



Technology Executive Committee

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Thirty-second meeting

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Draft annotated outline for a ITU-TEC joint publication on digital technologies and NDCs

Cover note

I. Background

1. As per activity A.4.1. of its rolling workplan (2023-2027), the TEC is exploring the role of artificial intelligence (AI) and applied machine learning as enablers of climate solutions.
2. At TEC 31, the TEC considered and welcomed a presentation made by a representative of the International Telecommunication Union (ITU) proposing possible areas for future collaboration with the TEC, including on a publication on digital technologies and NDCs. The TEC requested the open-ended activity group on digital technologies to explore a contribution to the publication and to provide an update on this work at TEC 32.

II. Scope of the note

3. The annex to this note contains a draft annotated outline for a ITU-TEC joint publication on digital technologies and NDCs.

III. Possible actions by the Technology Executive Committee

4. The TEC will be invited to consider the draft annotated outline and provide guidance to the activity group.

Annex

Draft annotated outline for a ITU-TEC joint publication on digital technologies and NDCs

Digital technologies and NDCs: Digital solutions in support of NDC implementation

Draft annotated outline

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1. Introduction to the annotated outline

Digital technologies are reshaping economies, societies and human activities worldwide and are increasingly central to climate action. They are now mainstream tools for enabling mitigation and adaptation as reflected in an increasing number of national climate strategies, including Nationally Determined Contributions (NDCs).

Adopted in 2015, the Paris Agreement established a collective pathway to holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change. Through successive five-year cycles of NDCs, Parties to the agreement translate this collective ambition into national mitigation and adaptation targets that reflect domestic circumstances. NDCs therefore constitute the primary climate action plans for Parties under the Paris Agreement, outlining intended emissions reductions, adaptation measures and resilience-building efforts.

NDCs are so named because they are fundamentally national instruments through which Parties set out their national efforts to contribute to the collective goals of the Paris Agreement, reflecting their own priorities, needs, and national circumstances. Often developed through whole-of-government coordination and multi-stakeholder consultations, NDCs form the backbone of national climate action and guide the prioritization of actions and resources across sectors.

While the Paris Agreement sets out the core element for NDCs, Parties retain significant flexibility in defining scope, level of detail and areas of emphasis. NDCs typically include mitigation targets expressed in greenhouse gas (GHG) emissions or percentage reductions by a target year, alongside planned adaptation actions. Some also provide implementation details, including policies, programmes, financing arrangements and monitoring, reporting and verification (MRV) frameworks. To reflect differing capacities and support needs, some Parties distinguish between unconditional targets, achievable with domestic resources, and conditional targets that depend on international finance, technology transfer and capacity building.

Given the diversity of approaches that Parties may adopt for their NDCs and the interpretation of their object and purpose, any comparison across submissions should be approached with due caution. Within this context, the present report seeks to identify overarching trends and notable cases in how digital technologies are reflected in NDCs, while recognizing that each submission must be understood in its own context. The absence of certain information among some NDCs, therefore, should not be interpreted as a gap in itself; rather, the trends observed help illustrate the growing relevance that some Parties are placing in specific issues.

As a way of context, it should be noted that the first Global Stocktake (GST) in 2023 assessed collective progress towards the Paris Agreement's goals and concluded that the world is not on track to limit warming to 1.5°C. The GST highlighted technology development and transfer, alongside finance and capacity building, as critical enablers of effective climate action, while noting persistent gaps and uneven adoption. These findings underscore the need for closer analysis of how technology is being prioritized, integrated, and operationalized within national climate commitments.

This report analyses how Parties reference digital technologies for climate action in NDCs with 2035 targets, as well as whether the environmental impact of the digital sector is reflected in those NDCs. Coverage extends to all official NDC submissions with 2035 targets from January 2024 to September 2026.

This analysis is informed by three complementary studies that explored the role of technology in climate action from different yet reinforcing perspectives, thereby establishing a baseline for the interpretation of the results of this analysis.

- Similar to this report, the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN) published two reports in 2021 and 2023 titled *Technology and Nationally Determined Contributions (NDCs): Stimulating the Uptake of Technologies in Support of NDC Implementation*. These reports examine the role of technology in NDCs, with a focus on technology needs and challenges, links between policy and implementation (including with national adaptation plans), and examples of successful technology uptake across regions and country contexts.
- Also in 2023, the World Bank's *Green Digital Transformation: How to Sustainably Close the Digital Divide and Harness Digital Tools for Climate Action* report examined how digitalization can support climate objectives with a focused analysis of technologies and digital technologies included in the previous cycle of NDCs.
- Finally, ITU's 2025 brief *Digital Technologies in NDCs: Stocktake and Analysis* provided a first glimpse of how digital technologies are reflected in a sample of 53 NDCs with 2035 targets, identifying recurring patterns in the ways Parties reference digital solutions as part of climate implementation.

