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Implementing the Paris Agreement

LDC gaps and needs in greenhouse gas inventory reporting

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Issue Paper

May 2021

Climate change

Keywords:

Capacity building, Least Developed Countries (LDCs), Paris Agreement, transparency, United Nations Framework Convention on Climate Change (UNFCCC)

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- Supporting public planning processes in delivering climate resilient development outcomes for the poorest
- Supporting climate change negotiators from poor and vulnerable countries for equitable, balanced and multilateral solutions to climate change
- Building capacity to act on the implications of changing ecology and economics for equitable and climate-resilient development in the drylands.

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The Global Green Growth Institute (GGGI) is a treaty-based international, inter-governmental organisation dedicated to supporting and promoting strong, inclusive, and sustainable economic growth in alignment with SDGs and NDCs in developing countries and emerging economies. GGGI currently has 39 members and operations in more than 40 countries. (www.gggi.org)

Acknowledgements

The authors would like to thank Brianna Craft, Illari Aragon, Tshewang Dorji and Clare Shakya for their comments and inputs during the review process. Thank you also to Lucy Southwood, Jérémy Davis, Laura Jenks and Judith Fisher for providing editing, proofreading and design support. We are pleased to acknowledge GGGI for supporting the research work for this piece conducted by Anna Schulz during her remit there.

This publication has been reviewed according to IIED's peer review policy, which sets out a rigorous, documented and accountable process. The reviewers were Tshewang Dorji, former policy analyst at Climate Analytics, and Illari Aragon, researcher at IIED. For further information, see www.iied.org/research-excellence-impact

Published by IIED, May 2021

Schulz, A, Alcobé, F and Endalew, G J (2021) Implementing the Paris Agreement: LDC gaps and needs in GHG inventory reporting. IIED, London.

<http://pubs.iied.org/10212IIED>

ISBN 978-1-78431-882-6

Cover photo: Bonn Climate Change Conference, June 2019. After a week-long heatwave across Europe, SBSTA Chair Paul Watkinson, France, closes the SBSTA plenary with the same image that he showed at the opening plenary: the Keeling Curve, a graph of the accumulation of carbon dioxide in the Earth's atmosphere. (Credit: IISD/ENB Kiara Worth)

Printed on recycled paper with vegetable-based inks.

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From 2024, all countries will face more stringent reporting requirements on their climate action under the Paris Agreement's Enhanced Transparency Framework (ETF). For developing countries – and the Least Developed Countries (LDCs) in particular – it is a big step up from existing arrangements. This paper analyses over 20 years of LDC reports to the United Nations Framework Convention on Climate Change to understand their current capacity constraints and needs for greenhouse gas inventory reporting, which becomes mandatory under the ETF. It provides recommendations to build in-country capacity, change reporting dynamics and help LDCs shift from a 'fly-in, fly-out' consultant model to a nationally-owned institutionalised process.

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Summary

With the first reports under the Enhanced Transparency Framework (ETF) due in 2024, all countries are preparing to meet the new and more stringent biennial reporting requirements. This is particularly challenging for developing countries, and the world's Least Developed Countries (LDCs) will need continuous and sustained capacity building support in this process.

BOX 1. WHAT IS THE ETF?

The ETF is a transparency mechanism for reporting countries' progress on mitigation and adaptation actions, and support provided and/or received. The information countries present under the ETF will feed into the Global Stocktake, the mechanism developed to assess collective progress towards achieving the Paris Agreement's long-term goals. Full implementation of the ETF is key to enhancing national and global ambition, and to operationalising and bringing credibility to the Paris Agreement.

The Paris Agreement recommends that capacity building actions be country-driven, based on national needs and guided by lessons learned during the United Nations Framework Convention on Climate Change (UNFCCC) reporting process. This paper uses a comparative analysis of information from national reports to the UNFCCC to understand LDCs' current capacity constraints and needs for reporting their greenhouse gas (GHG) inventories, one of three mandatory reporting elements of the ETF. It also aims to inform the development of capacity building initiatives to help LDCs implement the ETF.

Methodology

Analysing more than 20 years of LDC transparency reports under the UNFCCC, we collected their self-identified capacity gaps, constraints and needs in reporting their GHG inventories. We focused on GHG inventories because:

- They are a reporting requirement for all mandatory reports under the ETF
- All Parties use the same methodological framework to create their inventories, facilitating comparisons and allowing us to assess progress and needs

- They play a crucial policy role, providing information to assess the effectiveness of mitigation policies and measures at national and global levels and for modelling future emissions, making them a key input of nationally determined contributions (NDCs) and long-term planning, and
- Understanding current reporting constraints and needs provides a basis for assessing LDC capacity needs for reporting under ETF modalities and guidelines and for informing capacity building plans and programmes.

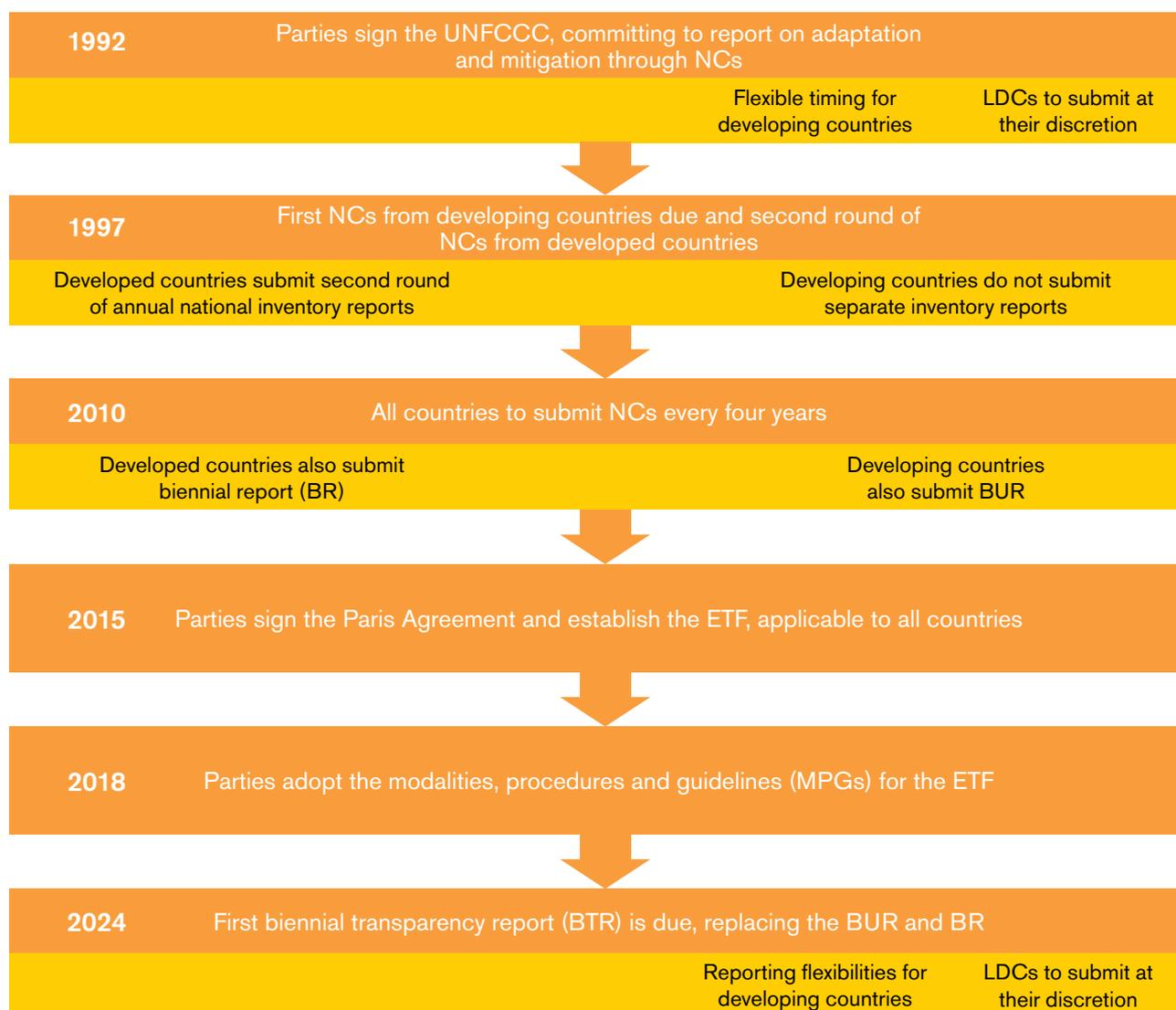
An overview of LDC transparency reporting

By March 2020, all 47 LDCs¹ had submitted their first national communication (NC), 40 their second, 14 their third and one its fourth. Only six had submitted their first biennial update report (BUR). LDC reporting has been much less frequent than the recommended four- and two-year intervals. The average time lapse between the first and second NCs was ten years. Those that have submitted three NCs closed the gap between the second and third submission to seven years on average. Forty countries submitted their first NC between 1997 and 2007; the other seven, between 2012 and 2020.

