Measuring Capacity Progress in Climate Transparency

A Framework to Inform Future Work

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iGST Independent Global Stocktake

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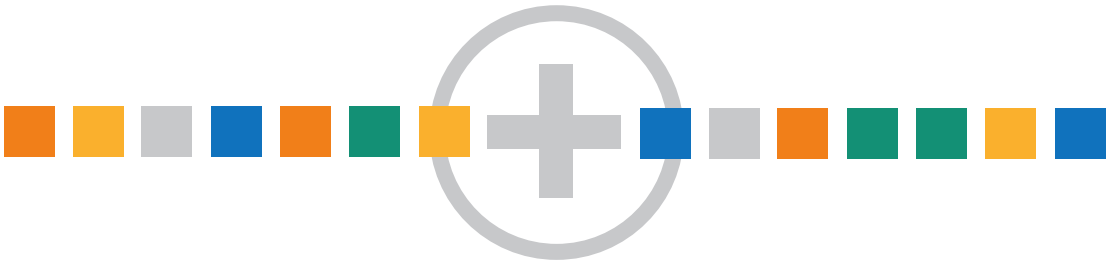

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About the independent Global Stocktake (iGST) and the Mitigation Working Group

The Independent Global Stocktake (iGST) is a consortium of civil society actors working together to support the Global Stocktake (GST), the formal process established under the Paris Agreement to periodically take stock of collective progress toward its long-term goals.

The iGST aligns the independent community — from modelers and analysts to campaigners and advocates — so we can push together for a robust GST that empowers countries to take greater climate action.

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The Mitigation Working Group of the independent Global Stocktake (iGST) aims to assist the independent community in using the Global Stocktake (GST) as an opportunity to ratchet up real-world progress in climate mitigation. The MWG intends to help facilitate new research, robust discussion, and knowledge exchange to create a stronger community and a more effective and broader mitigation narrative. It brings together researchers from all around the world to push forward the climate mitigation narrative. As co-leads of MWG, the Center for Global Sustainability (CGS) at the University of Maryland and the Council on Energy, Environment, and Water (CEEW) commissioned this work and advised on research into the importance of capacity-building and climate transparency. It is essential for this exploratory research to begin and MWG is looking forward to further research following this report on how to inform a more inclusive and successful stocktake.

Mitigation Working Group member organizations:

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+ 1. Background

1.1. Climate Transparency

The Paris Agreement, adopted in 2015, is the international community's latest attempt at global collective action to address climate change. The Agreement has three goals: 1) limit global temperature increase to 2.0°C above pre-industrial levels, while striving for a 1.5°C limit; 2) adapt to climate change while fostering climate resilient, low greenhouse gas (GHG) emission development; and 3) provide financial flows to support these efforts.

The Paris Agreement uses a "pledge and review" or "cycle of ambition" approach that applies to all countries, developing and developed. The cycle includes three phases: plan; implement; and report, review, and consider (see **Figure 1**). Every five years, countries communicate a Nationally Determined Contribution (NDC), outlining their plan for what they will commit to the international climate response. To build trust and confidence that all Parties are keeping their promises, each country will report key climate data and information on their GHG emissions, climate mitigation and adaption actions, and support provided to developing countries in a biennial transparency report (BTR).[1] The BTR is reviewed by a team of experts to enhance credibility and support countries in improving the quality of reporting. The expert team assesses countries' BTRs for transparency and completeness, among other qualities. The team prepares a report identifying areas of improvement for the reporting, and if applicable, capacity-building needs. Each Party then participates in a Facilitative Multilateral Consideration of Progress (FMCP), to showcase actions and engage in conversation with other countries on their efforts.

The BTR is a good vehicle for communicating domestically and internationally. Discussions between the Party and the expert review team to identify capacity-building needs related to the collection of this information, and the international exchange of information that takes place during the FMCP, together, provide an opportunity to improve transparency over time. The BTR, the technical expert team's review report, and the FMCP together comprise the Enhanced Transparency Framework (ETF) and are key inputs to the Global Stocktake (GST), where the world will evaluate collective progress and assess whether international efforts will be sufficient to meet the Paris Agreement goals.

In the context of climate transparency under the Paris Agreement, "capacity" is generally referred to as the ability of Parties to effectively implement the ETF. Within this context, capacity building efforts target developing country Parties, in particular countries with the least

[1] Reporting varies by a country's application of the Modalities, Procedures, and Guidelines of the ETF for elements that are *Should*, *Encouraged*, or a use of *Flexibility*.

capacity and those that are particularly vulnerable to climate impacts. This said, even the ETF, as a global transparency system itself, has an implicit capacity.

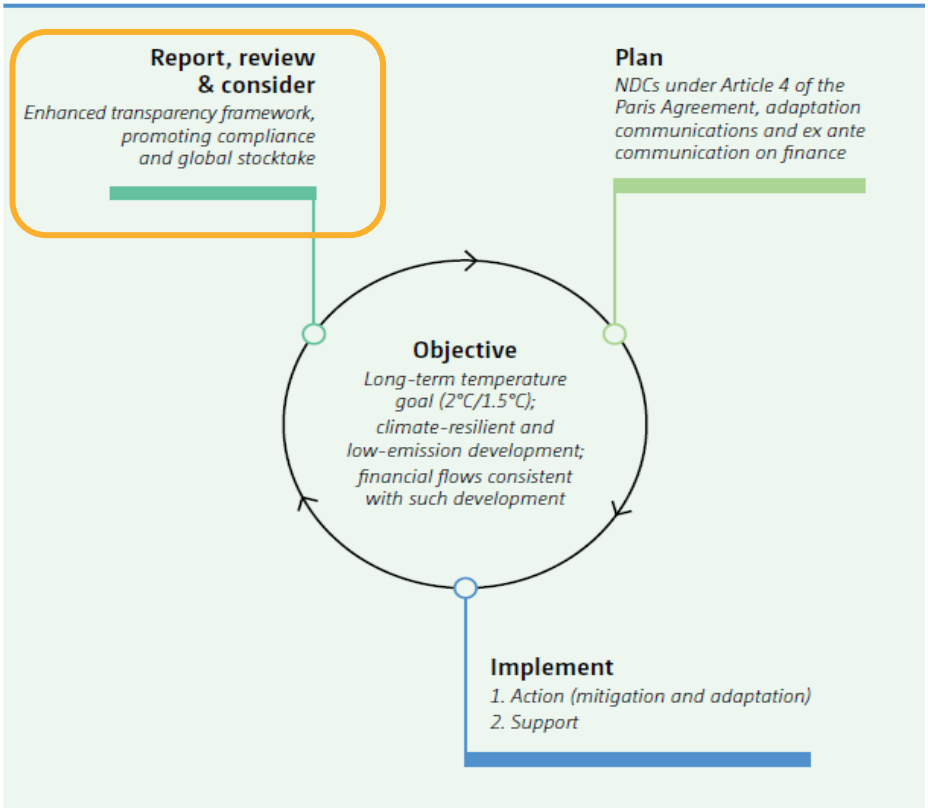

Figure 1 The Paris Agreement's three phases in the "cycle of ambition" to achieve the agreement's objectives (Reprinted from UNFCCC, 2022). The red rectangle highlights the "Report, review, and consider" phase where transparency capacity is needed.