2. Purpose of this annotated outline

The annotated outline is intended to support preparation of the full report by translating the analytical brief into a chapter-by-chapter structure. It provides a descriptive roadmap of the content to be developed, clarifies the intended function of each section, and helps ensure ITU-TEC experts' coherence.

Included in the outline are the proposed report structure, the content purpose of each chapter and subsection, as well as the expected focus of key analytical paragraphs. Its role is to guide drafting and seek early feedback from the TEC.

3. Outline and general structure of the report

Executive summary

This opening section will briefly state that the report examines how Parties reference digital technologies for climate action in NDCs with 2035 targets, and how the digital sector is reflected in those submissions. It will clarify that the analysis is descriptive in nature and based on official NDC texts within a defined submission window and language scope.

A concise snapshot of the sample will be provided here, including the total number of NDC submissions analyzed, the time boundary used for inclusion and any other key methodological notes. It will also clarify that the unit of analysis is the submission level with 2035 targets rather than the country level where multiple relevant submissions may exist.

This section will also synthesize the main descriptive patterns elaborated in the full report, such as the share of NDCs with explicit digital references, share referencing MRV/data systems, share referencing early warning systems, share referencing AI applications, and share reflecting the digital sector explicitly. The wording will describe these as recurring clusters observed across the sample without interpreting causality or policy significance beyond what is directly evident from the texts.

A short orientation paragraph will conclude the executive summary by explaining what each chapter contains. It will note that the report includes an introduction, methodology and comparability notes, analytical chapters presenting the stocktake of digital technologies in NDCs, a section on how the digital sector is reflected in 2035 NDCs, a section on illustrative use cases, and the references and annexes containing the corpus list and keyword logic.

Introduction

The introductory chapter will set the stage in a very similar note as the introduction of this annotated outline. It will situate the analysis within the broader context of the growing role of digital technologies in climate action and the evolving architecture of the Paris Agreement. It introduces NDCs as the primary instruments through which Parties translate the Agreement's collective temperature goals into nationally determined mitigation and adaptation efforts, reflecting domestic priorities and circumstances. Against this backdrop, the section frames the relevance of examining how digital technologies are reflected in NDCs, particularly in light of the findings of the first Global Stocktake, which identified technology development and transfer as critical enablers of accelerated climate action amid persistent gaps. Finally, the section introduces the scope, time frame, and analytical focus of the report, including its grounding in prior complementary studies, and sets out the rationale for the present analysis of digital technologies in NDCs with 2035 targets.

Definitions

This section introduces and clarifies the key concepts and terms used throughout the analysis to ensure a common understanding and analytical consistency. For example, it defines "technology", "digital technologies", and other frontier digital technologies, such as artificial intelligence, data platforms, and digital monitoring and decision-support systems. When relevant, it is highlighted how these are understood in NDCs.

Methodology

The methodology chapter will begin by clarifying that the report examines how Parties reference digital technologies for climate action in NDCs with 2035 targets, as well as whether the environmental impact of the digital sector is reflected in those NDCs. The section will note that tables and figures in the final report are derived from an underlying dataset, built on the basis of this methodology.

It will indicate that the corpus consists of official NDC submissions retrieved from the relevant registry source, subject to inclusion criteria related to target year, status as an official submission, and any other criteria used to define the corpus. It will also clarify any exclusion rule for submissions that do not match the methodological requirements.

Here, the text would also explain the structured approach used to identify references to digital technologies in the NDCs. This includes the use of a curated keyword list, manual contextual review of search results, and subsequent data cleaning and validation. It will clarify that grammatical variants, related terms, plural forms, and any other relevant derivations were taken into account to improve detection while preserving contextual accuracy. It will also note that the framework was informed by existing knowledge bases and prior work referenced in the report, and that the retained and expanded keyword list was linked to a category system. Moreover, the methodology chapter will explain how submissions were counted and coded. Clarification will be included on how multiple submissions from the same Party were treated, how multi-attribute tagging was used to reflect measures that carry more than one characteristic, and how deduplication logic was applied to avoid double counting. It will also define the rule for counting bundled components as a single measure or as multiple measures based on how objectives are separated in the text, accompanied by an example to convey the point.

