Biennial Transparency Report
CCAC	Climate and Clean Air Coalition
CCS	Carbon Capture and Storage
CMAN	Cement Manufacturers Association of Nigeria
CO_2	Carbon Dioxide
CO_2-eq	Carbon Dioxide Equivalent
CRF	Common Reporting Format
DCC	Department of Climate Change
ECN	Energy Commission of Nigeria
EDGAR	Emissions Database for Global Atmospheric Research
ETF	Enhanced Transparency Framework
FMARD	Federal Ministry of Agriculture and Rural Development
FMAFS	Federal Ministry of Agriculture and Food Security
FMEnv	Federal Ministry of Environment
FMITI	Federal Ministry of Industry, Trade and Investment
GHG	Greenhouse Gas
HFC	Hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change

IPPU	Industrial Processes and Product Use
LEAP	Low Emissions Analysis Platform
LT-LEDS	Long-Term Low Emissions Development Strategy
LULUCF	Land Use, Land-Use Change and Forestry
MDA	Ministry, Department or Agency
MMTPA	Million Metric Tonnes Per Annum
MRV	Measurement, Reporting and Verification
NBS	National Bureau of Statistics
NCCCS	National Council on Climate Change Secretariat
NCCP	National Climate Change Policy
NCCC	National Council on Climate Change
NDC	Nationally Determined Contribution
NERC	Nigerian Electricity Regulatory Commission
NESREA	National Environmental Standards and Regulations Enforcement Agency
NIPC	Nigerian Investment Promotion Commission
NISSC	National Inventory System Steering Committee
NMDPRA	Nigerian Midstream and Downstream Petroleum Regulatory Authority
NUPRC	Nigerian Upstream Petroleum Regulatory Commission
QA	Quality Assurance
QC	Quality Control
RAC	Refrigeration and Air Conditioning
SON	Standards Organization of Nigeria
SWMA	State Waste Management Authority
TER	Technical Expert Review
TWG	Technical Working Group
UNFCCC	United Nations Framework Convention on Climate Change

Section 1: Introduction and Purpose

The establishment of clear and coherent Overarching Institutional Arrangements is a foundational requirement for a credible, transparent, and sustainable national greenhouse gas (GHG) inventory system. This report sets out the institutional architecture through which Nigeria plans, coordinates, compiles, quality-assures, and reports GHG emissions and removals in a manner that is consistent with international obligations and responsive to national policy priorities. It provides a consolidated framework that clarifies roles and responsibilities across government institutions, defines coordination and decision-making mechanisms, and ensures continuity and institutional memory beyond individual reporting cycles or projects.

The primary purpose of the Overarching Institutional Arrangements is to operationalize a nationally owned and country-driven inventory system that supports regular, high-quality GHG reporting while enabling progressive improvement over time. By formalizing institutional mandates and workflows, the framework reduces reliance on ad-hoc arrangements, mitigates risks associated with staff turnover, and strengthens accountability across ministries, departments, agencies, and data-providing entities. Importantly, it serves not only as a technical reference for inventory compilation, but also as a governance instrument that links emissions data to policy formulation, implementation, and review.

The scope of this framework covers all five Intergovernmental Panel on Climate Change (IPCC) sectors used in national GHG inventories, namely Energy, Industrial Processes and Product Use (IPPU), Agriculture, Land Use, Land-Use Change and Forestry (LULUCF), and Waste. These sectors collectively represent the full emissions and removals profile of the Nigerian economy and align with the sectoral structure prescribed under the IPCC Guidelines and the reporting tables adopted under the Paris Agreement. While each sector has distinct data needs, methodological approaches, and institutional actors, this report adopts a harmonized architecture that applies common principles, processes, and quality standards across all sectors, while allowing for sector-specific operationalization through dedicated guidelines.

The legal and policy foundation for the Overarching Institutional Arrangements is anchored in Nigeria's domestic climate governance framework. The Climate Change Act of 2021 provides the statutory basis for coordinated climate action and mandates national institutions to support GHG accounting, reporting, and emissions reduction planning. Complementing this, the National Climate Change Policy (2021–2030) articulates Nigeria's long-term vision for a low-carbon and climate-resilient development pathway and underscores the importance of robust data systems, monitoring, and reporting as enablers of effective policy implementation. Together, these instruments establish both the authority and the obligation for public institutions to participate in a structured national inventory system.

At the international level, the institutional arrangements are designed to ensure Nigeria's full compliance with the Enhanced Transparency Framework (ETF) under the Paris Agreement, administered through the United Nations Framework Convention on Climate Change. The ETF requires Parties to submit regular, transparent, and consistent information on national GHG inventories, mitigation actions, and progress toward nationally determined contributions. Within this context, the Biennial Transparency Report (BTR) has become the central reporting vehicle, replacing previous reporting instruments and placing greater emphasis on institutional robustness, data quality management, and methodological consistency over time.

Beyond meeting international reporting requirements, the Overarching Institutional Arrangements are explicitly

intended to support implementation and tracking of Nigeria's Nationally Determined Contribution (NDC). A well-functioning inventory system enables the translation of policy commitments into measurable outcomes by providing the evidence base for tracking emissions trends, assessing the effectiveness of mitigation actions, and informing future policy adjustments.

1.2 Principles Guiding the National GHG Inventory System

Nigeria's National Greenhouse Gas (GHG) Inventory System is guided by a set of core principles that collectively ensure the credibility, durability, and policy relevance of emissions and removals data produced under the system. These principles are drawn from internationally agreed good practice under the Intergovernmental Panel on Climate Change (IPCC) Guidelines and the transparency requirements of the Paris Agreement, while also reflecting national institutional realities and long-term governance needs. Together, they provide the normative foundation upon which institutional roles, data flows, quality assurance processes, and reporting arrangements are built.

At the centre of the inventory system are the principles of Transparency, Accuracy, Completeness, Consistency, and Comparability (TACCC). Transparency requires that the assumptions, methodologies, data sources, and calculation steps used in estimating emissions and removals are clearly documented and traceable, allowing both national stakeholders and international reviewers to understand how results were derived. Accuracy refers to the systematic reduction of bias and uncertainty to the extent practicable, ensuring that estimates reflect, as closely as possible, Nigeria's actual emissions profile. Completeness demands that all relevant sources, sinks, gases, and sectors within the national boundary are covered, with any exclusions clearly justified and documented. Consistency ensures that estimates are comparable over time through the use of coherent methodologies and recalculations where improvements are introduced, while comparability enables Nigeria's inventory to be assessed alongside those of other Parties through the application of internationally agreed reporting formats and methodological standards.

Beyond technical robustness, the inventory system is designed to uphold institutional continuity and sustainability. Nigeria's experience with periodic reporting has shown that inventory quality is highly sensitive to staff turnover, project-based support, and ad hoc data collection arrangements. The guiding principle, therefore, is to embed inventory functions within permanent institutional mandates, supported by clear roles, standard operating procedures, and formal coordination mechanisms. This approach reduces dependence on individual expertise and external consultants, preserves institutional memory, and ensures that inventory preparation can be sustained across reporting cycles, political transitions, and evolving international requirements.

A further principle underpinning the system is sectoral ownership combined with central coordination. Each IPCC sector Energy, IPPU, Agriculture, LULUCF, and Waste has unique data needs, technical complexities, and stakeholder landscapes that are best managed by institutions with sector-specific mandates and expertise. Accordingly, sector lead institutions and technical working groups are entrusted with primary responsibility for data generation, validation, and sector-level methodological development. At the same time, strong central coordination by the national inventory lead institution is essential to maintain methodological coherence, manage cross-sector interfaces, prevent double counting, and ensure uniform application of quality assurance and reporting standards. This balance between decentralized technical ownership and central oversight is critical to both efficiency and integrity.

The principles of data confidentiality and integrity are particularly important in the Nigerian context, where significant portions of inventory data especially in the Energy and IPPU sectors are sourced from private operators and commercially sensitive activities. The inventory system is therefore guided by safeguards that protect confidential information while enabling its legitimate use for national reporting purposes. This includes the use of aggregated data, controlled access arrangements, and clear protocols governing data sharing, storage, and archiving. At the same time, data integrity is maintained through verification procedures, cross-checks with official statistics, and documented quality control processes, ensuring that confidentiality protections do not compromise the reliability or transparency of reported estimates.

The national inventory system is grounded in the principle of progressive improvement, recognizing that inventory development is an iterative process rather than a static end state. Nigeria's inventory system is expected to evolve over time through methodological refinement, improved data availability, and enhanced institutional capacity. This includes gradual movement from Tier 1 to higher-tier methods where justified by national circumstances, the development of country-specific emission factors, and the expansion of sectoral coverage and data granularity.

Importantly, improvements are to be implemented in a manner that preserves time-series consistency, with recalculations and documentation ensuring that methodological advances strengthen, rather than undermine, the comparability and credibility of the inventory. Through this principle, the inventory system remains adaptive, resilient, and aligned with both national development priorities and evolving international best practice.

2. National Governance Structure for GHG Inventory Management

Nigeria's national greenhouse gas (GHG) inventory system is underpinned by a governance structure that combines high-level strategic oversight with strong technical coordination and inclusive interministerial collaboration. This structure is designed to ensure that inventory preparation is not treated as a standalone technical exercise, but as a core component of national climate governance that informs policy, supports accountability, and enables compliance with international transparency obligations. The governance framework clarifies leadership, decision-making authority, and coordination mechanisms across institutions, thereby reducing fragmentation and strengthening institutional ownership of the inventory process.

2.1 Strategic Oversight

At the apex of the national GHG inventory governance structure is the National Council on Climate Change (NCCC), which provides strategic direction and political oversight for climate action in Nigeria. Established under the Climate Change Act (2021), the NCCC is mandated to coordinate, mainstream, and oversee climate change responses across sectors and levels of government. Within the context of the national GHG inventory system, this strategic role ensures that inventory development is aligned with national climate priorities, carbon budgeting processes, and long-term development objectives.

The NCCC's oversight function anchors the inventory system within Nigeria's broader climate governance architecture. By situating inventory management under a central statutory body with cross-sector authority, the system gains legitimacy, continuity, and accountability. This arrangement also strengthens the link between inventory outputs and policy decision-making, ensuring that emissions data and trends inform national planning, NDC implementation, and progress assessment. Through periodic briefings, approvals, and high-level guidance, the NCCC provides assurance that inventory processes meet national and international expectations while remaining responsive to evolving policy needs.

2.2 National Inventory Coordination

Operational responsibility for the coordination of the national GHG inventory rests with the NCCC, acting through its designated Inventory Management Unit, which serves as the National Inventory Coordinator. This unit provides the central technical and administrative hub for inventory preparation, bringing together sectoral inputs into a single, coherent national system. Its mandate spans the full inventory cycle, from planning and data coordination through compilation, quality assurance and quality control (QA/QC), archiving, and submission of reports.

As National Inventory Coordinator, the Inventory Management Unit is responsible for ensuring that inventory methodologies are applied consistently across sectors and over time, in line with IPCC guidelines and agreed national procedures. It oversees the implementation of QA/QC plans, manages recalculations arising from methodological improvements, and maintains comprehensive documentation to support transparency and technical review. The unit also serves as the custodian of inventory archives, preserving datasets, calculation files,

assumptions, and institutional records to safeguard institutional memory and enable continuity across reporting cycles.

A core responsibility of the Inventory Management Unit is the preparation and submission of Nigeria's inventory-related reports to the United Nations Framework Convention on Climate Change (UNFCCC), including Biennial Transparency Reports (BTR) and any supplementary technical submissions. In this role, the unit acts as the primary national interface with the UNFCCC Secretariat and international review processes, coordinating responses to technical expert review findings and ensuring that recommendations are systematically addressed in subsequent reporting cycles.

2.3 Interministerial Steering Committee

To support effective coordination across the diverse institutions involved in inventory preparation, Nigeria's governance framework provides for an Interministerial Steering Committee on the national GHG inventory. This committee brings together representatives from key ministries, departments, and agencies (MDAs) with responsibilities for data provision, regulation, statistics, and sectoral policy across the five IPCC sectors Energy, IPPU, Agriculture, LULUCF, and Waste. Its composition reflects the multi-sectoral nature of the inventory and ensures that all major data-producing and policy-relevant institutions are represented.

The Steering Committee functions as the principal platform for cross-sector coordination and collective decision-making within the inventory system. It facilitates alignment between sectoral approaches, resolves overlaps and boundary issues between sectors, and promotes coherence in data flows and methodological choices. By providing a forum for technical and institutional dialogue, the committee helps prevent double counting, address data gaps, and ensure that sector-specific practices are harmonized within a unified national framework.

The Steering Committee also plays a critical role in safeguarding methodological consistency and credibility. It reviews key methodological decisions, endorses proposed improvements or recalculations, and validates consolidated inventory outputs prior to submission. Through this validation and approval function, the committee reinforces collective ownership of the inventory results and strengthens confidence in their use for national and international purposes. Overall, the Interministerial Steering Committee acts as the connective tissue between strategic oversight and technical implementation, ensuring that Nigeria's national GHG inventory system operates as an integrated, transparent, and accountable whole.

*Table 1: **Governance Structure for Nigeria's National GHG Inventory System***

Governance level / function	**Energy**	**IPPU**	**Agriculture**	**LULUCF**	**Waste**
Strategic oversight (policy & accountability)	NCCC provides strategic oversight for Energy inventory development, ensures alignment with carbon budgets, NDC targets, and national climate priorities	Same	Same	Same	Same
National inventory coordination (technical &	NCCC Inventory Management Unit coordinates Energy inventory planning, compilation, QA/QC	Same	Same	Same	Same

administrative)	integration, archiving, and reporting				
Legal anchoring of inventory functions	Climate Change Act (2021) mandates national coordination and reporting of Energy emissions	Same	Same	Same	Same
Interministerial steering committee	Reviews Energy sector methods and data, resolves cross-sector boundary issues, validates estimates, and endorses outputs	Same	Same	Same	Same
Sector lead institution(s)	Lead Energy MDAs responsible for fuel combustion, fugitive emissions, electricity, oil & gas, and transport activity data	Lead IPPU MDAs responsible for industrial process and product-use emissions	Lead Agriculture MDAs responsible for crop, livestock, and soils emissions	Lead Environment/Forestry MDAs responsible for land-use and carbon stock change	Lead Environment/Waste MDAs responsible for solid waste and wastewater
Sectoral scope (IPCC definition)	Fuel combustion (stationary & mobile), fugitive emissions, energy industries	Industrial processes, product use, F-gases	Livestock, rice, soils, manure, liming	Forest land, cropland, grassland, wetlands, land-use change	Solid waste disposal, wastewater, biological treatment
Primary activity data custodians	Fuel suppliers, power generators, oil & gas operators, transport agencies, regulators	Cement, fertilizer, steel, RAC industries, regulators	Agricultural surveys, livestock agencies, research institutes	Forest inventories, land registries, remote sensing institutions	State waste authorities, utilities, municipalities
Energy Commission of Nigeria (ECN)	Harmonizes and officialises Energy activity data and time series	Same	Same	Same	Same
NBS	Official national statistics agency	Same	Same	Same	Same
Sector Technical Working Group (TWG)	Energy TWG comprising energy MDAs, regulators, utilities, industry,	IPPU TWG	Agriculture TWG	LULUCF TWG	Waste TWG

	academia, NBS				
TWG responsibilities	Sector data validation, methodological advice, uncertainty review, Tier improvement planning	Same	Same	Same	Same
Sector-level QA/QC (first line)	Energy sector QA/QC conducted by Sector Lead + Energy TWG	Same	Same	Same	Same
National-level QA/QC (second line)	Cross-sector consistency checks, recalculations, documentation led by National Inventory Coordinator	Same	Same	Same	Same
Handling of confidential data	Aggregation and controlled access applied to commercially sensitive Energy data	Same	Same	Same	Same
Data archiving & institutional memory	Energy datasets, assumptions, correspondence, and calculation files archived centrally	Same	Same	Same	Same
Validation & approval before submission	Steering Committee validates Energy estimates prior to consolidation	Same	Same	Same	Same
International reporting interface	Energy inputs integrated into BTR/CRF tables and submitted to UNFCCC; review responses coordinated nationally	Same	Same	Same	Same

2. 4. Guiding Principle Sectoral Institutional Arrangements

Nigeria's national GHG inventory system is operationalized through sectoral institutional arrangements that mirror the IPCC inventory structure and enable consistent application of inventory procedures across the economy. While the five sectors differ in emissions sources, data ecosystems, and methodological complexity, the institutional design follows a common architecture: each sector is anchored by a designated Sector Lead Institution (Lead MDA) supported by a Sector Technical Working Group (TWG), with defined reporting and quality management interfaces to the national inventory coordinator. This arrangement ensures that sector-specific expertise is fully utilized, while maintaining national-level methodological coherence, consistent QA/QC, and aligned reporting outputs for Biennial Transparency Reports (BTRs).