The concept behind transparency is not new, both developed and developing countries have been subject to reporting and review obligations for over 20 years, but with differing requirements. The existing system has seen varying levels of reporting success, generally with developed countries submitting in a more timely and comprehensive manner compared to developing countries (Weikmans, R. and Vihma, A., 2022). This is due to lower levels of reporting capacity and the burden of locating external financial support for much of the climate transparency-related work (Umemiya, C. and White, M.K., 2023). As experience under the United Nations Framework Convention on Climate Change (UNFCCC) demonstrates, countries' ability to comply with the reporting processes under the Paris Agreement will improve over time. The pressing questions are, what are the most needed and impactful improvements for achieving the Paris objectives, and how can these be incentivized? And, how to track the collective effectiveness of international actions and support to ensure the global community remains on course in realizing these goals? We will not be able to answer these questions without meaningful measurement of transparency capacity.

+ 2. Objective

The objective of this paper is to **identify relevant indicators** and highlight the current availability of data to **support collection of indicators** for measuring and evaluating transparency capacity under the GST. It is fair to question, why after all these years of international capacity-building do many countries, particularly developing countries, still face challenges in regularly submitting climate information? What can the international community do to best support countries in meeting the obligations of the ETF?.

The measurement framework presented in this paper should foster further research on measuring climate transparency capacity, to answer these questions, and thereby **improve the efficacy of investments in climate transparency capacity building**. Measuring this capacity will also improve the communication of capacity information domestically and internationally. This will hopefully lead to more efficient and effective **identification** of needs and equitable **prioritization** and **allocation** of capacity-building transparency support. At the same time, increasing **informed** domestic policy-making and actions that address capacity constraints. These improvements will support future evaluation of capacity through the GST process.

In order to prioritize and allocate resources, a common measurement framework is needed to objectively assess and compare countries' transparency capacity. In this paper, we define a common framework for measuring transparency capacity using three dimensions. The dimensions are **output quality**, **institution and organization**, and **knowledge and skills** that when measured can be used to evaluate national capacities to meet the transparency goals of the Paris Agreement. We then discuss how each of these dimensions is measured.

2.1. Capacity Building

Article 11 of the Paris Agreement focuses on capacity building. Capacity building is also mentioned in other articles such as Article 13 that establishes the ETF. Capacity building is assessed through the GST as one of the means of implementation (MOI), in addition to technology development and transfer, and finance (**Figure 2**).

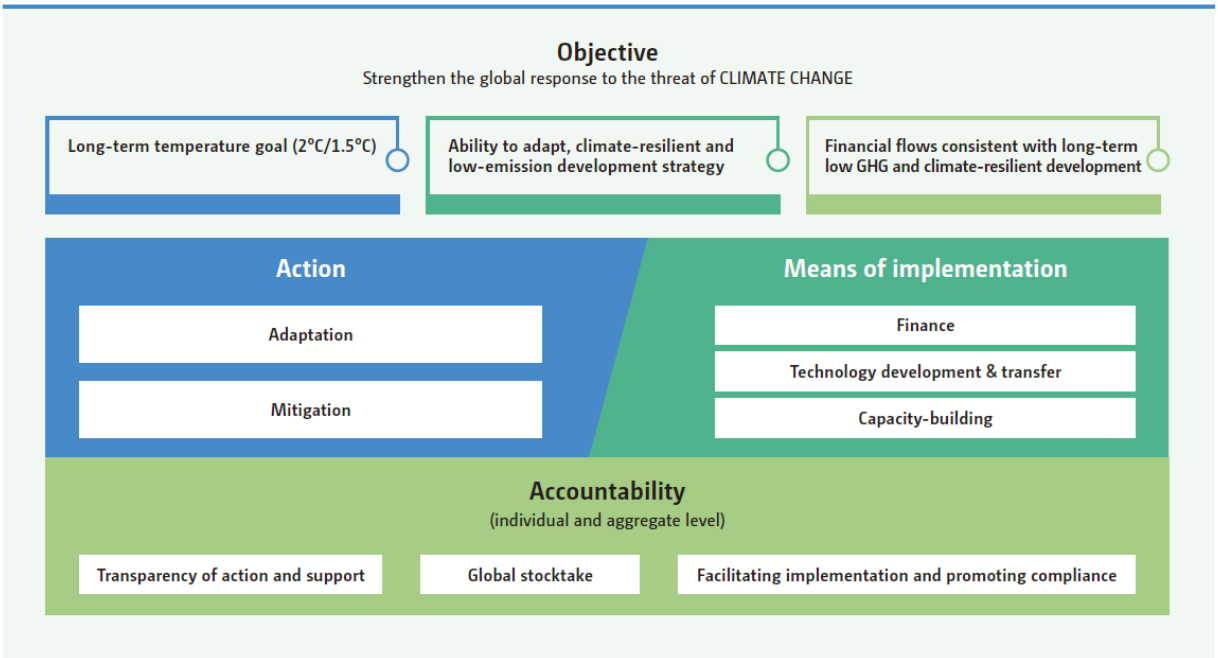

Figure 2 Means of implementation under the Paris Agreement (Reprinted from UNFCCC, 2022b).

The concept of "capacity" for climate transparency may also be inferred from the goals inscribed for the Capacity Building Initiative for Transparency (CBIT), established under the Paris Agreement. CBIT was born to support developing countries to strengthen national institutions for transparency in line with national priorities, provide relevant technical training and assistance, and among other goals facilitate improved transparency over time.[2] However, beyond this, there is no international agreement on what exactly transparency-related capacity should constitute. Instead, countries, donors, and scholars have crafted ad-hoc interpretations of transparency-related capacity. This lack of consensus is despite the fact that transparency-related capacity building has been undertaken under the Convention for more than 25 years.

One example of how researchers currently conceptualize transparency-related capacity is shown in **Figure 3**, where two independently developed methodologies for measuring transparency capacity were compared. The common dimensions of transparency capacity include aspects related to institutional structure, knowledge and technical skills, and the existence of applied quality principles within climate reporting.