An important note will be included to detail how NDCs vary substantially in length, structure, and degree of implementation detail, and how this affects what can be extracted consistently from the text. Some NDCs may describe digital measures in detailed and operational terms, while others may use broad or aspirational language. The report therefore limits itself to content that can be identified directly and consistently in the submissions. It will be clarified that attention is placed on the textual treatment of digital technologies in official submissions, capturing both explicit references to digital tools and the ways in which digital-enabling conditions, institutions, sectors, and support needs are incorporated into NDC language.

The report applies a conservative identification rule, whereby a measure is classified as digital only when the NDC text explicitly refers to a digital function, component, or system. This methodological choice is intended to ensure analytical consistency and comparability across submissions, while acknowledging that it may lead to an underrepresentation of cases where digitalization is implicit rather than explicitly articulated. An exception is applied for monitoring and information systems, as well as early warning systems, for which a basic level of digitalization is assumed, given the reliance of such solutions on underlying digital data layers and information infrastructures. Where relevant, illustrative examples will be provided to clarify the application of this approach.

Digital technologies in 2035 NDCs

This section constitutes the core analytical component of the report. It presents the main findings of the analysis and describes the observed trends in how digital technologies are reflected across NDCs with 2035 targets. The analysis remains descriptive in nature, focusing on patterns and variations across submissions

rather than evaluative judgments, and provides an evidence-based overview of how Parties are currently positioning digital technologies within their national climate commitments. The following list is an indicative outline of the trends and findings to be included:

- The section will open by describing whether and how the NDCs in the sample reference digital technologies in general terms. It will highlight the share of NDCs that have an explicit mention, comparing that figure with the baseline set by the previously outlined bibliography.
- The narrative will also note the presence of non-digital technology references as reflected in the NDC texts.
- Attention will then shift to the observed range in how digital technologies are referenced, from brief and high-level mentions to more detailed treatments across sectors, functions, or implementation areas.
- To provide a more detailed analytical framework, the report will classify the identified digital solutions into selected categories, such as early warning systems, monitoring, reporting, and verification systems, data platforms, registries, digital dashboards, and decision-support tools. In some relevant cases, it would exemplify the functions attributed to these systems in the texts, such as tracking emissions, supporting planning, improving reporting, enabling transparency, or informing decisions.
- As a common digital solution, a separate paragraph would be devoted to the frequency with which early warning systems appear in the NDCs. The drafting can describe whether such systems are framed as multi-hazard, sector-specific, risk communication tools, or broader resilience systems.
- The analysis will then turn to the number and share of NDCs that include concrete references to artificial intelligence applications as an emerging area of interest for several Parties. The text will describe notable use-case framing in the NDCs.
- Another subsection will capture instances in which NDCs reference digital tools in relation to loss-and-damage-related solutions. The narrative would explain how these references are framed where present.
- A dedicated paragraph would then describe how mitigation-related digital solutions are referenced in the NDCs. A parallel paragraph would cover adaptation-related digital solutions.
- The next step would be to describe the sectors in which digital solutions most commonly appear. The text will identify the sectors reflected in the dataset, such as energy, agriculture, forestry and land use, water, transport, waste, disaster risk management, and others where applicable, based strictly on the NDC texts. Not all references will be sector-bound. This paragraph will therefore indicate the share of non-sector specific references.
- The drafting can then examine the share of NDCs that indicate implementation of digital measures at regional, provincial, municipal, or community levels, or that refer to local authorities and multi-level governance arrangements.
- A separate paragraph would describe how often NDCs include targets, milestones, or other quantified references specifically linked to digital measures. It will note whether these appear as explicit numeric targets, roll-out goals, coverage goals, or deadlines.
- It will also identify relevant examples of when NDCs include cost estimates, budget references, or costed components associated with digital measures. The explanation will indicate what such costing language typically looks like in the texts where present.