2.4.1 Definition of Inventory Sectors

The national inventory is structured according to the five IPCC sectors used for reporting emissions and removals under the IPCC 2006 Guidelines and the 2019 Refinement, and consistent with the reporting formats of the Enhanced Transparency Framework (ETF):

- **Energy**: covers emissions from the combustion of fuels and fugitive emissions from fuels, including stationary combustion (e.g., electricity generation, manufacturing industries, residential fuel use), mobile combustion (transport), and fugitive emissions from oil and gas systems. It is typically the most data-intensive sector due to the breadth of activity data required (fuel balances, plant generation statistics, transport activity, gas flaring/venting estimates), and also the sector most sensitive to cross-sector boundary issues with IPPU (e.g., separating process emissions from combustion emissions).

- **Industrial Processes and Product Use (IPPU)**: covers emissions arising from chemical and physical transformation processes in industry and emissions from the use of products containing greenhouse gases. Unlike the Energy sector, IPPU excludes combustion emissions and focuses on process emissions (e.g., clinker production, ammonia and nitric acid production, metal production) and product-use emissions (e.g., HFCs from refrigeration and air-conditioning, SF_6 from electrical equipment where relevant). The IPPU sector often involves commercially sensitive data and typically requires structured engagement with industrial operators, regulators, and associations.

- **Agriculture**: covers emissions from managed agricultural systems, particularly enteric fermentation, manure management, rice cultivation, agricultural soils, field burning (where included), and other agricultural sources. Agriculture is highly dependent on national agricultural statistics, livestock population and productivity parameters, fertilizer use patterns, and sometimes regionally disaggregated data. It has strong links with the AFOLU suite under IPCC and requires careful boundary management with LULUCF.

- **Land Use, Land-Use Change and Forestry (LULUCF)**: covers emissions and removals from **land-based carbon stock changes**, including forest land, cropland, grassland, wetlands, settlements, and other land, as well as transitions between these land categories. It is methodologically distinct because it addresses both emissions and removals and often relies on spatial datasets, remote sensing products, national forest inventories, and land-use mapping. Strong QA/QC and transparency in assumptions is essential due to the uncertainty inherent in land-based estimation.

- **Waste**: covers emissions from solid waste disposal, biological treatment, waste incineration (if relevant), and wastewater treatment and discharge. Activity data often sits at state and local levels and across utilities and municipal authorities, making institutional coordination and standardization of data formats particularly important.

2. 4.2 Sector Lead Institutions

A core element of IPCC-aligned institutional arrangements is the designation of Lead MDAs (Sector Lead Institutions) for each inventory sector. These lead institutions provide sector-level stewardship, ensure that data mobilization and validation are systematic, and act as the primary interface between sector actors and the national inventory coordinator. In practice, sector lead institutions should be selected based on:

i. statutory mandate over the sector,
ii. custodianship or proximity to key datasets,
iii. convening authority over relevant data providers, and
iv. technical capacity to sustain routine engagement in inventory compilation.

Designation of lead MDAs for each sector

At a minimum, each sector in Nigeria have one Lead MDA formally recognized within the national inventory system. Depending on the national governance context, some sectors also have **co-lead institutions** where mandates and datasets are distributed (for example, where one institution holds regulatory authority and another holds official statistics). Where co-leads exist, roles must be explicitly delineated to avoid duplication and gaps, and the national inventory coordinator should maintain a single "point of accountability" for each sector.

Core responsibilities

Sector Lead Institutions are responsible for the full set of sectoral functions that enable timely, complete, and quality-assured inventory inputs. These responsibilities include:

- **Sector coordination**: The Sector Lead Institution convenes sector stakeholders and ensures that inventory preparation follows an agreed annual cycle (or reporting cycle aligned to BTR timelines). This includes initiating data requests, coordinating TWG meetings, tracking deliverables, ensuring continuity of sector inputs, and managing the interface with cross-cutting institutions such as NBS and regulators. Sector coordination also includes identifying and managing cross-sector boundary issues for example, ensuring that emissions are correctly assigned between Energy and IPPU, or that land-based emissions are properly allocated between Agriculture and LULUCF.

- **Data consolidation**: The Sector Lead Institution consolidates activity data and supporting information from multiple sources into a sector dataset suitable for inventory compilation. This function is not merely administrative; it requires the Lead Institution to ensure that datasets are internally coherent (units, time series, definitions), accompanied by metadata, and supported by sufficient documentation for transparency. Data consolidation should also include the use of standardized templates, version control, and clear referencing of data sources. Where confidential or commercially sensitive datasets are used (notably in Energy and IPPU), the lead institution ensures that aggregation rules and confidentiality protocols are applied while maintaining traceability for QA/QC purposes.

- **Liaison with NCCC (National Inventory Coordinator)**: The Sector Lead Institution serves as the formal interface between the sector system and the national inventory coordinator (NCCC or the designated national coordinating unit). This includes submitting validated sector datasets, documenting methodological choices and assumptions, responding to clarification requests, supporting national QA/QC processes, and participating in national validation sessions. During BTR preparation and technical expert reviews, the Sector Lead Institution supports the national coordinator by providing sector-specific justifications, responding to review questions, and helping implement corrective actions in subsequent cycles.

2.4.3 Sector Technical Working Groups (TWGs)

Sector Technical Working Groups are the technical engines of the inventory system. They provide the multi-institutional expertise required to validate activity data, advise on methodological choices, interpret sector trends, and support quality assurance processes. TWGs also provide continuity by institutionalizing knowledge beyond individual consultants or short-term assignments and act as a platform for sustained improvement in sector inventories.

Composition (MDAs, statistics, regulators, academia, private sector)

Each sector TWG should be constituted to reflect the full landscape of data custodians and technical expertise required for that sector. While exact membership will be defined in the sector guidelines, a robust TWG typically includes:

- Relevant sector MDAs with policy mandates and administrative datasets;
- National Bureau of Statistics representatives to support consistency with official statistics and time-series coherence;
- Regulators and enforcement bodies with access to facility-level monitoring and compliance data (especially for Energy, IPPU, Waste);
- Academia and research institutions with expertise in sector methodologies, emission factor development, and uncertainty analysis;
- Private sector and industry associations where they are key data providers (notably Energy and IPPU; sometimes Waste through utilities and service providers).

Membership should be formalized with clear terms of reference, meeting frequency, decision rules, and conflict-of-interest safeguards (particularly where private operators contribute data). The TWG should also maintain a documented roster and ensure that alternates are nominated to manage turnover.

Roles

TWGs perform technical functions that are essential to ensuring the quality and credibility of inventory estimates. Their roles include:

- **Data review and validation**: TWGs assess the completeness, consistency, and plausibility of activity datasets prior to their submission for national compilation. This includes cross-checking datasets against alternative sources where available, identifying outliers and sudden structural breaks in time series, ensuring that definitions and units are consistent with IPCC reporting categories, and confirming that any data gaps are transparently treated. Where sector datasets rely on surveys, estimates, or proxy indicators, TWGs review assumptions and ensure that documentation supports transparency and reproducibility.
- **Methodological advice**: TWGs advise the sector lead and national inventory coordinator on methodological selection consistent with IPCC guidance. This includes recommending appropriate tiers, confirming category allocation, advising on emission factor selection (default vs country-specific), and ensuring that method choices are consistent with data availability. TWGs also advise on recalculations where methodological improvements are introduced, ensuring that time-series consistency is preserved and that changes are transparent and justified.
- **Tier improvement planning**: Progressive improvement requires structured planning rather than ad hoc upgrades. TWGs identify priority categories for improvement based on emissions significance, uncertainty, and data feasibility, and propose practical steps for moving from Tier 1 to higher tiers. This may include commissioning targeted studies for country-specific emission factors, improving data capture systems, designing sector reporting templates, strengthening facility reporting protocols, or establishing memoranda of understanding for data sharing. TWGs also support the development of sector improvement roadmaps with clear milestones and responsibilities.

- **QA/QC support**: TWGs support QA/QC by helping implement sector-level checks, supporting documentation of assumptions and calculations, and ensuring that sector estimates align with national QA/QC plans. They also assist in preparing sector narratives for BTR reporting, including explanations of trends, recalculations, methodological changes, and key uncertainties. During technical expert reviews, TWGs provide technical depth to respond to review findings and support the implementation of improvement actions.

2.5 Sectoral Institutional Arrangement

2.5.1 Energy Sector (Oil & Gas)

The Oil and Gas Sector Institutional Arrangement (IA) framework positions the National Council on Climate Change (NCCC) as the apex coordinating authority and National Climate Action Focal Point, providing strategic oversight and ensuring alignment of sectoral reporting with Nigeria's national GHG inventory system and Enhanced Transparency Framework (ETF) obligations. Emissions related to petroleum fuels, gas production, flaring, venting, and fugitive releases are coordinated through the Federal Ministry of Petroleum Resources, with regulatory and technical data provided by the Nigerian Upstream Petroleum Regulatory Commission and the Nigerian Midstream and Downstream Petroleum Regulatory Authority. These institutions supply activity data on crude oil and gas production, gas flaring volumes, processing losses, pipeline transmission, and downstream fuel distribution, which are critical for estimating both combustion-related and fugitive emissions.

At the operational core of the system are the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA), which jointly serve as the sector leads responsible for monitoring, data management, coordination, and compilation of sectoral emissions and project data. Acting as Project Data Compilers, these institutions aggregate, validate, and consolidate information received from regulated entities across the upstream, midstream, and downstream segments of the oil and gas value chain. Their mandate includes ensuring consistency between facility-level reporting and national inventory requirements, harmonising methodologies, and maintaining structured data archives for reporting cycles.

A dedicated Technical Working Group (TWG) supports the regulatory authorities by providing technical guidance, reviewing methodological approaches, advising on emission factors and activity data treatment, and facilitating sector–inventory interface management, particularly where overlaps may occur with the Energy or IPPU sectors. The TWG functions as a technical backstopping mechanism to strengthen data integrity and methodological coherence.

At the base of the framework are the data providers and activity data experts. These include oil and gas companies operating across the value chain international oil companies (IOCs), the Nigerian National Petroleum Company (NNPC) Limited, marginal field operators, indigenous independents, depots, retail gas plants, and service providers. They supply GHG inventory activity data (e.g., production volumes, flaring data, fuel consumption), climate-related project data (mitigation initiatives and investment information), and relevant operational statistics. Complementary data streams are sourced from institutions such as the Nigerian Meteorological Agency (NiMet) for climate-related impact data, and other national statistical and research bodies including the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), IPCC reference materials, International Energy Agency (IEA), and the National Energy Transition Implementation framework (NETI), where applicable.

The framework incorporates layered quality assurance and quality control mechanisms. Internal quality control (QC) is conducted within the sector institutions during data compilation and reconciliation processes. Independent third-party quality assurance (QA) mechanisms provide additional verification at both the coordination and oversight levels, reinforcing transparency, credibility, and compliance with national and international reporting

standards.

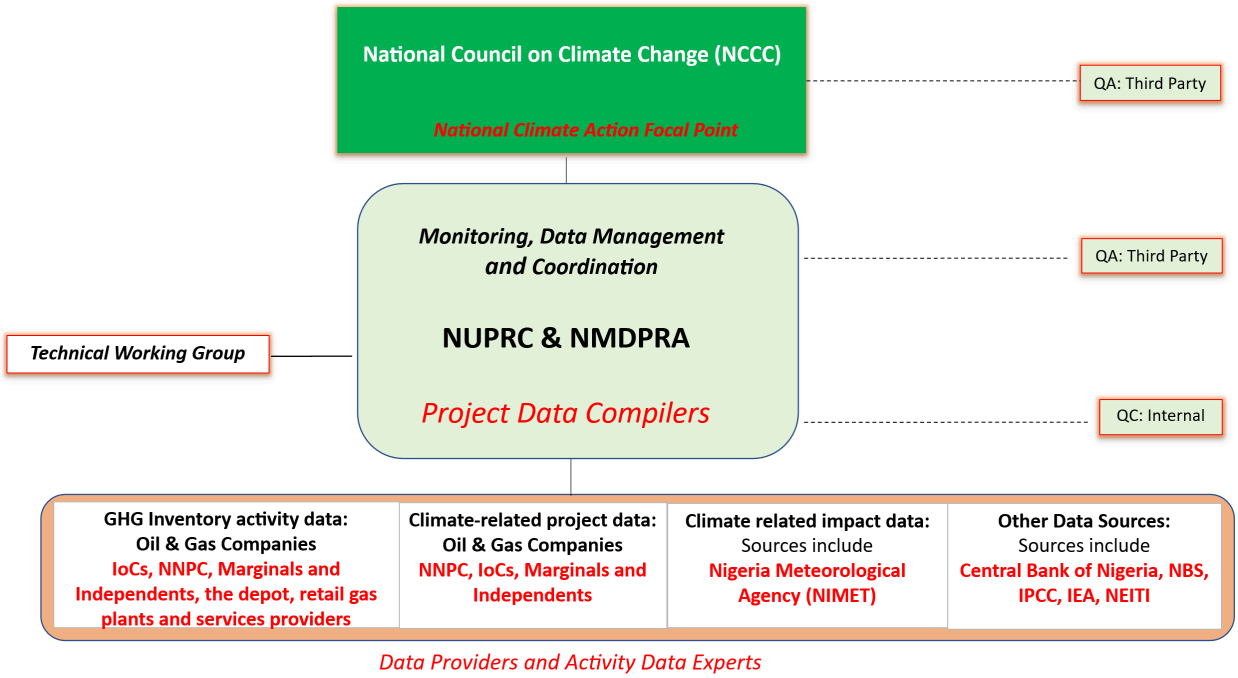


*Figure 1: **Institutional Arrangement Oil & Gas***

2.5.2 Energy Sector (Electricity etc)

The Energy sector covers greenhouse gas emissions arising from the combustion of fuels and fugitive emissions associated with fuel production, processing, transmission, and distribution. It includes stationary combustion in electricity generation, manufacturing industries, and buildings; mobile combustion in road, rail, aviation, and water transport; and fugitive emissions from oil and gas extraction, processing, storage, and distribution systems. Owing to its scale and reliance on multiple administrative and operational data systems, the Energy sector is one of the most institutionally complex components of Nigeria's national GHG inventory.