[2] Decision 1/CP.21, paragraphs 84 and 85

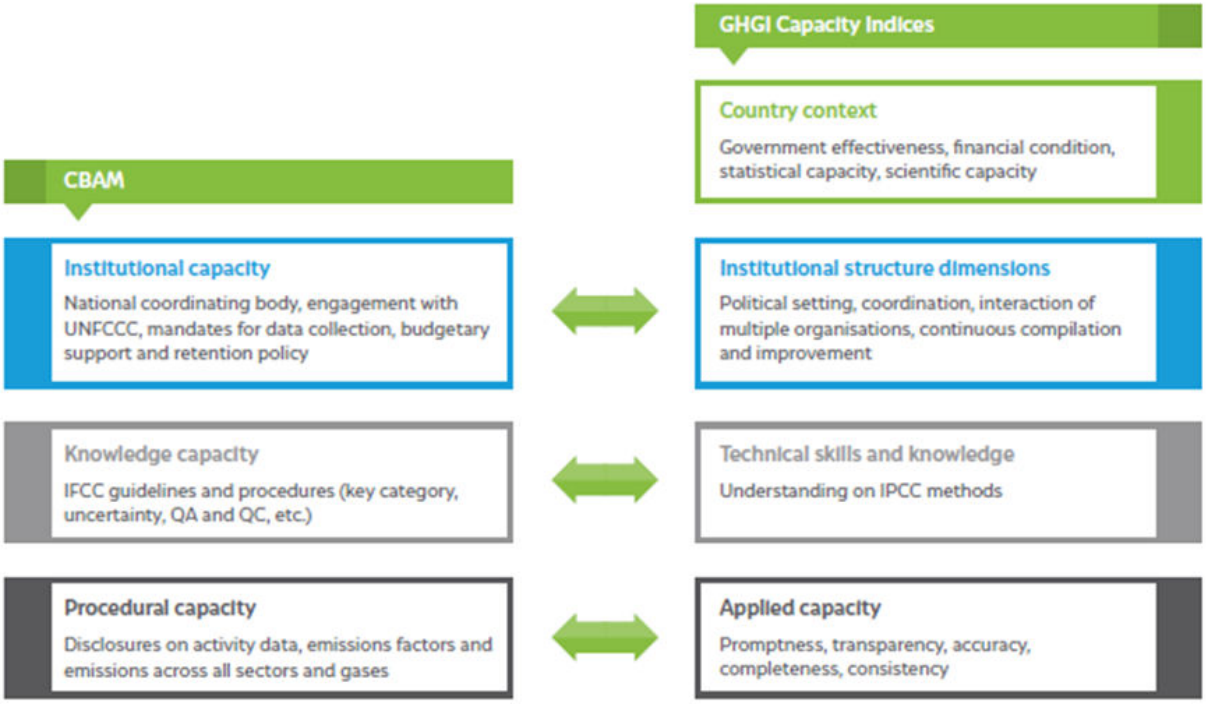

Figure 3 Reprinted from Umemiya, et al., 2022, comparison of the two existing monitoring and evaluation (M&E) methodologies: 1) Capacity-Building Assessment Matrix (CBAM) (Prasad and Gupta, 2019); and 2) Greenhouse Gas Inventory (GHGI) Capacity Indices (Umemiya, et al., 2020).

In the ETF, developed countries are mandated to provide support for transparency capacity-building of developing countries.[3] For multilateral support, the Global Environment Facility (GEF) is a designated entity for the financial mechanism of the UNFCCC and manages a key source of funding for technical assistance projects, including the CBIT, which has allocated 144.7 million USD across 88 projects globally.[4] Bilateral capacity-building support has also played a considerable and growing role for transparency, but there is no data on the share of support allocated specifically to transparency.

The lack of a clear definition of capacity, as well as an agreed approach to measuring changes in capacity, has spill-over effects on our understanding climate finance. How can finance flows be tracked to ensure they are commensurate with the need, if there is lack of clarity on what transparency capacity building is? What is clear is that developing countries are the recipients of capacity-building support, while developed countries are mandated to provide enabling support to these initiatives. Upon stocktaking, measures of transparency capacity are intended to link the outputs from reporting to the other phases of ambition (i.e. planning and implementation). Without robust outputs, countries will only be able to tell “half of the story”.

[3] Article 13, paragraph 15
[4] GEF_CBIT_2022_11.pdf (thegef.org)

2.2. Need for Measurement

Capacity building efforts to support other countries' implementation of climate obligations under climate agreements have been undertaken for more than two decades. These efforts have included strengthening institutional capacities to better understand reporting requirements related to GHG emissions and removals, mitigation efforts, and other elements of Biennial Update Reports or National Communications. Developing country parties, the Consultative Group of Experts of the UNFCCC, and other related bodies (e.g. GEF, UNDP, UNEP, and FAO) have supported measures on these fronts.

However, the third comprehensive review of the capacity-building framework[5] clearly highlights that collectively, little progress has been achieved in establishing self-sustaining capacities within countries. It was also observed that countries were at different starting points and that capacity-building efforts were need-based and ad-hoc (UNFCCC, 2016). In the UNFCCC's 2022 synthesis report, strengthening institutional arrangements for GHG inventory compilation and reporting remains the most significant capacity need (UNFCCC, 2022a). This synthesis report also clearly highlights the challenges with tracking progress in capacity building as disclosures in national reporting vary in structure, scope, and granularity.

It is important that we move away from ad-hoc capacity-building and establish the long-term national capacity to support transparency (para 27 and 31 UNFCCC, 2016). In the Paris Agreement's "Cycle of Ambition" the ETF demands more granular information be reported each cycle, making long-term capacity building essential in achieving this. Reporting "flexibilities" are included in the ETF to allow developing countries with a lower level of capacity a temporary accommodation of simpler reporting obligations. However, it is expected that the use of flexibilities should reduce overtime. If countries are able to identify, prioritize, and measure what climate transparency capacity is needed they can strategically prioritize capacity-building efforts and better attract sustained finance to support these needs. If the GST could objectively evaluate transparency capacity progress, it would help bring focus to the critical capacity issues instead of the common discourse heard at international summits, e.g., that there is a "lack of capacity" or "lack of support" without tangible problems identified that can be solved with targeted and effective support.

[5] Decision 2/CP.7

+ 3. Characterizing transparency capacity

3.1. Transparency Elements

Again, under the Paris Agreement, transparency is comprised of **reporting**, **review**, and **consideration** (**Figure**).

