

Working Paper

Analysis and Synthesis of Technology Components in Nationally Determined Contributions

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Key findings

- **Most Parties mention technology in their Nationally Determined Contributions (NDCs)** although there is no ICTU¹ provision that requests Parties to provide such information.
- The **structure and depth of information provided on technology in NDCs varies significantly**. Some Parties included a dedicated section on technology, while most Parties refer to technology in other sections of their NDCs, such as mitigation or adaptation sections. Most references to technology include qualitative aspects, while some also include quantitative or even project-specific information.
- Information on technology in NDCs is mainly focussed on **technology needs; specific technologies to be deployed; technology innovation, research and development; policy, regulatory and legal aspects; and support to be provided** to other Parties for technology development and transfer. Some Parties made specific reference to Technology Needs Assessments (TNAs).
- Most developing country Parties' NDCs depend either partially or fully on support for technology development and transfer. However, **some developing country Parties' NDCs are entirely unconditional**.
- **South-South cooperation, triangular cooperation and regional cooperation** was highlighted by some developing country Parties **as support mechanisms** on specific aspects of technology development and transfer.
- **All findings should only be taken as indicative and are subject to change** given that most developing country Parties have not yet submitted their new NDCs.

1. Introduction

This working paper presents the synthesis and analysis of information on technology contained in 48 NDCs received by 31 December 2020², which the UNFCCC secretariat used for the preparation of its Initial Synthesis Report on NDCs in response to requests from the COP³ and CMA⁴, which was published on 28 February 2021.⁵ A final version of the Synthesis Report on NDCs is to be published by the secretariat in advance of COP 26 in November 2021.

The 48 NDCs, representing 75 Parties⁶, include all revised, updated and/or enhanced (I)NDCs as well as some initial NDCs submitted by Parties in line with Decision 1/CP.21, paragraphs 23 and 24. Parties use different terminologies for referring to their latest NDCs as summarized in Table 1 below:

¹ In communicating its NDC, each Party has an obligation under Article 4.8 of the Paris Agreement to provide the “information necessary for clarity, transparency, and understanding” (ICTU) in accordance with Decision 1/CP.21 and any future decisions of the CMA.

² <https://www4.unfccc.int/sites/ndcstaging/Pages/LatestSubmissions.aspx>

³ Decision 1/CP.21, paragraph 25.

⁴ Decision 1/CMA.2, paragraph 10.

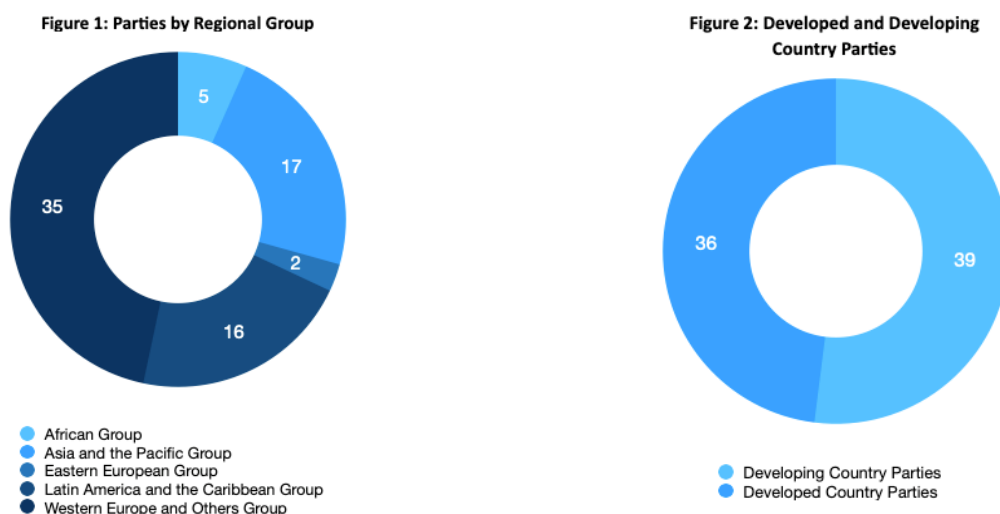
⁵ <https://unfccc.int/documents/268571>

⁶ The NDC submitted by the European Union is the only NDC considered for this report that represents a group of Parties. Since the European Union represents 27 Parties, 48 NDCs represent 75 Parties.