Beyond oil and gas, the Energy sector institutional arrangement must cover all remaining sub-categories required under the IPCC 2006 Guidelines and 2019 Refinement, namely: (i) stationary combustion (1A1 Energy Industries; 1A2 Manufacturing Industries and Construction; 1A4 Other Sectors), (ii) transport (1A3), (iii) fugitive emissions from fuels outside oil and gas where relevant (1B2, e.g., coal mining), and (iv) other energy-related activities not already addressed under upstream petroleum regulation. The institutional architecture for these sub-categories follows the same governance logic reflected in the oil and gas IA: apex oversight by the National Council on Climate Change (NCCC), sector-specific data compilation by designated lead institutions, structured data flows from regulated entities, and embedded QA/QC procedures.

For stationary combustion in Energy Industries (1A1), which includes grid-connected electricity generation, captive power plants, and other large-scale fuel combustion installations, the Federal Ministry of Power (FMoP) serves as the policy lead, while the Nigerian Electricity Regulatory Commission (NERC) functions as the primary regulatory focal point for data collection and compliance. The Transmission Company of Nigeria (TCN), the Nigerian Bulk Electricity Trading Company (NBET), and licensed Generation Companies (GenCos) are key data providers, supplying plant-level fuel consumption, generation output, plant efficiency, and technology data. The Rural Electrification Agency (REA) and embedded generation operators provide data for off-grid and mini-grid systems. In this arrangement, NERC (in coordination with FMoP) acts as the sector data compilation focal institution for grid electricity, ensuring harmonization between energy balance statistics and inventory reporting formats before

transmission to the national inventory coordinator under the NCCC.

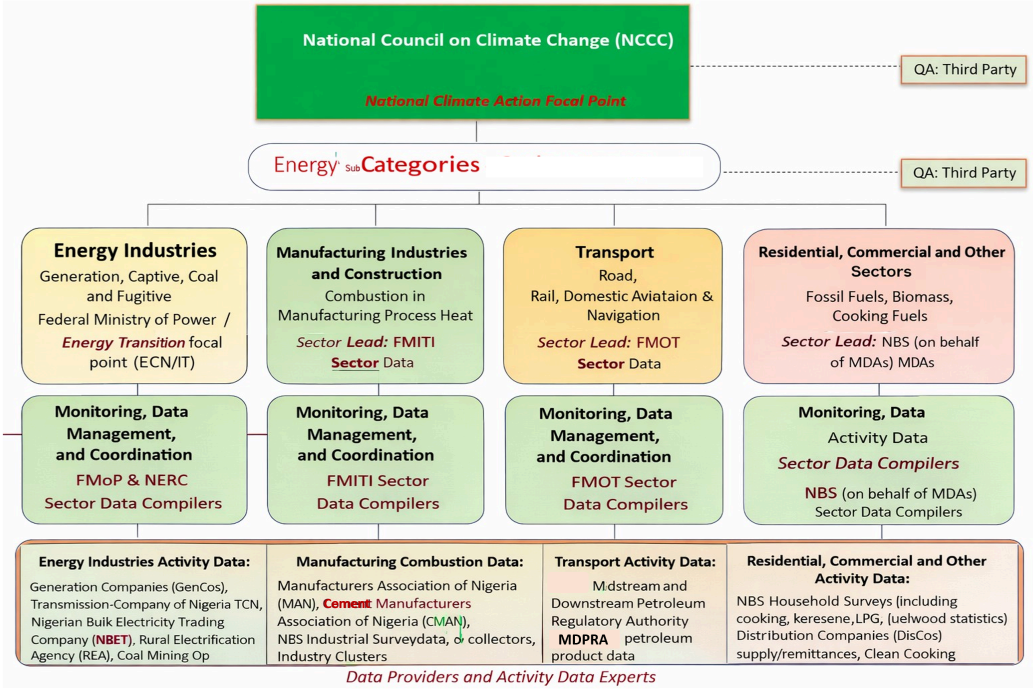


Figure 2: Institutional Arrangement for Energy Sector Subcategories (Excluding Oil and Gas)

For Manufacturing Industries and Construction (1A2), where fossil fuels are combusted in industrial boilers, furnaces, kilns, and process heating systems, the Federal Ministry of Industry, Trade and Investment (FMITI) provides sectoral policy oversight, while data coordination is undertaken in collaboration with the National Bureau of Statistics (NBS) and relevant industry regulators. Major industry associations such as the Manufacturers Association of Nigeria (MAN), Cement Manufacturers Association of Nigeria (CMAN), and sector-specific industrial clusters serve as structured data channels. Given that some industries overlap with IPPU process emissions (e.g., cement, iron and steel), a designated Energy–IPPU interface focal point is required to prevent double counting and ensure separation of combustion emissions from process emissions. In this configuration, FMITI, supported by NBS, acts as the activity data consolidation focal institution for industrial combustion.

For Transport (1A3), covering road, rail, domestic aviation, and domestic navigation, the Federal Ministry of Transportation (FMOT) serves as the policy lead. The Nigerian Railway Corporation (NRC), the Nigerian Civil Aviation Authority (NCAA), the Nigerian Ports Authority (NPA), and the Nigerian Maritime Administration and Safety Agency (NIMASA) provide sub-sector operational data. Road transport fuel use is primarily derived from petroleum product supply statistics coordinated by NMDPRA, complemented by vehicle registration and fleet data from the Federal Road Safety Corps (FRSC) and the National Automotive Design and Development Council (NADDC). In this arrangement, FMOT, in coordination with NMDPRA and NBS, functions as the transport emissions focal coordination point, ensuring consistency between fuel sales data, fleet characteristics, and modal activity data.

For Other Sectors (1A4), including residential, commercial, institutional, agriculture/forestry/fishing energy use, the Federal Ministry of Environment (FMEnv), the Federal Ministry of Agriculture and Food Security (FMAFS), and the Federal Ministry of Housing and Urban Development (FMHUD) play sectoral roles depending on sub-category. The NBS Household Survey Division provides critical activity data on biomass use, kerosene consumption, LPG penetration, and electricity access. Clean cooking programme implementers and distribution companies (DisCos)

supply complementary data on household energy transitions. Here, NBS acts as the central activity data aggregation focal point, working with sector ministries to ensure that survey-derived consumption estimates are aligned with national energy balance data.

For fugitive emissions from coal mining and other solid fuels (1B1 and relevant parts of 1B2), where applicable, the Federal Ministry of Solid Minerals Development (FMSMD) is the policy authority, with the Mining Cadastre Office and licensed operators providing production data. Although coal production in Nigeria is relatively limited, institutional clarity remains necessary to meet IPCC completeness requirements. FMSMD would therefore serve as the focal compilation institution for solid fuel fugitive emissions.

Across all these sub-categories, the NBS plays a cross-cutting role as the custodian of the national energy balance and industrial statistics, ensuring that fuel supply, transformation, and final consumption data reconcile across sub-sectors. The Energy Commission of Nigeria (ECN) provides strategic oversight on national energy planning and long-term modelling assumptions that may inform time-series consistency and recalculations. NiMet provides climate variables where needed for energy demand modelling. The Central Bank of Nigeria (CBN) and other financial regulators may provide macroeconomic or energy financing data where relevant to mitigation project tracking.

Quality control is conducted internally by each sector focal institution prior to submission to the national inventory coordination unit. Cross-sector reconciliation particularly between electricity generation, industrial fuel use, transport fuel sales, and oil and gas production statistics is managed through periodic inter-sector Technical Working Group sessions under the supervision of the NCCC. Independent third-party quality assurance may be applied at key stages to reinforce transparency and ETF compliance.

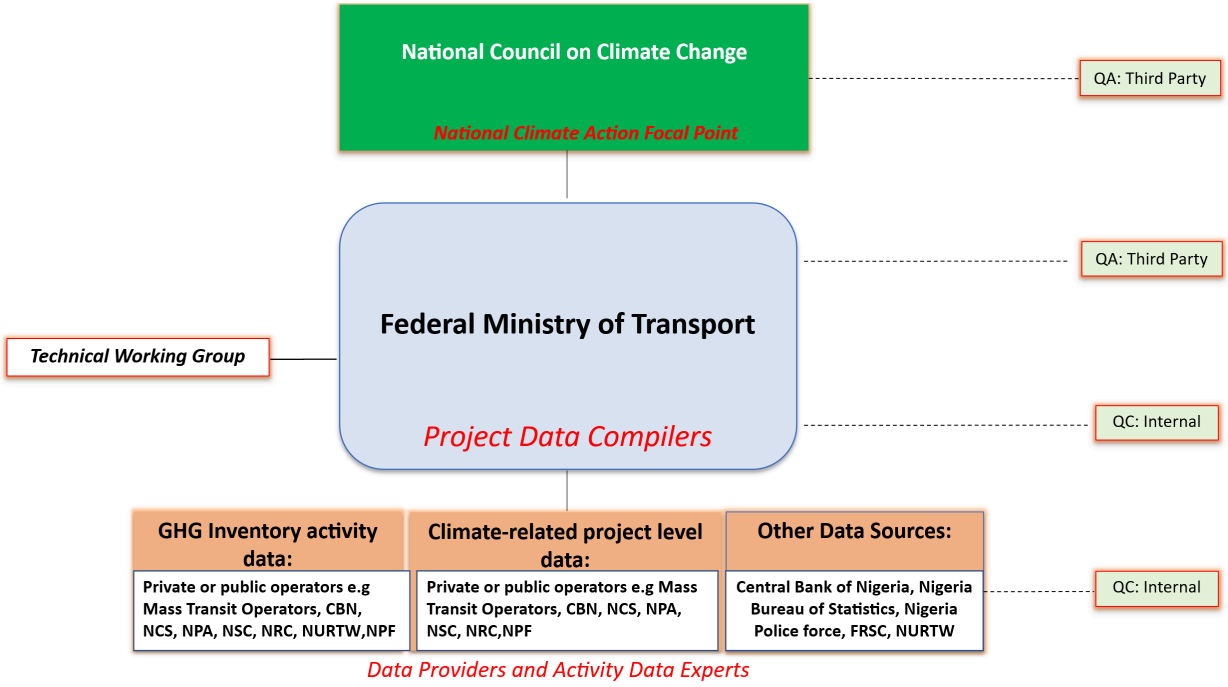


*Figure 3: **Institutional Arrangement Transport***

The National Bureau of Statistics (NBS) if strengthened can play a central integrative role across all Energy subsectors. At the moment Energy Commission of Nigeria compiles and harmonizes national energy balances, fuel supply and consumption statistics, electricity production data, and time-series datasets, ensuring internal consistency and alignment with official national statistics. These datasets form the primary activity data inputs for

Energy sector emissions estimation and underpin time-series consistency across inventory reporting cycles.

Within the national inventory system, these institutions are linked through a formal Energy Sector Technical Working Group (TWG) coordinated by the designated Energy Sector Lead Institution and interfacing directly with the national inventory coordinator. The Energy TWG comprises representatives from the Federal Ministry of Power, Federal Ministry of Petroleum Resources, NERC, NUPRC, NMDPRA, NBS, relevant transport agencies, and technical experts from academia. Its functions include reviewing and validating activity data, advising on IPCC-consistent methodological choices, addressing data gaps, and ensuring that emissions from fuel combustion are clearly distinguished from industrial process emissions reported under the IPPU sector.

The Energy sector's institutional arrangement emphasizes clear role delineation and structured data flows. Regulatory agencies and operators generate and submit activity data; ECN harmonizes and officializes time-series statistics; the Sector Lead Institution consolidates and validates sector datasets; and the national inventory coordinator integrates these inputs into the national inventory, applies cross-sector QA/QC checks, and ensures consistency with IPCC reporting requirements. Particular attention is given to managing interfaces with the IPPU sector especially in industrial facilities where both fuel combustion and process emissions occur to prevent double counting and maintain methodological integrity.

2.5.3 Industrial Processes and Product Use (IPPU) Sector

The Industrial Processes and Product Use (IPPU) sector covers greenhouse gas emissions arising from chemical and physical transformation processes in industrial production, as well as emissions from the use of products that contain or release greenhouse gases. In Nigeria, this includes emissions from cement and lime production, ammonia and nitric acid manufacturing, iron and steel production, and the use of fluorinated gases particularly hydrofluorocarbons (HFCs) in refrigeration and air-conditioning equipment. Unlike the Energy sector, IPPU excludes fuel combustion emissions and focuses specifically on process- and product-related emissions, requiring clear institutional and methodological separation to avoid double counting.

Institutional leadership for the IPPU sector is anchored primarily within the Federal Ministry of Environment, which has overall responsibility for climate change coordination and national GHG inventory preparation. Within this mandate, the Ministry provides sector oversight for IPPU emissions accounting and serves as the principal interface with the national inventory coordinator. Given the strong industrial dimension of the sector, the Federal Ministry of Environment works in close collaboration with the Federal Ministry of Industry, Trade and Investment, which is responsible for industrial policy, manufacturing development, and engagement with large industrial operators.

Regulatory oversight and facility-level environmental compliance data for IPPU activities are provided by the National Environmental Standards and Regulations Enforcement Agency (NESREA). NESREA plays a critical role by enforcing sector-specific environmental regulations for cement plants, chemical facilities, metal industries, and other manufacturing installations. Through inspections, permitting, and compliance reporting, NESREA provides administrative datasets that support activity data validation and cross-checking for inventory purposes, particularly for large point sources.