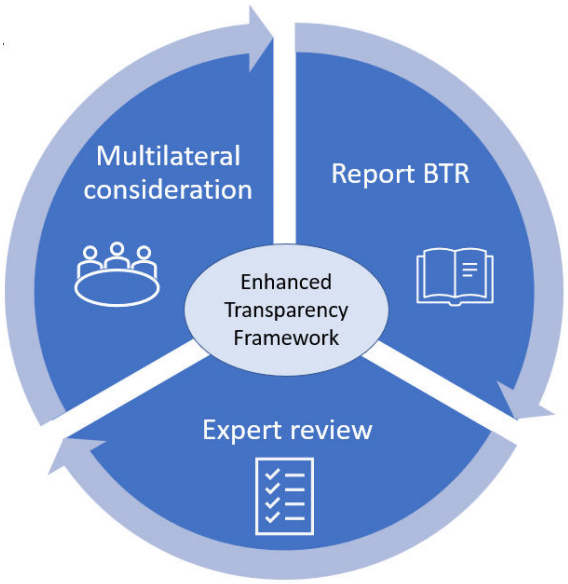

Figure 4 Under the context of the Paris Agreement, transparency is comprised of reporting, review, and consideration.

But, what is transparency? It is useful to remind ourselves of the term used by the UNFCCC under the Kyoto Protocol of measurement, reporting, and verification (MRV). Climate experts have more than a 25-year history with MRV and it can be defined as:

> *"[…] a scientifically guided estimation exercise […] to develop performance metrics, collect the data necessary to quantify those metrics (measurement), transparently document and communicate those metrics, as well as how they were produced (reporting), and apply quality assurance principles in an arena containing actors with misaligned incentives (verification)." (Gillenwater, 2014)*

Using this definition, capacity to meet transparency obligations under the Paris Agreement is defined by the ability to actively participate in all stages of the ETF to measure, report, and verify climate data and information. Strengthening Parties' capacity in each of these stages promotes availability of higher quality data and information, which better informs the consideration and deliberations during the GST. The following elements outlined in **Table 1** are included for achieving transparency.

3.2. Transparency Capacity Measurement Framework

Generally, capacity involves the ability to do and achieve things and make changes as needed in a complex environment. Transparency is a complex system environment and so indicators are needed to measure capacity within this system. Indicators represent information on an attribute as a single numerical value for the purpose of comparative assessment over time to understand progress. To facilitate evaluation or comparison, indicators are grouped by thematic "dimensions".

The proposed dimensions were chosen because they are already identifiable, and in many cases, already measurable. Future research may highlight the need for varying and/or additional dimensions or indicators. For this proposed framework, we describe the core dimensions and indicators that many would agree with and yet are still not measured (see **Table 2**).

Output quality is the system dimension of transparency capacity and the primary dimension of any evaluation effort. This can be measured by the number and quality of reports a country or set of countries can produce over a given time period, under "normal" conditions, where no additional external (to national) resources are used. But what level of national capacity is required to consistently produce high-quality reports? The national capacities required to produce this report can be further evaluated across two secondary dimensions, **institution and organization** and **knowledge and skills**. The resulting application of these latter two dimensions may produce a report of a certain quality (**Figure 5**).

Output Quality ← Institution and Organization + Knowledge and Skills

Figure 5 In theory, all institution and organization, knowledge and skills capacities within a transparency system will produce an output of a certain quality.

Each of these dimensions can be conceptualized as containing **social** or **structural** attributes. **Structural capacities** are constructed elements that provide infrastructure (both physical and non-physical) for humans to exercise their individual and collective abilities. Evidence of structural capacities include things like budget allocation, rules, laws, guidance, curriculum, and technology solutions. **Social capacities** are the actors, as individuals and in aggregate (e.g., networks, groups) exercising their abilities to complete an activity. Evidence of social capacities include things like stakeholders, groups, relational interaction, staff involvement, proficiency, frequency, timeliness, and efficiency.

Table 1 Transparency capacity framework for measurement

Dimensions	Examples of Capacity Attributes	
	Structural Attributes	**Social** Attributes
Output Quality (Primary Dimension)	Quality principles, output template	Frequency, timeliness, caliber
Institution and Organization (Secondary Dimension)	Budget, standards, agreements, regulations, laws, policy, procedures	Stakeholders, staff, efficiency, relational interaction
Knowledge and Skills (Secondary Dimension)	Curriculum, methods, information management software	Proficiency, software user efficiency

When and where output quality is not met, gaps in these dimensions may indicate capacity constraints and areas for improving climate transparency capacity, via capacity-building. Indicators are selected to appropriately identify potential gaps in these dimensions.

This framework of measurement allows us to define, develop, and evaluate indicators across time. Comparison of indicators across time allows us to evaluate progress. In the case of the GST, indicators help inform the evaluator about whether capacity has improved for any dimension. An evaluation of indicators may reveal gaps (e.g. related to capacity) or reassure evaluators that progress is occurring. It may also provide an estimate of the level of capacity that still needs to be built to ensure the ETF drives ambition under the Paris Agreement.

+ 4. Measuring Dimensions

In this section, we identify relevant indicators for measuring and evaluating transparency capacity under the GST. We list quantifiable indicators for each dimension and indicate whether they are a structural or social attribute; a measurement of the transparency element(s) of reporting, review, and/or consideration; likely data source(s); and a brief description of their link(s) to capacity progress.

4.1. Output Quality

We define output quality by the degree of excellence and improved reports a country can produce over a given time period, under "normal" conditions, where no additional external (to national) resources are used. To measure output quality, we have identified 17 indicators that when evaluated could provide evidence of transparency capacity progress.

Table 3 Indicators for output quality.

Indicator	Unit	Social or Structural	Reporting, review, consideration	Data Sources	Link(s) to Progress
BTR Guidelines (MPGs)	Does not exist, exists (n=0,1)	Structural	Reporting, Review, Consideration	UNFCCC	Evidence that reporting requirements are explicit.
Common Reporting Tables (CRT) [GHGI] and Common Tabular Formats (CTF)*	Does not exist, exists (n=0,1)	Structural	Reporting, Review	UNFCCC	(1) Evidence that reporting requirements are explicit. (2) Evidence that comparability between Parties could occur.
Definition of reporting quality principles and methodologies to achieve them for each submission element (e.g. chapter)**	Does not exist, exists (n=0,1)	Structural	Reporting, Review	IPCC, 2006 (TACCC GHGI Quality Principles)	Evidence that "quality" is defined and that methodologies exist for achieving quality.
BTR submission frequency	Number of reports submitted/time-period	Social	Reporting	UNFCCC Submission website Umemiya C. and White M.K. (2023)	Evidence of consistent reporting.