- A related paragraph can capture how some NDCs connect digital-climate actions to funding instruments, facilities, partnerships, procurement channels, international support, or other implementation mechanisms. The focus will remain on how specifically those mechanisms are linked to digital measures.
- The analysis will also highlight notable trends among NDCs that reference technology transfer and how that language is connected to implementation needs, international support, conditionality, or cooperation arrangements.
- A related subsection will include the share of NDCs with digital solutions that distinguish between unconditional targets and conditional targets linked to international finance, technology transfer, and capacity-building support.
- This subsection would indicate how often NDCs mention Technology Needs Assessments or otherwise articulate explicit technology needs. It will explain how this language appears in the texts and how it is treated as a readiness or support-related signal in the analysis.
- Another relevant angle will be to identify how often measures related to connectivity, digital inclusion, access to digital services, or closing the digital divide are explicitly mentioned in NDCs.
- This section will also describe how often NDCs reference research, development, innovation ecosystems, pilot programmes, or knowledge partnerships relevant to digital climate solutions.
- The report will also capture whether and how NDCs mention just transition considerations in relation to technology adoption or digitalization. The wording will stay strictly descriptive and tied to what appears in the texts.
- A final paragraph in this section will describe how NDCs reference gender considerations in relation to digital climate solutions, including access, training, participation, service reach, or support for women and girls where such links are explicitly made.

The digital sector in 2035 NDCs

This section will indicate whether NDCs include a standalone chapter, section, or subsection dedicated to ICT, digital transformation, digital infrastructure, or the digital sector. It would explain how common or rare this is across the sample.

This section will also capture whether NDCs include references to reducing the environmental footprint of digital infrastructure, improving the energy efficiency of ICT systems, greening data centres, sustainable connectivity, or related themes.

Notable use cases

This section presents a set of illustrative national use cases that show how digital technologies are being incorporated into climate action as reflected in NDC-related contexts and associated implementation narratives. The purpose is not to evaluate performance or compare Parties, but to provide concrete examples of how digital solutions are being identified, designed, and applied in different national circumstances. The use cases will be selected to reflect regional diversity, variation in sectoral focus, and different types of digital interventions.

To ensure coherence across cases, each use case should follow the same structure:

1) Initial situation and context

Each case will begin by outlining the national or sectoral situation prior to the digital intervention. This part would describe the underlying climate-related challenge, the institutional or operational gaps that existed, and the limitations of pre-existing systems, processes, or approaches. Where relevant, it may also note constraints related to data availability, coordination, infrastructure, access, or response capacity.

2) Opportunities identified for digital solutions

The next subsection would explain how opportunities for digitalization were identified in that national context. The drafting will describe the specific needs, priorities, or entry points that created space for digital tools to support climate action, whether in mitigation, adaptation, resilience, planning, monitoring, or service delivery.

3) Description of the digital solution used

This subsection will then describe the digital solution that was adopted, proposed, piloted, or scaled. It will explain what the solution consists of, what function it performs, which actors are involved in its implementation or operation, and in which sector or policy area it is applied. Where relevant, it may also indicate what digital tools or components are utilized.

4) Results obtained

Once the intervention is introduced, the case will describe the main results, outputs, or improvements associated with the digital solution. The drafting would remain descriptive and avoid overstating causality where the evidence is limited.

5) Challenges faced

A separate subsection will capture the main difficulties encountered in the design, deployment, operation, or scaling of the digital solution. These may relate to financing, institutional coordination, technical capacity, maintenance, interoperability, connectivity, access, data quality, or governance. The intention is to describe the implementation conditions and constraints visible in the case.

6) Lessons learned

Each use case would conclude with a short subsection summarizing the main lessons that emerge from the experience. These may relate to enabling factors, sequencing, institutional arrangements, design features, partnerships, or capacity needs. The focus will be on practical insights that help explain how the intervention evolved in context and what can be observed from that experience.

It should be noted that ITU has received early expressions of interest and suggestions from partners regarding these use cases. An indicative long-list includes the following Parties: Albania, Antigua and Barbuda, Argentina, Bangladesh, Cambodia, Cabo Verde, Chad, Comoros, Djibouti, Ecuador, Ethiopia, Fiji, Guatemala, Guyana, Haiti, Iraq, Kiribati, Liberia, Madagascar, Malaysia, Mauritius, Montenegro, Mozambique, Nepal, Niger, North Macedonia, Sao Tome and Principe, Senegal, Solomon Islands, Somalia, South Africa, Tonga, and Uganda and United Republic of Tanzania.

Annexes

Annex A. Corpus list by region

- A table listing all included NDC submissions (Party/submission identifier, region, submission date, language).

Annex B. Keyword list and search logic

- Full keyword list (baseline and added terms), plus a description of how variants were handled (pluralization, stems, language variants).

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