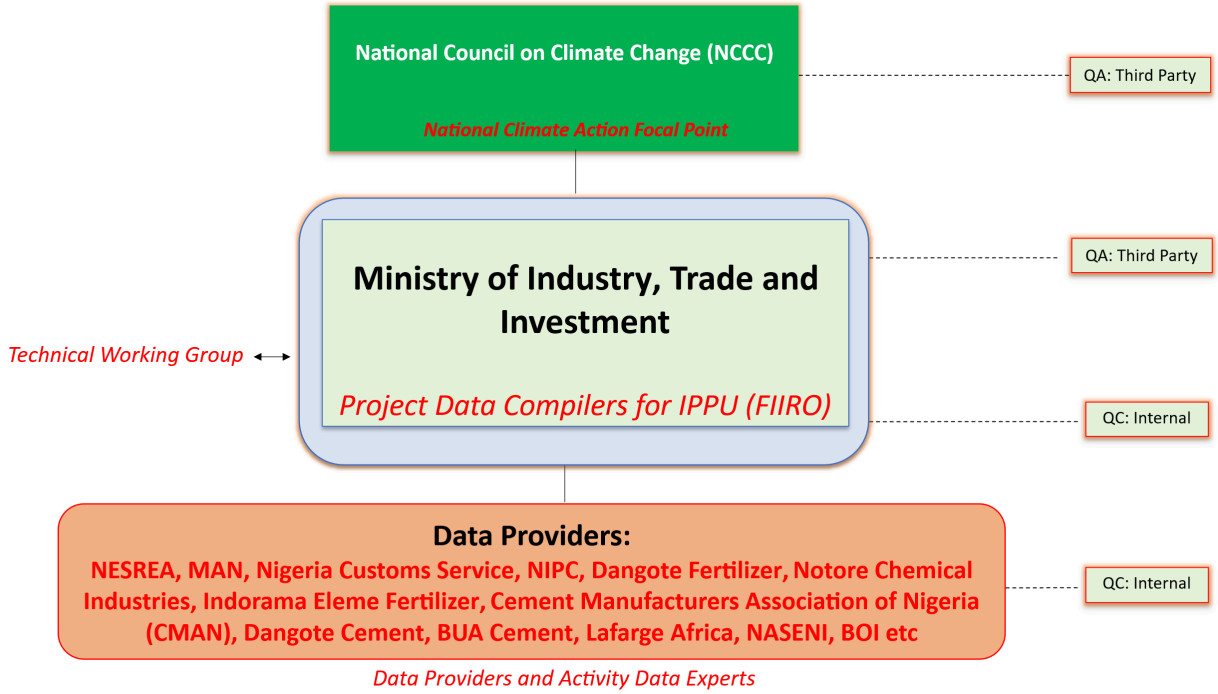


*Figure 4: **Institutional Arrangement IPPU***

Industrial activity data are sourced directly and indirectly from major industrial operators and industry associations. In the cement subsector, production and clinker output data are obtained from dominant producers such as Dangote Cement, BUA Cement, and Lafarge Africa, often coordinated through industry platforms and validated against regulatory and statistical records. For chemical production, including ammonia and nitric acid, data are provided by fertilizer and chemical manufacturers and supported by administrative records from relevant MDAs. Emissions related to metal production draw on information from iron and steel producers, including both integrated plants and mini-mills, supplemented where necessary by import and export statistics for intermediate products.

For product use emissions particularly HFCs the institutional landscape extends beyond traditional industrial actors. Data on the import, manufacture, and servicing of refrigeration and air-conditioning equipment are coordinated through the Federal Ministry of Environment in collaboration with customs authorities, servicing sector representatives, and programmes supporting implementation of the Kigali Amendment. These data streams are essential for estimating emissions from refrigerant banks, leakage during use, and end-of-life disposal, and require structured engagement with a fragmented and partly informal service sector.

Across all IPPU subsectors, the Ministry of Trade and Industries plays a central role in harmonizing industrial production statistics, manufacturing indices, and trade data. NCCC datasets provide the official time series used for inventory compilation and are essential for ensuring consistency across years, reconciling discrepancies between administrative and industry-reported data, and aligning IPPU activity data with national economic statistics.

These institutions are formally linked through an IPPU Sector Technical Working Group (TWG), coordinated by the Federal Ministry of Environment in its role as sector lead. The IPPU TWG comprises representatives from the Federal Ministry of Environment, Federal Ministry of Industry, Trade and Investment, NESREA, NBS, relevant research institutions, and selected industry representatives. The TWG is responsible for reviewing and validating activity data, advising on IPCC-consistent methodological choices, supporting the selection and improvement of emission factors, and ensuring that industrial process emissions are clearly distinguished from energy-related emissions reported under the Energy sector.

The IPPU sector's institutional arrangement places strong emphasis on data confidentiality, traceability, and methodological rigour. Commercially sensitive production data are handled through aggregation and controlled access arrangements, while maintaining sufficient documentation to support QA/QC and international review. Consolidated sector datasets are transmitted by the sector lead to the national inventory coordinator, where

cross-sector consistency checks, recalculations, and final QA/QC are applied prior to reporting.

2.5.4 Agriculture Sector

The Agriculture sector covers greenhouse gas emissions arising from managed agricultural activities, including enteric fermentation in livestock, manure management, rice cultivation, agricultural soils, and the application of organic and inorganic fertilizers. These emissions are predominantly methane (CH_4) and nitrous oxide (N_2O) and are closely linked to production systems, management practices, and agro-ecological conditions. The sector relies heavily on statistical, survey-based, and research-derived data, requiring strong coordination between agricultural institutions, statistical agencies, and technical experts.

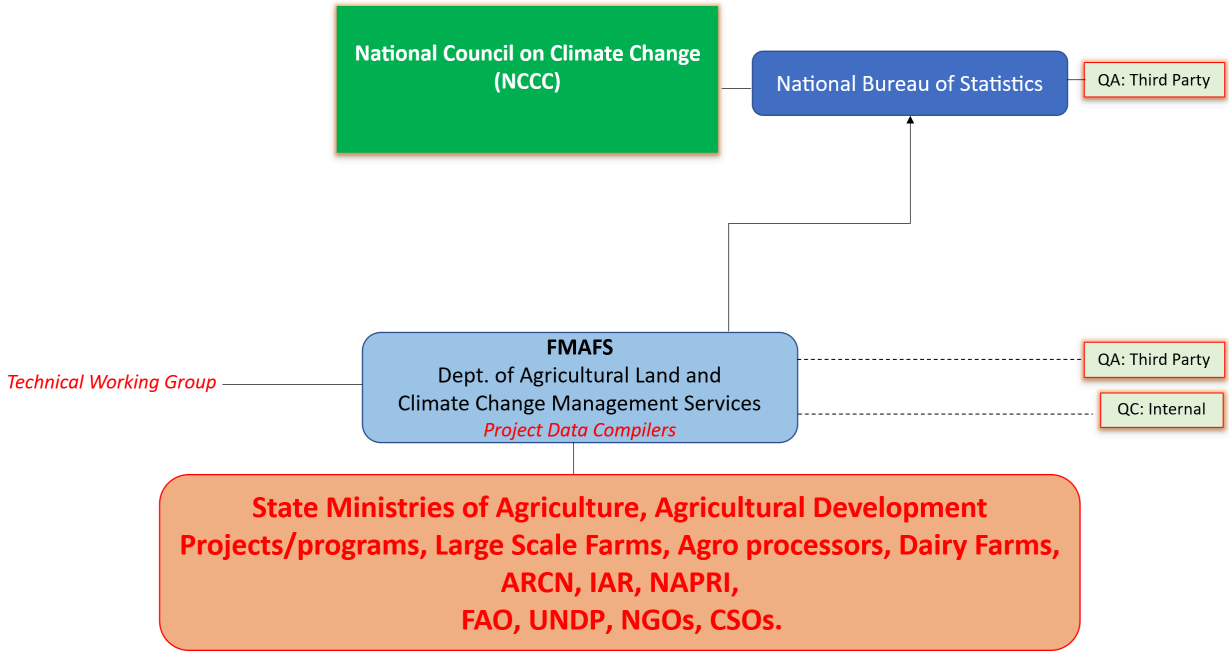


*Figure 5: **Institutional Arrangement Agriculture***

Institutional leadership for the Agriculture sector is anchored in the Federal Ministry of Agriculture and Food Security (FMAFS), which holds the national mandate for agricultural policy, planning, and sector coordination. FMAFS serves as the lead institution for agriculture-related activity data mobilization and sector coordination for inventory purposes. It provides access to administrative records, livestock and crop production statistics, fertilizer distribution data, and information on farming systems through its departments and affiliated agencies.

Agricultural activity data are generated through a combination of administrative systems, surveys, and research programmes. Key inputs are drawn from livestock census data, crop production surveys, fertilizer use records, and extension service datasets coordinated by FMAFS and its agencies. These datasets are complemented by research outputs from national agricultural research institutes and universities, which provide parameters related to animal productivity, feed systems, manure management practices, and soil management parameters that are critical for applying IPCC methodologies accurately in the Nigerian context.

The NCCC plays a central role in the Agriculture sector by compiling, harmonizing, and officializing national agricultural statistics. NCCC ensures consistency of time series for livestock populations, crop areas, yields, and fertilizer use, and aligns sector data with national statistical standards. These official datasets form the primary activity data inputs for Agriculture sector emissions estimation and are essential for maintaining consistency across inventory reporting cycles. improvements in data quality and tier progression over time.

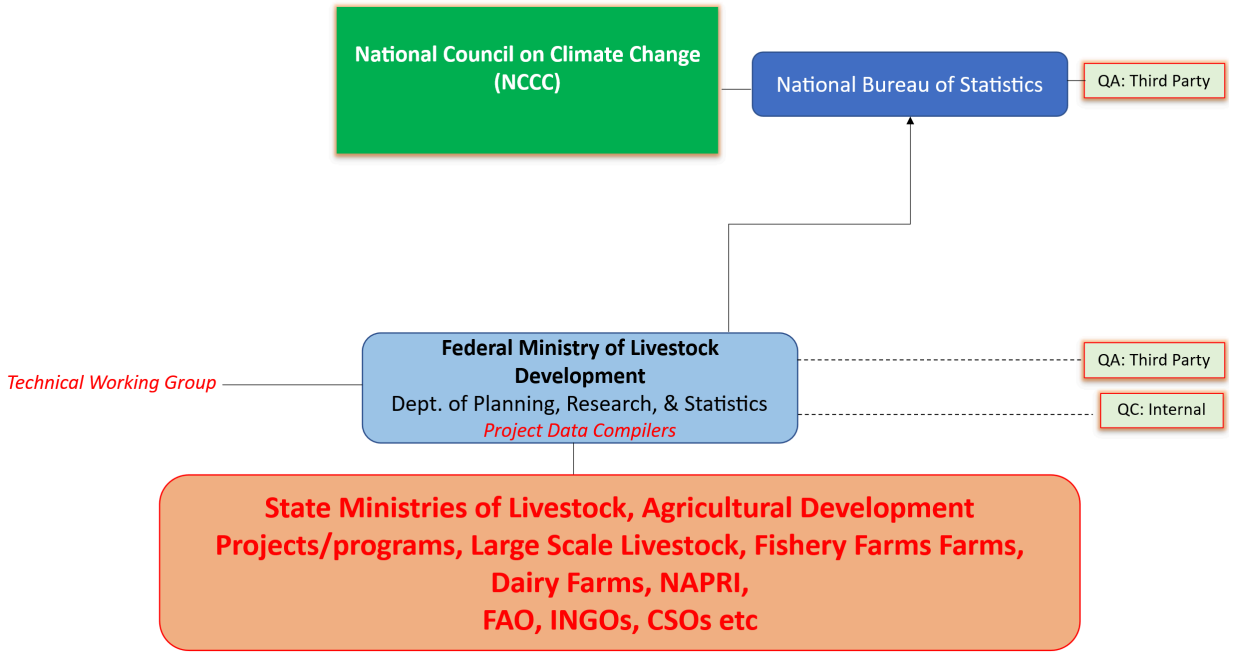


*Figure 6: **Institutional Arrangement Livestock Sector***

Within the inventory system, these institutions are coordinated through an Agriculture Sector Technical Working Group (TWG), led by FMAFS and interfacing directly with the national inventory coordinator. The Agriculture TWG comprises representatives from FMAFS, NBS, agricultural research institutes, universities, and technical experts with experience in livestock systems, soils, and agronomy. Its functions include reviewing and validating activity data, advising on IPCC-consistent methodological choices, assessing assumptions and emission factors, and supporting

The Agriculture sector's institutional arrangement places particular emphasis on methodological transparency and boundary management, especially at the interface with the LULUCF sector. Emissions associated with managed soils and agricultural practices are carefully distinguished from carbon stock changes reported under LULUCF to avoid overlap or double counting. Consolidated and validated sector datasets are transmitted by the sector lead to the national inventory coordinator, where they undergo cross-sector QA/QC and integration into the national inventory. Livestock data is now managed by federal ministry of Livestock and associated livestock stakeholders/date providers

2.5.5 Land Use, Land-Use Change and Forestry (LULUCF) Sector

The Land Use, Land-Use Change and Forestry (LULUCF) sector covers greenhouse gas emissions and removals resulting from changes in land use and land management, including forest land, cropland, grassland, wetlands, settlements, and other land categories, as well as transitions between these categories. Unlike other sectors, LULUCF explicitly accounts for both emissions and carbon removals, making it central to Nigeria's overall emissions balance and highly sensitive to data quality, assumptions, and methodological consistency.

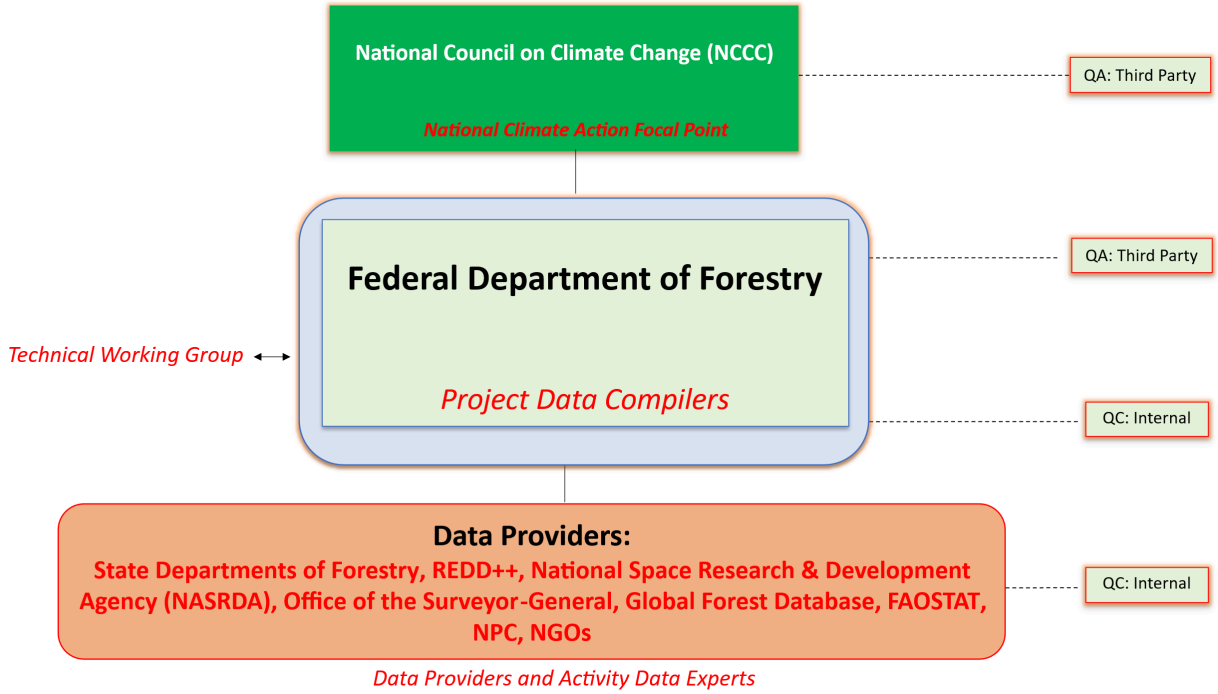


*Figure 7: **Institutional Arrangement LULUCF***

Institutional leadership for the LULUCF sector is anchored in the Federal Ministry of Environment, which has national responsibility for environmental management, forestry policy, and climate change coordination. Within this mandate, the Ministry provides sector oversight for land-use and forestry emissions accounting and coordinates the integration of land-based data into the national GHG inventory system. Forestry-related data and land-use information are further supported by relevant departments and agencies under the Ministry, as well as by state-level forestry authorities.