BTR submission timeliness	Number of days report is submitted after deadline	Social	Reporting	UNFCCC Submission website (e.g. https://unfccc.int/BURs)	Evidence in meeting the deadline often seen as the best indicator if all systems are working together
Adherence with BTR guidelines (MPGs)	Ratio of MPG requirements completed per total number of requirements	Social	Reporting, Review	Technical Expert Review Report (TERR)	Caliber of reporting
Adherence with Common Reporting Tables (CRT)	Ratio of cells completed per total	Social	Reporting, Review	UNFCCC Submission website (e.g. https://unfccc.int/BURs)	Caliber of reporting
"Shall" requirements achieved in BTR	Number of "shall" requirements achieved	Social	Reporting	TERR	Caliber of reporting. By nature of being shall requirements, the Parties collectively identified this information as the most essential for informing transparency of action and support
"Should" requirements achieved in BTR	Number of "should" requirements achieved	Social	Reporting	TERR	By nature of being should requirements, the Parties collectively identified this information as needed for informing transparency of action and support
"Flexibilities" utilized in BTR	Number of "Flexibilities" utilized	Social	Reporting	TERR	Flexibilities are provided to various Parties, and Parties expect that the utilization of flexibilities should reduce overtime. Evidence of capacity improvement overtime.
Degree of BTR chapter quality	Number of recommendations and encouragements from Technical Expert Review (*Varies depending on quality principle*	Social	Reporting	TERR	The number of recommendations and encouragements from Technical Expert Review should reduce overtime. Evidence of capacity improvement overtime.

	(e.g. TACCC) and reporting chapter.)				
TERR Review Guidelines, Procedures, Templates	Does not exist, exists (n=0,1)	Structural	Review	UNFCCC	TERR guidelines for GHGI, Support, and NDC tracking exist. Evidence of other TERR guideline components, procedures and templates, is evidence that TER capacity has improved overtime. Noting countries could develop their own TER procedures, but these would indicate institutional (national) capacity improvement as opposed to TER capacity improvement.
TERR completion timeliness	Number of days report is completed after deadline	Social	Review	UNFCCC	Evidence of TER meeting the deadline often seen as the best indicator if all systems are working together. Noting countries also have TER deadlines, so this indicator may need to be evaluated in combination with institutional indicator, "Timeliness of review and comment on TERR."
Adherence to TERR format (in-country, desk, centralized)	Number of in-country reviews (not exercising flexibilities) within a 10-year timeframe.	Social	Review	TERR	Evidence of TER team and country capacity. From in-country review requiring the most capacity, to centralized, with desk review requiring the least capacity. May provide evidence of varying levels of TER team capacity. Noting at least 2 BTRs within a 10-year period are subject to an in-country review.

Adherence with TERR Guidelines/Procedures/Templates	Number of recommendations for improvements, encouragements, and capacity building needs missing during a lead reviewer and UNFCCC QA of TERR	Social	Review	UNFCCC	Lead reviewers and UNFCCC conduct a quality assurance of TERR. Missing recommendations, encouragements, and needs may provide evidence that the TER team may be lacking in capacity.
FMCP Presentation Guidelines/Procedures/Templates	Does not exist, exists (n=0,1)	Structural	Consideration	UNFCCC	FMCP guidelines for GHGI, Support, and NDC tracking exist. Evidence of other FMCP guideline components (guidelines procedures and templates) is evidence that consultation capacity has improved overtime. Noting countries could develop their own FMCP procedures, but these would indicate institutional (national) capacity improvement as opposed to consultation capacity improvement.
FMCP completion timeliness	Ratio of completed FMCP at the SBIs per number of TERRs completed	Social	Consideration	UNFCCC	As this ration moves closer to one, evidence that consultation capacity exists.

* As an example of this indicator's measurement, for GHGI, Support, tracking NDC this indicator is 1; however, for adaptation it is 0.

** As an example of this indicator's measurement, for GHGI this indicator is 1; however, for mitigation tracking, adaptation, and support this indicator is 0.

Capacity building implementers may find some of these indicators within Table 3 surprising and perhaps unnecessary for understanding country capacity. Wouldn't all countries reporting under the Paris Agreement rely on the existence of the BTR guidelines? Do we need system indicators? In this framework we argue yes, because it is important to note their existence (or not) when evaluating a combination of country-capacity indicators. For example, countries are to report on progress in adaptation, which is a requirement - despite the fact that there are, "No agreed frameworks, methods, indicators or metrics to assess progress towards the Global Goal on Adaptation" (Ebi, K.L., et al. 2022). Continuing this example, an evaluator

would be further informed by examining the output quality structural indicator, in this case a lack of defined adaptation methodologies; and the social indicator, a country's frequency of reporting on adaptation within the BTR.

4.2. Institution and Organization

We define institution and organization abilities as the efficiency, efficacy, sustainability, and resiliency of collective routines that facilitate the execution of such transparency plans, actions, and reporting. To measure the institution and organization dimension, we have identified 26 indicators that when evaluated could provide evidence of transparency capacity progress.

Table 4 Indicators for institution and organization.

Indicator	Unit	Social or Structural	Reporting, review, consideration	Data Sources	Link(s) to Progress
Existence of BTR coordinator	Does not exist, exists (n=0,1) If 1, number of coordination hours worked per report	Social	Reporting	Time-sheets	The coordination level of effort for compiling and submitting BTR
Employment type of BTR coordinator	Domestic staff, domestic consultant, international consultant, non-existent	Social	Reporting	Institutional arrangement	The degree of coordination effort that was conducted domestically
Total budget for BTR	USD/BTR	Structural	Reporting	Domestic record of budget mobilized	The level of resources utilized
Budget allocation for BTR	Domestic USD/BTR, International (source) USD/BTR	Structural	Reporting	Domestic and International record of budget received	The degree of international vs. domestic resources utilized
Budget allocation for BTR Chapters	USD/BTR Chapter	Structural	Reporting	Domestic and contractual records of budget mobilized	The degree of resources allocated for reporting chapters within the BTR