Capacity gaps

To compare quantitative information between countries and reports, we divided capacity gaps into five clusters: lack of data, data quality, data management, methodological issues and institutional issues. We found that LDCs faced multiple capacity constraints across all of these. As well as struggling to obtain the quantity and quality of data required, many LDCs reported a lack of or informal institutional arrangements and data management systems, making it difficult to coordinate, gather and process data across multiple agencies, and therefore estimate all the relevant inventory categories. When available, data were often contradictory, uncertain, not for public use, or lacked the level of disaggregation necessary to prepare a complete and accurate GHG inventory. Technical difficulties included a lack of expertise to understand the guidelines, use the software, or develop country-specific emission factors that would reduce uncertainty and increase the accuracy of national GHG inventories.

Figure 1. Evolving transparency arrangements in the UNFCCC reporting process



Capacity needs

In general, LDCs identified their capacity constraints in more detail than their needs. Few countries presented a detailed plan for addressing their capacity building needs to improve future GHG inventory preparation, partly because of a lack of reporting guidance on how to do this. Some reported their needs as part of a broader reporting capacity needs analysis that included adaptation, mitigation and finance. The five clusters of capacity needs were strengthening data management systems, increasing human capacity in both number and skills, generating primary data, accessing technology and accessing financial resources.

Enhancing LDC reporting

Self-identified capacity gaps and needs have increased over time as experience enables countries to understand and identify the challenges they face. Between the first and third NC, the percentage of countries identifying needs around access to primary data, strengthening institutional arrangements and access to financial resources at least doubled. This may reflect an increasing understanding of the need for significant and sustained financial and capacity building support to improve the quality of activity data, develop national emission factors, or properly operationalise institutional arrangements.

To understand how to frame transparency-related LDC capacity building actions, we can organise gaps and needs into two interlinked components:

1. The **governance systems and institutional arrangements** that need to be in place to ensure continuous reporting, and
2. The **technical aspects** of obtaining the information they need to fulfil the mandatory and non-mandatory requirements established under the ETF.

Using this approach, it becomes clear, for example, that strengthening governance would help LDCs submit reports on time, while technical support can help them overcome constraints on fulfilling reporting requirements. Having access to financial resources would help with both aspects.

Recommendations

Our analysis points to certain actions that could increase LDC capacities and improve LDC reporting. Direct support to build in-country capacity would change reporting dynamics and help LDCs shift from a fly-in, fly-out consultant model to a nationally-owned institutionalised process. We therefore recommend that the main **UNFCCC** bodies and financing mechanisms involved in ETF implementation:

- Develop **methodological guidelines** for reporting on gaps and needs in line with the ETF

- Ensure LDCs get the **long-term financial and technical resources** they need to improve the frequency and quality of their GHG inventory reports, and
- **Simplify** procedures, **reduce bureaucracy** and **streamline** the approval process so countries receive timely funds.

To meet reporting requirements under the ETF, LDCs need more accurate and reliable data. So, assuming they get stronger guidance and support we also recommend that, to prepare for future reports, **LDCs:**

- **Undertake more detailed and structured gaps and needs analysis** to guide capacity building actions and better inform the UNFCCC process, capacity building initiatives and potential funders
- **Institutionalise the reporting process**, building on existing resources and structures to reduce costs and time to ensure more sustainable systems and seeking high-level political buy-in to foster better engagement and coordination across stakeholders, facilitate primary data collection and development and build a solid transparency system
- **Increase technical capacity** to support and implement governance systems through country-led training, extending capacity building programmes to other national and local stakeholders to expand domestic capacities.

Introduction

1

On adopting the Paris Agreement, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to reach net zero emissions by 2050 to maintain the global average temperature increase well below 2°C higher than pre-industrial levels and pursue efforts to keep it below 1.5°C. As part of these efforts, they agreed to present nationally determined contributions (NDCs) – national plans with ambitious objectives to transition to a low-carbon, climate-resilient economy – and established the Enhanced Transparency Framework (ETF).

The ETF is a transparency mechanism to report countries' progress on mitigation and adaptation actions and support provided and/or received. The information presented under the ETF will feed into the Global Stocktake, the mechanism developed to assess collective progress towards achieving the Paris Agreement's long-term goals. Full implementation of the ETF will be key to enhancing national and global ambition and operationalising and bringing credibility to the Paris Agreement.

As 2024 – the first ETF reporting deadline – approaches, all countries are preparing to meet the new and more stringent biennial reporting requirements. This is particularly challenging for developing countries, especially the Least Developed Countries (LDCs), who will need continuous and sustained capacity building support to meet them.

The LDCs are the world's 46¹ poorest and most vulnerable countries. They are highly vulnerable to both economic and environmental shocks and have low levels of human assets and per capita income.² Thirty-three LDCs are in Africa, eight are in Asia, and five are Small Island Developing States – four in the Pacific and one in the Caribbean.

Recognising the new reporting challenges for developing countries, the Paris Agreement calls for continuous support to build their transparency-related capacities,³ and establishes special provisions for LDCs. The ETF also has reporting flexibilities for developing countries that need them. However, many LDCs already struggle to implement the current transparency framework, commonly known as the monitoring reporting and verification (MRV) arrangements. And they will need additional support to ensure their successful transition to the ETF.

According to the Paris Agreement, capacity building actions should be country-driven, based on national needs and guided by lessons learned during the UNFCCC reporting process. Understanding LDCs' capacity constraints and needs is therefore crucial so they can start preparing for the ETF.

Based on a comparative analysis of information from national reports to the UNFCCC, this paper aims to understand LDCs' capacity building gaps and needs for greenhouse gas (GHG) inventory reporting. It also aims to inform the development of capacity building initiatives to support LDCs to implement the ETF.

1.1 Evolution of transparency arrangements

When they signed the UNFCCC in 1992, Parties committed to reduce GHG emissions, communicate regularly on their GHG emission performance, and provide information on measures undertaken to mitigate and adapt to climate change.⁴ Since then, they have presented this, alongside other information relevant to implementing the UNFCCC, in the form of national communications (NCs). Reporting requirements are different for developed and developing countries: the former need to include more information and greater detail – for example, on policies, measures and projections. They must also present annual, standalone GHG inventory reports. Their NCs and national GHG inventory reports are all subject to review. Developing countries do not need to present a GHG inventory report, providing this information within their NC instead.

To improve the transparency of mitigation actions and their effects, all Parties agreed in 2010 to submit NCs every four years and provide an update on this information every two years.⁵ For developed countries, these updates take the form of biennial reports (BRs), and for developing countries, biennial update reports (BURs). In their BR, developed countries are required to submit summary information focused on mitigation targets, progress towards these targets and provision of support. They still present annual GHG inventory reports. Developing countries update their GHG inventories, mitigation actions, needs and support received within their BUR. LDCs retain additional flexibility to submit their NCs and BURs at their discretion.