A defining feature of the LULUCF sector is its reliance on spatial and geospatial datasets. Activity data are derived from national forest inventories, land-use maps, satellite imagery, and remote sensing products, complemented by ground-based measurements and administrative land records. These datasets are generated through collaboration between environmental authorities, forestry institutions, and geospatial data providers, and are essential for estimating changes in land area, biomass, and carbon stocks over time.

The National Bureau of Statistics (NBS) supports the LULUCF sector by harmonizing land-use statistics and ensuring alignment between spatial datasets and official national statistics. NBS plays an important role in maintaining consistency of land-use categories, supporting time-series coherence, and integrating LULUCF data with broader national statistical frameworks.

Coordination across these institutions is formalized through a LULUCF Sector Technical Working Group (TWG), led by the Federal Ministry of Environment and linked to the national inventory coordinator. The LULUCF TWG brings together representatives from environmental and forestry MDAs, NBS, geospatial and remote sensing institutions, research organizations, and academic experts in land-use modelling and carbon accounting. The TWG is responsible for reviewing land-use and carbon stock data, validating assumptions and methods, advising on IPCC category allocation, and supporting uncertainty assessment and tier improvement planning.

The institutional arrangement for LULUCF places strong emphasis on documentation, transparency, and QA/QC, given the inherent uncertainty associated with land-based emissions and removals. Particular attention is paid to managing interfaces with the Agriculture sector, ensuring that emissions from managed lands are appropriately allocated and that carbon stock changes are not double counted. Consolidated LULUCF datasets are transmitted to the national inventory coordinator for cross-sector consistency checks, recalculations where necessary, and final integration into national inventory outputs.

Through this coordinated framework linking environmental authorities, forestry institutions, geospatial data providers, the national statistics system, and technical experts, the LULUCF sector institutional arrangement

enables Nigeria to produce credible and transparent estimates of land-based emissions and removals.

2.5.6 Waste Sector

The Waste sector covers greenhouse gas emissions arising from the treatment and disposal of solid waste and wastewater, including emissions from solid waste disposal sites (managed and unmanaged), biological treatment of waste, waste incineration where applicable, and domestic and industrial wastewater treatment and discharge. Emissions are primarily methane (CH_4) and nitrous oxide (N_2O) and are strongly influenced by waste composition, management practices, population coverage, and service levels. In Nigeria, waste management functions are decentralized, making institutional coordination and data harmonization central to the integrity of Waste sector emissions estimates.

Institutional leadership for the Waste sector at the national level is anchored in the Federal Ministry of Environment, which provides overall policy oversight for solid waste and wastewater management and serves as the lead institution for Waste sector emissions accounting within the national GHG inventory system. The Ministry coordinates Waste sector inputs in collaboration with regulatory bodies and subnational authorities responsible for waste service delivery.

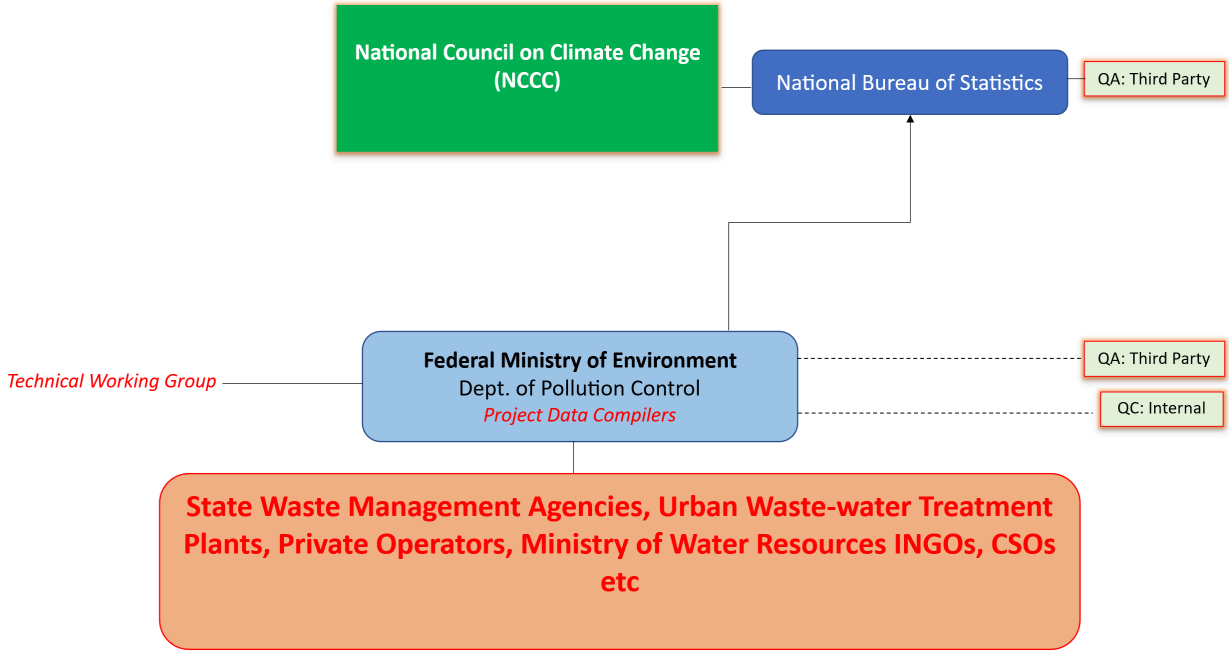


*Figure 8: **Institutional Arrangement Waste Sector***

Regulatory oversight and environmental compliance data for waste management facilities are provided by the National Environmental Standards and Regulations Enforcement Agency (NESREA). NESREA enforces national environmental regulations for solid waste disposal sites, wastewater treatment facilities, and industrial effluent discharge. Through permitting, inspections, and compliance monitoring, NESREA generates administrative datasets on facility types, management practices, and operational status, which are essential for validating activity data used in emissions estimation.

Primary activity data for the Waste sector are generated predominantly at state and municipal levels. State Waste Management Authorities (SWMAs) and municipal councils are responsible for solid waste collection, transport, treatment, and disposal, and they provide data on waste quantities collected, disposal methods, landfill characteristics, and service coverage. For wastewater, data are provided by water and sanitation utilities, public works departments, and relevant state agencies responsible for sewage systems and wastewater treatment facilities. In areas without centralized treatment, proxy data derived from population statistics and sanitation

coverage are used in line with IPCC guidance.

The NCCC plays a critical integrative role in the Waste sector by compiling and harmonizing national statistics on population, urbanization, waste generation rates, and sanitation coverage. These datasets provide the official time series required for inventory calculations, particularly where facility-level data are incomplete or uneven across states. Stakeholder data are essential for ensuring national consistency and comparability over time.

Within the inventory system, these institutions are coordinated through a Waste Sector Technical Working Group (TWG) led by the Federal Ministry of Environment and linked to the national inventory coordinator. The Waste TWG includes representatives from the Federal Ministry of Environment, NESREA, NBS, selected State Waste Management Authorities, water and sanitation utilities, and technical experts from academia and research institutions. The TWG is responsible for reviewing and validating waste activity data, advising on methodological choices consistent with IPCC guidance, assessing assumptions related to waste composition and management practices, and supporting sector-level quality assurance and quality control.

The Waste sector's institutional arrangement places strong emphasis on data harmonization and standardization, given the decentralized nature of waste management in Nigeria. Sector data are consolidated by the sector lead using standard templates and documented assumptions before submission to the national inventory coordinator. Particular attention is given to transparency in the use of default parameters, proxy indicators, and model assumptions where direct measurements are unavailable. The consolidated datasets then undergo national-level QA/QC, cross-sector consistency checks, and integration into the national inventory prior to reporting.

2.7 Overarching Institutional Arrangement for an Integrated National GHG Inventory System

The overarching institutional arrangement for Nigeria's national greenhouse gas (GHG) inventory system is designed as a centrally coordinated, sectorally executed framework that integrates all IPCC inventory sectors Energy, Industrial Processes and Product Use (IPPU), Agriculture, LULUCF, and Waste within a single national governance and reporting architecture. The arrangement ensures that sector-specific data generation and technical expertise are systematically consolidated, quality-assured, and reported in compliance with international obligations under the Paris Agreement.

At the apex of the system is the United Nations Framework Convention on Climate Change (UNFCCC), to which Nigeria submits its national inventory outputs as part of Biennial Transparency Reports and other mandatory communications. National-level accountability for these submissions is exercised through Nigeria's climate governance framework, anchored by the National Council on Climate Change (NCCC), within which the GHG Inventory and Mitigation Division serves as the institutional hub for inventory coordination.

The GHG Inventory and Mitigation Division of the NCCC functions as the National Inventory Coordinator, responsible for overseeing the compilation of inventory data across all sectors, applying national QA/QC procedures, maintaining inventory archives, and coordinating reporting to the UNFCCC. This division interfaces directly with the National Bureau of Statistics (NBS), which acts as the national custodian of official statistics. NBS plays a critical role in harmonising activity data, ensuring time-series consistency, and aligning sectoral datasets with official national statistics before they are integrated into the inventory system. Where required, technical consultants provide targeted support to strengthen compilation, methodological application, and documentation, under the coordination of the NCCC.

Oversight and cross-sector validation are further reinforced through an Interministerial Committee on Climate Change, which provides a platform for inter-ministerial review, third-party quality assurance, and collective endorsement of inventory outputs. This committee strengthens transparency, accountability, and policy ownership of the national inventory by ensuring that results reflect a whole-of-government position prior to international submission.

At the sectoral level, the arrangement brings together responsible sector ministries and regulatory agencies as the primary compilers and validators of activity data and mitigation-related information. For the Energy sector, this includes the Ministry responsible for petroleum resources, supported by the Nigerian Upstream Petroleum Regulatory Commission and the Nigerian Midstream and Downstream Petroleum Regulatory Authority; the Federal Ministry of Power and the Nigerian Electricity Regulatory Commission for electricity-related data; and the Federal

Ministry of Transportation and its modal agencies for transport activity data. These institutions coordinate data from operators in the oil and gas, power, and transport subsectors, ensuring comprehensive coverage of fuel combustion and fugitive emissions.

For the IPPU sector, institutional responsibility is shared between the Ministry of Solid Minerals Development and the Federal Ministry of Industry, Trade and Investment, in close coordination with the Federal Ministry of Environment. These institutions mobilize activity data from industrial operators in cement, chemicals, metals, and other manufacturing subsectors, while ensuring that industrial process emissions are clearly distinguished from energy-related emissions.

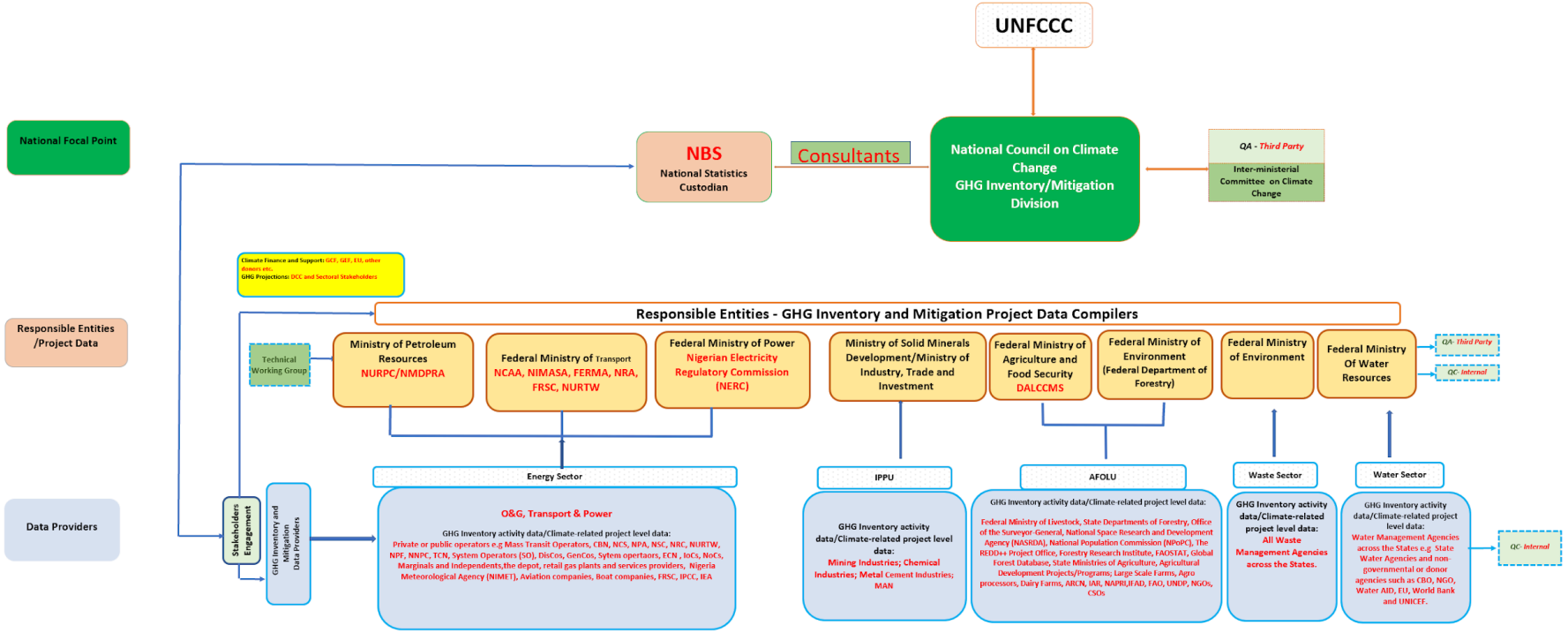
The Agriculture and LULUCF sectors are coordinated through the Federal Ministry of Agriculture and Food Security and the Federal Ministry of Environment (including forestry departments), supported by agricultural research institutions, extension services, and state-level forestry authorities. These institutions provide activity data related to livestock, crops, soils, and land-use change, as well as spatial and administrative data required for estimating land-based emissions and removals.

For the Waste sector, responsibility lies primarily with the Federal Ministry of Environment, working with State Waste Management Agencies and relevant water and sanitation authorities. These entities supply data on solid waste disposal, wastewater treatment, and waste management practices across states, which are consolidated and harmonized for national inventory purposes.

Across all sectors, data providers including public agencies, regulators, state institutions, private operators, and utilities feed activity and project-level data into sectoral compilation processes. These data flow through sectoral technical working groups and responsible entities before being transmitted to the national level for consolidation by the NCCC Inventory Division, harmonization by NBS, and final QA/QC and approval through interministerial mechanisms.

Overall, this integrated institutional arrangement ensures that Nigeria's national GHG inventory system operates as a coherent, transparent, and durable system, linking sectoral expertise with central coordination. By clearly defining roles across data providers, sector ministries, statistical authorities, and national oversight bodies, the framework supports consistent reporting across all IPCC sectors, facilitates continuous improvement of inventory quality, and strengthens the use of inventory outputs for national climate policy, mitigation planning, and international reporting.

