Recommendations for an MRV Toolbox and Long-Term Transparency Strategy in Sudan's Transport Sector

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Republic of Sudan
The Higher Council for the Environment and Natural Resources

ICAT Initiative for Climate Action Transparency

Initiative for Climate Action Transparency – ICAT

Recommendations for the Development of a fit-for-purpose MRV Toolbox and Long-term Transparency Strategy in Sudan's Transport Sector

Deliverable #4

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DISCLAIMER

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List of Acronyms

BUR	Biennial Update Report
CBIT	Capacity Building Initiative for Transparency
CC	Climate Change
COP	Conference of the Parties
CSO	Civil Society Organization
CSP	Concentrating Solar Power
ERA	Electricity Regulatory Authority
FAO	Food and Agriculture Organization of the United Nations
FiT	Feed-in Tariff
FNC	Forests National Corporation
GEF	Global Environment Facility
GHG	greenhouse gases
HCENR	Higher Council for Environment and Natural Resources (Sudan)
ICAT	International Climate Action Transparency
IRR	Internal Rate of Return
M&E	Monitoring & evaluation
MEAs	Multilateral Environmental Agreements
MPGs	Modalities, Procedures and Guidelines
MRV	Measurement, reporting and verification
MWRIE	Ministry of Water Resources, Irrigation, and Electricity (Sudan)
NAP	National Adaptation Plan
NBSAP	National Biodiversity Strategy and Action Plan
NC	National Communication
NCSA	National Capacity Self-Assessment
NDC	Nationally Determined Contribution
NGO	Non-governmental organization
POPP	Programme and Operations Policies and Procedures
PV	Photovoltaic
QA/QC	Quality assurance/quality control
RE	Renewable Energy
REDD+	Reducing Emissions from Deforestation and forest Degradation
ROI	Return on Investment
SCIA	Sudanese Chambers of Industries Association
SEHC	Sudanese Electricity Holding Company
SPC	Sudanese Petroleum Corporation

SWOT	Strengths, Weaknesses, Opportunities, and Threats
TOR	Terms of Reference
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

1 Executive summary

This technical report provides a comprehensive overview of the proposed tracking tool for monitoring the implementation of Nationally Determined Contributions (NDCs) in Sudan's transport sector. It also presents the development of a long-term transparency strategy for the transport sector, highlighting its objectives and the recommended actions to enhance transparency efforts, strengthen Measurement, Reporting, and Verification (MRV) systems, and promote sustainable development.

To effectively track progress, the report suggests a list of indicators that can be used to assess the implementation of NDCs in the transport sector. These indicators will enable Sudan to monitor its performance and identify areas that require additional attention and action.

In addition to the tracking tool, the report outlines the design and features of a general tool that will support the long-term transparency strategy in the transport sector. This tracking tool will facilitate data collection, analysis, and reporting, enabling Sudan to meet its transparency commitments, in addition of attracting climate action related investment for the transport sector .

The objectives of the long-term transparency strategy are clearly stated, focusing on the improvement of the greenhouse gas (GHG) inventory, the implementation of mitigation actions, and the adoption of adaptation measures. These objectives align with Sudan's commitment to addressing climate change and contribute to global mitigation and adaptation efforts through enhancing the accountability, providing data-driven decision-making to attract investment and gaining global trust.

Moreover, the report highlights the linkages and synergies between the proposed transparency strategy and the ongoing Capacity Building Initiative for Transparency (CBIT) project. By leveraging the experiences and lessons learned from the CBIT project, Sudan can strengthen its transparency efforts and ensure coherence between different initiatives.

To ensure the sustainability of the project outcomes, the report suggests a roadmap for consolidating the institutional framework, capacity building, and knowledge transfer. This roadmap will guide the implementation of the transparency strategy, fostering collaboration among stakeholders and enabling effective utilization of resources.

Additionally, the report emphasizes the importance of consolidated long-term financing mechanisms to support the transparency objectives. It suggests exploring various funding sources and mechanisms to secure the necessary financial resources for sustained implementation.

Lastly, the report presents a roadmap for continuous stakeholder engagement and communication. This includes regular consultations, workshops, and information sharing to foster collaboration, build consensus, and maintain transparency throughout the process.

By following the recommended actions outlined in this report, Sudan can enhance its transparency efforts, strengthen its MRV systems, and promote sustainable development in the transport sector. Continued collaboration, capacity building, and the establishment of long-term financing mechanisms will be key in achieving the country's long-term transparency goals and making meaningful contributions to global climate change mitigation and adaptation efforts.

2 Sudan’s NDCs in the transport sector and a proposed tracking tool

NDCs in the transport sector

NDCs, or Nationally Determined Contributions, are the pledges made by countries to reduce their greenhouse gas (GHG) emissions under the Paris Agreement on climate change. Sudan is one of the countries that has submitted its first NDC in 2015 and updated it in 2021.
The transport sector is one of the key sources of emissions in Sudan, Energy use in the residential and transport sectors dominate fuel use, accounting on average for 70% of total fuel consumed over the period 2012-2017.
Sudan's NDCs in the transport sector include the following actions:

1. Developing and implementing a low-carbon transport strategy and action plan
2. Promoting the use of public transport and non-motorized transport modes
3. Improving the efficiency and performance of the existing transport fleet
4. Introducing electric and hybrid vehicles and renewable fuels
5. Enhancing the capacity and infrastructure of railways and waterways
6. Implementing urban planning and transport demand management measures

Sudan estimates that these actions could reduce its transport emissions by 18% by 2030 compared to the business-as-usual scenario. However, Sudan also states that its NDCs are conditional on the availability of international support, such as finance, technology, and capacity building. Sudan also emphasizes the need for regional and international cooperation to address the challenges and opportunities of the transport sector.

Key Commitments:

1- In term of GHG mitigation: Sudan aims to achieve a 20% reduction in CO2 emissions from the transport sector by 2030 compared to a business-as-usual (BAU) scenario.
2- For adaptation:
Sudan also identifies several adaptation actions for the transport sector, focusing on:
   a) Resilient infrastructure: Building roads and bridges that can withstand climate extremes like floods and droughts.
   b) Sustainable transport modes: Promoting non-motorized and public transport options to reduce dependence on fossil fuels.
   c) Climate-smart planning: Integrating climate considerations into transport policies and infrastructure development.

The following figure illustrates simple analysis of the NDCs in the Transport sector in Sudan.

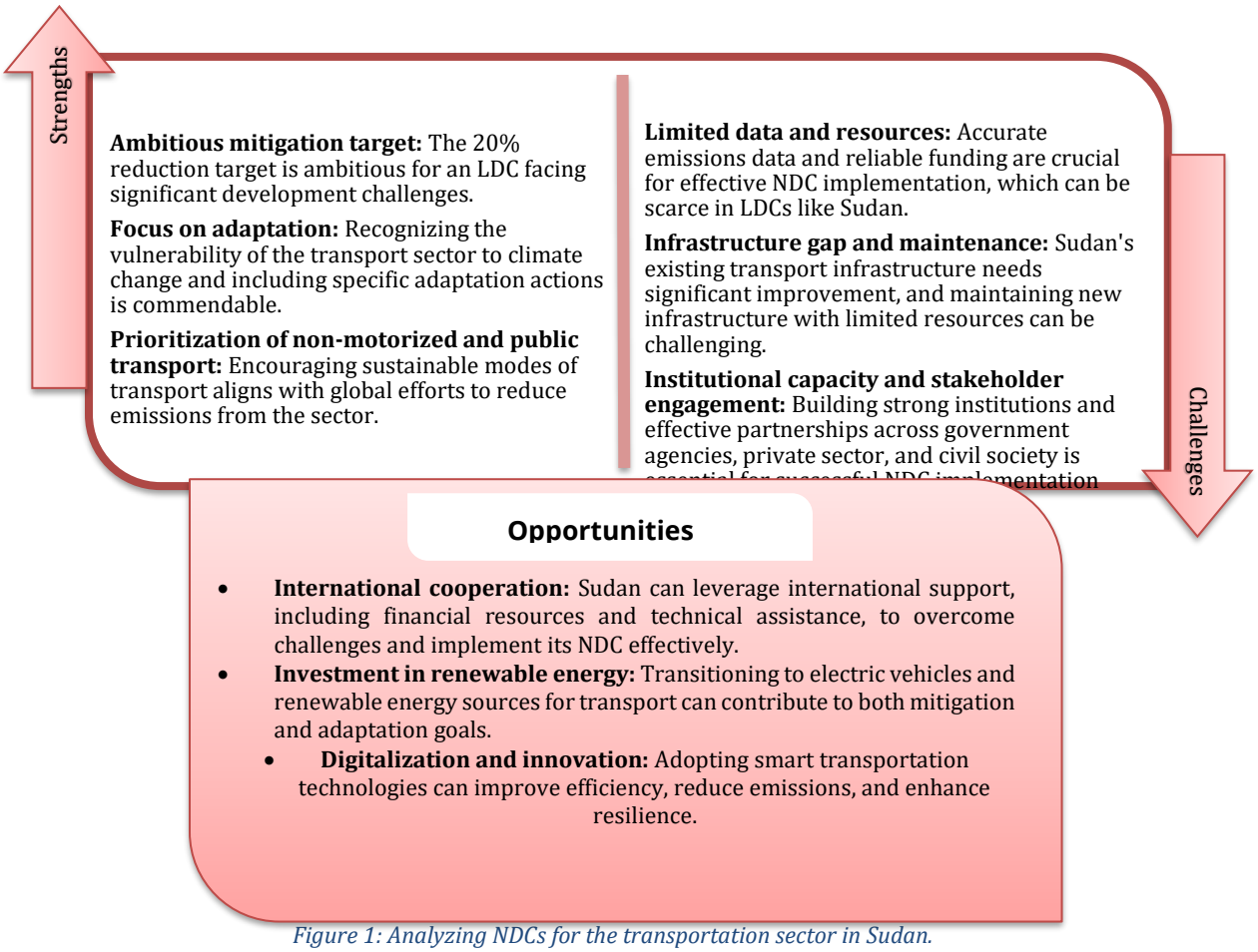


Figure 1: Analyzing NDCs for the transportation sector in Sudan.

NDC Tracking Tool for Sudan's target in the transport sector

Sudan's target in the transport sector is to reduce its emissions by (18- 20%) by 2030 compared to the business-as-usual scenario, by implementing various actions such as promoting public and non-motorized transport, improving vehicle efficiency, introducing electric and hybrid vehicles, and enhancing railways and waterways. Sudan's NDC is conditional on the availability of international support and cooperation.

The NDC Tracking Tool can help Sudan collect and analyze the information required to track its progress in the transport sector, such as the baseline emissions, the mitigation actions and their impacts, the indicators and methodologies used, the data sources and quality, and the challenges and gaps. The tool can also facilitate the preparation of the biennial transparency report (BTR) that Sudan needs to submit to the UNFCCC Secretariat every two years, starting from Dec. 2024.

The tracking tool is a valuable instrument for monitoring progress, informing decision-making, and enhancing transparency. By overcoming the challenges and continuously improving the tool, Sudan can demonstrate its commitment to achieving its climate goals and contribute to global efforts to combat climate change.

Indicators for tracking progress in the implementation of RE related NDCs:

The following comprehensive set of indicators can track progress towards Sudan's transport-related NDC goals, ensure transparency and accountability, and inform effective implementation strategies for a sustainable and resilient transport system.

1. Mitigation Indicators:

- CO2 emissions reduction: Track annual CO2 emissions from the transport sector compared to a BAU scenario and the NDC target.
- Renewable energy share: Monitor the percentage of renewable energy used in transport (e.g., biofuels, electric vehicles).
- Fuel efficiency standards: Assess the implementation and impact of fuel efficiency standards for new vehicles.
- Modal shift: Track the change in modal share towards sustainable modes like public transport, cycling, and walking.
- Vehicle electrification: Monitor the number and types of electric vehicles registered and deployed.
- Freight efficiency: Analyze improvements in logistics efficiency and reductions in empty truck kilometers.

2. Adaptation Indicators:

- Climate-resilient infrastructure: Track the development and implementation of climate-resilient infrastructure projects for roads, bridges, and public transport systems.
- Vulnerability assessments: Monitor the vulnerability of transport systems to climate change impacts like floods, droughts, and extreme weather events (example: frequency of damage due to flash floods as for Omdurman- Bara road)

- Early warning systems: Assess the development and effectiveness of early warning systems for climate hazards impacting transportation.
- Emergency preparedness and response: Evaluate the capacity and preparedness of transport authorities to respond to climate emergencies.
- Integration of climate change into transport planning: Track the inclusion of climate change considerations in national and regional transport policies and planning processes.

3. Implementation and Enabling Environment Indicators:

- Financial resources: Monitor the allocation and disbursement of funds for transport-related NDC activities.
- Institutional capacity: Assess the capacity of government agencies and stakeholders to implement NDC commitments.
- Technology transfer and innovation: Track the adoption and development of new technologies and solutions for sustainable transport.
- Public awareness and participation: Evaluate public awareness of transport-related climate change issues and engagement in NDC implementation.
- Policy and regulatory environment: Monitor the development and implementation of policies and regulations that support the NDC targets

These indicators provide a holistic view of the progress being made towards NDC goals in the transport sector. However, it's important to note that data availability and quality can vary, so these indicators should be interpreted with caution.