Also in 2010, Parties established the International Consultation and Analysis (ICA) and International Assessment and Review (IAR) processes for developing and developed countries, respectively. Under the ICA, a group of technical experts analyses the BURs and prepares a technical report, followed by a question-and-answer session called a facilitative sharing of views. Aimed at increasing clarity and effectiveness of developing countries' mitigation actions and other information provided in the BURs, the ICA process marked the first time developing countries were engaged in a technical analysis process. The

IAR process also has two stages: a technical review of individual developed country NCs, GHG inventory reports and BRs, followed by a multilateral assessment of progress towards achieving emission reduction targets, based on the results of the review.

Following the adoption of the Paris Agreement in 2015 and the establishment of the ETF, the reporting process has evolved. From 2024, the differentiated BUR and BR will be replaced by the biennial transparency report (BTR), which all Parties will be required to submit. The deadline for submitting the first BTR is 31 December 2024, though LDCs have the flexibility to submit at their discretion.

The ETF has three mandatory (in bold below) and two non-mandatory reporting elements:

- **National GHG inventories**
- **Support provided and mobilised**
- **Progress in implementing and achieving NDCs**
- Support needed and received, and
- Climate change impacts and adaptation.⁶

Like its predecessors, the BTR will be subject to a technical expert review and a sharing of views session, called the facilitative multilateral consideration of progress. Table 1 compares the current MRV transparency arrangements for developing countries under the UNFCCC and the new ones under the ETF. Under the current MRV arrangements, they report with both NCs and BURs under the UNFCCC. From 2024, they will continue to report with the NC, which remains the main reporting document under the UNFCCC. But instead of the BUR, they will report with the BTR under the Paris Agreement.

1.2 Requirements and flexibilities

In contrast to the differentiated reporting requirements for developed and developing country NCs and biennial reporting, the ETF applies to all countries, irrespective of economic status. It will be operationalised through a set of rules called modalities, procedures and guidelines, (MPGs), which were established in a decision under the Paris Agreement.⁷

Based and built on the existing MRV transparency arrangements, the ETF is not a completely new reporting framework. But it does bring changes in all the reporting elements. Under the ETF, it becomes mandatory for developing countries to present a national GHG inventory report. They must also now follow the Intergovernmental Panel on Climate Change's (IPCC) most recent (2006) methodological guidelines for GHG inventories⁸ rather than the older (1996) ones, prepare key category analysis and uncertainty assessments, and report on seven, rather than three, gases. Table 2 summarises the requirements for the different types of report.

While there is still some flexibility for developing countries in terms of scope, frequency and level of detail, the change in requirements is more significant for them than it is for developed countries. As the most vulnerable countries with severe capacity limitations, LDCs can submit information at their discretion and participate in the review process as a group rather than individually.

Table 1. Existing and new transparency arrangements for developing countries

| | EXISTING ARRANGEMENTS | | ARRANGEMENTS FROM 2024 | |
|----------------------------|-----------------------|-------------------------------|------------------------|---|
| | MRV UNDER THE UNFCCC | | MRV UNDER THE UNFCCC | ETF UNDER THE PARIS AGREEMENT |
| Reporting | NC | BUR | NC | BTR |
| Review and analysis | Not contemplated | Technical analysis of BURs | Not contemplated | Technical expert review |
| Multilateral consideration | Not contemplated | Facilitative sharing of views | Not contemplated | Facilitative multilateral consideration of progress |

The BTR is at the core of the Paris Agreement. It will be an input for the Global Stocktake, where countries will assess, every five years, their collective progress towards achieving the Paris Agreement goals. The first stocktake is due in 2023. If LDC limitations are

addressed in a sustainable way, their reporting will be crucial to ensure subsequent Global Stocktakes create a full picture of what has been accomplished at global level.

Table 2. GHG inventory reporting requirements for developing countries, by report type

| REQUIREMENTS | NC | BUR | BTR |
|---------------------------------|--|--|--|
| National inventory report | No requirement for separate report. GHG inventory information included as chapter of the NC every four years | No requirement for separate report. Update of GHG inventory information in chapter of the BUR every two years | Mandatory full national inventory report every two years, either as part of the BTR or a standalone document |
| National inventory arrangements | Describe institutional arrangements | Describe institutional arrangements | Report on institutional arrangements, including preparation process, archiving of information and quality assurance/ quality control |
| IPCC guidelines | Revised 1996 IPCC guidelines for national greenhouse gas inventories (1996 IPCC guidelines) | 1996 IPCC guidelines Good practice guidance (GPG) and uncertainty management in national greenhouse gas inventories (2000) GPG for land use, land-use change and forestry (LULUCF) | 2006 IPCC guidelines for national greenhouse gas inventories (2006 IPCC guidelines) |
| Inventory years | 1990/94 2000 | No more than four years before submission | No more than four years before submission |
| Key category analysis | Encouraged | Encouraged | Mandatory |
| Time series | No requirement | Years since the last NC | From 1990 |
| Uncertainty assessment | Quantitatively estimate | Quantitatively estimate | Quantitatively estimate |
| Quality assurance/control | No requirement | No requirement | Develop a quality assurance/control plan |
| Recalculations | No requirement | Update activity data | Recalculate data |
| Gases: | Mandatory | CO ₂ , N ₂ O, CH ₄ | CO₂, N₂O, CH₄, HFCs, PFCs, SF₆, NF₃ |
| | Non-mandatory | HFCs, PFCs, SF ₆ | |

Notes: For requirements in bold, developing countries with capacity limitations are granted flexibility in reporting. CO₂ = carbon dioxide; N₂O = nitrous oxide; CH₄ = methane; HFCs = hydrofluorocarbons; PFCs = perfluorocarbons; SF₆ = sulphur hexafluoride; NF₃ = nitrogen trifluoride

1.3 Scope and methodology

This issue paper report looked at more than 20 years of LDC transparency reporting experience under the UNFCCC, covering all NCs and BURs submitted before March 2020 that are available on the UNFCCC webpage. This meant analysing 109 reports: 47 first NCs, 40 second NCs, 15 third NCs, 1 fourth NC and 6 BURs.

We focused primarily on the self-identified capacity gaps and needs that countries faced in reporting their GHG inventories. We considered capacity gaps as the technical and institutional constraints that countries encountered when preparing their GHG inventories. We considered capacity needs as the technical, technological and financial support that would allow them to overcome those constraints and report in line with the guidelines. We focused on GHG inventories because:

- They are a common reporting requirement for all reports that become mandatory under the ETF
- All Parties use the IPCC methodological framework to create their inventories, facilitating comparisons and allowing us to assess progress and needs
- They have a crucial policy role as they provide information to assess progress towards the ultimate objectives of the UNFCCC and the Paris Agreement: reducing emissions and evaluating mitigation options and the effectiveness of policies and measures at national and global levels
- The information reported in them is used for modelling future emissions and is therefore an important input for NDCs and long-term planning, and

- Understanding current GHG inventory reporting constraints and needs provides a basis for assessing LDC capacity needs for reporting under the MPGs and informing capacity building plans and programmes.

The analysis was focused on collecting self-identified capacity gaps and needs, which we classified into five main groups, subdivided by issues. In most reports, we found the data either in the executive summary or one of the following chapters:

- National GHG inventory (introduction, and/or sector quality assurance, control and uncertainties sections)
- MRV, or
- Constraints, gaps and financial and technical capacity building needs.

We created a table with the list of countries and capacity gaps and needs for each NC round (first, second and third) and for the BURs, processing all the information based on a binary (1/0) approach to prepare the quantitative analysis. We also compiled the relevant sections or chapters from the reviewed reports in a document organised by country and report, which we used to gather and present the qualitative information. Due to the small number of BURs and the single fourth NC in the sample, we did not include these in the quantitative analysis, focusing instead on comparing the first, second and third NCs. We did, however, consider the information in the qualitative analysis.

LDC transparency reporting: state of play



Senegal was the first LDC to submit an NC in 1997. Since then, all LDCs have presented their first NC; 40 have submitted their second; 14 their third; and one country, Mauritania, has submitted its fourth NC. Of the 47 countries, only six had submitted their first BUR between 2016 and May 2020 (Figure 2).