Figure 9: ***Overarching Institutional Arrangement for the National GHG inventory***



Section 3: Data Collection, Management, and Flow Architecture

The effectiveness, credibility, and sustainability of Nigeria's national greenhouse gas (GHG) inventory system depend fundamentally on a well-defined architecture for data collection, management, and flow. This architecture provides the operational backbone that links diverse data providers across sectors and levels of government to a single, coherent national inventory. It is designed to ensure that activity data and supporting information are systematically generated, validated, harmonized, and transmitted in a manner that supports transparency, consistency over time, and compliance with IPCC and Enhanced Transparency Framework (ETF) requirements.

The data architecture recognizes that Nigeria's emissions profile spans multiple sectors, institutions, and administrative levels, each with distinct data systems and capacities. Accordingly, it combines decentralized data generation and sectoral ownership with centralized coordination, harmonization, and quality control, allowing sector expertise to be retained while ensuring national consistency and integrity.

3.1 Data Providers and Sources

Nigeria's GHG inventory draws on multiple categories of data sources, reflecting the diverse nature of emissions and removals across the five IPCC sectors. These sources are complementary and are used in combination to ensure completeness, accuracy, and transparency.

Administrative records constitute a core source of activity data across sectors. These records are generated routinely by ministries, departments, agencies, and regulators in the course of their statutory functions. Examples include energy production and consumption records maintained by power and petroleum sector regulators; industrial production and compliance records maintained by environmental and industrial authorities; agricultural production and livestock records maintained by agricultural institutions; forestry and land administration records; and waste management records maintained by environmental authorities at national and subnational levels. Administrative data are particularly valuable because they are institutionalized, regularly updated, and often linked to regulatory or policy processes, making them suitable for sustained inventory reporting over time.

National statistics provide the official backbone of the inventory data system. The **National Bureau of Statistics (NBS)** plays a central role by compiling, harmonizing, and officializing time-series datasets on population, energy balances, industrial output, agricultural production, land use, and waste-related indicators. These datasets ensure consistency across years, enable reconciliation of data from multiple administrative sources, and provide nationally endorsed figures that underpin emissions estimation. National statistics are particularly critical where sectoral administrative data are fragmented or incomplete, and they form the reference point for ensuring comparability of inventory outputs over time.

Facility-level and sectoral data are essential for sectors dominated by large point sources or decentralized service providers. In the Energy and IPPU sectors, facility-level data are provided by power plants, oil and gas operators, cement plants, chemical facilities, and other industrial installations, often through regulators or compliance mechanisms. In the Waste sector, facility- and service-level data are provided by state waste management authorities, private operators, and water and sanitation utilities. These data enable more granular estimation, support validation of aggregated statistics, and provide a pathway for progressive improvement toward higher-tier methods where national circumstances allow.

Surveys and studies complement administrative and statistical sources, particularly where routine data systems do not fully capture the parameters required by IPCC methodologies. These include household and enterprise surveys, agricultural and livestock surveys, land-use and forest inventories, remote sensing analyses, and targeted research studies that generate country-specific emission factors or activity parameters. While surveys and studies are often periodic rather than annual, they play a critical role in filling data gaps, reducing uncertainty, and informing methodological improvements, provided their assumptions and limitations are clearly documented.

3.2 Standardized Data Flow Pathways

To manage the complexity of multiple data sources and institutions, Nigeria's inventory system applies standardized data flow pathways that define how data move from generation to national reporting. These pathways are designed to be transparent, repeatable, and adaptable across sectors, while preserving a common national structure.

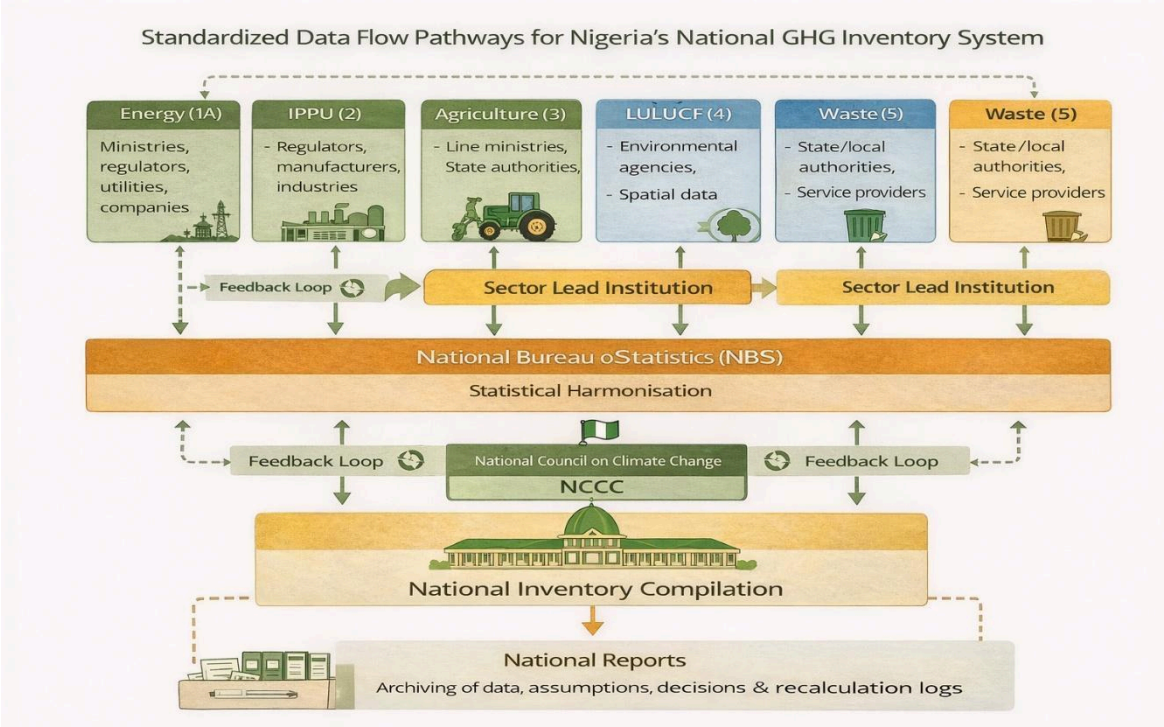


Figure 10: Data Flow Pathways for GHG Inventory System

At the core of the system is a sequential data flow in which activity data are generated by data providers and first consolidated at the sector level. Sector Lead Institutions coordinate data collection within their respective sectors, consolidate inputs from multiple providers, apply initial validation checks, and document sources, assumptions, and any gap-filling methods used. This sectoral consolidation ensures that data are technically coherent and aligned with sector-specific realities before entering the national system.

Consolidated sector datasets are then transmitted to the National Bureau of Statistics, where they are reconciled with official national statistics and time-series datasets. This step is critical for harmonization, as it ensures that sector data are consistent with nationally endorsed figures and that discrepancies between administrative records and statistical series are identified and resolved to the extent possible. NBS's role at this stage strengthens the statistical credibility of the inventory and supports consistency across reporting cycles.

Following statistical harmonization, sector datasets are submitted to the national inventory compiler, housed within the National Council on Climate Change (NCCC) through its GHG Inventory and Mitigation Division. The inventory compiler integrates data across all sectors, applies cross-sector consistency checks, implements national QA/QC procedures, manages recalculations where methodological improvements are introduced, and prepares inventory outputs for reporting under the UNFCCC. This central compilation step ensures that emissions estimates across Energy,

IPPU, Agriculture, LULUCF, and Waste are methodologically coherent and free from double counting.
While the overall pathway data generation to sector lead to NBS to national inventory compiler is applied uniformly, the system allows for sector-specific adaptations within a unified national framework. For example, sectors with strong facility-level reporting may transmit aggregated facility data directly to the sector lead, while land-based sectors may rely more heavily on spatial datasets and periodic inventories. Waste sector data may flow through state authorities before national consolidation, whereas Energy sector data may pass through federal regulators and national energy balances. These adaptations are formally documented within sector guidelines to ensure transparency and repeatability, while the overarching structure remains consistent across sectors.

Section 4: Quality Assurance, Quality Control, and Verification

Quality Assurance (QA), Quality Control (QC), and verification are integral to the integrity, credibility, and sustainability of Nigeria's national greenhouse gas (GHG) inventory system. In accordance with the IPCC Guidelines and the Enhanced Transparency Framework (ETF), Nigeria applies a tiered and institutionalized QA/QC framework that is embedded within the national inventory governance structure and operationalized across all five IPCC sectors Energy, IPPU, Agriculture, LULUCF, and Waste.
The objective of this framework is not only to detect and correct errors, but to ensure that inventory outputs are transparent, reproducible, consistent over time, and robust to both domestic scrutiny and international technical expert review. Given Nigeria's decentralized data landscape and sector-specific capacity differences, the QA/QC system is designed to be proportionate, practical, and progressive, combining sector-level technical scrutiny with national-level coordination and targeted independent review.

4.1 National QA/QC Framework

Nigeria's national QA/QC framework is structured around a multi-layered approach that assigns responsibility for quality management at the point in the system where errors are most likely to arise and can most effectively be addressed. The framework is aligned with IPCC good practice and applies consistently across sectors, while allowing for sector-specific implementation modalities.

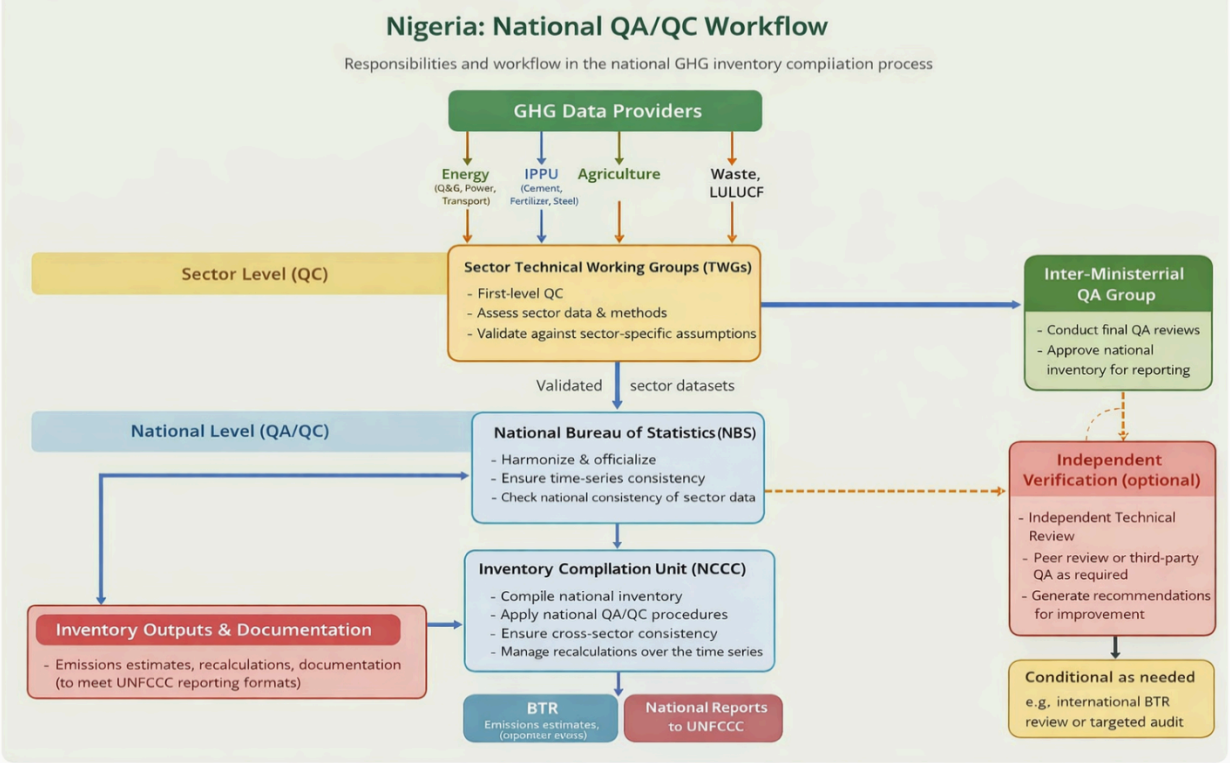


*Figure 11: **National QA/QC Workflow Diagram***

Quality Control (QC) refers to routine, technical checks undertaken during data generation, consolidation, and compilation. These checks are embedded in day-to-day inventory preparation activities and are designed to ensure numerical accuracy, internal consistency, correct application of methods, and completeness of coverage. QC activities include verification of units and conversions, checking calculation formulas, confirming category allocation, reviewing trends and outliers, and ensuring that assumptions and gap-filling methods are transparently documented.

Quality Assurance (QA) refers to systematic reviews conducted by institutions or individuals not directly responsible for preparing the estimates being reviewed. QA provides an additional level of confidence that QC procedures have been correctly applied and that inventory outputs meet national and international reporting standards. In Nigeria's system, QA is institutionalized through national-level review and interministerial validation processes rather than ad hoc expert opinion.

The national QA/QC framework is documented through standard operating procedures, sector templates, checklists, and archiving requirements. All QA/QC actions, findings, and corrective measures are recorded and retained as part of the national inventory archive, ensuring traceability and continuity across reporting cycles.

4.1.1 Roles and Responsibilities in QA/QC and Verification

The effectiveness of the QA/QC framework depends on clear role differentiation and disciplined interaction between institutions, consistent with the governance structure described in earlier chapters.

Sector Technical Working Groups (TWGs) constitute the first line of quality control within the inventory system. As custodians of sector-specific expertise, TWGs are responsible for reviewing activity data and methodological application before sector inputs are transmitted for national compilation. Their QC role includes assessing data completeness and plausibility, reviewing sector time series for unexplained discontinuities, validating emission factor choices, and confirming that emissions are correctly allocated within sector boundaries. TWGs play a particularly important role in managing cross-sector interfaces such as the separation of combustion and process emissions between Energy and IPPU, or the distinction between agricultural emissions and land-use carbon stock changes to prevent double counting.

The **Inventory Compilation Unit**, housed within the National Council on Climate Change, provides the second line of QA/QC at national level. This unit is responsible for integrating validated sector datasets, applying cross-sector consistency checks, ensuring uniform application of IPCC methodologies, and confirming that national totals reconcile across sectors and gases. It reviews the completeness of reporting tables and narratives, checks consistency with national statistics harmonized by the National Bureau of Statistics and ensures that recalculations are applied coherently across the full time series. The compilation unit also maintains the national QA/QC plan and coordinates QA/QC implementation across sectors.

Independent technical review, where applicable, provides an additional layer of assurance. In the Nigerian context, independent review is applied in a targeted and proportionate manner, recognizing capacity constraints and data sensitivities. This may include peer review by national experts not involved in inventory preparation, focused third-party assessments of specific methodological components, or international Technical Expert Reviews conducted under the ETF as part of Biennial Transparency Report submission. Findings from independent reviews are formally documented and feed into improvement actions coordinated by the inventory compilation unit and sector leads.

4.1.2 Recalculation and Time-Series Consistency Procedures

Recalculations are an expected and necessary feature of a national inventory system that is progressively improving. Nigeria's QA/QC framework therefore includes formal procedures for managing recalculations in a manner that preserves time-series consistency and transparency.

Recalculations may be triggered by several factors, including the availability of improved activity data, the introduction of country-specific emission factors, refinement of methodologies, correction of identified errors, or changes in category allocation in line with updated IPCC guidance. When a recalculation is proposed, it is first assessed at sector level, with the relevant TWG evaluating the technical justification, scope, and potential implications for historical emissions trends.