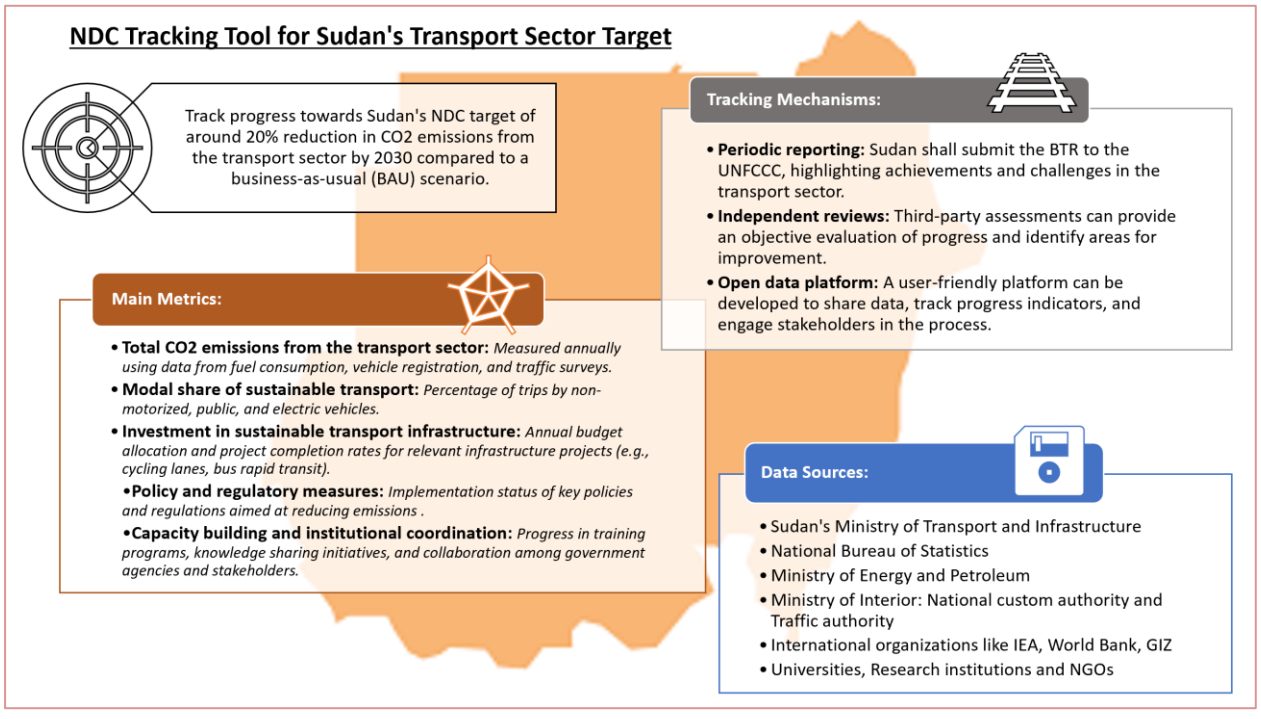


Figure 2: Metrices, mechanisms and data source for NDC tracking tool - Sudan's transport sector

Tool Design and Features:

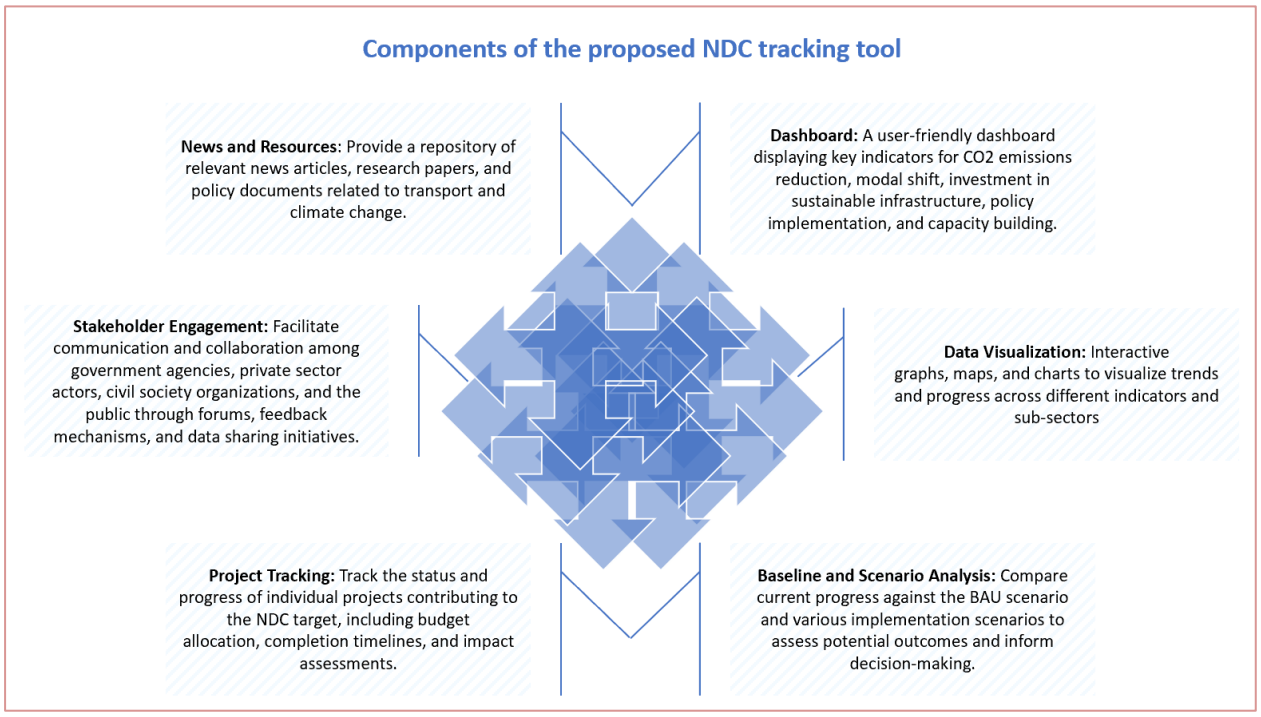


Figure 3: Components of the proposed NDC tracking tool - Sudan's energy and transport sectors.

By implementing an effective NDC tracking tool, Sudan can effectively monitor progress towards its ambitious transport sector target, ensure transparency and accountability, and contribute to achieving a sustainable and resilient transport system.
The NDC tracking tool shall be designed as an interactive online platform hosted and operated by HCENR according to the proposed institutional arrangement presented in a previous report.

Key Features:

- **Dashboard:** A user-friendly dashboard displaying key indicators for CO2 emissions reduction, modal shift, investment in sustainable infrastructure, policy implementation, and capacity building.
- **Data Visualization:** Interactive graphs, maps, and charts to visualize trends and progress across different indicators and sub-sectors (e.g., passenger, freight, urban, rural).
- **Targeted Reports:** Generate downloadable reports on specific topics or indicators for stakeholders and policymakers.
- **Baseline and Scenario Analysis:** Compare current progress against the BAU scenario and various implementation scenarios to assess potential outcomes and inform decision-making.
- **Project Tracking:** Track the status and progress of individual projects contributing to the NDC target, including budget allocation, completion timelines, and impact assessments.
- **News and Resources:** Provide a repository of relevant news articles, research papers, and policy documents related to transport and climate change.
- **Stakeholder Engagement:** Facilitate communication and collaboration among government agencies, private sector actors, civil society organizations, and the public through forums, feedback mechanisms, and data sharing initiatives.

Technical Specifications:

- Open-source platform: Utilize open-source technologies to ensure accessibility and scalability by all data providers and stakeholders:
    1. HCENR
    2. Sudan's Ministry of Transport
    3. National Bureau of Statistics
    4. Ministry of Energy and Petroleum
    5. Ministry of Interior: National custom authority and Traffic authority
    6. Ministry of infrastructure, roads and bridges
    7. Universities, Research institutions and NGOs
- Multilingual interface: Accommodate **Arabic and English** to reach a wider audience.
- Mobile-friendly design: Optimize access for users on various devices.
- Data security: Implement robust data security measures to protect sensitive information.

The authors recommend hiring through open bid a technically qualified firm/organization to build the tracking tool and to provide technical support for users in a long contract basis. HCENR is encouraged to call for funding for building the tracking tools (for both the energy and transport sectors as well as other sectors)

Implementation and Maintenance:

- Institutional collaboration protocol: Establish a clear division of responsibility for data collection, analysis, and tool maintenance among relevant government agencies.
- Capacity building: Train personnel on data management, analysis tools, and platform usage.
- Regular updates and improvements: Continuously update the tool with new data, features, and functionalities based on user feedback and evolving needs.

Potential Benefits:

- Transparency and accountability: Increased public awareness about progress towards the NDC target and responsible resource allocation.
- Improved decision-making: Data-driven insights to inform effective policy design, project selection, and resource allocation.
- Enhanced stakeholder engagement: Fostering collaboration and knowledge sharing among various stakeholders.
- Attract investments and partnerships: Demonstrating commitment and progress can attract international support and private sector investments.

Challenges and Considerations:

- Data availability and quality: Addressing gaps and inconsistencies in data collection and reporting.
- Technical capacity building: Ensuring personnel have the necessary skills and expertise to manage and maintain the tool.
- Sustaining funding: Securing resources for ongoing data collection, tool maintenance, and capacity building.
- Accessibility and user engagement: Reaching diverse stakeholders and ensuring effective communication and utilization of the tool.

3 Development of Long-Term Transparency Strategy on Actions related to the Transport Sector in Sudan

Background and objectives of the log-term Transparency Strategy

Sudan, as a developing country, recognizes the importance of transparency in addressing climate change. This section provides an overview of the development of a long-term transparency strategy, including the establishment of greenhouse gas (GHG) inventories, mitigation actions, and adaptation measures in the transport sector.

The overall objective of the long-term transparency strategy is to enable Sudan to achieve its national development goals, while effectively addressing climate change. Effective climate action requires strengthened institutional arrangements, that ensure the availability of sound data and information, as well as a sustainable flow of both. This would enable the country to design and implement evidence-based policies and programs, that constitute the country's climate action in line with the Paris Agreement. A strong transparency framework enhances climate action's national ownership, integration of stakeholders, and consequently, ensures accountability at national and international levels. Moreover, it allows climate action to be integrated into the national planning process, improves finance mobilization, and thus, enables transformational change.

Modalities, Procedures and Guidelines (MPGs) for the transparency framework for action and support – were adopted in the first CMA in December 2018. The adopted MPGs are contained in decision 18/CMA.1 and its annex. The reporting format has changed from Biennial Update Reports (BURs) to Biennial Transparency Reports (BTRs) , with stronger obligatory language of requirements, while maintaining certain flexibility provisions that considers different parties' resources and capacity. In addition, the main principle that guides the MPGs, is building on and enhancing the transparency arrangements under the Convention (Measurement, Reporting and Verification).

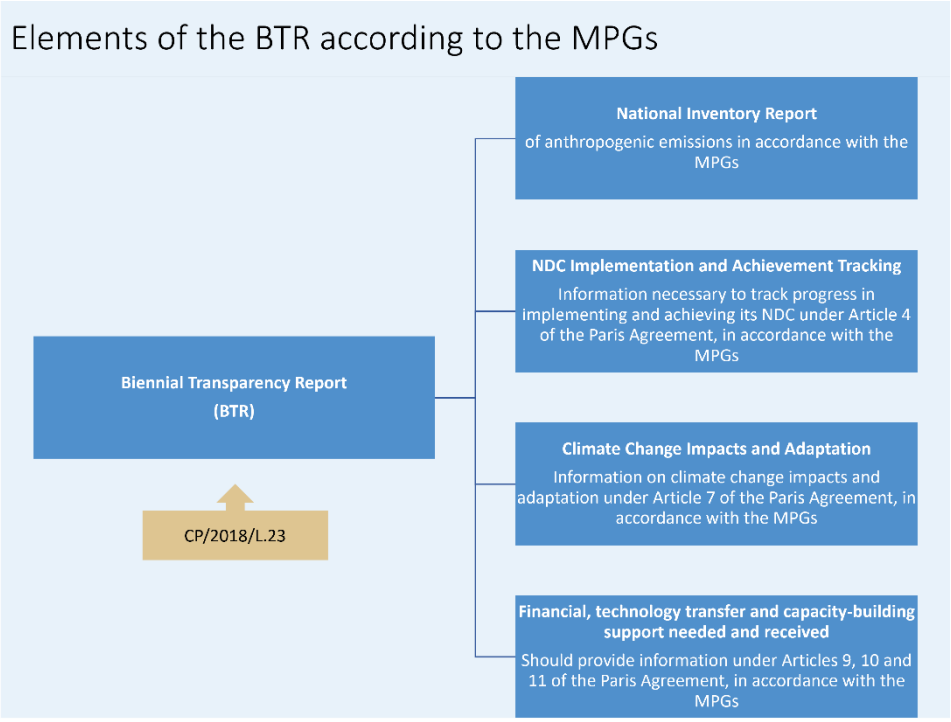


Figure 4: Key elements of the BTR as per the MPGs

Each party **shall** provide a national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases (GHGs), in accordance with the MPGs. Each Party **shall** provide the information necessary to track progress in implementing and achieving its NDC under Article 4 of the Paris Agreement, in accordance with the MPGs. As for Climate Change Impacts and Adaptation, each party **should** provide information under Article 7, in accordance with the MPGs. The term "should" indicates an expected course of action that is to be followed unless inapplicable due to a particular circumstance. Similarly, each party **should** provide information on financial, technology transfer and capacity-building support needed and received under Articles 9, 10 and 11, in accordance with the MPGs.

Sudan has submitted a First and Second National Communications reports, in 2003 and 2013, respectively, and the Third National Communications was drafted and awaiting Cabinet approval before submission to UNFCCC. In 2021/2022, Sudan has updated its Nationally Determined Contributions.

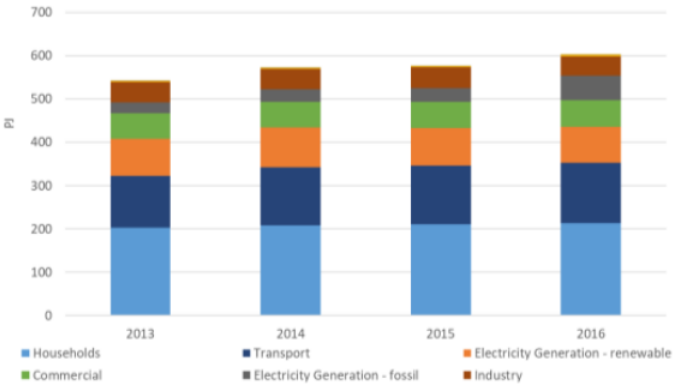


Figure 5: Energy use by activity (Higher Council for Environment and Natural Resources, 2022)

Most recent trends (2013 – 2016) in energy use has shown an upward trend, from 543 PJ to 603 PJ , with transport averaging the second largest share of 23% of energy use over the period (Higher Council for Environment and Natural Resources, 2022). Transport energy use is categorised as follows (Table 1).

Table 1: Energy sector key categories related to the Transport demand sector

Category	Activity

Fuel combustion	Domestic aviation Road transportation Railways Domestic water-borne navigation
Fugitive emissions	Transport

Developing a long-term transparency strategy is crucial for Sudan to secure its future in a climate-conscious world. It is the roadmap to building trust with the international community, demonstrating Sudan's commitment to the Paris Agreement, and attracting vital investment for sustainable development. This strategy, delivered under the ICAT project, will lay the foundation for:

I. Enhanced Accountability:

- Shine a spotlight on progress: Regularly track and report on climate actions in energy and transport to ensure clear lines of responsibility and optimal use of resources.
- Fuel effective policies: Use transparent data to inform and refine policies, driving their effectiveness and maximizing impact.

II. Data-Driven Decision Making:

- Empower evidence-based action: Build a robust MRV system to deliver accurate data on emissions, mitigation efforts, and adaptation progress, empowering informed decision-making and targeted interventions.
- Navigate towards informed solutions: Leverage data-driven insights to chart a clear course for effective climate action, maximizing results and minimizing resource strain.