Our analysis indicated that countries were able to submit reports much less frequently than the recommended four and two-year intervals for NCs and BURs, respectively. The average time lapse between the first and second NCs for the 40 countries that submitted them was ten years. The 14 countries that have submitted three NCs closed the gap between the second and third submission to seven years on average. This reduction could be the consequence of the knowledge and experience gained by these countries or the sharing of such knowledge by other countries and organisations over the years. Not all LDCs submitted their reports at the same time: 40 submitted their first NC between 1997 and 2007; the other seven, between 2012 and 2020.

Although the first BUR was due by December 2014,⁹ the first LDC to submit one, Mauritania, did so in 2016. They were followed by Togo in 2017 and Yemen in 2018. Uganda, Benin, and Afghanistan submitted theirs in 2019. No LDC had submitted a second BUR within the period analysed in the study.

2.1 Classifying self-identified capacity gaps and needs

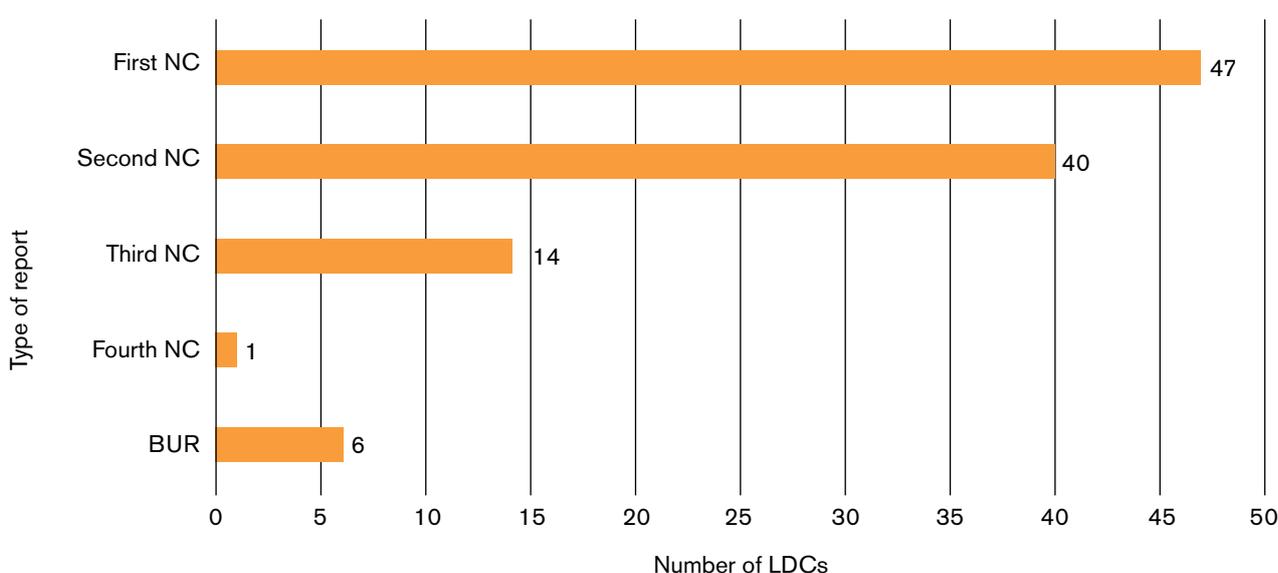
From the 109 reports analysed, 88 identified capacity constraints. We divided this information into gaps and needs. It is important to note that, although capacity needs can be expected to directly correlate to capacity gaps, many of the reports that outlined a capacity gap did not also identify a related capacity need.

Capacity gaps

To compare quantitative information between countries and consecutive reports, we broke capacity gaps down into five clusters, which we subdivided into three or four types of issue for a more detailed analysis (see Table 3). We used the following criteria to define the clusters and issues within them:

- **Lack of data:** Existence of or access to the basic data required to make the emissions estimates – for example, quantity of fuel used or area of rice cultivation
- **Data quality:** The condition of existing information, including high uncertainty, level of information or incompatibility of the same or related data from different sources – for example, available category-level information that makes it difficult to prepare estimates at the subcategory level according to the 2006 IPCC inventory guidelines

Figure 2. NCs and BURs submitted by LDCs (1997 to May 2020)



- **Data management:** All constraints related to data collection, from inconsistent forms to the lack of systems or designated institution for obtaining, organising and storing data
- **Methodological issues:** Lack of technical expertise for developing national emission factors and models, and capacity to use the 2006 IPCC guidelines and related inventory software, and
- **Institutional issues:** Difficulties with national procedures and arrangements for preparing and reporting the GHG inventory, including organisational structure and mandates, coordination between institutions involved in the inventory process and lack of trained technical staff.

Capacity needs

Among LDCs' self-reported capacity needs, five clusters emerged, but a lack of details in the NCs meant we could not subdivide these into issues. We used the following criteria to define the five clusters:

- **Primary data generation:** Obtaining or improving activity data and emission factors
- **Strengthening institutional arrangements:** Collecting, archiving and organising data for use in the GHG inventory, and institutional structures to facilitate this
- **Increasing human capacity:** Skilled human resources to prepare the inventory
- **Access to technology:** Software, hardware, and other technology, and
- **Access to financial resources:** Financial or in-kind support to improve any aspect of the inventories and/or undertake timely transparency processes.

BOX 2. DEFINITIONS

National GHG inventory report: Document containing sectoral and total human-induced domestic GHG emissions for a certain year or period, including data and methodologies used to prepare the estimates. It also includes a set of standard reporting tables and should be prepared following agreed IPCC methodological guidelines.

Sectors, categories and subcategories: GHG emission and removal estimates are divided into five main sectors: energy, industrial processes and product use, agriculture, LULUCF and waste. Each sector comprises individual categories (such as transport in energy or rice cultivation in agriculture) and subcategories (such as cars or irrigated land). Countries follow IPCC methodologies to build their inventories, starting from the more disaggregated subcategory level and then adding these together into categories and sectors to calculate total emissions.

Time series: A sequence of annual GHG inventory estimates – for example, each year from 2010 to 2015.

Activity data (AD): Data on the magnitude of a human activity resulting in emissions or removals – for example, fuel consumption, metal production, land areas or fertiliser use – taking place in a given period.

Emission factor (EF): A coefficient that quantifies the emissions or removals of a gas per unit activity. For example, kilogrammes of carbon dioxide emitted

per litre of diesel consumed. We use emission factors to convert activity data into emissions. Emission factors are often based on a sample of measurement data, averaged to develop a rate of emissions for a unit of a certain activity.

Estimation methods: The most common simple methodological approach to estimate emissions is combining activity data with relevant emission factors. The basic equation is:

$$emissions = AD * EF$$

The 2006 IPCC guidelines include more complex modelling approaches that could represent better processes and national circumstances.

Uncertainty: GHG inventories are based on emissions estimates, which may have different levels of uncertainty – and the bigger the uncertainty, the less reliable the estimates. Uncertainty depends on the quality and quantity of data and on knowledge of the underlying processes and methods used in the estimates.

Secondary data source: Information not produced or collected for the main purpose of developing the national GHG inventory – for example, published studies, scientific literature and regional or global databases from international organisations.