The Inventory Compilation Unit then coordinates the recalculation across the full time series wherever feasible, ensuring that methodological changes are applied consistently across all affected years. The quantitative impact of recalculations on sectoral and national totals is analyzed and documented, and explanations are prepared for inclusion in inventory documentation and BTR narratives. Where full recalculation of the time series is not possible due to data limitations, this is clearly stated, and the implications for trend interpretation are transparently explained.

Maintaining time-series consistency is treated as a core quality objective. Recalculations are not undertaken selectively or opportunistically, but within a governed process that balances accuracy improvement with comparability over time. All recalculation decisions, methodologies, and outcomes are archived as part of the national inventory record to support future reporting and review.

4.1.3 Contribution of QA/QC to System Maturity and Sustainability

Beyond ensuring numerical accuracy, Nigeria's QA/QC and verification framework contributes directly to the long-term maturity and sustainability of the national inventory system. By institutionalizing quality management roles within sector TWGs and the national compilation unit, the framework reduces dependence on individual expertise and external projects, strengthens institutional memory, and enables continuous learning across reporting cycles.

The QA/QC system also enhances the usability of inventory outputs for domestic policy processes, including NDC tracking, mitigation planning, and sectoral decision-making. Transparent documentation of assumptions, recalculations, and uncertainties allows policymakers and stakeholders to interpret emissions trends with confidence, while providing a clear pathway for targeted improvement over time.

4.2 Cross-Sector Coordination and Interface Management

Cross-sector coordination is a core integrity requirement of Nigeria's national GHG inventory system because several real-world activities and datasets sit at the boundary between sectors. If sector interfaces are not explicitly governed, the same activity data can be used twice (double counting), emissions can be assigned to the wrong category (misallocation), or inconsistent methods can be applied to closely related variables, undermining time-series consistency and comparability across BTR cycles. In practice, effective interface management means agreeing, documenting, and consistently applying

- allocation rules,
- shared datasets and master classifications,
- reconciliation checks, and
- an escalation pathway for resolving boundary disputes, before compilation begins and again during QA/QC and final validation.

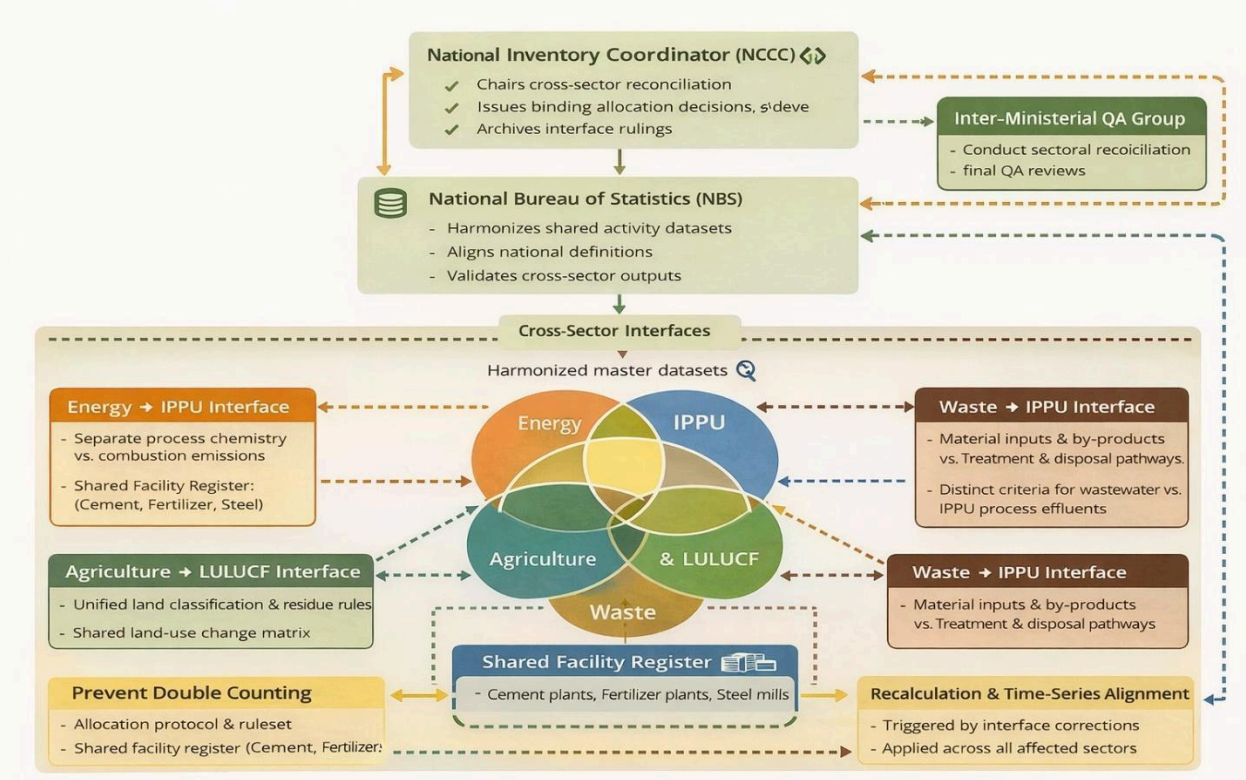


*Figure 12: **Cross-Sector Coordination and Interface Management***

4.2.1 Managing overlaps between sectors

Energy-IPPU interface. The most persistent boundary risk between Energy and IPPU is the separation of "process emissions" from "combustion emissions" for the same facility. In cement, lime, glass, metals, and some chemical operations, CO_2 from calcination or process chemistry belongs in IPPU, while CO_2 from fuel burned in kilns, boilers, furnaces, or captive power belongs in Energy. The practical problem is that facilities often report aggregated fuel and production information, and inventory teams may be tempted to estimate emissions using a single proxy. Nigeria's workflow should therefore require a facility-level split rule: production/process variables (e.g., clinker output, carbonate input, stoichiometric conversion) feed IPPU methods, while fuel consumption variables feed Energy methods, with both linked through a shared facility register so the same plant is not counted as two different entities across sector spreadsheets. Where waste-derived fuels or alternative fuels are used in industrial kilns, the interface must also specify whether the combustion component is reported under Energy (and in which subcategory), while the process chemistry remains in IPPU. The inventory coordinator should enforce a "one facility one identifier" principle across Energy and IPPU datasets to enable automated cross-checks of plant lists, time coverage, and activity totals.

Agriculture/LULUCF interface. Although IPPU is not directly involved in this boundary, national coherence depends on using consistent land and biomass assumptions across Agriculture and LULUCF because the same land areas, livestock

systems, and residue flows can affect multiple sectors. The most common interface risk is inconsistent treatment of harvested wood products, residue removal and burning, and land-use transitions, which can create artificial jumps when Agriculture and LULUCF teams apply different land classifications, different activity data sources, or different temporal allocation rules. Nigeria's workflow should therefore mandate a single national land classification schema and a shared land-use change matrix that both sector teams use, alongside an agreed rule for where emissions from biomass burning are reported and how activity data for residues are partitioned between "left on field," "removed," "burned," or "used for energy." Even though this interface sits outside IPPU, the same governance mechanisms recommended here shared master data, documented allocation rules, reconciliation checks should apply across all sector boundaries to protect national totals.

Waste/IPPU interface. The Waste IPPU boundary most often arises where (i) waste is used as a material input (e.g., clinker additives, industrial by-products), (ii) waste is used as a fuel in industrial processes, (iii) industrial wastewater or process effluents could be interpreted as either "industrial process" or "waste treatment," and (iv) product-use gases and end-of-life emissions intersect with waste handling practices. Nigeria's workflow should treat the Waste sector as responsible for emissions from waste treatment and disposal pathways (landfills, open dumping, wastewater treatment, biological treatment), while IPPU remains responsible for emissions from industrial chemistry and high-GWP product use categories. Where waste-derived fuels are used in kilns, emissions from combustion should be assigned using the national rule for alternative fuels under Energy (or, if the national inventory structure assigns it to Waste in specific cases, this must be explicitly stated and consistently applied), and the kiln's process emissions remain in IPPU. For refrigerants and other fluorinated gases, IPPU should lead the estimation (product use) using imports/consumption, servicing and leakage assumptions, while Waste provides contextual information on end-of-life handling only where the method requires it; in that case, the interface rule must ensure end-of-life emissions are not independently estimated by both sectors.

4.2.2 Avoiding double counting

Avoiding double counting requires both ex ante allocation rules and ex post reconciliation tests.

At the allocation stage, Nigeria's national system should adopt a written "sector boundary and allocation protocol" that is binding across all sector teams. This protocol should define, for each known interface category, which sector owns the emissions estimate, which sector may provide supporting activity data, and what the decision rule is when a pathway could plausibly sit in two places. The protocol should also require a single national list of facilities and operators relevant to inventory compilation, with unique identifiers that are reused across sector worksheets, data requests, and archival records. This reduces the risk that the same plant, product, or flow is included twice under slightly different names.

At the reconciliation stage, the QA/QC plan should require systematic cross-sector checks that can be executed consistently every cycle. These checks should include comparisons of shared activity data totals (for example, verifying that the quantity of alternative fuel reported as used in cement kilns is not simultaneously counted as disposed waste in Waste, or that industrial energy use reported in Energy aligns with production expansions driving IPPU process emissions), facility list matching (confirming that plants appearing in IPPU also appear in Energy where they have major combustion sources), and trend diagnostics (flagging abrupt changes in one sector that are not mirrored in related indicators elsewhere). Any failed check should trigger a documented resolution process, culminating in an inventory coordinator decision that is recorded in the archive with the rationale, datasets used, and the final allocation.

4.2.3 Ensuring methodological coherence across sectors

Methodological coherence means that sector teams do not apply inconsistent assumptions to shared drivers, and that methodological upgrades (e.g., moving from Tier 1 to Tier 2) do not create artificial breaks in national time series. Nigeria's cross-sector workflow should therefore standardize a small set of "national method coherence rules" that apply to all sectors.

First, shared data definitions must be harmonized. "Production," "consumption," "imports," "exports," "stocks," and "apparent consumption" should be defined once at national level and used consistently across IPPU (product use gases), Energy (fuel statistics), and Waste (material flows), with clear guidance on how to treat stock changes and informal markets where data are weak.

Second, time-series consistency rules should be centralized. When any sector recalculates historical estimates due to

revised activity data, new emission factors, or method changes, the national coordinator should ensure that related sectors assess whether their own series requires recalculation to remain consistent with shared datasets or boundary rules. This is particularly important where a change in industrial production statistics affects IPPU process emissions and also changes industrial fuel use totals in Energy.

Third, uncertainty and completeness treatment should be coherent. Where one sector applies conservative assumptions to avoid underestimation, another sector should not simultaneously apply assumptions that reintroduce the same emissions via a different pathway. Nigeria's QA/QC system should therefore require that key assumptions at interfaces are logged in a national assumptions register, with each assumption tagged to the sector owner, the interface category, and the justification, so reviewers can verify that the same phenomenon is not being "covered twice."

Governance is as important as method. Nigeria should operationalize cross-sector interface management through a standing cross-sector technical reconciliation session (at least once mid-compilation and once pre-finalization), chaired by the national inventory coordinator, with participation from all sector leads. The output of each session should be a short interface decision note that records boundary decisions, adjustments made, and the list of checks passed, and this note should be archived alongside the sector worksheets to ensure institutional memory across BTR cycles.

4.3 Reporting, Review, and Institutional Learning

This section focuses on what happens after inventory preparation and submission how Nigeria's reporting obligations, international review outcomes, and domestic reflection are systematically translated into institutional learning and system improvement between reporting cycles. While earlier sections address coordination, QA/QC, and interface management during compilation, this sub-chapter clarifies how the national system evolves over time through structured feedback and governance processes. Reporting as a system milestone, not an endpoint

Nigeria's national GHG inventory outputs are formally reported through Biennial Transparency Reports (BTRs) and National Communications (NCs). These reports consolidate sectoral estimates, methodological explanations, and interface decisions taken during compilation into a single, nationally endorsed submission. The reporting phase functions as a system milestone that locks in a specific configuration of data sources, methods, assumptions, and boundary rules for a given cycle. By design, all cross-sector allocation decisions, recalculations, and deviations from default methods are explicitly documented at this stage to ensure transparency and reproducibility in future cycles.

Crucially, reporting is treated as the culmination of a governed process rather than a one-off compliance task. Sector leads submit validated datasets and documentation alongside records of interface resolutions and QA/QC actions, ensuring that the rationale behind key choices is preserved beyond the individuals involved in preparation. This documentation becomes part of the national inventory archive and serves as the baseline against which future improvements are assessed.

International review as structured external feedback

Following submission, Nigeria's reports undergo international Technical Expert Review (TER) under the Enhanced Transparency Framework. Within the national system, TER is not treated as an external audit to be "passed," but as a structured source of independent feedback on methodological soundness, transparency, completeness, and consistency over time. The institutional arrangements described in this report are intentionally designed to ensure that TER questions and recommendations can be traced back to specific sectors, datasets, or interface rules.

TER findings related to sector boundaries, data sources, or methodological application are channelled through the National Inventory Coordinator to the relevant sector lead institutions and Technical Working Groups. This avoids ad hoc or consultant-driven responses and reinforces institutional accountability. Importantly, the system distinguishes between clarifications (where existing approaches are sound but insufficiently explained) and substantive improvement needs (where methods, data systems, or governance arrangements require change). This distinction prevents unnecessary recalculations while ensuring genuine weaknesses are addressed.

Domestic review and post-cycle reflection

In parallel with international review, Nigeria's inventory system incorporates domestic post-reporting reflection as a formal step between cycles. This involves a structured assessment of what worked well, where bottlenecks occurred, and which assumptions or data gaps posed the greatest risk to accuracy or consistency. Unlike QC activities conducted

during compilation, this reflection is forward-looking and system-oriented, focusing on institutional processes rather than individual estimates.

Key questions addressed at this stage include whether sector interfaces were resolved efficiently; whether data-sharing arrangements functioned as intended; whether reliance on proxies or default parameters can realistically be reduced in the next cycle; and whether capacity constraints or institutional mandates limited data access. Outcomes of this reflection inform priorities for methodological refinement, data system strengthening, and capacity development.

The core purpose of reporting and review within this framework is to generate actionable feedback loops that drive continuous system improvement. Recommendations arising from TERs, domestic reviews, and technical assessments are consolidated into a national improvement log maintained by the inventory coordination function. This log records the nature of each issue, the sector(s) affected, the agreed response, and the intended timing of implementation.

Where improvements affect methods or activity data, they are assessed for implications on historical estimates and, where appropriate, trigger governed recalculations in line with the procedures described in Chapter 6. Where issues relate to governance or coordination such as recurring interface challenges or unclear data custodianship responses may include revisions to sector guidelines, updates to allocation protocols, or formalization of new data-sharing arrangements. In this way, learning is embedded at the system level rather than remaining an informal outcome of individual experience.