Employment type of BTR chapter compiler(s)	Domestic staff, domestic consultant, international consultant, non-existent	Social	Reporting	Institutional arrangement	The degree of technical compilation that was conducted domestically
BTR workplan/Gantt chart	Does not exist, exists (n=0,1)	Structural	Reporting	Domestic files	Evidence of report planning
Documented (written) BTR institutional arrangements	Does not exist, exists (n=0,1)	Structural	Reporting	BTR	Evidence and strength of institutional relational interaction.
National legislation, regulation, or policy(ies) containing climate measurement, reporting, verification requirements	Does not exist, exists (n=0,1)	Structural	Reporting	Domestic legal filings	Evidence and strength of institutional authority
National legislation, regulation, or policy(ies) climate enforcement	Fines per year collected (USD) Size of lawsuit (USD)	Social	Reporting	Domestic legal filings	Evidence of legal climate transparency enforcement
Flexibilities reported within CRT	Number of cells denoting use of flexibility per country	Social	Reporting	BTR Submission	Evidence that institutional capacity to support reporting element did not exist
BTR archiving information management system	Does not exist, exists (n=0,1)	Structural	Reporting	Domestic files	Evidence of ongoing reporting sustainability or resilience
Use of BTR archiving information management system	Number of recommendations and encouragements on the archiving information management system	Social	Reporting	TERR	Evidence of ongoing reporting sustainability or resilience

Data management system components (e.g. software, databases, models, cloud or physical storage, security, etc.)	Component type and name	Structural	Reporting, Review, Consultation	Component websites	Evidence that data management system components exist, these components may improve efficiency and efficacy of data management
Data measurement technology (e.g. surveys, sensors, satellites, etc.)	Technology type and name	Structural	Reporting	Technology websites	Evidence that data measurement capacity exists, these technologies may improve the data available for reporting
Existence of technical reviewers assigned to report review	Does not exist, exists (n=0,1). If, 1, number of reviewers and number of review hours worked per report	Social	Review	UNFCCC	The level of effort for compiling and publishing a TERR
Total budget for Technical Expert Review (TER)	USD/TER	Structural	Review	UNFCCC Budget	The level of resources utilized
Budget allocation for TER	Party USD/TER, UNFCCC USD/TER	Structural	Review	Domestic Party record of budget UNFCCC Budget	The degree of international vs. domestic resources utilized
Country nomination of technical review experts	Number of nominated experts per country	Social	Review	UNFCCC Roster of Experts	Evidence of available national experts for TER
Timeliness of review and comment on TERR	Number of days comments provided after deadline	Social	Review	UNFCCC	Evidence of a functioning consideration process. Evidence of countries' capacity improvement as the number of days after deadline approaches zero.

Regular stakeholder consultation	Number of meetings per stakeholder group Number of stakeholders per group Number of written comments received	Social	Reporting	Domestic meeting minutes BTR	Evidence of transparency inclusivity
Degree of FMCP written questions received	Number of Party attendees Number of questions received per Party	Social	Consideration	UNFCCC	As transparency increases, the number of questions received during consideration may reduce or increase overtime. Evidence of Party representativeness. (Qualitative nature and complexity of questions received should also be evaluated.)
Degree of FMCP written questions answered	Number of responses per number of questions received	Social	Consideration	UNFCCC	Evidence of a functioning consideration process. Evidence of countries' capacity improvement as the ratio of responses provided per number of questions received becomes closer to one.
Degree of FMCP in-person questions received	Number of Party attendees Number of questions received per Party	Social	Consideration	UNFCCC	As transparency increases, the number of questions received during consideration may reduce or increase overtime. Evidence of Party representativeness. (Qualitative nature and complexity of questions received should also be evaluated.)
Degree of FMCP in-person questions answered	Number of responses per number of questions received	Social	Consideration	UNFCCC	Evidence of a functioning consideration process. Evidence of countries' capacity improvement as the ratio of responses provided per number of questions received becomes closer to one.

Timeliness of responses to FMCP questions received	Number of days questions answered after deadline	Social	Consideration	UNFCCC	Evidence of a functioning consideration process. Evidence of countries' capacity improvement as the number of days after deadline approaches zero.

4.2. Knowledge and Skills

We define knowledge and skill abilities as the efficiency, efficacy, sustainability, and resiliency of an individual's performance in doing tasks or demonstration of practical understanding of subject-matter related to transparency. To measure the knowledge and skills dimension, we have identified 22 indicators that when evaluated could provide evidence of transparency capacity progress.

Table 5 Indicators for knowledge and skills.

Indicator	Unit	Social or Structural	Reporting, review, consideration	Data Sources	Link(s) to Progress
Eligible technical review experts	Number of qualified review experts per country (i.e. experts who pass training exams)	Social	Review	UNFCCC Roster of Experts	Evidence of level of national skills available.
BTR submission team individual employment type	Number of staff, domestic consultants, or international consultants within submission team	Structural	Reporting	BTR	Evidence of level and sustainability of national skills applied and available.
Curriculum on BTR submission elements (GHGI, V&A, Mitigation Assessment, Support)	Number of training programs	Structural	Reporting, Review	Curriculum providers	Evidence of knowledge available
BTR curriculum delivery	Instructional person-hours delivered per curriculum per year per country	Social	Reporting	Training providers	Evidence of knowledge delivery

BTR curriculum proficiency	Statistics (mean, median, etc.) on learner exam results per country	Social	Reporting	Training providers	Evidence of learner knowledge
Flexibilities reported within CRT	Number of cells denoting use of flexibility per country	Social	Reporting	BTR Submission	Evidence that skill capacity to support reporting element did not exist
Improvements reported	Number of improvements per priority type (High, Medium, Low)	Social	Reporting	BTR (chapter 10) TERR	Evidence of improvements achieved over time demonstrates skill progression; particularly if confirmed by technical review
Capacity building needs identified	Number of capacity building needs identified	Social	Reporting	BTR (chapter 10) TERR	Ability to identify capacity building needs, and address over time, demonstrates skill progress
Curriculum on technical components of BTR chapters guidelines/procedures/ templates (e.g. IPCC guidelines, MRV practices, verification guidelines, standards, data collection templates)	Number of training programs	Structural	Reporting, Review, Consultation	Curriculum providers	Evidence of knowledge available
Curriculum on technical components of BTR chapters Guidelines/procedures /template curriculum delivery	Instructional person-hours delivered per curriculum per year per country	Social	Reporting, Review, Consultation	Training providers	Evidence of knowledge delivery
Proficiency in curriculum on technical components of BTR chapters Guidelines/procedures /template curriculum	Statistics (mean, median, etc.) on learner exam results per country	Social	Reporting, Review, Consultation	Training providers	Evidence of learner knowledge