Source: Based on Eggleston *et al.* 2006.⁸

Table 3. Capacity gaps: types of issue by cluster

| LACK OF DATA | DATA QUALITY | DATA MANAGEMENT | METHODOLOGICAL ISSUES | INSTITUTIONAL ISSUES |
|---|---|---|---|---|
| Time series data not available | Reliability of data | Data in different or unsuitable formats | Lack of national emission factors | Lack of coordination between institutions |
| Proprietary data issues preventing access | Data not disaggregated or data from secondary sources | Widely dispersed data sources | Unfamiliarity with IPCC inventory software/ guidelines or lack of technical expertise | Absence of multidisciplinary teams |
| Data not in electronic form | Non-concordance of data | Lack of focal institution for data management | Insufficient or inappropriate models | Lack of institutional structure |
| | | Lack of data management system | | Absence of permanent team |

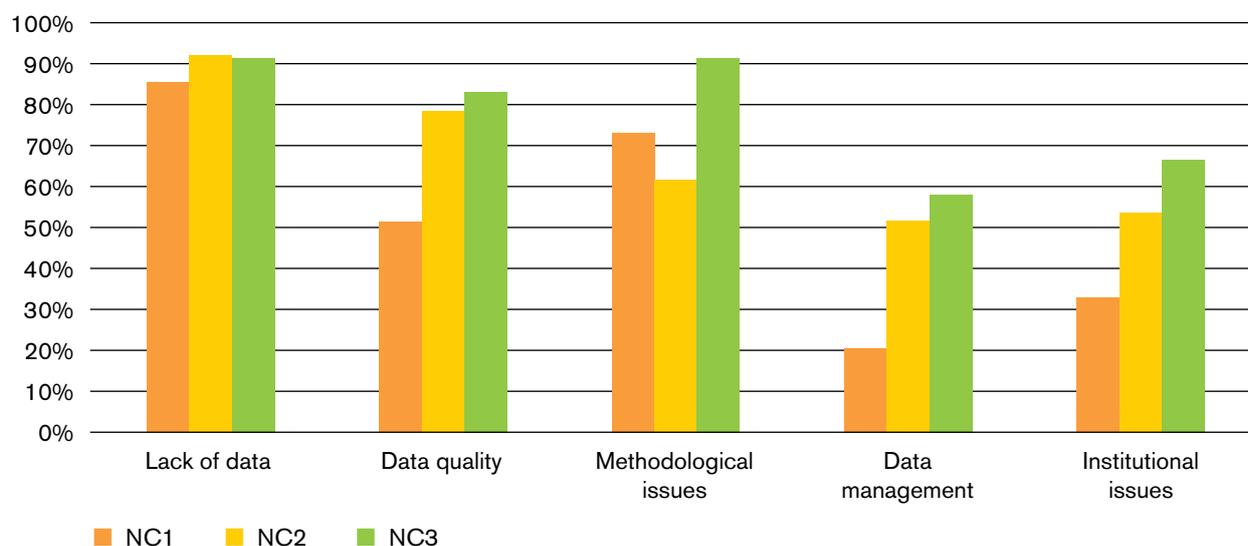
2.2 Understanding capacity gaps

The analysis showed that 70% of LDCs self-identified capacity gaps in their first NC, at least in one of the five clusters. That figure grew to 93% in the second NC, falling to 80% for those who reported a third NC. All BURs reported self-identified gaps, possibly because the UNFCCC reporting guidelines contain advice on reporting on capacity-related issues.⁹ The reduction in self-identified capacity gaps in the third NCs is caused by several countries that identified gaps in the

second report but not in the third. That could be due to a change of team and/or general strategy or plan for preparing the GHG inventory section, or down to a lack of guidance on how to report capacity gaps in NCs.¹⁰

The data showed that self-identified capacity gaps increased over time in all five clusters, but particularly for lack of data and methodological issues (Figure 3). Analysis of the disaggregated issues in each cluster showed that, although several countries identified lack of data as a problem, few (25% in the first NC and 45% in the third) disaggregated this information to issues such as type of data or sector.

Figure 3. Self-identified capacity gaps by cluster and NC report



Lack of data

Countries reported problems related to the scarcity of data for all or some of the sectors required for estimating GHG inventories. This was particularly relevant in informal or less organised sectors of the economy, such as agriculture, forestry and small-scale industries, in which gathering and registering information is not a common practice.

In some cases, the information was available for one or some years but not for the number of years required to build a GHG inventory time series, which is important for tracking emissions trends over time. Time series are also mandatory under the ETF, although reporting flexibility is granted to developing countries where data are unavailable. Countries reported a lack of up-to-date data, with some using estimates that were more than ten years old – for example, one NC submitted in 2016 contained emissions estimates for 2000.

Some countries reported difficulties in accessing information, with institutions reluctant to share data they considered confidential, private or not for public use. There were also issues with information not being available in electronic format, requiring quality checks and making data collection and analysis both difficult and time consuming.

Data quality

The quality of the information used to prepare GHG inventories determines the accuracy of emissions estimates. But the lack of local or national information meant that several countries used secondary data sources from international or regional organisations or default emission factors available in the IPCC guidelines. The more a country's inventory relies on secondary sources and default values, the less accurate it becomes. This is especially so when the values are obtained or developed under other countries' conditions.

Some sectors struggled more than others, and the land use sector had the highest uncertainties due to data quality. In some cases, data providers did not publish the uncertainty ranges associated to the information, so countries had to use expert judgement to determine the uncertainty associated with activity data and emission factors. This increased the uncertainty of inventory estimations. In other cases, countries used data series provided by private sector entities that were not reliable enough in terms of continuity or quality.

Several countries reported that, although information was available at category level, it could not be

disaggregated into the required subcategories. This affected the completeness of the GHG inventory, and in some cases led to the development of alternative and less reliable data estimates reported at the subcategory level. Some countries found that the lack of disaggregated data affected their ability to use some generic emission factors, as the activity data were not adequately aggregated for the available emission factors in the IPCC guidelines.

Non-concordance of data from different sources was another problem. This includes discrepancies between data collected by:

- Different government institutions
- Private and public sector institutions
- The supply and demand sides of the same product – for example, diesel imports reported in the trade statistics and diesel use reported by the transport, energy and agriculture sectors
- Different national entities within the same sector – for example, differences in areas reported to be under crop cultivation or forest land in the land use sector.

Such inconsistencies also increase uncertainty in the estimates and the inventory results.

Data management

Several countries reported difficulties in preparing their inventories because the data were available in formats that were unsuitable for the GHG inventory or difficult to process. This includes data reported in percentages and rates rather than in real figures and counts. In most cases, this was because the GHG inventory was not the primary reason for collecting that information.

In many countries, data sources are widely dispersed among different institutions, which makes identifying the organisations in charge of collecting the data and pulling together the disparate information time consuming. For example, one country reported that data for the energy sector was dispersed between more than five institutions.

In the first and second NCs, some countries reported that not having a designated ministry or government institution holding continuous data and knowledge management systems was a problem when preparing GHG inventories. Closely related to this, some reported that their lack of data management system, formal and institutionalised framework and planned process for gathering, compiling and archiving the data they need to produce the inventories made it difficult to ensure continuity in GHG estimations.

Methodological challenges

The lack of national emission factors was the most prominent methodological issue countries mentioned. With no capacity to develop their own emission factors, many countries applied the generic emission factors from the IPCC guidelines. Measured under particular ecological and socioeconomic conditions, these are often unsuitable for LDCs, increasing the uncertainty of inventory results. The absence of country-specific emission factors for different categories meant that countries could not use the more complex methods provided in the IPCC guidelines, which can produce more accurate estimates.

A few countries reported that unfamiliarity with the IPCC guidelines and inventory software used to estimate emissions made it difficult for them to prepare the inventories, while some pointed to a lack of technical modelling expertise. An incomplete understanding of the processes or variables that cause GHG emissions from different activities – such as the impact of farm management practices on rice cultivation emissions – also posed difficulties in identifying and applying appropriate models for estimating emissions.

Institutional challenges

The most common institutional constraints reported were a lack of coordination between ministries or other national organisations involved in preparing the inventory and a lack of institutional structure. Several countries said they struggled to involve all the necessary organisations in the process and to coordinate the activities between them, which made it difficult to collect and report data in the right format and a timely manner.

The lack of institutional structures, support and administrative or legal texts, such as decrees or laws, also made it hard for countries to ensure they undertook national GHG inventory processes on a regular basis. A formal and institutionalised framework, with clear roles and responsibilities, can:

- Ensure the participation of all relevant government and private entities in preparing the GHG inventory
- Define and operationalise a data management system for compiling the GHG inventory, and
- Provide continuity between NC and BTR cycles.

Figure 4 shows an example of such a framework.