Table 1: Terminology used by Parties to describe their latest NDCs

| | "NDC" | "NDC 1" | "NDC 2" | "NDC 2020" | "Updated & enhanced NDC" | "Updated NDC 1" | "Updated NDC 2" | TOTAL |
|----------------|-------|---------|---------|------------|--------------------------|-----------------|-----------------|-------|
| Number of NDCs | 5 | 2 | 5 | 5 | 25 | 5 | 1 | 48 |

The 75 Parties that submitted the 48 NDCs considered for this working paper represent only 39% of the 190 Parties to the Paris Agreement⁷. These 75 Parties are shown by regional groups in Figure 1 and by developed and developing countries in Figure 2 below. Out of the 39 developing countries, 7 are LDCs and 10 are SIDS.

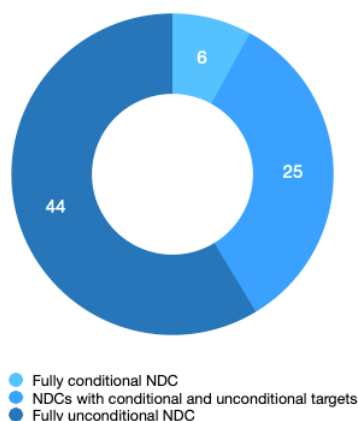


The 48 NDCs analysed and synthesized for this working paper represent a relatively small sample size, given that only 26% of developing country Parties that are Party to the Paris Agreement are represented here. This becomes even more apparent when looking at specific groups of developing country Parties, e.g. only about 10% of Parties from the African Group and 16% of LDCs are represented in this sample size.

Figure 3 shows the number of NDCs that are fully conditional, fully unconditional or include both conditional and unconditional targets.

⁷ <https://unfccc.int/process/the-paris-agreement/status-of-ratification>.

Figure 3: Conditionality of NDCs



While 31 NDCs (79%) from developing country Parties include targets that are either partially (25 NDCs) or fully (6 NDCs) dependent on support for technology development and transfer, eight NDCs (21%) of developing country Parties are completely unconditional.

2. Methodology

The analysis of technology components in the NDCs was done in three steps. The first step included the development of a database to systematically capture the different aspects of NDC references to technology, including on:

- Where information was included in NDCs: Dedicated section on technology/means of implementation or in other sections;
- What type of information was included: Qualitative information, quantitative information and/or detailed projects on the development, transfer and/or deployment of specific technologies;
- What type of overall objective the action that includes a reference to technology has: adaptation, mitigation or adaptation and mitigation;
- What sector the action that includes a reference to technology can be attributed to: agriculture; climate observation and early warning systems; coastal zones; energy; forestry and land-use; human health; industry; infrastructure and buildings; tourism; transport; waste or water;
- The title of the action mentioning technology, if any, as well as the specific references to technology;
- The category that the technology reference falls into: i) innovation, research & development; ii) institutional strengthening and co-ordination; iii) policy, regulatory and legal (enabling environment); iv) specific technology to be deployed; v) support for technology development and transfer; vi) technology needs, including TNA; vii) cross-cutting; viii) other.
- Involvement of other countries in the action, including through South-South cooperation, triangular cooperation or regional cooperation; and
- Financial data, if any.

In the second step the database was populated based on the review of the 48 NDCs, including the review of documents that Parties submitted together with their NDCs. Documents referred to by Parties in their NDCs, but not submitted with their NDCs as well as policies or targets communicated by Parties outside their NDCs were not considered.

In the third step the identified and collated information and data related to technology as contained in the NDC submissions was analysed and synthesized as presented in the following section of this paper.

3. Findings

Most Parties mention technology in their NDCs: Out of the 48 NDCs reviewed for this paper, 43 NDCs (90%) mention technology although there is no ICTU provision that requests Parties to provide such information.

Structure and depth of information on technology in NDCs varies significantly: Out of the 43 Parties that refer to technology in their NDCs, 11 Parties (26%) included a dedicated section on technology, while 32 Parties (74%) only refer to technology in other sections of their NDCs. Out of the 43 NDCs submitted by those Parties referring to technology, 40 NDCs (93%) included qualitative aspects of technology, while 16 NDCs (37%) also include quantitative information in this regard. Five NDCs (12%) further included specific projects on technology development and transfer, some with detailed information on technical and financial requirements, implementing entities and time frames.