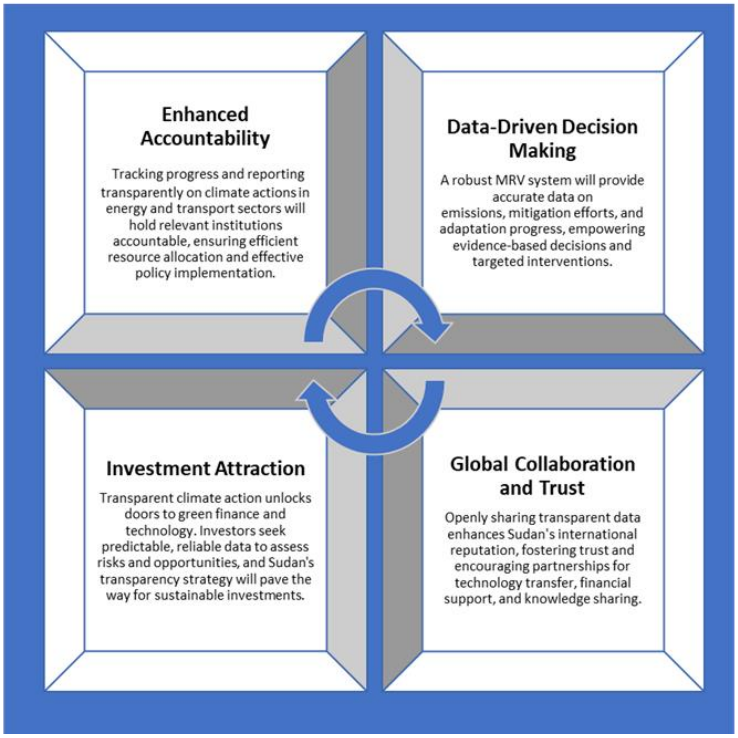


Figure 6: the objectives of the long term transparency strategy

III. Global Collaboration and Trust:

- Build bridges of trust: Openly share transparent data, strengthening Sudan's global reputation and fostering trust with international partners.
- Unlock doors to collaboration: Attract partnerships for technology transfer, financial support, and knowledge sharing by demonstrating commitment to responsible climate action.

IV. Investment Attraction:

- Open the door to green investments: Secure green finance and technology by establishing Sudan as a reliable and predictable partner with a clear commitment to transparent climate action.
- Attract responsible investors: Provide investors with the confidence they need to support Sudan's sustainable development journey through transparent data and strong climate action.

GHG Inventory

The first step in the transparency strategy is the development of a comprehensive GHG inventory for the transport sector in Sudan. This inventory will include emissions from various sources such as road transport, aviation, and other means of transportation. The data collection process will involve collaboration with relevant stakeholders, including government agencies, energy companies, and research institutions. The inventory will be developed based on internationally recognized methodologies, such as those provided by the Intergovernmental Panel on Climate Change (IPCC).
Building a long-term transparency strategy for the GHG emissions inventory in Sudan's transport sector requires a multi-step approach with specific formats for data collection, analysis, and reporting.

Planning and preparation stage:
The planning phase for the GHG inventory in the transport sector will encompass several steps, as outlined below:

I. **Define Scope and Boundaries:**
   a) Vehicle categories: Identify all relevant vehicle categories within the transport sector, such as passenger cars, motorcycles, light and heavy trucks, buses, waterborne navigation and airplanes.
   b) Fuel types: Specify the different fuel types used by each vehicle category, including gasoline, diesel, LPG, and any potential biofuels.
   c) Geographic boundaries: Decide whether the inventory covers the entire country or specific regions.

II. **Identify Data Sources:** Research and list available data sources for fuel consumption and vehicle population.

III. **Gather Data Collection Tools:** Develop or acquire data collection templates, questionnaires, and data management software compatible with IPCC guidelines.

IV. **Establish Communication Channels:** Define communication channels with relevant stakeholders (ministries, fuel suppliers, power utilities) for data collection and collaboration.

Here's a breakdown of the key steps and formats that must be considered for the upcoming GHG inventory for in both energy and transportation sectors:

1. Institutional Setup and Planning:

- Stakeholder Engagement: Establish a steering committee with representatives from relevant government agencies, private sector, academia, and civil society to ensure ownership and collaboration. The proposed stakeholders to be represented in the steering committee are:
    1. The traffic authorities- Ministry of Interior
    2. National custom authority – Ministry of Interior

3. Ministry of Transport (railways and maritime)
4. Civil Aviation authority
5. Ministry of Infrastructure, Roads and Bridges
6. Ministry of Energy and Petroleum
7. State-level related ministers
8. National bureau of statistics
9. Rep. from HCENR and rep. from academia

- Institutional Capacity Assessment: Evaluate existing institutional capacities for data collection, analysis, and reporting within the transport sector. Identify gaps and needs for training or infrastructure development.
- Legal and Policy Framework Review: Analyze existing laws, policies, and regulations relevant to transport emissions inventory and identify any alignment needs with international standards.
- Define Scope and Boundaries: Clearly define the sector coverage (e.g., road, rail, air) and data collection boundaries (e.g., geographic, temporal).

2. Data Collection and Management:

- Develop Data Sources and Collection Methods: Identify and map relevant data sources:
  - fuel sales statistics – Ministry of Energy and Petroleum
  - vehicle registration data - The traffic authorities- Ministry of Interior
  - traffic volume data - The traffic authorities- Ministry of Interior, Ministry of Infrastructure, Roads, and Bridges
  - activity-based surveys – Ministry of Transport, Academia
  - efficient data collection methods aligned with Tier levels of the Intergovernmental Panel on Climate Change (IPCC) guidelines – HCENR and Academia
- Establish Data Management System: Implement a robust data management system for secure storage, transfer, and analysis of collected data. Ensure clear data quality control and version control procedures.
- Develop Inventory Methodology: Choose an appropriate methodology for calculating emissions based on IPCC guidelines and national context (e.g., Tier 1, Tier 2). Utilize relevant tools and models for calculating emissions from different transport modes and fuel types.

3. Reporting and Communication:

- Develop Reporting Format: Choose a reporting format consistent with international standards and national reporting requirements (e.g., Biennial Update Reports, National Communications, BTR). Develop templates for clear and concise presentation of data and results.
- Public Communication Strategy: Create a communication plan to share inventory results with stakeholders and the public. Design accessible materials and utilize diverse communication channels like reports, infographics, and public dialogues.
- Continuous Improvement: Implement a review and improvement process to regularly update the inventory methodology, data sources, and reporting formats based on technological advancements and evolving international standards.

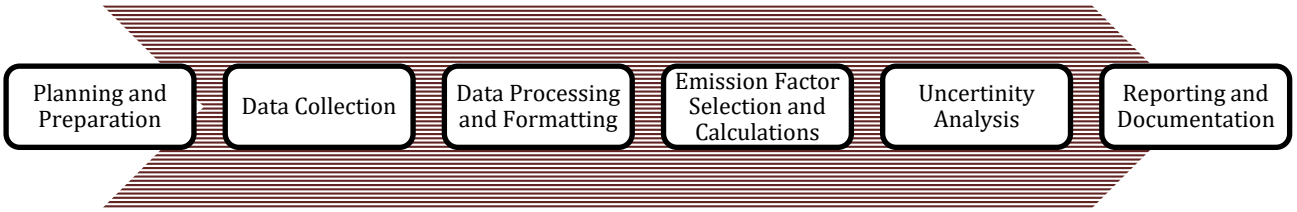


Figure 7:The Flow of Activities to conduct GHG inventory for the energy/transport Sectors in Sudan

Methodology

The methodology and sequence of activities will adhere to a systematic progression, starting with planning and culminating in the final report, in accordance with the IPCC guidelines. This process follows the formula below for all transportation sub-categories, and the various stages can be visually represented through subsequent sequential steps:

Emission GHG, Fuel = Fuel Consumption x Emission Factor GHG, Fuel

Where:

Emissions GHG, fuel = Emissions of a given GHG by type of fuel (kg GHG)

Fuel Consumption fuel = Amount of fuel combusted (TJ)

Emission Factor GHG, fuel = Default emission factor of a given GHG by type of fuel (kg gas/TJ). For CO2, it includes the carbon oxidation factor, assumed to be 1.

Emission GHG = ∑ Emission GHG, Fuel

Designed for flexibility, the following two-tiered table can be used for both GHG inventory reporting and subsequent mitigation modeling, ensuring data transparency and informing effective action planning

Table 2: GHG emission calculation tiers

FEATURE	TIER 1	TIER 2
METHOD COMPLEXITY	Simple	More complex
DATA REQUIREMENTS	Fuel types, fuel sales/consumption, basic vehicle fleet data	Detailed data on vehicle types, VKT[1], fuels, technology, driving patterns, regional emission factors
EQUATION	Activity Data x Emission Factor	Complex equations considering various factors, potentially using models like COPERT or MOVES
ACCURACY	Less accurate (uses average factors)	More accurate (considers specific parameters)

[1] VKT stands for **Vehicle Kilometers Traveled**, which is a measure of the total distance traveled by vehicles over a defined period. It is typically expressed in units like "vehicle kilometers per year" or "vehicle miles traveled per day."

SUITABLE FOR	Basic national reporting of GHG emissions and sinks	Modeling mitigation scenarios and currying on bottom-up analysis for localities, cities, or states
Features	• Can only estimate overall emission reductions from fuel switching or fuel efficiency improvements. • Difficult to target specific vehicle types or technologies. • Less effective for modeling complex measures like traffic management or modal shift.	• Can assess specific impacts of various mitigation measures on different vehicle types and driving patterns. • Allows for detailed modeling of complex interventions like low-emission zones or road pricing schemes. • Provides more accurate data for cost-benefit analysis of mitigation options.

Activity data collection and emission factors

The data collection and formatting process for the GHG inventory in the transport sector will be segmented into distinct categories for organizational clarity. These categories will encompass data as follow:

Table 3: Activity Data Collection and Formatting

DATA ELEMENT	DATA SOURCE	REQUIREMENTS	FORMAT[2]	ADDITIONAL NOTES
VEHICLE POPULATION	Official registration databases, industry associations, surveys	Number of vehicles by category (cars, motorcycles, trucks, buses, airplanes),	Spreadsheets/tables with clear definitions and units	Cross-check with multiple sources, consider regional variations.
FUEL CONSUMPTION	National sales data, import/export records, civil aviation and surveys	Total fuel consumption by fuel type (gasoline, diesel, LPG, jet fuel), disaggregation by sector category (Road, civil aviation and railways)	Spreadsheets/tables with clear definitions and units	Cross-check with import/export data, consider seasonal variations.
AVERAGE ANNUAL MILEAGE (AAM)	Surveys, traffic data, literature values	Average distance traveled by vehicles in each category, consider urban/rural or regional	Average value or range per category, document data sources and assumptions	Using reliable sources, consider factors affecting mileage (e.g., road conditions, traffic patterns).

[2] Formulated tables as guideline for each data element are shown in Appendix - A

	variations (optional)

For reporting obligation purposes, it is recommended by the authors that Sudan start with tier-1 approach for the coming BTR and moves to tier-2 for the 4th national communication. While for modeling the mitigation scenarios, Sudan shall start with tier -2 and upgrade to tier-3 if applicable.
Emission factor

In accordance with the IPCC Tier 1 methodology, the inventory will utilize the default emission factors for each sector, including: road transportation, off-road mobile sources, railways, waterborne navigation, and civil aviation as shown in the table below:

Table 4: Tire 1 Transport Sector IPCC default Emission Factors

Fuel Type	**CO2 (kg/TJ)**	**CH4 (kg/TJ)**		**N2O (kg/TJ)**
Road Transport				
Motor Gasoline	69,300	Uncontrolled	33	3.2
		Oxidation Catalyst	25	8
		Low Mileage Light Duty Vehicle Vintage 1995 or Later	3.8	5.7
Diesel/Gas Oil	74,100	3.9		3.9
Railways				
Diesel	74,100	4.15		28.6
Waterborne				
Diesel	74,100	7		2
Civil Aviation				
Aviation Gasoline	70,000	0.5		2
Jet Kerosene	71,500	0.5		2

Table 5: Off-road IPCC Tire1 Default emission Factor

Off- Road Source	**CO_2(kg/TJ)**	**CH_4(kg/TJ)**	**N_2O(kg/TJ)**
Diesel			
Agriculture	74,100	4.15	28.6
Forestry	74,100	4.15	28.6
Industry	74,100	4.15	28.6
Household	74,100	4.15	28.6
Motor Gasoline 4-stroke			
Agriculture	69,300	80	2
Forestry	69,300		
Industry	69,300	50	2
Household	69,300	120	2
Motor Gasoline 4-stroke			
Agriculture	69,300	140	0.4
Forestry	69,300	170	0.4
Industry	69,300	130	0.4
Household	69,300	180	0.4

Mitigation Actions

To address GHG emissions in the energy sector, Sudan aims to develop a set of mitigation actions. These actions may include promoting renewable energy sources, improving energy efficiency, and implementing sustainable transportation systems. The strategy will outline specific targets, timelines, and responsible entities for each mitigation action.

Sudan has submitted its updated first NDC in May 2021, and it describes the mitigation component contributions and targets set for the period 2021 – 2030. The Third National Communications (yet to be submitted to the UNFCCC) describes the Business-As-Usual scenarios and NDC scenarios for all sectors, including energy, projected to the year 2050.

Table 6 combines the contributions programs defined in Sudan's NDC and the specific mitigation measures set in the draft third National Communication. The specific mitigation measures were matched as appropriate to the programs set in the NDC.

Table 6: Programs and measures as set in the NDC and the Third National Communication

Program/Contribution	Measure	Type of measure	Sector
Transport: Inner-city private cars model switching to buses in Khartoum. Blending fossil fuel by 10 biofuel and promotion of fuel efficiency. Good trucks, switching to rail transport.	1. Fuel switching away from gas/diesel buses to CNG buses	Fuel switching	Transport
	2. Introduction of high efficiency gas/diesel buses	Energy efficiency	Transport
	3. Introduction of high efficiency gas/diesel trains	Energy efficiency	Transport
	4. Mode switching from light duty vehicles to electric trams in Khartoum	Fuel switching	Transport
	5. Fuel switching from gas/diesel buses to electric buses	Fuel switching	Transport

The analysis in the draft mitigation analysis of the Third National Communication was made for measures 4 and 5 from Table 6. These measures are expected to result in emissions reductions of 15,586 Gg CO_2e by 2050.

Transparency in mitigation actions comprises providing transparent, accurate, complete, consistent and comparable information on the components shown in (Figure 8). This, in turn, would allow the country to assess the progress made in mitigation actions implementation and the resulting changes in GHG emissions due to mitigation actions. Most importantly, the country can assess the effects on national development goals, through the indicators developed with each mitigation action, program, policy and measure. These may include environmental, social and economic indicators.