Countries' ability to prepare GHG inventories was also hampered by their lack of multidisciplinary teams with technical experts for the different inventory sectors. Problems related to maintaining a permanent transparency team – mainly due to high staff turnover within national institutions – and the need to rely on consultants to prepare the inventory affected institutional memory and continuity in reporting.

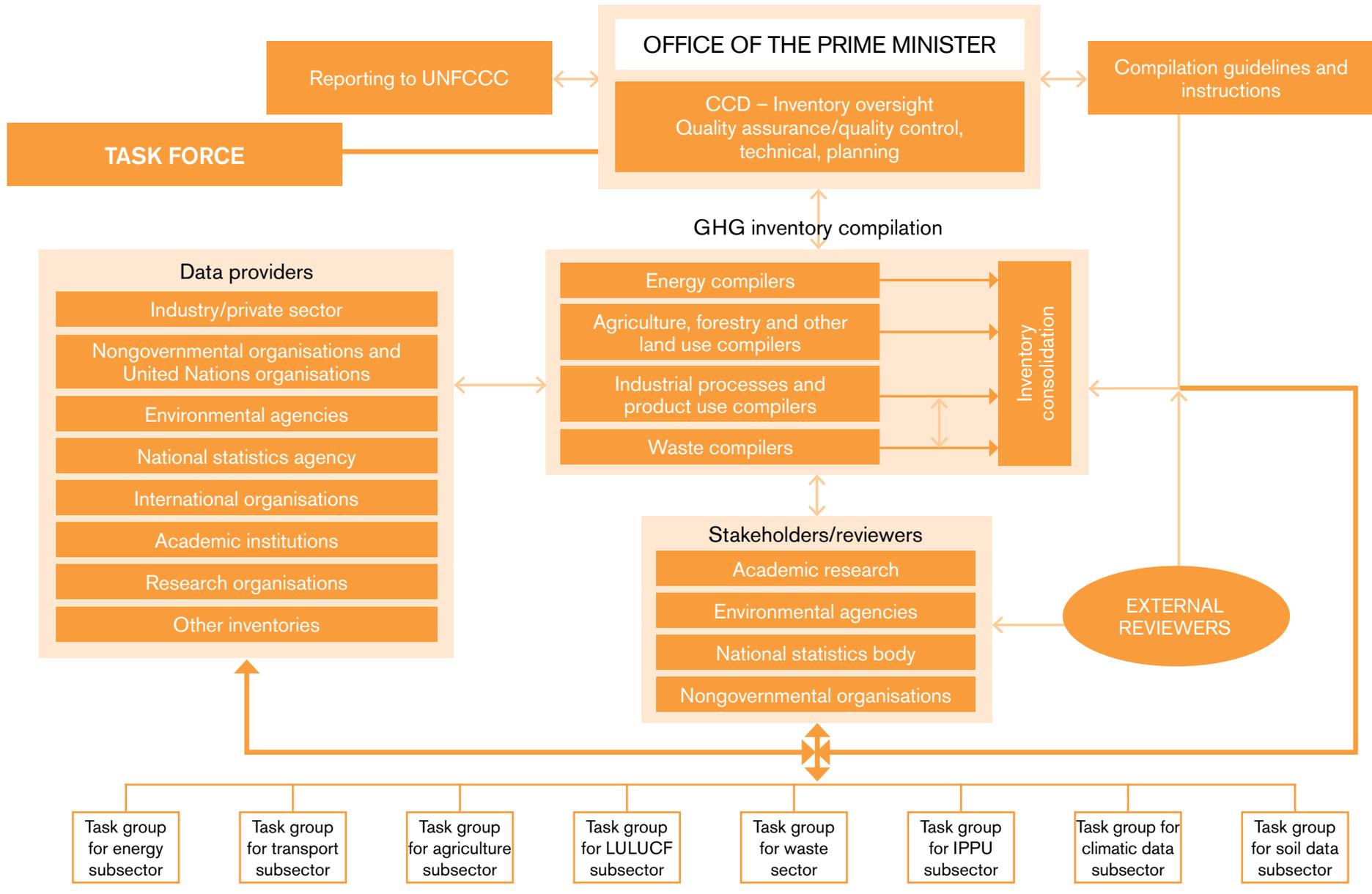
2.3 Understanding capacity needs

The study showed that, in general, LDCs identified the capacity constraints they face in undertaking their GHG inventories in more detail than their capacity needs. Few countries presented a detailed plan for addressing their capacity building needs to improve future GHG inventory preparation described by sector and categories. This was at least partly because of a lack of reporting guidance on how to do this. Some reported their needs as part of a broader reporting capacity needs analysis that included adaptation, mitigation and finance. Our analysis showed, however, that self-identification of needs grew steadily over the years, with 61% of countries reporting needs in the first NC, 84% in the second NC, and 92% in the third.

Across the three NCs, countries consistently identified strengthening data management systems and increasing human resources as their most important capacity needs. Access to financial resources became more important, particularly between the second and third NC rounds, with an increase of almost 50% of countries stressing the need to access financial resources to improve their reporting (Figure 5). This may also reflect an increasing understanding of capacity gaps and needs over time, including the need for significant and sustained financial and capacity building support to address the new demand.

In their NCs and BURs, countries have increasingly raised the need to generate good quality **primary data** – both activity data and local emission factors – to reduce uncertainty in their inventories. Some have carried out studies to enhance their understanding of GHG emissions in different production activities under local conditions; others have prioritised the need to collect new data in different sectors to fill the data gap and improve the completeness of their inventory.

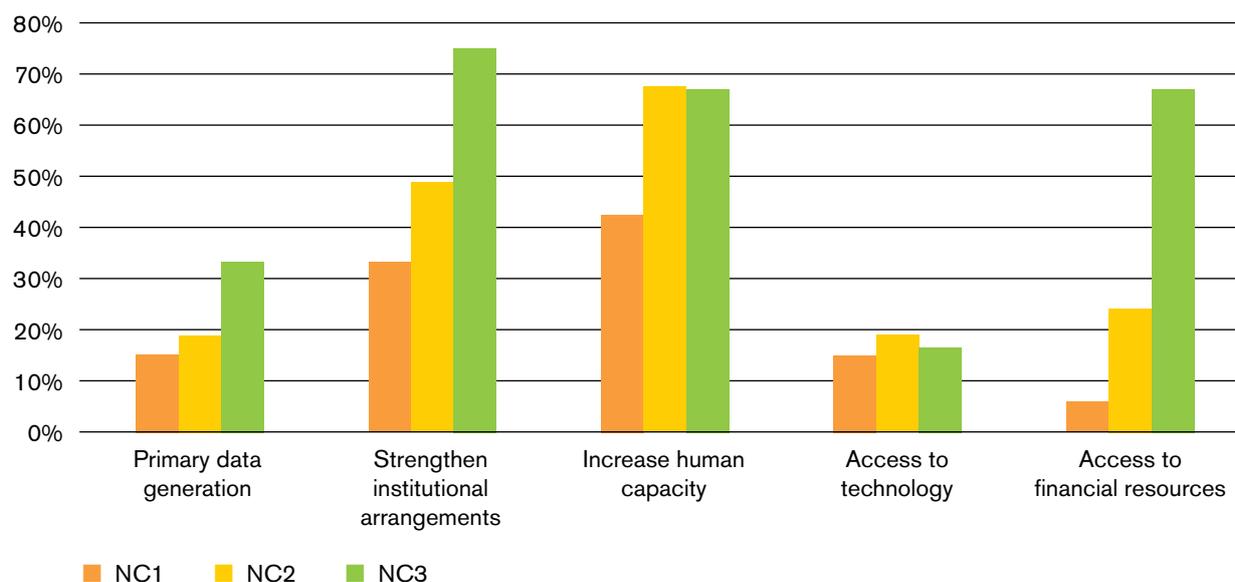
Figure 4. Somalia's proposed national GHG inventory institutional arrangements



Source: Modified from Federal Republic of Somalia 2018.¹¹

Note: Each subsector task group has a sector lead and an archiving coordinator. Energy, transport, agriculture, LULUCF and waste also have a quality assurance and quality control coordinator.