Technology is mostly referred to in NDCs in the context of actions that are either **focussed on both adaptation and mitigation** (32 Parties) **or on mitigation** (31 Parties) only. To a lesser extent technology is also referred to in the context of adaptation actions (20 Parties).

Information on technology in NDCs mainly focussed on: technology needs (28 Parties), including on TNAs (7 Parties)⁸; specific technologies to be deployed (25 Parties); policy, regulatory and legal aspects (15 Parties); technology innovation, research and development (12 Parties); institutional strengthening and coordination (5 Parties) and support to be provided to other Parties for technology development and transfer (5 Parties). Some technology references in NDCs also focussed on cross-cutting and other issues, such as strengthening market preparation, business planning and investment to promote the deployment of prioritized technologies; promoting social acceptance of new technologies; and ensuring gender responsiveness of technology development and transfer (3 Parties). For specific examples per category, see Table 2 below.

Concrete technology needs expressed by Parties in their NDCs are mainly in **agriculture, climate observation and early warning, energy, industry, infrastructure and buildings, transport, and water**.

The most referred to specific technologies that Parties intend to use for achieving their adaptation and mitigation targets are **energy-efficient appliances and processes, renewable energy technologies, low or zero emission vehicles, and hydrogen**.

Actions on policy, regulatory and legal aspects commonly referred to by Parties in their NDCs include developing or updating policies to **promote technology innovation, energy-efficiency and the accelerated adoption and transfer of climate technologies through private investments**.

⁸ A full list of reference to TNAs is provided in the Annex.

In the context of technology innovation, research and development, some Parties included information on **promoting institutions, mechanisms, tools and business models that foster national innovation capacity.**

Examples of actions in the area of institutional strengthening and coordination include **building institutional capacities and specific technical skills** as well as improving coordination between the local and national levels and among different stakeholders.

Some Parties also included specific information on their intended support to developing country Parties on the development and diffusion of climate technologies. **South-South cooperation, triangular cooperation or regional cooperation** was highlighted by three developing country Parties⁹ **as support mechanisms** for example in the areas of renewable energy and energy efficiency.

Only three Parties included in their NDCs financial information on their planned actions with reference to technology. Two of these Parties provided finance requirements for specific projects that include the development or transfer of climate technologies.

Table 2: Examples of information on technology in NDCs

| Category | Information on technology in NDC |
|---|--|
| Technology needs | <ul style="list-style-type: none"> • Climate-resilient building construction technology and low-cost affordable housing technology (Cambodia) • Modernization of the country's hydrometeorological services, allowing for the maintenance of accurate forecasts and early warning systems for an effective and efficient response, which includes modernization in observation, assimilation and forecasting systems, access to sensors and technologies (Nicaragua) • Enhancement of access to, development and transfer of technologies at different stages of the technology cycle, promotion of innovation and implementation of prioritized technologies in the areas of agriculture, renewable energy and transport among others (Thailand) • Technologies for water savings, recycling and irrigation for sustainable water management for households, agriculture and industrial purposes (Zambia) |
| Specific technologies to be deployed | <ul style="list-style-type: none"> • Establish first regional hydrogen export hub to boost the country's hydrogen industry and fund research collaborations and supply chain studies to enable demonstration and deployment (Australia) • Increase electric vehicle, including in the areas of private vehicles, commercial vehicles, taxis & buses (Chile) • Ensure smooth transition towards a nationwide adoption and use of renewable energy technologies, mainly solar photovoltaic, will be critical (Brunei Darussalam) • Increase of energy efficiency in industrial sectors (Japan) |
| Policy, regulatory and legal aspects | <ul style="list-style-type: none"> • Develop and update energy efficiency standards and regulations for end-use technologies, including for refrigeration and air conditioning equipment, boilers, heat pumps, vehicles, machinery and other energy-intensive equipment (Costa Rica) • Prepare and implement a strategy and action plan on gender-responsive climate-smart technologies and practices (Nepal) • Promote clean fuel technology regulations to set standards for the GHG emissions and economic incentives for fuel-efficient vehicles & e-mobility (Papua New Guinea) • Adjust country regulatory framework to create stronger incentives for private investment in technologies that will increase climate resilience (Republic of Moldova) |
| Innovation and R&D | <ul style="list-style-type: none"> • Design an inventory system for climate technologies that facilitates the development of local technologies and the adoption of technologies existing worldwide (Dominican Republic) |