Data management system components (e.g. software, databases, models, cloud or physical storage, security, etc.)	Component type and name	Structural	Reporting, Review, Consultation	Component websites	Evidence of skill efficiency, efficacy, sustainability, or resiliency gained through IT components
Curriculum on data management system components (e.g. software, databases, models, cloud or physical storage, security, etc.)	Number of training programs	Structural	Reporting, Review, Consultation	Curriculum providers	Evidence of knowledge available
Data management system component curriculum delivery	Instructional person-hours delivered per curriculum per year per country	Social	Reporting, Review, Consultation	Training providers	Evidence of knowledge delivery
Proficiency in data management system components curriculum	Statistics (mean, median, etc.) on learner exam results per country	Social	Reporting, Review, Consultation	Training providers	Evidence of learner knowledge
Usage of data management system components	Does not exist, exists in country (n=0,1), If 1, then Component user records (varies by component type)	Social	Reporting, Review, Consultation	BTR Component user statistic reporting	Evidence of applied data management skills, user efficiency and efficacy is evidence of the degree of capacity that exists.
Curriculum on data measurement technology (e.g. surveys, sensors, satellites, etc.)	Number of training programs	Structural	Reporting	Curriculum providers	Evidence of knowledge available
Data measurement technology curriculum delivery	Instructional person-hours delivered per curriculum per year per country	Social	Reporting	Training providers	Evidence of knowledge delivery

Proficiency in data measurement technology curriculum	Statistics (mean, median, etc.) on learner exam results per country	Social	Reporting	Training providers	Evidence of learner knowledge
Usage of data measurement technology	Does not exist, exists in country (n=0,1), If 1, then Component user records (varies by component type)	Social	Reporting	BTR Component user statistic reporting	Evidence of applied data measurement skills, user efficiency and efficacy is evidence of the degree of capacity that exists.
Research and development on climate transparency	Number of peer-reviewed literature published	Structural	Reporting, Review, Consultation	Peer-reviewed journals	Evidence of knowledge available and knowledge progression through observation, experimentation, and testing.
Climate transparency researchers per capita	Number of authors per capita publishing on climate transparency	Social	Reporting, Review, Consultation	Peer-reviewed journals	Evidence of skills available and skill progression through observation, experimentation, and testing.

+ 5. Evaluating framework for future work

After identifying the long list of possible indicators, it is necessary to establish criteria to enable prioritization of these indicators to facilitate measurement and evaluation of transparency capacity (see **Table 6**).

In total, we identified 65 indicators from three transparency capacity dimensions that can help to assess transparency capacity progress (see **Table 7**). Upon evaluating this set of indicators for data clarity, data availability, and potential to increase data availability, we were able to define three prioritized areas for future work (1st effort, 2nd effort, unknown effort). Noting that BTR reporting, review, and consideration has not yet occurred, when ranking data availability, we evaluated an indicator based on current NC/BUR/BR data experiences. It is also worth mentioning that 'large-N' datasets within transparency refers to the combination of two aspects, the level of Party representativeness (e.g., n=194) and the range of years data is available (e.g., 1997-2023, into future).

Table 6 Indicator and data criteria.

<table>
<tr><th>Indicator Clarity</th><th>Current Data Availability</th><th>Effort to Increase Data Availability</th></tr>
<tr><td rowspan="2">High: Very clear, the degree to which the indicator can be differently interpreted is very low</td><td>High: Existing large-N datasets that are valid, accurate, timely, and publicly-available</td><td>Low: No need to increase data availability, it exists.</td></tr>
<tr><td>Moderate: Existing large-N datasets with less validity, accuracy, timeliness, and may only be privately-available</td><td rowspan="2">Moderate: Data could be improved, collected and aggregated, or made publicly available from national/cross-national sources to create a large-N data set</td></tr>
<tr><td rowspan="2">Low: The indicator has multiple, debatable interpretations</td><td>Mild: Existing small-N datasets with un-known validity, accuracy, or availability</td></tr>
<tr><td>Low: No existing or unknown datasets</td><td>High: Data mostly collected and aggregated from small-N qualitative sources</td></tr>
</table>

The first-priority effort includes the “low-hanging fruit”, those 29 indicators that should be evaluated under the 1st or 2nd GST because they are clear, have existing large-n datasets, with little to no need for data improvement. The second-priority effort includes those that need further research and development, those 24 indicators that could be evaluated under the 3rd GST because they are clear, with non-existent or small-n datasets, with needs for data improvement, collection, and/or aggregation. The remaining set of indicators are on the “wish list”, those 12 indicators that are of unknown priority and effort because the indicators may have multiple debatable interpretations, with non-existent or small n-datasets, with substantial need for data improvement, collection, and/or aggregation.

Table 7 Indicator prioritization for future research and evaluation under the GST.

No.	Dimension	Indicator	Indicator Clarity	Current Data Availability	Effort to Increase Data Availability
First effort indicators					
1	Output Quality	BTR Guidelines (MPGs)	High	High *(e.g. UNFCCC, 2019)*	Low
2	Output Quality	Common Reporting Tables (CRT) [GHGI] and Common Tabular Formats (CTF) (Support and tracking NDC progress)	High	High *(e.g. UNFCCC, 2022c)*	Low
3	Output Quality	BTR submission frequency	High	High *(e.g. https://unfccc.int/BURs)*	Low
4	Output Quality	BTR submission timeliness	High	High *(e.g. https://unfccc.int/BURs)*	Low
5	Output Quality	TERR Review Guidelines, Procedures, Templates	High	High	Low
6	Output Quality	FMCP Presentation Guidelines/Procedures/Templates	High	High	Low
7	Institution and organization	Country nomination of technical review experts	High	High *(e.g. https://www4.unfccc.int/sites/roestaging/Pages/Home.aspx)*	Low
8	Output Quality	"Shall" requirements achieved in BTR	High	High	Moderate
9	Output Quality	"Flexibilities" utilized in BTR	High	High	Moderate
10	Output Quality	TERR completion timeliness	High	High	Moderate
11	Output Quality	Adherence to TERR format (in-country, desk, centralized)	High	High	Moderate
12	Output Quality	Definition of reporting quality principles and methodologies to achieve them for each submission element (e.g. chapter)	High	Moderate	Moderate
13	Output Quality	Adherence with Common Reporting Tables (CRT)	High	Moderate	Moderate
14	Output Quality	Degree of BTR chapter quality	High	Moderate	Moderate
15	Output Quality	FMCP completion timeliness	High	Moderate	Moderate