Figure 5. Self-identified capacity needs by cluster and NC report



Strengthening institutional arrangements was one of the highest priority areas for ensuring a continuous flow of information between institutions involved in inventory preparation. Specifically, countries highlighted the need to:

- Standardise data collection by developing manuals and formats that are consistent with the 2006 IPCC guidelines and training sectoral institutions in how to use them
- Automate and upgrade data collection and processing facilities, modernise information systems and improve the process through data verification
- Formalise and institutionalise the collection and reporting process, assigning clear roles and responsibilities to the institutions involved, and
- Develop robust archiving systems to facilitate future inventory compilations.

Several countries also reported the need to **increase human capacity**, both in terms of numbers and skills, to improve their inventories. This includes training government staff to collect and analyse data and improve the quality of activity data and emission factors used to generate the inventory. Some said they need training on how to use the IPCC guidelines and software, and other relevant computer systems, or access to better **technological resources** – including computers, software and internet connections – to be able to process the data and prepare reports. Finally, several countries outlined their need to **access financial resources**. Among other things, this would allow them to improve the quality of activity data, develop national emission factors, or properly operationalise the institutional arrangements.

Enhancing LDC reporting: preparing for the ETF

3

The data collected show that self-identified capacity gaps have increased over time (Figure 3). This means that countries have gained experience over the years to self-identify the challenges they face. And while simple capacity constraints such as lack of data have not significantly decreased, countries have identified significantly more capacity constraints around data quality, data management, methodological issues and institutional issues, which reflect a more sophisticated understanding of transparency systems.

In general, countries identified fewer capacity needs than gaps. But self-identified capacity needs have increased over time, particularly around access to primary data, strengthening institutional arrangements and access to financial resources. These three needs at least doubled, in terms of percentage of countries that identified them, between the first and third NC, demonstrating LDCs' increasing capacity to self-identify their needs.

It is not always possible to find a clear and straightforward linkage between capacity gaps and needs; nor do they always correlate in level of importance. For example, although almost 90% of NCs identified 'lack of data' as a constraint, only 22% identified 'primary data generation' as a need. The lack of disaggregation and capacity need details also made it difficult to analyse the results and understand countries' capacity requirements.

These inconsistencies and different levels of reporting are not only the result of constraints on countries' ability to prepare and report on gaps and needs. They also reflect the NCs' and BURs' lack of standardised sections, formats and methodological guidance on where and how to present the gaps and need analysis for GHG inventories. Reports are also mainly prepared with the support of external consultants through a fly-in, fly-out model. As a result, countries do not own the technical process, making it difficult for them to understand what they can do as well as their limitations and capacity needs.

3.1 Understanding the relationship between gaps and needs

LDCs' self-identified capacity gaps and needs covered all aspects of preparing a national GHG inventory. Although most reports do not explicitly correlate needs and gaps, we can organise them under the following interlinked components that LDCs should carefully consider:

- The **governance systems** and institutional arrangements that need to be in place to ensure continuous reporting, and
- The **technical aspects** of obtaining the information they need to fulfil the mandatory and non-mandatory requirements established under the ETF.¹²

This framework can help illuminate the relationship between gap and need clusters and how they affect reporting. This, in turn, will help LDCs understand how to frame transparency-related capacity building actions when assessing future gaps and needs. For example, from an international perspective, capacity gaps have made it difficult for LDCs to submit timely reports to the UNFCCC and fulfil all mandatory and non-mandatory reporting requirements.¹³ Using the framework presented in Table 4, we can see that the difficulties of submitting reports on time are mainly associated with governance, while the constraints on fulfilling all the reporting requirements are a technical issue. Having access to financial resources is a crosscutting need that affects both aspects.

Table 4. Linkages between capacity gaps and needs

| | GAPS | NEEDS | |
|---------------------------|---|--|-------------------------------|
| Governance aspects | Institutional issues Data management | Strengthening institutional arrangements | Access to financial resources |
| Technical aspects | Lack of data Data quality Methodological issues | Primary data generation Access to technology Increase human capacity | |

3.2 Strengthening governance systems

LDCs face difficulties in establishing or enhancing domestic institutional arrangements. Most rely on consultants, using a fly-in, fly-out approach, to prepare reports without strong links to national institutions. This ad hoc approach has also weakened institutional memory, as each new consultant group starts almost from scratch when collecting data and preparing estimations. This, in turn, causes delays in reporting.

With the increased reporting frequency established by the BURs and continued by the BTRs, countries must move from this project-based approach to reporting to a more institutionalised approach that supports more frequent reporting. They need to build in-house capacity, develop domestic institutional reporting arrangements and build institutional memory for transparency processes. For national GHG inventories, this includes establishing procedures and arrangements for collecting, documenting, preparing quality checks on, and archiving data, as well as for preparing the inventory reports.

But experience from developed countries shows that, even with the right resources, building reporting capacity and developing the ability to meet deadlines takes time. It took developed countries 16 years to improve from 30% of countries (13) submitting their NCs on time in the third round¹⁴ to 65% (28) in the seventh,¹⁵ with 12 of the 15 outstanding reports submitted within a year of the deadline. This progress is mainly the result of a steady improvement of national institutional arrangements, which has allowed most developed countries to report in a timely manner and with the required level of detail.

From 2010, developing countries were required to submit their NCs every four years, conditional to the availability of financial resources. With the introduction of the BUR, the reporting cycle was reduced to every two years. The same frequency has been established for the BTR from 2024, although LDCs can submit at their discretion. Most LDCs have needed more than double the expected time to report their NCs; only 30% have been able to present a third NC and only 15% have submitted a BUR. So, it is highly probable that they will not find it easy to transition into the ETF with the new reporting requirements. Like developed countries before them, LDCs will need both time and support to develop a system that is adapted to their reporting needs and domestic circumstances.

3.3 Overcoming technical challenges

Technical aspects also affect countries' ability to fulfil all their reporting requirements. The scarcity of adequate primary data reduces the quality of LDC inventories, mainly in terms of accuracy and completeness. According to the IPCC guidelines, complete inventories report emissions for all gases, sectors and categories, and accurate inventories neither over- nor underestimate emissions.

When countries cannot gather activity data or obtain emission factors for some categories, they cannot fully estimate emissions of some sectors. This leads to incomplete inventories. The impact of the missing categories on total emissions depends on the importance of those categories and their corresponding sectors in the country. The sectors that correlate with main economic activities are generally more relevant in terms of emissions. LDC economies are usually highly dependent on farming, grazing and forest-related activities, so agriculture and land use are often the most relevant sectors in their GHG inventories.

But these sectors are also the most challenging to estimate and report on, due to their dual function of being both sources and sinks of emissions, the multiple methods for understanding and representing the fluxes of gases in natural systems, and, in some cases, the difficulty of attributing emissions to anthropogenic or natural causes. In most LDCs, these are also informal sectors, where statistics are scarce and a variety of management practices and production models coexist that are not always well documented and studied. This adds complexity to the estimations. For example, the IPCC guidelines lack methodologies and emission factors that are suitable for traditional agriculture in Nepal, and the country has not yet the capacity to develop its own.¹³

When activity data are available but the quality of information is low, or when countries mainly use generic or default emission factors in their calculations, it increases uncertainty, reducing the accuracy of inventory results. This means that the real emissions of the category or sector can be significantly higher or lower than the estimates, which would impact on global GHG emissions figures and progress achieved towards global emissions reduction goals. And as one of the objectives of GHG inventories is to inform and guide national mitigation actions, it affects the robustness of the inventory and can mislead domestic decision making.

To generate emission factors that reflect local realities and improve activity data to prepare and biennially report high-quality GHG inventories, countries need a qualified mass of experts from different backgrounds that can:

- Collect a broad range of information
- Apply the 2006 IPCC guidelines
- Understand the dynamics of different sectors to define assumptions
- Take methodological decisions
- Implement the calculations, and
- Prepare the reports.