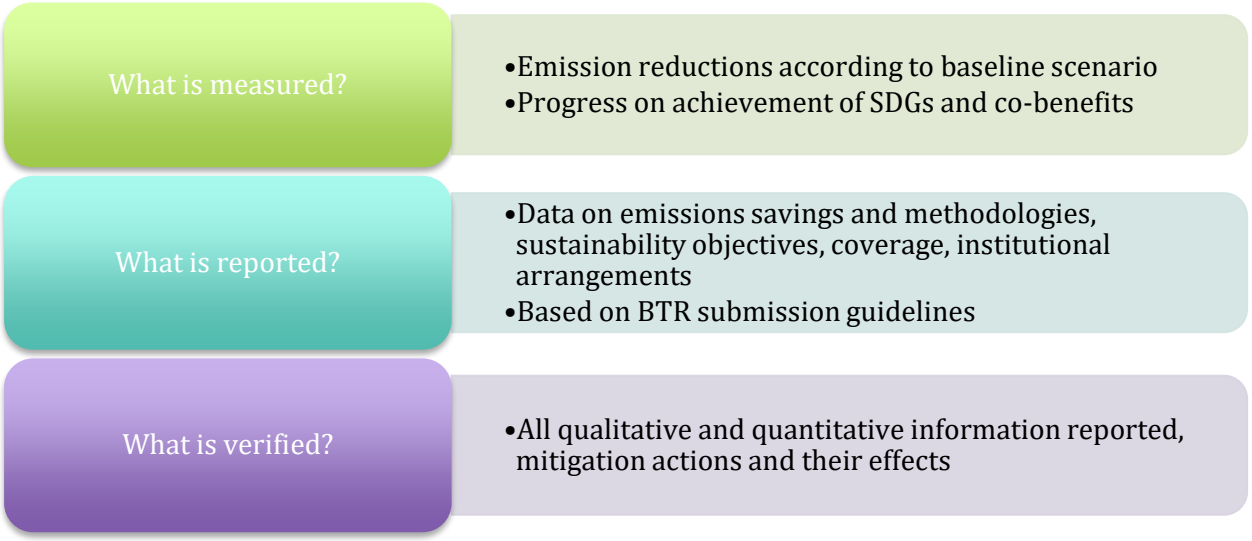
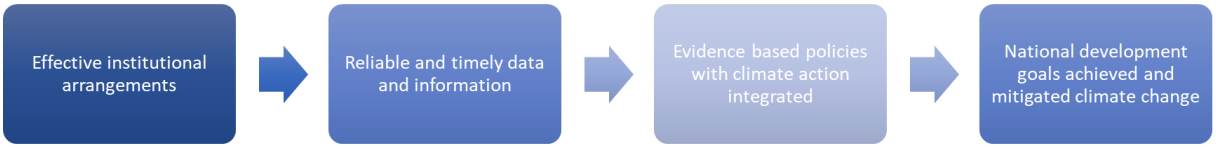


Figure 8: Mitigation actions transparency components

Accordingly, the involvement of the institutions that are directly involved and/or can assist in tracking of mitigation actions, assessing effects on sustainable development goals (social, environmental and economic) and assessing changes in GHG emissions resulting from the actions – is crucial. This would also require that the set institutional arrangements are effective, sustainable, and are able to ensure that the development of policies is evidence-based, with climate change mainstreamed into the national planning process.



The institutional framework under which the institutional arrangements must be set, consists of several components (Figure 9). At the very top, a body with authority (HCENR) is needed to lead and coordinate all the other aspects of the institutional framework.

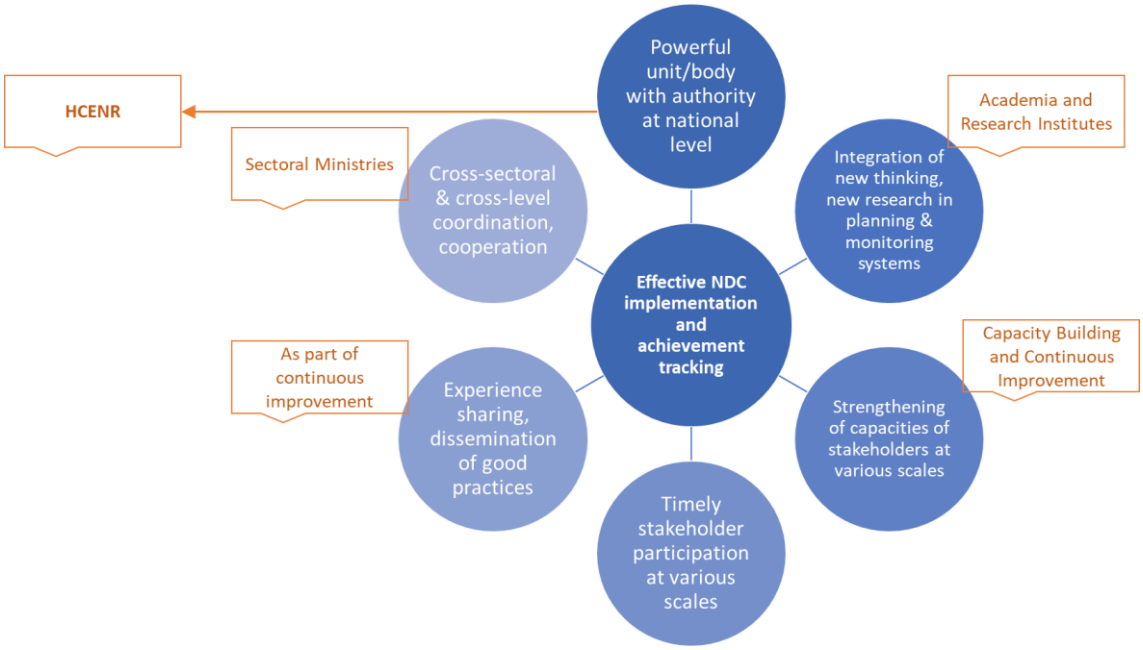


Figure 9: Institutional framework

Figure 10 shows the institutions involved in three aspects of mitigation actions transparency, and include ministries, private sector, governmental institutions and academia and research institutions.

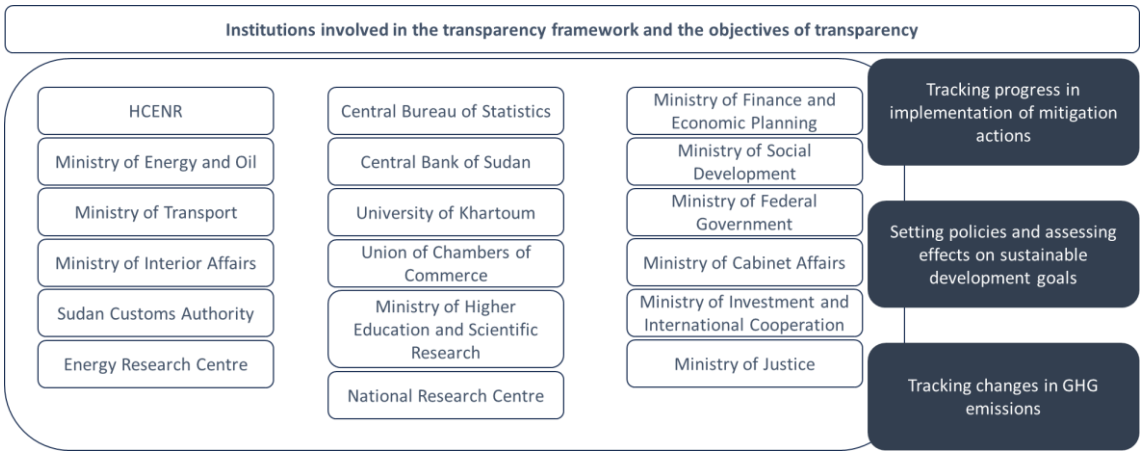


Figure 10: Institutions involved in the transparency framework

With that institutional framework in place, and involvement of all institutions mentioned, the final output of the strategy would be a continuous cycle as shown in (Figure 11).

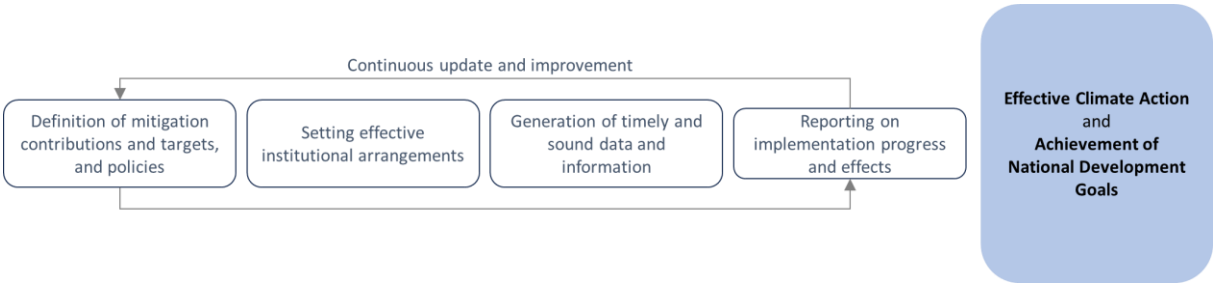


Figure 11: Long-term transparency setting

Adaptation measures

In addition to mitigation actions, Sudan will incorporate adaptation measures into the transparency strategy. These measures will focus on building resilience to the impacts of climate change in the energy sector. Examples of adaptation measures may include enhancing infrastructure resilience, developing early warning systems, and promoting climate-smart technologies.
Considering the ongoing war in Khartoum and potential escalation, a long-term transparency strategy for adaptation in Sudan's transport sector should focus on:

1. Resilient and Scalable Infrastructure:
    - Invest in multi-modal infrastructure: Develop and connect diverse transportation modes like cycling paths, pedestrian areas, and public transport networks (buses, trams) to reduce reliance on single points of vulnerability.
    - Focus on adaptable technologies: Prioritize electric vehicles (EVs) and other low-emission options with flexible charging infrastructure, less dependent on centralized fuel distribution.
    - Strengthen existing infrastructure: Implement measures like road maintenance and bridge repairs to increase resilience against conflict-related damage.
2. Community-led and Inclusive Mobility:
    - Empower local communities: Support community-based transportation initiatives and invest in local public transport systems tailored to specific needs.
    - Promote non-motorized transport: Encourage walking, cycling, and other pedestrian-friendly options for short distances through infrastructure improvements and awareness campaigns.
    - Ensure equitable access: Address disparities in transportation access between different regions and communities, particularly vulnerable groups.
3. Data-Driven Governance and Transparency:
    - Strengthen data collection and management: Establish systems for monitoring traffic patterns, emissions, and impacts of adaptation measures.
    - Develop transparent reporting mechanisms: Regularly share data and progress on adaptation initiatives with stakeholders and the public.
    - Promote open data accessibility: Make data on transportation infrastructure, vulnerabilities, and adaptation measures easily accessible to researchers, policymakers, and the public.
4. Conflict-Sensitive Planning and Peacebuilding:
    - Conduct conflict impact assessments: Identify potential security risks associated with different adaptation measures and develop strategies to mitigate them.
    - Promote conflict-sensitive infrastructure development: Ensure infrastructure projects do not exacerbate existing conflicts or create new ones.
    - Support alternative livelihoods: Invest in programs that offer alternative income options for individuals and communities reliant on conflict-related activities in the transportation sector.
5. Additional Considerations:
    - Prioritize immediate needs: Focus on measures that address current transportation challenges and vulnerabilities caused by the war, such as providing temporary transport links or assisting displaced communities.

- Seek international collaboration: Work with international partners to access funding, expertise, and technology for implementing resilient and sustainable transportation solutions.
- Continuously adapt and learn: Regularly review and update the transparency strategy based on evolving conflict dynamics, climate impacts, and technological advancements.

4 Identifying Links and Synergies with Other Support Initiatives

The Initiative for Climate Action Transparency (ICAT) is one of the support initiatives for Sudan's transparency strategy. This section highlights the links between the ICAT initiative for Sudan's energy sector with Capacity Building Initiative for Transparency (CBIT) . It emphasizes the potential for knowledge exchange, technical support, and alignment of methodologies between both initiatives.

Capacity Building Initiative for Transparency (CBIT)

The Capacity Building Initiative for Transparency (CBIT) is an important support initiative aimed at assisting developing countries in strengthening their Measurement, Reporting, and Verification (MRV) systems. Sudan recognizes the synergies between its long-term transparency strategy and the CBIT. This section outlines the specific areas of collaboration and coordination between Sudan's transparency strategy and the CBIT, including capacity-building activities, technical assistance, and knowledge sharing.

The project aims to enhance Sudan's capacities in transparency related to climate change, specifically focusing on the provisions of Article 13 and decision (18/CMA.1) of the Paris Agreement. It consists of four components: creating an enabling institutional environment for transparency, providing tools and training, developing a long-term plan for climate change research and reporting, and embedding knowledge in Sudanese institutions.

Component 1 focuses on strengthening national institutions for transparency activities. It involves analyzing current institutional arrangements, identifying gaps, and proposing suitable arrangements. It also aims to establish a monitoring, reporting, and verification (MRV) system with legal and procedural arrangements. The climate change department of the Higher Council for Environment and Natural Resources (HCENR) will be strengthened to enhance its coordination role. This includes capacity building, participation in training programs, and establishing steering and technical committees. Stakeholder consultations and workshops are planned throughout the project. In this component, the project aims to establish inter-institutional transparency coordination mechanisms in Sudan. This involves creating a national mechanism where policy/decision makers and technical experts from various institutions can collaborate to support transparency obligations. The mechanism will be coordinated by the climate change unit of HCENR and include representatives from government, research, academia, private sector, and civil society. Specific activities include establishing a data center, capacity building programs, and stakeholder consultations. The online transparency portal (which will include NDCs' tracking tools in a later stage) will disseminate materials and increase awareness of transparency obligations. The project focuses on improving awareness and knowledge of the transparency framework among national experts and stakeholders. Sudan will actively participate in the CBIT Global Coordination Platform and engage in workshops to align its project with other transparency initiatives. Activities include awareness plans, workshops, training sessions, and participation in regional/international workshops.

Component 2 of the project focuses on providing tools, systems, trainings, and assistance in line with the transparency provisions of the Paris Agreement. Sudan aims to enhance technical and institutional capacities related to transparency in various sectors, including government, research,

academia, the private sector, and civil society. The project will develop comprehensive sector-specific training programs and materials in Arabic and English for stakeholders at different levels, including subnational institutions. These programs will cover topics such as greenhouse gas (GHG)inventories, mitigation actions, vulnerability and adaptation, and supporting systems and tools. The project also aims to promote sustainable knowledge management by disseminating training results through existing information sharing networks and participating in relevant forums. Under Output 2.1.1, transparency training programs and materials will be prepared and implemented, targeting both technical and procedural aspects of the Paris Agreement's Measurement, Reporting, and Verification (MRV) system. The project will collaborate with universities, research institutions, and training centers to ensure the sustainability of capacity building efforts. Output 2.1.2 involves the development of tools and approaches to meet transparency requirements, including MRV systems, GHG inventories, and quantification of mitigation and adaptation actions. The project will conduct a comprehensive review of existing tools and customize them to meet Sudan's context. Activities include developing guidelines, protocols, and data management systems, as well as designing templates for data collection and dissemination of gender-relevant best practices. Output 2.1.3 focuses on establishing an information sharing mechanism and implementing a public awareness program. The project aims to build the knowledge base and capability of stakeholders, including line ministries, on MRV requirements and transparency obligations. An online transparency portal will be developed to provide accessible information, and public awareness activities will be conducted to highlight Sudan's obligations under the Paris Agreement.
Overall, Component 2 aims to build national capacity for transparency under the Paris Agreement by providing training, developing tools, and promoting information sharing and public awareness.