Feedback loops into system improvement

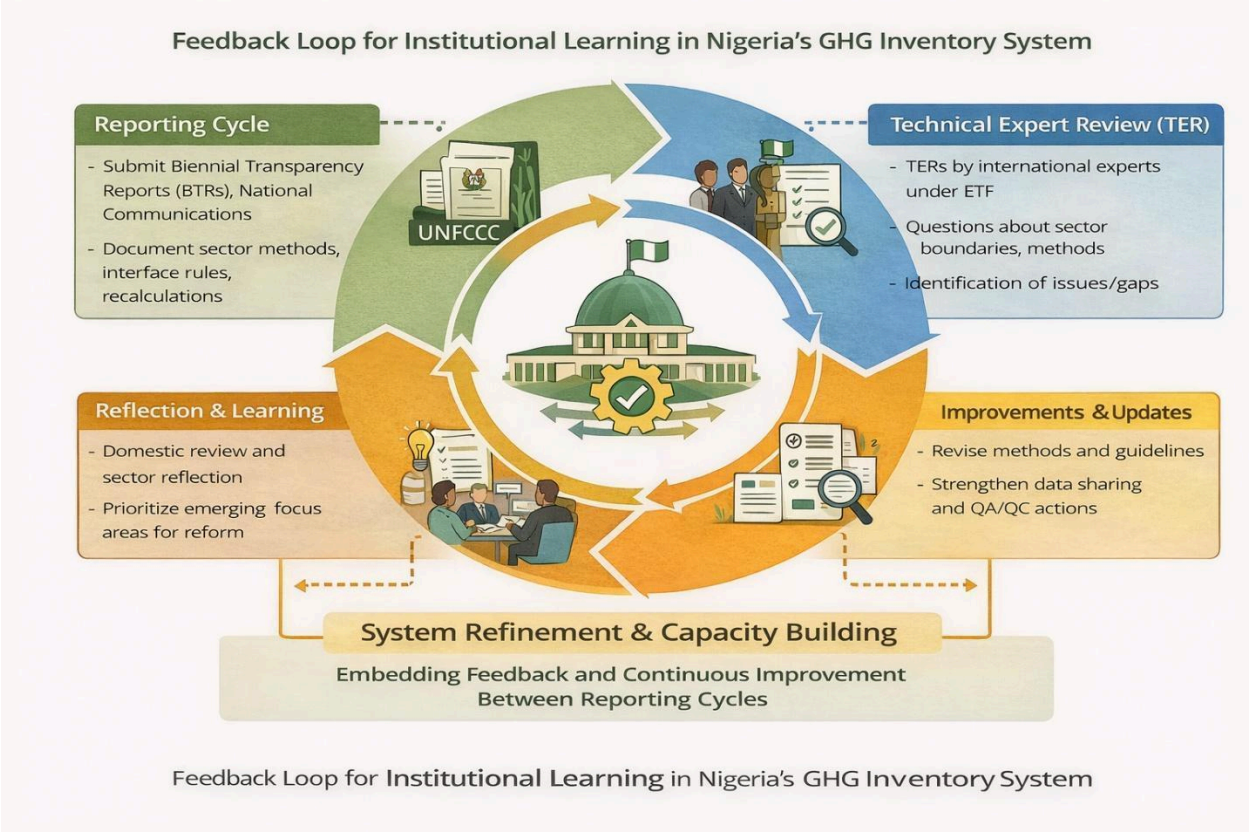


*Figure 13: **Feedback Loop and System Improvement***

Strengthening institutional memory and continuity

A defining feature of this approach is its emphasis on institutional memory. By formally linking reporting outcomes and review findings to documented decisions, archived datasets, and updated guidance, the system reduces dependence

on individual expertise and external support. Knowledge generated in one reporting cycle is retained and operationalized in the next, even where staff turnover occurs or sector responsibilities evolve.

Over successive BTR cycles, this learning-oriented approach supports gradual movement toward higher-tier methods, improved national data systems, and clearer sector interfaces, without undermining time-series consistency. It also enhances the credibility and usability of inventory outputs for domestic policy processes, including NDC tracking and mitigation planning.

In summary, this sub-chapter positions reporting and review as drivers of institutional learning, not repetitions of quality control. By embedding feedback loops between submission, review, and system reform, Nigeria's national GHG inventory framework moves beyond compliance toward a durable, self-improving system aligned with the long-term expectations of the Enhanced Transparency Framework.

4.4 Capacity Building and System Strengthening

The effectiveness and long-term sustainability of Nigeria's national GHG inventory system depend not only on sound institutional arrangements and methodologies, but also on deliberate and continuous investment in capacity building and system strengthening. This section therefore focuses on the foundational capabilities required to operationalize the frameworks described in earlier chapters and to ensure that inventory preparation, QA/QC, cross-sector coordination, and reporting can be delivered routinely and independently of ad-hoc project support.

Institutional and human capacity needs

Nigeria's inventory system is characterized by uneven capacity across institutions and sectors, reflecting differences in mandates, technical exposure, and access to resources. While some federal MDAs and regulators particularly those involved in Energy and parts of IPPU have benefited from repeated engagement with inventory preparation, other institutions and subnational actors remain weakly equipped to contribute effectively. This is consistent with findings from the IPPU sector assessment, which identified gaps in methodological expertise, limited familiarity with IPCC guidelines, and heavy reliance on a small number of trained individuals.

Addressing these gaps requires a shift from one-off trainings to a structured, multi-level capacity development approach. At institutional level, clear role definitions and formal mandates must be matched with dedicated staff positions for inventory-related functions within sector lead institutions, the National Bureau of Statistics, and the national inventory coordination function. At the individual level, capacity building should prioritize practical skills in activity data management, application of IPCC methods, uncertainty assessment, QA/QC procedures, and documentation, rather than abstract awareness-raising. Importantly, capacity strategies must recognize staff turnover as a systemic risk and therefore aim to train teams rather than individuals, ensuring redundancy and continuity.

Inventory software and digital MRV systems

A critical enabler of system strengthening is the progressive deployment of inventory software and digital MRV tools that reduce manual handling, improve transparency, and support consistency across cycles. Nigeria has already made use of spreadsheet-based templates and the IPCC Inventory Software, but these tools are often applied in a fragmented and project-driven manner. The next stage of system maturity requires a more coherent digital architecture that links sectoral data collection, national statistics, compilation, and archiving within a single logical workflow.

Digital MRV systems should be designed to support, rather than replace, institutional processes. This includes standardized electronic data templates aligned with sector guidelines; built-in validation checks to support QC at source; controlled access levels to address confidentiality concerns, particularly in IPPU and Energy; and secure archiving of datasets, assumptions, and recalculation histories. Over time, such systems can also facilitate integration between the national inventory, mitigation tracking, and NDC monitoring, reducing duplication of effort across reporting streams.

Knowledge management and staff continuity

One of the most persistent weaknesses in national inventory systems is the loss of institutional memory between reporting cycles. In Nigeria, this challenge has been particularly evident where inventories were prepared with heavy reliance on external consultants or temporary project teams, leading to discontinuities in methods, data sources, and interface decisions across time series. Strengthening knowledge management is therefore a core capacity priority, not

an optional add-on.

Practical measures include the establishment of a national inventory knowledge repository, managed by the inventory coordination function, where sector methodologies, allocation rules, QA/QC checklists, interface decision notes, and training materials are systematically stored and updated. Clear documentation standards should be enforced so that assumptions and methodological choices are intelligible to new staff and can be scrutinized during international review. In parallel, mentoring arrangements and internal peer learning particularly through Sector Technical Working Groups can help transfer tacit knowledge that is not easily captured in written guidance.

Use of sector guidelines as operational tools

The development of sector-specific guidelines, including the IPPU guideline, represents a major opportunity to translate institutional arrangements into day-to-day operational practice. However, guidelines only add value if they are actively used by data providers, sector leads, and compilers, rather than treated as static reference documents. Capacity building efforts should therefore focus on embedding these guidelines into routine workflows, training programmes, and data request processes.

For each sector, guidelines should serve as the authoritative reference for roles and responsibilities, data sources, methodological choices, interface rules, and QA/QC requirements. Training activities should be explicitly linked to guideline content, using real national data and past inventory examples to reinforce learning. Over time, guidelines should be treated as living documents, updated in response to TER findings, domestic reviews, and system improvements, thereby reinforcing the feedback loops described in Section 7.4.

4.5 Legal, Policy, and Institutional Sustainability

The long-term effectiveness of Nigeria's national greenhouse gas (GHG) inventory system depends on its ability to operate as a permanent public function, rather than as a series of ad hoc reporting exercises driven by short-term projects or external support. Legal, policy, and institutional sustainability therefore constitute a critical foundation for ensuring continuity, accountability, and credibility across successive reporting cycles under the Enhanced Transparency Framework (ETF). This section examines how inventory functions are embedded within statutory mandates, how data-sharing and confidentiality are governed, how long-term financing is secured, and how the inventory system aligns with broader development and just transition objectives.

Embedding inventory roles within statutory mandates

A key determinant of sustainability is the extent to which inventory roles are anchored in formal legal and policy instruments. In Nigeria, the Climate Change Act (2021) provides a foundational statutory basis for national climate governance, including coordination of climate data, reporting, and international obligations. Embedding inventory preparation, coordination, and quality assurance functions within this legal framework ensures that responsibilities are clearly assigned to institutions rather than individuals and are maintained irrespective of political transitions or staff turnover.

At the institutional level, sustainability requires that inventory-related functions are reflected in the formal mandates, organizational structures, and job descriptions of the National Council on Climate Change, sector lead ministries, the National Bureau of Statistics, and key regulatory agencies. This includes explicit recognition of inventory coordination, sectoral data consolidation, QA/QC, and reporting responsibilities as part of routine institutional work programmes. By formalizing these roles, the inventory system is protected from reliance on informal arrangements or personal expertise and can be integrated into broader public sector planning and performance management processes.

Data-sharing obligations and confidentiality

Effective inventory preparation depends on timely access to high-quality data held across multiple institutions, including regulators, state authorities, and private operators. Legal and policy frameworks must therefore strike a careful balance between mandatory data-sharing obligations and the protection of confidential or commercially sensitive information. In the Nigerian context, this is particularly important for Energy and IPPU sectors, where facility-level production and fuel use data are often subject to confidentiality constraints.

Sustainable arrangements require clear protocols that define who is obligated to provide data, the form and frequency of data submission, and the conditions under which data may be aggregated, anonymized, or restricted. These protocols should be underpinned by legal instruments such as regulations, memoranda of understanding, or

data-sharing agreements that provide certainty to data providers and compilers alike. At the same time, robust confidentiality safeguards, including controlled access systems and clear rules on data use and disclosure, are essential to maintain trust and cooperation. Embedding these provisions within the national inventory framework ensures that data access is predictable and enforceable without undermining data integrity or stakeholder confidence.

Long-term institutional financing

Financial sustainability is a prerequisite for maintaining inventory operations beyond individual project cycles. While international support has played an important role in establishing Nigeria's inventory capacity, long-term viability requires that core inventory functions are supported through domestic institutional financing. This includes budgetary allocations for staffing, data management systems, training, and routine QA/QC and reporting activities.

Integrating inventory-related expenditures into the medium- and long-term budgets of the National Council on Climate Change and relevant sector institutions reduces dependence on external funding and enhances national ownership. Where external resources continue to be used, they should be aligned with nationally defined priorities and structured to complement, rather than substitute for, domestic financing. Over time, predictable financing enables forward planning, gradual system improvement, and retention of skilled personnel, all of which are essential for sustaining ETF-compliant reporting.

Alignment with just transition and development objectives

Beyond compliance with international reporting requirements, the national GHG inventory system must remain relevant to Nigeria's broader development and just transition agenda. By design, the inventory provides the empirical foundation for tracking emissions trends, assessing mitigation impacts, and informing policy choices across sectors. Aligning inventory outputs with national development plans, energy transition strategies, and just transition frameworks enhances the system's policy relevance and reinforces institutional commitment to its maintenance.

This alignment requires that inventory data are not only reported internationally but are also accessible and usable for domestic decision-making, including planning for low-carbon development, sectoral transformation, and social inclusion. As Nigeria advances its just transition objectives, the inventory system can support evidence-based dialogue on trade-offs, distributional impacts, and pathways for sustainable growth. Embedding this broader policy utility within the inventory's legal and institutional framework strengthens its perceived value and, in turn, its long-term sustainability.

Section 5: Conclusion and Way Forward

Summary of the consolidated institutional framework

This report has set out a consolidated, IPCC-aligned institutional framework for Nigeria's national greenhouse gas (GHG) inventory system that brings together governance, sectoral execution, data architecture, quality management, and learning processes into a single, coherent whole. At its core, the framework is centrally coordinated and sectorally executed: strategic oversight and national compilation are anchored within the National Council on Climate Change (NCCC), while technical ownership and data generation reside with designated sector lead institutions and Sector Technical Working Groups across Energy, IPPU, Agriculture, LULUCF, and Waste. The National Bureau of Statistics provides the statistical backbone, harmonizing activity data and safeguarding time-series consistency, while interministerial mechanisms provide validation and collective accountability.

The framework explicitly manages cross-sector interfaces, establishes layered QA/QC and verification, and embeds feedback loops that translate reporting and review outcomes into institutional learning. It also addresses the enabling conditions legal anchoring, data-sharing and confidentiality, financing, capacity, and digital systems required to sustain inventory operations beyond project cycles. Taken together, these elements move Nigeria's inventory from fragmented, ad hoc arrangements toward a durable public function capable of delivering transparent, consistent, and policy-relevant outputs.

Immediate and medium-term priorities

Immediate priorities (next 12–18 months) should focus on operationalization. First, formalize mandates and workflows: confirm sector lead institutions, issue terms of reference for Sector TWGs, and adopt binding interface and allocation protocols particularly at Energy-IPPU, Agriculture-LULUCF, and Waste-IPPU boundaries. Second, standardize data flows using agreed templates and a national facility register to prevent duplication and support reconciliation. Third, implement the national QA/QC plan in practice, including documented recalculation procedures and archiving standards. Fourth, institutionalize post-reporting reflection by maintaining a national improvement log that tracks TER findings and domestic reviews through to corrective actions.

Medium-term priorities (18-36 months) should consolidate system maturity. These include strengthening subnational data pipelines (notably for Waste and parts of LULUCF), expanding country-specific emission factors where feasible, and progressively integrating digital MRV tools that embed validation at source and preserve institutional memory. Medium-term actions should also secure predictable domestic financing for core inventory functions and deepen capacity across teams (training groups, not individuals) to mitigate turnover risk.

Role of sectoral guidelines in operationalizing the framework

Sectoral guidelines are the operational linchpin of the framework. They translate high-level institutional design into day-to-day practice by specifying roles, data sources, methods, interface rules, QA/QC checks, and documentation

standards for each sector. When actively used, guidelines reduce ambiguity, accelerate onboarding of new staff, and ensure that improvements are applied consistently across cycles. To maximize impact, guidelines should be embedded in training, data requests, and compilation calendars; referenced explicitly in reporting; and updated as **living documents** in response to review outcomes and system improvements.

Pathway to a mature, ETF-compliant national inventory system

The pathway forward is iterative and learning oriented. By institutionalizing coordination, harmonization, and quality management; by treating reporting and review as engines of improvement; and by aligning inventory outputs with national development and just transition objectives, Nigeria can progressively advance toward a mature, ETF-compliant system under the United Nations Framework Convention on Climate Change. Success will be evidenced not only by timely submissions, but by stable methods, transparent documentation, reduced reliance on proxies, and credible use of inventory data for domestic policy and investment decisions.