In their NCs and BURs, LDCs have identified the need to increase human capacity and reduce the high turnover of trained government staff dedicated to compiling and preparing GHG inventories. To mitigate this problem, LDCs could consider involving other sectors at national, regional and local levels in training programmes. Increasing collaboration between academia, the private sector and civil society organisations at different levels can help expand the number of trained staff and reduce the impact of high staff turnover.

The Paris Agreement established the Capacity Building Initiative for Transparency (CBIT) to help developing countries meet their requirements under the ETF. Operationalised by the Global Environmental Facility (GEF) – the financial mechanism to the UNFCCC that supports developing countries in preparing their NCs and BURs¹⁶ – the CBIT has the tools, training, assistance and other activities to help countries build reporting systems that are in line with their national priorities. The mandate of the Consultative Group of Experts (CGE), a UNFCCC technical body aimed at helping developing countries meet reporting requirements, has also been extended to help implement the ETF.⁷ Both bodies can be instrumental in this process, helping LDCs strengthen their technical and institutional capacities and providing technical advice and support to prepare the BTRs.

3.4 Access to finance

The UNFCCC and Paris Agreement acknowledged the need for financial support to developing countries for reporting and established a mechanism to provide it. As with the NCs and BURs, LDCs will need to access financial resources through the GEF to prepare and submit their BTRs. There are two main modalities for accessing funds: either directly from the GEF Secretariat or indirectly via a GEF agency,¹⁷ such as the United Nations Development Programme or the United Nations Environment Programme. These agencies help countries develop project proposals that follow GEF policy guidelines, and manage and implement the projects on the ground. To access available funds for NC and BUR reporting, all LDCs have presented their funding proposals through a relevant GEF agency rather than directly. This might have been because these agencies have a longer experience and better understanding of the GEF processes and requirements, as there are several administrative stages before countries can sign the grant agreement and receive the funds.

It is true that countries' gaps in capacity – for writing proposals, understanding requirements, engaging different stakeholders in the process, and so on – have contributed to delays in accessing the funds they need to start preparing their transparency reports. But the financing process also needs to be more efficient. While the administration time has improved significantly over the years, reaching to almost two years for BURs,¹⁸ there are still challenges within the GEF and GEF agencies that delay the application process.⁷ For example, each transparency report is treated as a new project, so countries must make a new application to the GEF at the start of each reporting cycle. This creates delays in the application process, which in turn cause delays in the new reporting cycle or mean that countries must rush the preparation of their transparency reports. On average, it takes almost two years from submitting a project proposal to the GEF Secretariat to the first disbursement of funds. Unless this turnaround time becomes more efficient, countries will invariably struggle to meet the two-year reporting cycle.

Looking forward



At the heart of the ETF, GHG inventories form the basis for developing mitigation policies, projecting emissions and assessing progress at national and global levels. Improving LDCs' GHG inventory reporting is therefore vital if they are to meet their domestic and international commitments and achieve their vision to deliver net-zero emissions by 2050. Our analysis points to certain actions that could increase LDC capacities and improve LDC reporting. We present these here as recommendations for UNFCCC bodies and financial mechanisms that support the ETF implementation and for LDCs.

4.1 Recommendations for UNFCCC bodies and financial mechanisms

Provide guidance for gaps and needs reporting: LDC capacity building gaps and needs have increased and evolved over time in response to their gained experience in UNFCCC reporting. However, they were not consistently reported and many LDCs collected and reported more detailed information on gaps than needs. This does not mean they have fewer needs; it probably reflects a lack of guidance. To support LDCs, the CGE could develop methodological guidelines for reporting on gaps and needs in line with the ETF. By facilitating a more systematic approach, such guidelines would help countries monitor progress and assess their capacity building efforts.

Improving financial and technical support: LDCs need timely, sustained financial and technical support to improve the frequency and quality of their inventory reports, and UNFCCC mechanisms and initiatives have an important role to play in ensuring they receive it. Simplifying the GEF's procedures during the project cycle, reducing bureaucracy and streamlining the approval process so countries receive funds within six months of submitting a project proposal would be good starting points.

Allowing one funding application to support multiple reporting cycles would also speed up reporting. With NDCs at the core of the BTRs, it is important for the GEF to finance a package of at least three BTRs (six years) to match a five-year NDC cycle.

As a GEF capacity building entity, the CBIT has a crucial role in helping LDCs address technical gaps and strengthen their national inventory arrangements. By providing direct support to build in-country capacity, the CBIT could be instrumental in changing LDC reporting dynamics and helping them move from a fly-in, fly-out consultant model to a nationally owned institutionalised process. It can also facilitate access to capacity building by including a separate funding stream designed to respond to LDC needs and circumstances.

4.2 Recommendations for LDCs

Enhance capacity gaps and needs analysis:

Although LDCs have self-identified capacity gaps and needs for preparing and reporting their GHG inventories, their analysis of the issue is neither systematic nor consistent across sectors or reports. And with the ETF's increased reporting requirements, these gaps and needs will only increase.

If the UNFCCC take up the recommendation to provide stronger guidance on reporting gaps and needs, LDCs could undertake more detailed and structured gaps and needs analysis in future reports. Not only would this guide capacity building actions, it would also better inform the UNFCCC process, capacity building initiatives and potential funders. Including such assessments in the planning stage of the GHG inventory process would ensure countries collect information from all stages of the inventory cycle.

Institutionalise the reporting process: Institutional arrangements that respond to national circumstances and priorities and build on existing resources and structures will reduce costs and time and ensure more sustainable reporting. It is important that decision makers understand the benefits of strong governance systems and institutional arrangements for international reporting and national policy development. And as institutional setups involve multiple ministries and organisations across government and nongovernmental institutions, LDCs should seek high-level political buy-in to foster better engagement and coordination across stakeholders and facilitate primary data collection and development. Establishing multistakeholder commissions or other national coordination forums can help build a solid transparency system.

Increase technical capacity: Training can help LDCs collect and develop primary data, understand and implement IPCC guidelines, and prepare GHG inventory reports. But to be effective and sustainable, capacity building activities must be country-led, adapted to national conditions and structures, and responsive to their reporting objectives and priorities. LDCs should also explore extending capacity building programmes to other stakeholders to expand domestic capacities. Involving universities, research institutes and nongovernmental organisations in the inventory process can improve data collection and archiving, facilitate the development of emission factors, increase the number of national experts, and contribute to institutional memory.

Acronyms

| | |
|--------|---|
| AD | activity data |
| BR | biennial report |
| BTR | biennial transparency report |
| BUR | biennial update report |
| CBIT | Capacity Building Initiative for Transparency |
| CGE | Consultative Group of Experts |
| EF | emission factor |
| ETF | Enhanced Transparency Framework |
| GEF | Global Environment Facility |
| GHG | greenhouse gases |
| GPG | good practice guidance |
| IAR | International Assessment and Review |
| ICA | International Consultation and Analysis |
| IPCC | Intergovernmental Panel on Climate Change |
| LDCs | Least Developed Countries |
| LULUCF | land use, land-use change and forestry |
| MPGs | modalities, procedures and guidelines |
| MRV | monitoring reporting and verification |
| NC | national communication |
| NDCs | nationally determined contributions |
| UNFCCC | United Nations Framework Convention on Climate Change |

Related reading

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Notes and references

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From 2024, all countries will face more stringent reporting requirements on their climate action under the Paris Agreement's Enhanced Transparency Framework (ETF). For developing countries – and the Least Developed Countries (LDCs) in particular – it is a big step up from existing arrangements. This paper analyses over 20 years of LDC reports to the United Nations Framework Convention on Climate Change to understand their current capacity constraints and needs for greenhouse gas inventory reporting, which becomes mandatory under the ETF. It provides recommendations to build in-country capacity, change reporting dynamics and help LDCs shift from a 'fly-in, fly-out' consultant model to a nationally-owned institutionalised process.

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Funded by



This report was produced with the generous support of the Swedish International Development Cooperation Agency (Sida). However, the views expressed do not necessarily represent those of Sida



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