Component 3 of the project focuses on establishing long-term transparency arrangements to improve communication, reporting, and progress tracking of Sudan's Nationally Determined Contributions (NDCs). Sudan aims to develop a long-term transparency strategy that enhances the country's capacity in areas such as greenhouse gas (GHG) inventories, mitigation, adaptation, and support received. The strategy will align with Sudan's obligations under the Paris Agreement and involve consultations with national and international experts. Activities include developing TORs for consultants, integrating MRV (Measurement, Reporting, and Verification) into national institutions, and conducting stakeholder consultations. Output 3.1.2 involves integrating MRV into related national institutions and tracking the implementation of NDCs. This integration will ensure Sudan's regular compliance with climate change obligations and facilitate continuous improvement in meeting transparency requirements. Tasks include working with key institutions to incorporate climate obligations into their reporting systems and policies, developing a methodology and tracking tool to monitor progress, and ensuring gender equality issues are documented through sex-disaggregated data collection.

Component 4 focuses on knowledge management, monitoring, and evaluation. Output 4.1.1 involves monitoring and evaluating project results and outcomes through standard M&E activities. This includes conducting workshops, monitoring implementation, reporting progress to stakeholders, conducting reviews, and preparing final reports. Output 4.1.2 focuses on sharing lessons learned and best practices through the online transparency platform. Sudan aims to capture, document, and share data, information, and knowledge generated by project activities. Lessons learned will be shared with stakeholders, templates and best practices will be disseminated, and participation in training workshops and the CBIT Global Coordination Platform will be facilitated to leverage emerging knowledge for future climate change initiatives.

Links and synergies between CBIT project and ICAT Sudan

project

Based on the detailed objectives and activities of the ICAT Sudan project in the transport sector, here are some potential synergies and links with the CBIT project:

Component 1: Enabling Institutional Environment:

- ICAT's institutional strengthening activities can directly support CBIT in setting up Sector Working Groups for MRV of NDCs in the transport sector, as outlined in the ICAT approach.
- CBIT's established inter-institutional coordination mechanisms can be adapted to include relevant stakeholders from energy ministries, agencies, and technical bodies, aligning with ICAT's goal of strengthening institutional arrangements for MRV.

Component 2: Tools, Systems, Trainings, and Assistance:

- CBIT's training programs and materials on GHG inventories and mitigation actions can be tailored to specifically address needs identified in the ICAT Sudan project's needs and gaps assessment for the transport sector.
- ICAT's data and methodologies for energy sector emissions, MRV toolbox and models for impacts of transport pricing policies can be integrated into CBIT's tools and platforms for national reporting under the Paris Agreement.

Component 3: Long-Term Transparency Arrangements:

- CBIT's support for developing a long-term transparency strategy can be aligned with ICAT's road map for sustainability and future UNFCCC transparency requirements.
- CBIT's stakeholder consultations and public awareness efforts can be combined with ICAT's initiatives for tracking progress and enhancing reporting on transport sector contributions to NDCs.

Additional synergies and links:

- Both projects can collaborate on building national capacity for MRV of renewable energy projects, transport efficiency and other listed NDCs in the transport sector discussed in the ICAT project.
- CBIT's knowledge sharing and information dissemination platform can be utilized to promote ICAT's best practices and methodologies within the transport sector.
- Both projects can leverage joint activities to improve data collection and management systems for energy and transport sector emissions, further strengthening the accuracy and reliability of reporting.

5 Proposing a Way Forward and Roadmap to Ensure the Sustainability of ICAT Project Outcomes

Consolidation of Institutional Frameworks

To ensure the sustainability of ICAT project outcomes, Sudan should focus on strengthening its institutional frameworks related to climate change and transparency. This includes establishing clear roles and responsibilities, enhancing coordination between relevant ministries and agencies, and integrating transparency considerations into existing policies and strategies.

For the Transport Sector, the suggested institutional arrangement is designed to articulate the transparency obligations. The framework shows the interaction between the identified key institutions involved in the MRV process (Refer to this report's appendices). Processes such as data collection, QA/QC, reporting of climate mitigation actions and GHG inventories. It is structured to define all the roles and responsibilities of the identified stakeholders and institutions involved.

To ensure the effectiveness and the applicability of the proposed IA for the transport sector in terms of both the regulation and policy, as well as the commitment we suggest the following:

Table 7: The way Forward for effective institutional arrangement

	Data providers	***Central Bureau of Statistics (CBS)***	***Technical Working Group/expert (TWG)***	***HCNER-Climate change unit (CCU)***
Clear mandates and objectives	• Specify the types of data to be provided, frequency of reporting, and the level of granularity required. • Clearly articulate the scope of data collection, including emissions, fuel consumption, vehicle types, and other relevant indicators • Empower the data provider to implement robust quality assurance measures to guarantee the accuracy, completeness, and reliability of the collected data. • Establish protocols for	• Define the CBS's role as the central authority responsible for coordinating, overseeing, and managing the collection, analysis, and reporting of climate-related data, with a focus on the transport sector. • Ensure the legal backing for CBS role in climate-related data management.	• Define the scope of the TWG's role within the MRV framework, specifying its responsibilities in coordinating, overseeing, and contributing to the collection, analysis, and reporting of climate-related data in the transport sector. • Ensure alignment with the overall goals and objectives of the institutions nominating members to the TWG, fostering collaboration and a unified approach to climate-related data management.	• Clearly define a mandate for transparency emphasizing transparency as a primary objective. • Ensure alignment with international standards and commitments under the UNFCCC.

	data validation and verification to enhance credibility.			
Monitoring and reporting system	• Develop a reporting template that aligns with ETF standards and includes key performance indicators for the transport sector. • Design a template for annual reports summarizing transport sector data, including trends, achievements, and areas for improvement.	• Implement a standardized data collection framework for the transport sector, outlining the specific data points, formats, and methodologies to be used. • Integrate climate-related data collection and reporting mechanisms into the broader national statistical system managed by the CBS, ensuring coherence and efficiency.	• Organize regular workshops for TWG members to review data collection methodologies, reporting frameworks, and explore opportunities for improvement based on emerging best practices. • Establish knowledge exchange platforms, both within the TWG and with external experts, to share experiences, lessons learned, and insights on effective data management.	• Develop/design standardized data formats and reporting templates to facilitate consistency and comparability in reporting across different sectors and entities.
Adaptability and review mechanism	• Regularly review and update data collection processes to stay aligned with evolving transparency requirement	• Within the CBS, encouraging the adoption of new technologies, methodologies, and best practices for climate-related data management. • Conduct periodic reviews of data collection methodologies and reporting frameworks.	• Encourage collaboration between TWG members from various sectors, regarding climate-related data that transcends institutional boundaries.	• Integrate a continuous improvement mechanism within the MRV system, allowing for regular reviews and updates to adapt to evolving scientific, technological, and policy standards.
Enhance accountability	• Activate the suggested independent verification mechanism conducted by external	• Implement a system for monitoring compliance with reporting requirements, conducting	• Implement internal quality assurance mechanisms within the TWG to review and validate the	• Implement a verification processes, involving independent third-party assessments to

	auditors or third-party entities to validate reported data and ensure transparency (Proposed IA).	regular assessments to identify and address any non-compliance issues.	accuracy and reliability of data before submission. • Conduct periodic self-assessment sessions within the TWG to evaluate its effectiveness, identify areas for improvement, and adjust strategies accordingly.	enhance the credibility and accountability of reported data.

Capacity Building and Knowledge Transfer

Capacity building plays a crucial role in sustaining ICAT project outcomes. Sudan should prioritize training programs and knowledge transfer activities to empower local stakeholders in implementing transparency measures. This includes workshops, technical trainings, and knowledge-sharing platforms to build technical expertise and enhance understanding of MRV systems.

The best way to prioritize the capacity building programs and to managing the knowledge transfer process is through establishing a comprehensive framework that underpin the proposed IA for the Transport sector. This will allow the effectiveness and operationality of the proposed IA, accelerate the positive outcomes and provides an opportunity for enhancement.

Table 8: The comprehensive framework for the capacity building programs

	Data providers	*CBS*	*TWG*	*HCNER-CCU*
Capacity Building Needs	**Data collection Methods:** Develop training modules and capacity-building tools to educate the data providers on data collection protocols, GIS, tools, and templates. **Data Quality:** Implement training programs focused on data quality assurance, emphasizing accuracy, completeness, and reliability in reported data. **BTR modalities:** Familiarize data providers with international reporting MPGs and best practices to align Sudanese data with global expectations.	**Statistical Methodologies for Climate Data:** focus on capacity-building initiatives to enhance the CBS's expertise in climate-related data management, including training programs and knowledge-sharing sessions. **Integration of Climate Data in National Statistics:** Develop training programs to integrate climate-related data into the national statistical system, ensuring comprehensive reporting.	**Data collection expertise**: Facilitate ongoing capacity-building opportunities for TWG members to enhance their expertise in climate-related data collection, analysis, and reporting methodologies. **Cross-Sectoral Training:** Conduct cross-sectoral training programs to foster collaboration among TWG members from different sectors, promoting a holistic approach to transparency.	**MRV operation:** Engage in capacity-building initiatives with international partners to enhance the HCNER expertise in the latest methodologies and technologies for climate-related data assessment as well as the administrative abilities.

Long-Term Financing Mechanisms

Sudan needs to explore long-term financing mechanisms to sustain the outcomes of the ICAT project. This includes identifying domestic and international funding sources, establishing partnerships with financial institutions, and integrating transparency-related activities into national budgetary processes. Leveraging climate finance opportunities and engaging with relevant donors will be essential in securing resources for transparency initiatives.

Identifying international public and private funding sources:

Mapping the Climate Finance sources: this recommendation emphasizes the importance of conducting a comprehensive mapping of existing climate finance sources, both domestic and international, to identify potential funding streams for transparency initiatives. Figure (1) presents an overview of the global climate finance architecture, focusing particularly on public climate-related financing mechanisms. The main purpose is to identify the climate finance resources that are most relvant to Sudan particularly to the transport sector. Financing for low-carbon transport is increasing rapidly. Average annual finance to transport projects rose by 54% from 2015/16 to 2017/18 (USD 140 billion).

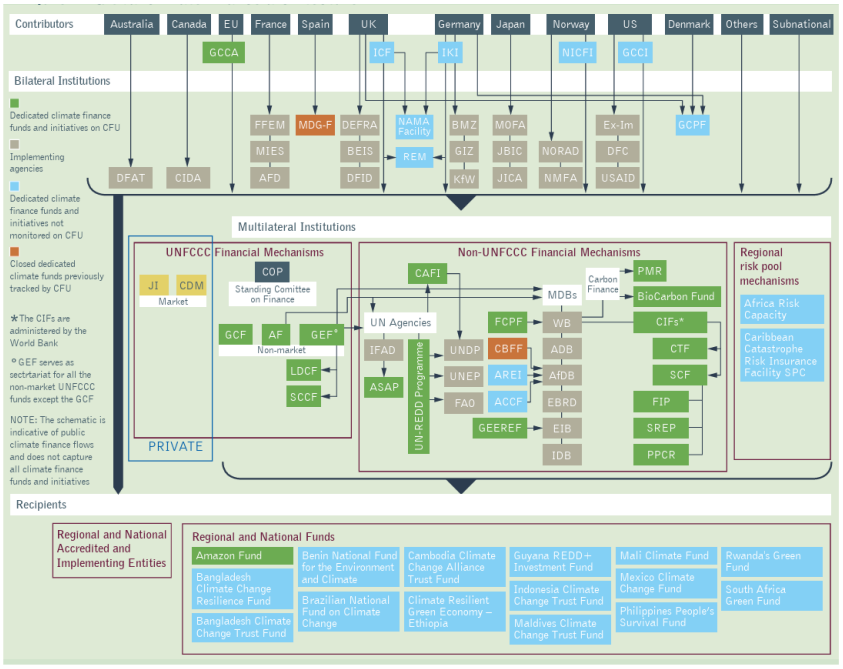


Figure 12: Global Climate Finance architecture
Source: CFU 2021

The understanding of the *elgibilty criteria*, *investment plan* and the *application process* for the top funds (i.e. GCF and CIF for example) will enhance the accessability to the climate finance and the Collaboration with the international climate finance mechanisms to access additional funding for large-scale low-carbon transport infrastructure projects. This may involve partnerships with multilateral development banks and climate funds.

Diversification of Funding Channels:

The analysis of the available funding channels for low-carbon transport under the mitigation action in Sudan will involves the following channels:

(1) Domestic public finance (public budget, public FIs):

Sudan's inflation is the third highest in the world, after Venezuela and Zimbabwe, negative trade balance; imports surpass exports by 50 percent. These two factors have contributed to currency devaluations. The struggling economic indicators show a critical public budget. In addition, the actual performance for the public budget in 2021, shows that development components account only for 19%. However, the public financial institutions such as National Social Insurance Fund (NSIF)and Public Service Pension Fund (PSPF) are considered potential sources and channels for low carbon transport. Pension funds make out an important portion of institutional investors in terms of assets under management. Unless appropriate investment options become available on the market, pension funds are not likely to take on a key role on the transport finance landscape.

According to the International Energy Agency, concessional capital of around USD 28 billion per year is needed to mobilize the USD 90 billion of private sector investment by 2030 in the Sustainable Africa Scenario. The effective approach is allocating budget for Sustainable

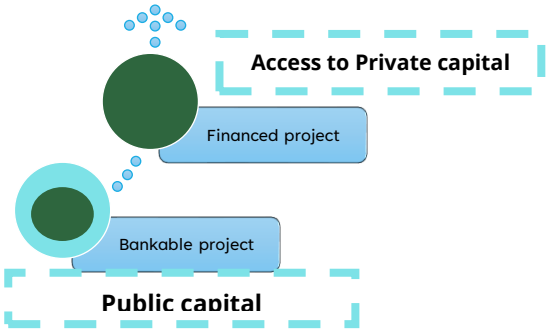


Figure 13:Role of public capital in mobilizing the private capital

Transportation through prioritize and allocate a portion of the national budget specifically for sustainable and low-carbon transport projects. This demonstrates a commitment to the NDC and facilitates the implementation of climate-friendly initiatives. This will accelerate the mobilization of the private capital. In addition to the articulation of the relevant policies that allow for positive collaboration of the public institutional investor such as (NSIF) and (PSPF).

(2) Domestic private finance

Domestic private finance in Sudan involves domestic credits, public private partnership, Corporate social responsibility, public philanthropy and Zakat.

Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, Revolving Credit. However, the domestic credit in Sudan is characterized by higher interest rates and high taxes, which together will reduce inflation, but at a cost of falling spending, investment and output.

Public Private Partnership, Sudan now has a PPP-specific policy and law in place. A PPP unit was set up recently, but it will require more staffing and resources in order to become fully operational. Nevertheless, a notable PPP project is the Omdurman water supply and optimization project, a design build-operate-transfer contract between a private company (Al Manara Water Company) and the Khartoum State Water Corporation.

Public philanthropy and Zakat: local philanthropy is widespread, focused mainly on tangible results – hardware and infrastructure like hospitals and wells, rather than softer programmes like capacity building. Zakat tax is automatically deducted from the salaries of people, and the Sudanese

government itself also makes significant contributions into the Zakat Fund.