16	Institution and organization	Flexibilities reported within CRT	High	Moderate	Moderate
17	Institution and organization	Use of BTR archiving information management system	High	Moderate	Moderate
18	Institution and organization	Total budget for TER	High	Moderate	Moderate
19	Institution and organization	Timeliness of review and comment on TERR	High	Moderate	Moderate
20	Institution and organization	Degree of FMCP written questions received	High	Moderate	Moderate
21	Institution and organization	Degree of FMCP written questions answered	High	Moderate	Moderate
22	Institution and organization	Degree of FMCP in-person questions received	High	Moderate	Moderate
23	Institution and organization	Timeliness of responses to FMCP questions received	High	Moderate	Moderate
24	Knowledge & Skills	Eligible technical review experts	High	Moderate	Moderate
25	Knowledge & Skills	BTR curriculum proficiency	High	Moderate	Moderate
26	Knowledge & Skills	Flexibilities reported within CRT	High	Moderate	Moderate
27	Knowledge & Skills	Improvements reported	High	Moderate	Moderate
28	Output Quality	"Should" requirements achieved in BTR	High	Moderate	Moderate
29	Output Quality	Adherence with TERR Guidelines/Procedures/Templates	High	Moderate	Moderate
Second effort indicators					
30	Output Quality	Adherence with BTR guidelines (MPGs)	High	Moderate	Low
31	Institution and organization	Existence of technical reviewers assigned to report review	High	Mild	Moderate
32	Institution and organization	Budget allocation for TER	High	Mild	Moderate
33	Knowledge & Skills	BTR curriculum delivery	High	Mild	Moderate
34	Institution and organization	Existence of BTR coordinator	High	Mild	High
35	Institution and organization	Employment type of BTR coordinator	High	Mild	High

36	Institution and organization	Total budget for BTR	High	Mild	High
37	Institution and organization	Employment type of BTR chapter compiler(s)	High	Mild	High
38	Institution and organization	Documented (written) BTR institutional arrangements	High	Mild	High
39	Knowledge & Skills	Proficiency in Guidelines/procedures/template curriculum	High	Mild	High
40	Knowledge & Skills	Proficiency in data management system components curriculum	High	Mild	High
41	Knowledge & Skills	Usage of data management system components	High	Mild	High
42	Knowledge & Skills	Proficiency in data measurement technology curriculum	High	Mild	High
43	Knowledge & Skills	Usage of data measurement technology	High	Mild	High
44	Institution and organization	Budget allocation for BTR	High	Low	High
45	Institution and organization	BTR workplan/Gantt chart	High	Low	High
46	Institution and organization	National legislation, regulation, or policy(ies) containing climate measurement, reporting, verification requirements	High	Low	High
47	Institution and organization	National legislation, regulation, or policy(ies) climate enforcement	High	Low	High
48	Knowledge & Skills	BTR submission team individual employment type	High	Low	High
49	Knowledge & Skills	Guidelines/procedures/template curriculum delivery	High	Low	High
50	Knowledge & Skills	Data management system component curriculum delivery	High	Low	High
51	Knowledge & Skills	Data measurement technology curriculum delivery	High	Low	High
52	Institution and organization	Budget allocation for BTR Chapters	High	Low	High
53	Institution and organization	Degree of FMCP in-person questions answered	Low	Moderate	Moderate
Unknown priority or effort					

54	Knowledge & Skills	Capacity building needs identified	Low	Mild	Moderate
55	Institution and organization	Regular stakeholder consultation	Low	Mild	High
56	Knowledge & Skills	Research and development on climate transparency	Low	Mild	High
57	Institution and organization	BTR archiving information management system	Low	Low	High
58	Institution and organization	Data management system components (e.g. software, databases, models, cloud or physical storage, security, etc.)	Low	Low	High
59	Institution and organization	Data measurement technology (e.g. surveys, sensors, satellites, etc.)	Low	Low	High
60	Knowledge & Skills	Curriculum on BTR submission elements (GHGI, V&A, Mitigation Assessment, Support)	Low	Low	High
61	Knowledge & Skills	Curriculum on guidelines/procedures/templates (e.g. IPCC guidelines, MRV practices, verification guidelines, standards, data collection templates)	Low	Low	High
62	Knowledge & Skills	Data management system components (e.g. software, databases, models, cloud or physical storage, security, etc.)	Low	Low	High
63	Knowledge & Skills	Curriculum on data management system components (e.g. software, databases, models, cloud or physical storage, security, etc.)	Low	Low	High
64	Knowledge & Skills	Curriculum on data measurement technology (e.g. surveys, sensors, satellites, etc.)	Low	Low	High
65	Knowledge & Skills	Climate transparency researchers per country	Low	Low	High

***Note**: In total, 65 indicators were identified from three transparency capacity dimensions (i.e. output quality, institution and organization, and knowledge and skills). Indicators were evaluated across the current status of data clarity, data availability, and potential to increase data availability. Based on this evaluation, three levels of prioritized future work were determined (i.e. 1st effort, 2nd effort, unknown effort). Specifically, 29 indicators (No.1-29) and 24 indicators (No.30-53) are included as the 1st and 2nd effort indicators, respectively, which have better data availability and should be prioritized. There are 12 indicators (No.54-65) included in the unknown effort, which are on the "wish list" for development. They are currently not clear, with non-existent or existing small-n datasets, with needs for data improvement, collection, and/or aggregation.*

+ 6. Conclusion

To measure capacity progress in climate transparency we need to address the measurement gap in information on transparency capacity. The following three concluding messages serve as critical inputs for informing future research and should receive due consideration under the first GST (2021-2023).

First, this paper proposes a common framework for measuring transparency capacity. Utilization of this framework will ensure that data collection on transparency capacity is reliable and consistent.

Secondly, measuring 'first-priority' indicators under the 1st and 2nd GST will allow the international community to answer basic questions like, "When and where is transparency output quality being met?" and secondarily, if gaps exist, "What capacity constraints and areas exist for improving climate transparency, via capacity-building?" Measuring 'second-priority' indicators by the third GST will provide information for facilitating deeper evaluation into answering other questions like, "What institutional and technical skills could countries build in order to meet the obligations under the ETF?"

Finally, integrating indicator data collection during technical expert review and making that data publicly available has the potential to be an efficient and effective solution for the development and utility of future indicator datasets.

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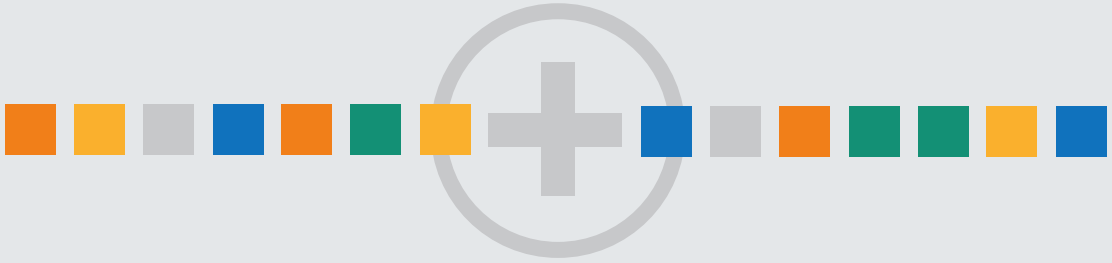

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