Regarding the domestic private channel of finance, the following recommendations are suggested:

- **Introduce tax incentives for businesses and investors engaged in low-carbon transport projects. These incentives can help offset the impact of higher taxes, encouraging more environmentally friendly investments.**
- **Consider government guarantees to reduce the high perceived risk associated with investing in the low-carbon transport sector. This can make projects more attractive to private investors and lenders which in turn reduce the cost of finance.**
- **Explore PPPs with private entities to co-finance and implement sustainable transport infrastructure. This collaborative approach can leverage both public and private resources for greater project impact.**
- **Implement risk mitigation strategies to address concerns related to project uncertainties. This may involve insurance mechanisms or risk-sharing arrangements to protect investors and lenders, Sudan can make use of the available international risk sharing mechanisms offered by the WB and other FIs.**

(3) Sudan Banking sector

Sudan's financial sector comprises of:

- ✓ *Banks* (38).
- ✓ *Capital market* (The Khartoum Stock Exchange (KSE) is the country's main stock exchange where stocks and sukuk are traded).
- ✓ *Insurance and reinsurance* market (15).
- ✓ *Microfinance institutions* (45 MFIs).
- ✓ Other *non-bank financial institutions*

The next table shows the total loan and assets in SDG for the banking sector in Sudan:

Table 9: The total loan and assets in SDG for the banking sector in Sudan[3]

SDG/Year	***2017***	***2018***	***2019***	***2020***	***2021***
Total loans	**66,596,508,088**	**113,827,150,582**	**145,731,577,153**	**243,050,134,189**	**679,061,493,016**
Total Assets	**184,926,397,760**	**420,151,770,822**	**511,355,664,454**	**955,384,556,711**	**3,631,069,013,292**
Total Deposits	**150,804,762,930**	**332,374,685,472**	**407,744,840,207**	**775,651,810,582**	**2,782,045,485,669**

The total lending capacity of the banking sector is 1.15 billion dollars, the Loan-to-Deposit Ratio (LDR)[4] for the banking sector is around 25% which may reflect a conservative stance, excessively low ratios could imply underutilization of funds and missed revenue opportunities[5].

The Central Bank of Sudan (CBoS) has incorporated a new axle into its 2023 annual policies by

[3] Islam, M. M. (2023, February), National Finance Modalities for Sudan's NDCs. Workshop of "Assessment of constraints in plans, strategies and legal framework to enhance the implementation of nationally determined contributions," HCNER-UNDP.
[4] A financial metric that expresses the proportion of a bank's loans in relation to its total deposits.
[5] Islam, M. M. (2023, February), National Finance Modalities for Sudan's NDCs. Workshop of "Assessment of constraints in plans, strategies and legal framework to enhance the implementation of nationally determined contributions," HCNER-UNDP.

emphasizing green financing. Additionally, a specialized committee has been established to address matters concerning climate change and green finance, fostering coordination with pertinent institutions. Consequently, green finance has emerged as a key priority within the CBoS policy framework.

The Financial institutions have the ability to direct capital and demonstrate to markets the opportunities, risks and potential returns of investments. They play a pivotal role in the implementation of low carbon, climate resilient development pathways. To deliver climate smart financing at scale, and to achieve core business objectives and obligations, financial institutions will need to integrate and mainstreaming climate change considerations systematically across all levels of its strategies, programs and operations. The banks need to clearly identify both the *transitional risks* which includes include policy, regulatory and legal changes initiated as a response to climate change, such as the green policy initiated by the CBoS. The *physical risks* which include risks from extreme weather events (classified as acute physical risks) and longer-term shifts in climate patterns, such as sustained higher temperatures or sea-level rise, these risks will affect the market, supply and demand.

(4) International private flows:

Foreign Direct Investment: Sudan has put in place a relatively open investment legislative framework with several of the existing laws being modern and in line with good practices. However, their implementation is often impeded by the absence of secondary legislation, insufficient institutional capacity and lack of coordination among different levels of the Government.

Attracting Foreign Direct Investment (FDI) in the low-carbon transport sector, aligned with the Nationally Determined Contributions (NDCs), requires a strategic approach starting from stablish a clear and transparent policy framework that supports low-carbon transport initiatives. This includes regulatory incentives, tax breaks, and a stable legal environment. Ensure alignment with national climate goals and commitments. Furthermore, prioritize infrastructure development to support low-carbon transport as cornerstone for the investment. This includes charging stations for electric vehicles, public transportation systems, and sustainable urban planning. Develop projects with clear economic viability to attract investors.

Remittances: One of the important sources of fund is the attracting remittances of Sudanese working abroad. The difference between the official exchange rate and the black-market rate – meaning that significant amounts are channelled informally, denying the country the benefits of foreign currency reserves. This due to the underdeveloped banking sector, and the restrictions imposed by sanctions in the previous periods, which make it impossible to transfer funds.

There are potential opportunities to effectively re-direct the remittance fund, which can be directed toward purchasing Electric Vehicle (EVs), installing charging stations, or supporting EV-related businesses and the use remittances to improve and expand public transportation system.

National finance tools

The national finance tools in Sudan are known as asset-backed Islamic debt instruments which are considered one of the most powerful investments. These tools include both, the instrument issued by the government and those by the corporation:

Finance tools by the government: the government (CBoS and MoFEP) issues a number of financial

instruments that comply with Shariah instead of the conventional system. The goal of these instruments is to contribute to the developmental, economic, and social projects of Sudan and to assist in managing liquidity to keep the national economy afloat and finance the government budget deficit. Sukuk can be classified in a variety of ways. The most common types are Murabahah, Ijarah, Mudarabah, Musharakah.

Finance tools by the corporation: these include Khartoum refinery Ijarah Certificates (Shama) and Sudanese Electricity Distribution Company Asset Management Ijarah Certificates

Given Sudan's well-established experience in Islamic national finance tools, here are clear recommendations for redirecting these finance tools to finance the low carbon transport sector as part of Sudan's Nationally Determined Contributions (NDC):

- ✓ **Actively promote and facilitate the issuance of Green Sukuk (Islamic Bonds) by the government and private entities. Ensure that the proceeds (following the criteria of greenness) from these Sukuk are exclusively directed toward financing low carbon projects, such as renewable energy, energy efficiency, and sustainable transportation.**
- ✓ **Collaboration with Islamic banks in Sudan to integrate climate considerations into their financing portfolios. Support the development of financial products that adhere to Islamic principles while promoting low carbon transport project and products.**

Stakeholder Engagement and Communication

Effective stakeholder engagement and communication are vital for sustaining ICAT project outcomes. Sudan should prioritize building partnerships with civil society organizations, private sector entities, and local communities. Engaging stakeholders throughout the transparency process will foster ownership, collaboration, and awareness of climate action initiatives.
Recognizing the importance of stakeholder engagement in the ICAT project for Sudan's transport sector, let's delve deeper into how this can be effectively achieved considering the nation's unique context.

Challenges and Opportunities:

- Current Situation: Sudan faces ongoing political instability, economic hardship, and internal conflicts. These create challenges for broad stakeholder engagement, but also opportunities to foster unity and resilience through collaborative climate action.
- Population and Governance: Sudan's diverse population necessitates inclusive engagement strategies that reach urban and rural communities, address gender disparities, and involve youth and marginalized groups. The evolving governing system requires adapting engagement approaches to ensure alignment with current and future leadership structures.
- Economy: The economic situation necessitates prioritizing initiatives with tangible benefits for communities, like job creation and improved livelihoods. Building on existing experiences with REDD+, National communication projects, NAMA framework, NAP , NAPA and other projects can provide valuable lessons and partnerships for stakeholder engagement in the transport sector.

Prioritizing Partnerships:

- Civil Society Organizations (CSOs): Partnering with established and trusted CSOs can extend project reach, enhance community trust, and harness local knowledge. CSOs can play crucial roles in awareness raising, capacity building, and advocacy for sustainable transport solutions.
- Private Sector: Engaging private sector entities like transport providers, renewable energy companies, and technology developers can unlock crucial investments, expertise, and innovation for scaling up ICAT project outcomes. Public-private partnerships can drive market transformation towards cleaner and more efficient transport systems.
- Local Communities: Directly involving local communities in project design, implementation, and monitoring builds ownership and ensures solutions address their specific needs and concerns. Community-based initiatives for walking, cycling, and public transport can be particularly effective.

Engaging throughout the Transparency Process:

- Information Sharing: Ensure transparency by actively sharing project updates, data, and results with all stakeholders through accessible channels like community meetings, local media, and online platforms.
- Capacity Building: Invest in capacity building workshops and training programs for stakeholders to understand the ICAT project, contribute to data collection, and participate meaningfully in discussions and decision-making processes.
- Feedback Mechanisms: Establish clear feedback mechanisms for stakeholders to voice their concerns, suggestions, and ideas for improvement throughout the project lifecycle.

Expected Outcomes:

- Enhanced Ownership and Collaboration: By effectively engaging stakeholders, the ICAT project can foster a sense of collective responsibility for achieving Sudan's transport sector NDCs and climate goals. Collaboration across diverse groups can unlock synergies and lead to more effective and sustainable solutions.
- Increased Awareness and Action: Broad engagement creates broader awareness of climate action initiatives and empowers individuals and communities to adopt sustainable practices in their daily lives.
- Improved Project Outcomes: Through active participation and feedback, stakeholders can contribute to refining the project, ensuring its alignment with their needs and maximizing its positive impact on the transport sector and climate action in Sudan.

In Sudan's complex context, prioritizing effective stakeholder engagement is not just a best practice, but a critical path to sustainable success for the ICAT project. By building partnerships, actively engaging throughout the transparency process, and prioritizing capacity building and feedback mechanisms, the project can empower all stakeholders to become active participants in shaping a cleaner and more resilient future for Sudan's transport sector. Sector specific, detailed roadmap is needed for continuous stakeholder engagement and communication shall include regular consultations, workshops, and information sharing to foster collaboration, build consensus, and maintain transparency throughout the process.

6 Conclusion

This technical report lays the groundwork for achieving long-term transparency within Sudan's tansport sector and ensuring the sustainability of the ICAT project's positive impacts. By implementing the proposed recommendations, Sudan can significantly enhance its transparency efforts, strengthen its Monitoring, Reporting, and Verification (MRV) systems, and advance its journey towards sustainable development.

Key contributions of this report include:

- Proposed NDC tracking tool: With a suggested list of indicators and general tool design features, this tool has the potential to effectively monitor progress towards Sudan's transport sector NDCs, enhancing accountability and informing future actions.
- Long-term transparency strategy: By outlining objectives related to greenhouse gas (GHG) inventory development, mitigation actions, and adaptation measures, this strategy provides a clear roadmap for increasing transparency within the transport sector.
- Synergies with CBIT: Identifying and leveraging collaborative opportunities with the Capacity Building Initiative for Transparency (CBIT) will maximize the combined impact of both projects in strengthening institutional frameworks and capacity within Sudan.
- Roadmap for ICAT project sustainability: The proposed roadmap details concrete steps for institutional framework consolidation, capacity building, knowledge transfer, and long-term financing mechanisms, ensuring the ICAT project's continued effectiveness beyond initial support.
- Continuous stakeholder engagement: Recognizing the importance of stakeholder involvement, the report proposes a roadmap for ongoing engagement and communication with civil society organizations, private sector entities, and local communities, fostering ownership and promoting collaborative action.

By putting these recommendations into action, Sudan can take significant strides towards achieving the following:

- Enhanced transparency and accountability: Improved NDC tracking, robust GHG inventory development, and continuous reporting on mitigation and adaptation measures will demonstrate Sudan's commitment to climate action and attract further support.
- Strengthened MRV systems: A well-defined, data-driven approach to MRV will provide reliable and comprehensive information on the energy/transport sector's performance, informing effective policy decisions and strategic adjustments.
- Sustainable development advancements: Integrating climate action considerations into the transport sector will contribute to achieving broader sustainable development goals, including improved air quality, energy security, and economic growth.

Continued collaboration, capacity building, and secured financing mechanisms will be essential for Sudan to maintain its momentum towards long-term transparency goals. Engaging with international partners, fostering local expertise, and diversifying funding sources will be crucial in sustaining the positive outcomes of the ICAT project and securing a path towards a cleaner and more resilient energy future for Sudan.

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8 Appendices

Required Dataset for GHG Emissions Estimation in Transport Sector

Here are three separate tables outlining the required data for each of the selected activity data:

1. Vehicle Population and Type:

DATA CATEGORY	DATA ELEMENT	DESCRIPTION	VERIFICATION METHOD
VEHICLE POPULATION	Total Number of Vehicles	Overall number of vehicles registered in the country, categorized by type (e.g., cars, motorcycles, trucks, buses).	Government vehicle registration records, surveys, vehicle inspections.
VEHICLE TYPE	Specific Vehicle Categories	Detailed breakdown of vehicle population by subcategories (e.g., passenger cars, SUVs, light trucks, heavy trucks, motorcycles).	Same as above, with additional vehicle classifications if needed.
VEHICLE AGE	Age Distribution of Vehicles	Number of vehicles in each age category (e.g., 0-5 years, 6-10 years, etc.).	Registration records, vehicle inspections, surveys.
TECHNOLOGY LEVEL	Emission Standards	Classification of vehicles based on their emission standards (e.g., Euro 4, Euro 5, etc.).	Registration records, vehicle inspections, manufacturer data.

2. Fuel Consumption:

DATA CATEGORY	DATA ELEMENT	DESCRIPTION	VERIFICATION METHOD
FUEL SALES DATA	Sales per Fuel Type	Total volume of each fuel type (e.g., gasoline, diesel, LPG) sold within the country.	Fuel retail outlets, wholesale distributors, tax records.
VEHICLE-SPECIFIC FUEL CONSUMPTION	Average Fuel Consumption by Vehicle Type	Fuel consumption per kilometer traveled for different vehicle categories, often expressed as liters per 100 kilometers (L/100km) or miles per gallon (MPG).	Manufacturer data, fuel economy tests, in-country studies.
ACTIVITY FACTORS	Driving Patterns and Fuel Use	Adjustments for specific driving conditions (e.g., urban vs. rural, cold starts) and non-road mobile machinery fuel use.	Surveys, traffic models, fuel consumption studies.

3. Average Annual Traveled Kilometers:

DATA CATEGORY	DATA ELEMENT	DESCRIPTION	VERIFICATION METHOD
VEHICLE-TYPE SPECIFIC VKT	Average Annual Distance Traveled per Vehicle Type	Estimated average kilometers traveled per year for each vehicle category.	Traffic surveys, GPS tracking, distance-based tolls, household travel surveys.
ROAD NETWORK DATA	Characteristics of Road Infrastructure	Information on road types (highways, rural roads), traffic volumes, and average speeds.	Traffic surveys, infrastructure databases, satellite imagery.
REGIONAL VARIATIONS	VKT Differences by Region	Adjustments for regional variations in travel patterns and infrastructure.	Same as above, with focus on regional discrepancies.

Notes:

- The level of detail in each table can be adjusted based on resources available.
- Data verification methods should be employed to ensure data quality and accuracy.
- Additional data categories, such as emission factors, can be added to the tables for more comprehensive emission calculations.
- Regularly updating and improving data collection and verification processes is crucial for reliable and accurate GHG emissions estimation.

9 Suggested Institutional Arrangement for the Transport Sector in Sudan

The suggested institutional arrangement is designed to articulate the transparency obligations. The framework shows the interaction between the identified key institutions involved in the MRV process. Processes such as data collection, QA/QC, reporting of climate mitigation actions and GHG inventories. It is structured to define all the roles and responsibilities (see the next section) of the identified stakeholders and institutions involved. Figure below shows the proposed Institutional Arrangement with identified stakeholders in the transport sector.

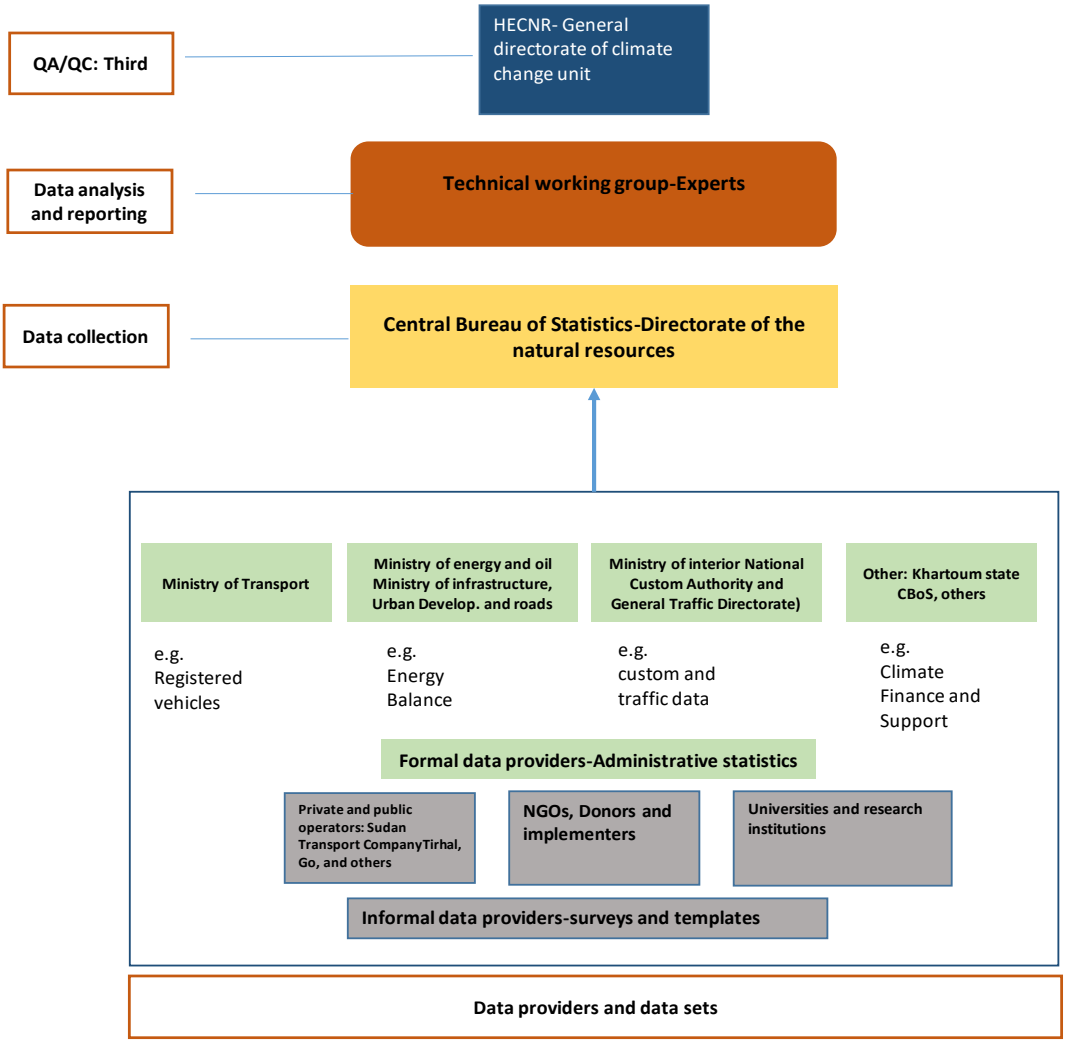

Figure 14- Proposed Institutional Arrangement for the transport sector

Roles and Responsibilities

HECNR-CCU is key link to the intergovernmental process and the international community responsible for the following:

- Setting the overall frameworks for national and international climate change related reporting. All information on climate impacts and action and will bring together information from a range of ministries and agencies, the private sector, academia and subnational governments.
- Identifying The methods, procedures and guidelines including the templates, format and quality assurance.
- Coordinates the activities needed to ensure that outputs are prepared and are of sufficient quality to meet the country's commitments.

Technical Working Group/expert, as HECNR operates in an administrative manner, technical functions are suggested to be delegated via clear mandates and terms of reference, to a specialized climate change, environmental or statistical experts/agency with the relevant technical expertise.

Central Bureau of Statistics CBS currently operates under the 2003 Statistics Act which empowers the Director General to collect, analyse and disseminate statistical information and provide technical advice to the government departments on statistical matters. The Central Bureau of Statistics is responsible for coordinating statistical activities throughout Sudan and for producing and disseminating official statistics on the country's population, economy, society, and environment. The 2003 Act contains some important new features, including the setting up of National Statistical Council, and makes the CBS responsible for the overall coordination and supervision of the production of statistics in the country.

The proposed institutional arrangement assumes a critical role for the CBS based on the 2003 Statistics Act as major data-generating agency in the country and, according to the Statistics Act, mandated to provide statistical advice to government departments. CBS is supposed to be the leader in terms of coordinating, collecting and gathering the climate related date form the relevant ministries and entities.

The Sudanese Statistical Law provides a legal framework for the collection, compilation, analysis, and dissemination of climate related data in a coordinated and integrated manner. The law aims to ensure that statistical data is of high quality and meets international standards.

Data providers can be divided into formal and informal. The formal data providers are the key ministries and governmental agencies e.g. ministry of transport, ministry of energy and oil and other relevant institutions including ministry of finance and economic planning and Central bank of Sudan. The other data providers include the private and public operator companies, universities and research institutes.

10 Glossary

Activities (related to inputs when describing policy)	Administrative activities involved in implementing the policy or action (undertaken by the authority or entity that implements the policy or action), such as permitting, licensing, procurement, or compliance and enforcement. Examples include provision of technical assistance or incentive payments
Activity data	Data on the magnitude of a human activity resulting in emissions or removals taking place during a given period of time. Data on land areas, management systems, and fertiliser use are examples of activity data
Adaptation	Strategies and measures to adjust and respond to the impacts of climate change. In the energy sector, adaptation may involve making

Adopted policies	Policies for which an official government decision has been made and there is a clear commitment to proceed with implementation, but implementation has not yet begun
Assessment boundary	The scope of the assessment in terms of the range of GHG impacts that are included in the assessment
Assessment period	The time period over which GHG impacts resulting from a policy are assessed
Assessment report	A report, completed by the user, that documents the assessment process and the GHG, sustainable development and/or transformational impacts of the policy
Barrier	Any obstacle to developing and deploying an RE potential that can be overcome or attenuated by a policy, programme or measure
Baseline Emission Level	The reference level of greenhouse gas emissions against which reductions or increases are measured. It serves as a benchmark for evaluating the effectiveness of mitigation actions
Baseline scenario	A reference case that represents the events or conditions most likely to occur in the absence of a policy (or package of policies) being assessed
Biennial Transparency Reports (BTRs)	Comprehensive reports submitted by Parties every two years that provide information on their greenhouse gas emissions, progress in implementing their NDCs, and support received or provided. BTRs are a key element of the transparency framework.
Biennial Update Report (BUR)	A report submitted by non-least developed countries to the United Nations Framework Convention on Climate Change (UNFCCC), providing updates on their climate actions, greenhouse gas inventories, and support needs
Bottom-up data	Data that are measured, monitored or collected at the facility, entity or project level
Building code	Sets of standards for buildings or building systems determining minimum requirements of energy performance
Capacity Building	Activities and support provided to enhance the knowledge, skills, and institutional capacity of countries to effectively implement the transparency framework. Capacity building helps countries meet their reporting requirements and improve the quality of their transparency-related information.
Carbon Neutrality	Achieving a balance between the amount of greenhouse gases emitted and removed from the atmosphere. This is often pursued through a combination of emissions reduction and offsetting activities
Carbon Offset	A reduction in greenhouse gas emissions or an increase in removals that can be used to compensate for emissions occurring elsewhere. Carbon offsets are often used to achieve carbon neutrality
Carbon pool	A system which has the capacity to accumulate or release carbon. The carbon pools involved in C stock changes include soil organic matter, biomass, and dead organic matter
Cash flows	The net amount of cash and cash-equivalents moving into and out of a business. Positive cash flow indicates that a company's liquid assets are increasing, enabling it to settle debts, reinvest in its business, return money to shareholders, pay expenses and provide a buffer against future financial challenges. Negative cash flow indicates that a company's liquid assets are decreasing. Some stakeholders will not implement an action that has a negative net cash flow at any time
Category of transformational change	A group of transformational characteristics that describe processes of change (technology, agents of change, incentives and norms) and outcomes of change (scale of outcome and sustained nature of outcome)
Causal chain	A conceptual diagram tracing the process by which the policy leads to impacts through a series of interlinked logical and sequential stages of cause-and-effect relationships
CBIT (Capacity Building Initiative for Transparency)	A program supported by the GEF and implemented by the UNDP that assists developing countries in strengthening their capacity to meet the enhanced transparency requirements under the Paris Agreement.
Characteristic of transformational change	An element or property of a system undergoing a transformation. A policy can result in changes of characteristics describing a system that lead to processes of change and outcomes of change
Climate Action	Any action or set of actions intended to address and respond to climate change, including both adaptation and mitigation efforts
Climate Action Transparency	The openness, clarity, accuracy, and completeness with which countries or entities communicate information related to their climate actions. Transparency is essential for building trust and accountability in the global response to climate change.
Climate Change	Refers to long-term changes in temperature, precipitation, and other atmospheric conditions on Earth. In the context of the energy sector, it encompasses efforts to mitigate and adapt to these changes.
Climate Finance	Financial resources provided by developed countries to support developing countries in their efforts to mitigate and adapt to climate change. Climate finance facilitates the transition to low-carbon and climate-resilient economies
Co-Benefits	Positive outcomes or advantages, beyond the primary goal, resulting from the implementation of climate mitigation or adaptation actions. Co-benefits may include improved air quality, health benefits, and job creation

Cross-elasticity of demand	The responsiveness of the quantity demanded for a good to a change in the price of another good, all other things being equal. The cross-price elasticity is used to estimate the indirect impact, or the gross effect, of a fuel price increase on transport demand in alternative modes. It is the percentage change in a good's demand divided by the percentage change in a substitute good's price
Current policy scenario	A scenario that represents the events or conditions most likely to occur in the presence of the current mix of policies and actions
Dimension	An overarching category of sustainable development impacts. There are three dimensions: environmental, social and economic
Discount rate	The interest rate you need to earn on a given amount of money today to end up with a given amount of money in the future. The discount rate accounts for the time value of money, which is the idea that a dollar today is worth more than a dollar tomorrow given that the dollar today has the capacity to earn interest
Drivers	Socioeconomic or other conditions, or other policies that affect an impact category. For example, economic growth is a driver of increased energy consumption. Drivers are divided into two types: other policies and non-policy drivers
Dynamic	A descriptor for a parameter that changes over time
Electricity grid (grid)	A network consisting of wires, switches and transformers to transmit electricity from power sources to power users. A large network is layered from low-voltage (110-240 V) distribution, over intermediate voltage (1-50 kV) to high-voltage (above 50 kV to MV) transport subsystems. Interconnected grids cover large areas up to continents. The grid is a power exchange platform enhancing supply reliability and economies of scale.
Emission factor	A factor that converts activity data into GHG emissions data.
Emission intensity	GHG emissions per unit of production.
Energy Carrier	A transmitter of energy, including electricity and heat as well as solid, liquid and gaseous fuels which occupy intermediate steps in the energy-supply chain between primary sources and end- use applications
Energy savings company (ESCO)	A commercial or non-profit business providing a broad range of energy solutions including designs and implementation of energy savings projects, retrofitting, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management. ESCOs guarantee that energy savings are able to repay the efficiency investment, which helps. overcome financial constraint to energy efficiency investments
Enhanced Transparency Framework (ETF)	A framework established under the Paris Agreement to enhance transparency in the reporting and review of climate-related information, including mitigation and adaptation actions
Ex-ante assessment	The process of estimating expected future GHG impacts of a policy (i.e., a forward-looking assessment)
Ex-ante baseline scenario	A forward-looking baseline scenario, based on forecasts of external drivers (such as projected changes in population, economic activity or other drivers that affect emissions), in addition to historical data
Expert judgement	A carefully considered, well-documented qualitative or quantitative judgement made in the absence of unequivocal observational evidence by a person or persons who have a demonstrable expertise in the given field (IPCC 2006). Users can apply their own expert judgement or can consult experts.
Ex-post assessment	The process of estimating historical GHG impacts of a policy (i.e., backward-looking assessment)
Ex-post baseline scenario	A backward-looking baseline scenario that is established during or after implementation of a policy
Facilitative, Compliance, and Implementation Committee (FCIC)	A committee established under the Paris Agreement to facilitate implementation and promote compliance with the Agreement's provisions. The FCIC provides guidance and assistance to Parties on matters related to transparency and other issues.
Feed-in tariff	The price per unit of electricity that a utility or power supplier has to pay for distributed or renewable electricity fed into the grid by non-utility power producers
GCF (Green Climate Fund)	A financial mechanism established under the UNFCCC to support developing countries in their efforts to mitigate and adapt to climate change. The GCF provides grants, loans, and equity investments to projects and programs that contribute to climate action.
GEF (Global Environment Facility)	An international financial institution that provides grants and concessional funding to support global environmental projects and programs. The GEF focuses on biodiversity conservation, climate change mitigation and adaptation, land degradation, and sustainable development.
GHG assessment boundary	The scope of the assessment in terms of the range of GHG impacts that is included in the assessment
GHG impacts	Changes in GHG emissions by GHG sources and carbon pools that result from a policy
Global Stocktake	A periodic assessment conducted under the Paris Agreement to evaluate collective progress toward the goals of limiting global temperature rise and enhancing climate action.
Global warming potential	Global Warming Potentials (GWP) are calculated as the ratio of the radiative forcing of one kilogramme of greenhouse gas emitted to the atmosphere to that from one kilogramme CO_2 over a period of time (e.g., 100 years)

Greenhouse Gas (GHG) Inventory	A comprehensive record of the emissions and removals of greenhouse gases from a country, region, or entity. It includes emissions from various sectors and serves as a basis for understanding the impact of human activities on the climate
Grid access	The acceptance of power producers to deliver to the electricity grid
Heavy-duty vehicle (HDV)	A vehicle designed for heavy work (bus or truck), which is generally powered by a diesel engine
Impact assessment	The estimation of changes in GHG emissions or removals resulting from a policy, either ex-ante or ex-post
Impact category	A type of sustainable development impact (environmental, social or economic) affected by a policy
Impact type	A result of transformational change that describes the process of change and the outcome of change
Independent policies	Policies that do not interact with each other, such that the combined effect of implementing the policies together is equal to the sum of the individual effects of implementing them separately
Indicator	A metric that can be estimated and monitored over time to understand the impact of non-state and subnational actions, and track changes towards targeted outcomes
Indicator value	The value of an indicator. For example, 500 is an indicator value for the indicator "number of jobs created
In-jurisdiction impacts	Impacts that occur inside the geopolitical boundary over which the implementing entity has authority, such as a city boundary or national boundary
Inputs	Resources that go into implementing the policy, such as financing
Intended effects	Effects which reflect the original objectives of the policy
Intended impacts	Impacts that are intentional based on the original objectives of the policy or action. In some contexts, these are referred to as primary impacts
Interacting policies	Policies that produce total effects, when implemented together, that differ from the sum of the individual effects had they been implemented separately
Intermediate effects	Changes in behaviour, technology, processes or practices that result from the policy, which lead to GHG impacts
Intermediate impacts	Changes in behaviour, technology, processes or practices that result from a policy, which lead to sustainable development impacts
International Consultation and Analysis (ICA)	A process that involves the review and assessment of the BTRs and other information provided by Parties. ICA aims to identify areas where support and capacity-building are needed and to facilitate the sharing of experiences and best practices.
IPCC (Intergovernmental Panel on Climate Change)	A scientific body established by the UN to provide policymakers with regular assessments of the scientific basis of climate change and its impacts. The IPCC's reports inform global climate policy discussions and decision-making.
Jurisdiction	The geographic area within which an entity's (such as a government's) authority is exercised
Key performance indicator	A metric that indicates the performance of a policy
Lead Reviewers	Experts designated by Parties to conduct the review of the transparency-related information provided by other Parties. Lead Reviewers are appointed based on their expertise and undergo training to ensure consistency and quality in the review process.
Levelized cost of electricity (LCOE)	The unique cost price of the outputs (US cent/kWh or USD/GJ) of a project that makes the present value of the revenues (benefits) equal to the present value of the costs over the lifetime of the project
Life cycle impacts	Changes in upstream and downstream activities, such as extraction and production of energy and materials, or effects in sectors not targeted by the policy, resulting from the policy
Light-duty vehicle (LDV)	Any motor vehicle with a gross vehicle weight rating of 10,000 pounds or 4,500 kg or less, which generally use gasoline fuel
Long-term impacts	Impacts that are more distant in time, based on the amount of time between implementation of the policy and the impact
Macroeconomic impacts	Changes in macroeconomic conditions – such as GDP, income, employment or structural changes in economic sectors – resulting from a policy.
Market impacts	Changes in supply and demand, prices, market structure or market share resulting from a policy
Measure	Implementation of technologies, processes, or practices outlined in policy instruments aimed at achieving mitigation
Minimum energy performance standards	Rules or guidelines for a particular product class that set a minimum efficiency level, and usually prohibit the sale of underperforming products
Mitigation	Actions and strategies aimed at reducing or preventing the emission of greenhouse gases (GHGs) to mitigate the impacts of climate change. In the energy sector, this includes transitioning to cleaner and renewable energy sources
Monitoring period	The time over which the policy is monitored, which may include pre- policy monitoring and post-policy monitoring in addition to the policy implementation period
MRV (Measurement, Reporting, and Verification)	A framework that outlines the processes and procedures for measuring, reporting, and verifying emissions and other relevant information related to climate actions. MRV enhances accountability and transparency

Multilateral Assessment (MA)	A process that provides a platform for Parties to present and discuss their progress in implementing their NDCs. MA sessions allow for peer-to-peer sharing of experiences and enable Parties to learn from each other's successes and challenges.
NAMA (Nationally Appropriate Mitigation Action)	Policies, projects, or programs that countries undertake voluntarily to mitigate greenhouse gas emissions while promoting sustainable development. NAMAs can be supported by international financing mechanisms.
National policy or action	An intervention taken or mandated by a national government, which may include laws, regulations and standards; taxes, charges, subsidies and incentives; information instruments; voluntary agreements; implementation of new technologies, processes or practices; and public or private sector financing and investment
Nationally Determined Contributions (NDCs)	Commitments made by countries under the Paris Agreement, outlining their climate action targets, policies, and measures. NDCs communicate each country's contribution to global efforts to limit temperature rise
NDC (Nationally Determined Contribution)	Each country's climate action plan submitted under the Paris Agreement. NDCs outline the country's emission reduction targets, adaptation measures, and other climate-related actions. They are updated every five years and are a key instrument for achieving the Agreement's goals.
Negative impacts	Impacts that are perceived as unfavourable from the perspective of decision-makers and stakeholders
Net impact	The aggregation of all impacts, both positive and negative, within a given impact category
Net metering	The practice of using a single meter to measure consumption and generation of electricity by a small generation facility (such as a house with a wind or solar PV system). The net energy produced or consumed is purchased from, or sold to, respectively, the power producer
Non-policy drivers	Conditions other than policies, such as socioeconomic factors and market forces, that are expected to affect the emissions sources included in the GHG assessment boundary
Non-state actor	Any actor other than a national or subnational government
Non-state commitments	Planned non-state action that has been publicly announced but, unlike non-state mitigation action, has not yet been implemented
Non-state mitigation action	Any kind of activity that is directly or indirectly aimed at reducing GHG emissions and that is led by non-state actor(s)
Other policies or actions	Policies, actions and projects – other than the policy or action being assessed – that are expected to affect the impact categories included in the assessment boundary
Outcome of transformational change	The change in GHG emissions reductions and sustainable development impacts at scale and sustained over time resulting from a policy
Out-of-jurisdiction impacts	Impacts that occur outside the geopolitical boundary over which the implementing entity has authority, such as a city boundary or national boundary
Overlapping non-state and subnational actions	Non-state and subnational actions that interact with each other or with national policies and that, when implemented together, have a combined effect less than the sum of their individual effects when implemented separately. This includes both actions that have the same or complementary goals (such as national and subnational energy efficiency standards for appliances), and counteracting or countervailing actions that have different or opposing goals (such as a national fuel tax and a subnational fuel subsidy)
Overlapping policies	Policies that interact with each other and that, when implemented together, have a combined effect less than the sum of their individual effects when implemented separately. They include both policies that have the same or complementary goals and counteracting or countervailing policies that have different or opposing goals.
Own-price elasticity	The own-price elasticity is used to estimate the direct impact, or the net effect, of a fuel price increase on fuel demand. It is the percentage change in a good's demand divided by the percentage change in that good's price.
Parameter	A variable such as activity data or emission factors that are needed to estimate GHG impacts
Parameter uncertainty	Uncertainty regarding whether a parameter value used in the assessment accurately represents the true value of the parameter
Parameter value	The value of a parameter. For example, 5 is a parameter value for the parameter "tonnes of SO2 emitted per kWh of electricity'
Paris Agreement	An international treaty adopted in 2015 under the UNFCCC. The Agreement aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5 degrees Celsius. It establishes guidelines for countries to set and achieve their NDCs.
Peer-reviewed	Literature (such as articles, studies or evaluations) that has been subject to independent evaluation by experts in the same field before publication
Phase of transformation	A stage in the historical development of a system that undergoes an innovation and social transition process. Generic phases are pre-development, take-off, acceleration, and stabilization or relapse
Planned policies	Policy options that are under discussion, and have a realistic chance of being adopted and implemented in the future, but have not yet been adopted or implemented
Policies and/or actions	Interventions at various stages along a policy-making continuum, from broad strategies or plans that define high-level objectives or desired outcomes to specific policy instruments to carry out a strategy

	or achieve desired outcomes
Policy implementation period	The time period during which the policy is in effect
Policy instrument	A mechanism utilised by a government, institution, or other entity, which may include laws, regulations, and standards; taxes, charges, subsidies, and incentives; information instruments; voluntary agreements; implementation of new technologies, processes, or practices; and public or private sector financing and investment, among others
Policy or action, or policy and measures	An intervention taken or mandated by a government, institution or other entity, which may include laws, regulations and standards; taxes, charges, subsidies and incentives; information instruments; voluntary agreements; implementation of technologies, processes or practices; and public or private sector financing and investment
Policy scenario	A scenario that represents the events or conditions most likely to occur in the presence of the policy (or package of policies) being assessed. The policy scenario is the same as the baseline scenario except that it includes the policy (or package of policies) being assessed
Positive impacts	Impacts that are perceived as favourable from the perspectives of decision-makers and stakeholders
Power purchase agreement (PPA)	A contract between an electricity (power) producer and an electricity consumer (or distributor). Historically, PPAs have been signed between utilities and independent power producers as a way for the utility to procure additional generation. In recent years, PPAs have been used as a way for power consumers to purchase electricity, often from solar systems, from a third-party power producer (National Renewable Energy Laboratory definition).
Present value	The current worth of a future sum of money or stream of cash flows given a specified discount rate. Future cash flows are discounted at the discount rate, and the higher the discount rate the lower the present value of the future cash flows
Price elasticity of demand	A measure of the responsiveness of demand or supply of a good or service to changes in price. The price elasticity of demand measures the ratio of the proportionate change in quantity demanded to the proportionate change in the price
Pricing policy	Pricing policies in the transport sector incorporate external costs of transport into price signals that are intended to influence demand and reduce GHG emissions. They include increased fuel taxes and levies, fuel subsidy reductions, road pricing, vehicle purchase incentives, carbon taxes, vehicle taxes, parking pricing, distance- based pricing, public transit fare reforms, company car policy reforms and Smart Growth reforms
Process of transformational change	A series of events describing how elements or characteristics of a system interact and change to reconfigure a system. Elements of a transformational change process are technology, agents of change, incentives and norms
Propagated parameter uncertainty	The combined effect of each parameter's uncertainty on the total result
Qualitative assessment	An approach to impact assessment that involves describing the impacts of a policy or action on selected impact categories in numerical terms
Qualitative assessment boundary	The scope of the qualitative assessment in terms of the range of dimensions, impact categories and specific impacts that are included in the qualitative assessment
Quantitative assessment boundary	The scope of the quantitative assessment in terms of the range of dimensions, impact categories, specific impacts and indicators that are included in the quantitative assessment and estimated
RE addition	The additional installation of RE capacity or electricity generation from renewable sources realized via a policy, expressed in megawatts (MW) or megawatt-hours (MWh), respectively
Rebound effect	Increased consumption that results from actions that increase efficiency and reduce consumer costs
Regression analysis	A statistical method for estimating the relationships among variables – in particular, the relationship between a dependent variable and one or more independent variables
Reinforcing non-state and subnational actions	Non-state and subnational actions that interact with each other or with national policies and that, when implemented together, have a combined effect greater than the sum of their individual effects when implemented separately
Reinforcing policies	Policies that interact with each other and that, when implemented together, have a combined effect greater than the sum of their individual effects when implemented separately
Renewable energy	Any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use. Renewable energy is obtained from the continuing or repetitive flows of energy occurring in the natural environment. It includes low-carbon technologies such as solar energy, hydropower, wind, tide and waves, and ocean thermal energy, as well as renewable fuels such as biomass.
Renewable portfolio standard	A legal mandate that requires utilities to procure a certain percentage or flat amount of renewable electricity or power, based on their total generation. Utilities can procure the RE via direct ownership or the purchase of RE credits (National Renewable Energy Laboratory definition)
Retrofit	Involves modifications to existing buildings that improve energy efficiency or decrease energy demand
Scenario uncertainty	Variation in calculated emissions resulting from methodological choices, such as selection of baseline scenarios

Sectoral Approach	A method of organizing and addressing climate actions by specific economic sectors (e.g., energy, agriculture) to streamline efforts and enhance effectiveness. It can be used also in the GHG inventory for the energy sector, in which the GHG emissions are calculated as a sum of the emissions from each energy sub-sector.
Sensitivity analysis	A method to understand differences resulting from methodological choices and assumptions, and to explore model sensitivities to inputs. The method involves varying the parameters to understand the sensitivity of the overall results to changes in these parameters
Short-term impacts	Impacts that are nearer in time, based on the amount of time between implementation of the policy and the impact.
Solar energy	Energy from the sun that is captured either as heat, as light that is converted into chemical energy by natural or artificial photosynthesis, or by PV panels and converted directly into electricity
Specific impact	A specific change that results from a policy or action
Stakeholders	People, organisations, communities or individuals who are affected by and/or who have influence or power over the policy
Starting situation	The current situation of a selected historical year before implementation of a policy that describes the phase of transition and the status of selected indicators as a benchmark for tracking performance
Static	A descriptor for a parameter that does not change over time
Subnational actor	Any form of government that is not a national government
Subnational commitments	Planned subnational action that has been publicly announced but, unlike subnational mitigation action, has not yet been implemented
Subnational mitigation action	Any kind of activity that is directly or indirectly aimed at reducing GHG emissions and that is led by subnational actor(s)
Sustainable development impacts	Changes in environmental, social or economic conditions that result from a policy, such as changes in economic activity, employment, public health, air quality and energy security
Technical Expert Review (TER)	A review process carried out by technical experts to assess the technical aspects of the transparency-related information provided by Parties. TER focuses on the completeness, accuracy, and consistency of the reported data and methodologies.
Technology impacts	Changes in technology, such as design or deployment of new technologies, resulting from a policy
Top-down data	Macro-level statistics collected at the jurisdiction or sector level, such as energy use, population, GDP or fuel prices
Top-down methods	Methods (such as econometric models or regression analysis) that use statistical methods to calculate or model changes in GHG emissions
Trade impacts	Changes in imports and exports resulting from a policy
Transformational change	A fundamental, sustained change of a system that disrupts established high- carbon practices and contributes to a zero-carbon society, in line with the Paris Agreement's 1.5–2 °C temperature goal and the United Nations SDGs
Transformational impact	Changes in system characteristics resulting from a policy, described by processes and outcomes of transformational change with regard to GHG and sustainable development impacts at scale and sustained over time
Transmission and distribution	The network that transmits electricity through wires from where it is generated to where it is used. The distribution system refers to the lower-voltage system that delivers the electricity to the end consumer
Uncertainty	1. Quantitative definition: Measurement that characterises the dispersion of values that could reasonably be attributed to a parameter. 2. Qualitative definition: A general term that refers to the lack of certainty in data and methodological choices, such as the application of non-representative factors or methods, incomplete data, or lack of transparency
UNFCCC (United Nations Framework Convention on Climate Change)	An international treaty established in 1992 to address climate change. The UNFCCC sets the overall framework for global efforts to combat climate change, including the negotiation of the Paris Agreement.
Unintended effects	The effects that fall outside of the policy's control and may amplify or diminish the impact of the policy
Unintended impacts	Impacts that are unintentional based on the original objectives of the policy. In some contexts, these are referred to as secondary impacts
Utility	An entity in the electric power industry that engages in electricity generation and distribution of electricity for sale, generally in a regulated market
Weighted average cost of capital (WACC)	The rate that a company is expected to pay, on average, to all its security holders to finance its assets, including the fraction of each financing source in the company's capital structure