⁹ Mexico, Singapore and United Arab Emirates.

| | |
|--|---|
| | <ul style="list-style-type: none"> • Promote research and development focusing on climate smart agriculture technologies and practices to address challenges facing the sector due to climate variabilities, seasonal changes and extreme events (Maldives) • Significantly scale up R&D investments for core emission reduction technologies, e.g., renewable energy, zero emission vehicles and hydrogen technologies (Republic of Korea) |
| Institutional strengthening | <ul style="list-style-type: none"> • Generate, focus and link the supporting tools for technology development and transfer, both for the local development and for the transfer of existing technologies at the local and global level in mitigation and adaptation for the various and/or different prioritized productive sectors at national and regional level. Strengthen cooperation and exchange among local actors in country and overseas including on technology transfer (Chile) • Build institutional capacities to support the transfer of climate and environmentally sound technologies (Republic of Moldova) • Support research, technological development and innovation through alliances with academia, think tanks and research centres that contribute to the generation of new knowledge, development of new technologies, transfer processes and technological appropriation (Colombia) |
| Support to be provided to other Parties | <ul style="list-style-type: none"> • Committed to foster South-South and triangular cooperation, with a focus on scientific and technological cooperation, in order to support other countries in achieving more ambitious adaptation and mitigation goals in accordance with national development priorities for each country (Mexico) • Continue to deepen and broaden technical cooperation programmes with other developing countries (Singapore) • Support renewable energy projects in developing countries (United Arab Emirates) |

4. Next step

Any of the findings presented above may be subject to change given the relatively small number of NDCs that this working paper is based on. The majority (74%) of developing country Parties are still to submit their new NDCs in the course of 2021. Therefore it possible that an updated analysis and synthesis based on all new NDCs later this year will have different findings regarding information on technology development and transfer.

Annex: References to TNAs in NDCs

| Party | References to TNA in NDC |
|----------------------------|--|
| Cambodia | <p>“Cambodia has developed a technology needs assessment for adaptation and mitigation, and technology needs also feature prominently in the sectoral climate change action plans. However, these are largely outdated so each ministry provided an action by action indication of technology needs and availability.”</p> <p>The Ministry of Planning “might require support for technology needs assessments “.</p> <p>The Ministry of Water Resources and Meteorology lists “technology needs assessment” as a barrier.</p> |
| Dominican Republic | <p>The country “requires a comprehensive technology needs assessment in 2021 for its NDC implementation”.</p> |
| Republic of Moldova | <p>“TNA with regard to adaptation carried out for water, health and agriculture sectors. TAPs for agriculture and health sectors.”</p> <p>“Main activities and actions in support of adaptation priorities” include:</p> <ul style="list-style-type: none"> - “Based on the results of TNA develop a portfolio of projects and programmes which can facilitate access to and the transfer of, climate and environmentally sound technologies (CESTs) and know-how in key sectors of the economy.” - “Taking into account lessons learned from the TNA process and produced portfolio of CESTs, develop a technology roadmap with clear targets, milestones and implementation timeframe.” |
| Mongolia | <p>Included under “Needs for Support” on “Technology Transfer”: “For determining the most suitable, efficient, and effective technologies, Mongolia needs to conduct the technology needs assessment.”</p> |
| Panama | <p>Most technology needs were identified in the sectors of “Integrated River Basin Management” (25%) and “Forests (LULUCF)” (20%). Although it is not a conclusive analysis on the national priority needs in the technological context at the national level, it identifies the needs expressed by the technical teams of the Climate Change Directorate, responsible for coordinating climate action and those who manage projects with climate components. The Technological Needs Assessment Report for Climate Change (ENT) issued by MiAMBIENTE in 2017 identified a list of 24 technologies to address the problem of drinking water and sanitation. ... The next steps in the technology needs assessment process involves the identification and analysis of the opportunities and barriers of each of the identified technologies.”</p> |
| Papua New Guinea | <p>Included in the “Means of Implementation” section under “Information on Technology”:</p> <ul style="list-style-type: none"> - “A TNA must be conducted (if not yet carried out), which will clearly set out the specific needs of the identified sectors.” - “A TNA for the NDC needs to be carried out with relevant stakeholders at the national level. The TNA ought to be gender-responsive and should consider the local context.” |
| Suriname | <p>Included in the “Means of Implementation” section under “Technology transfer”:</p> <p>“In 2019, Suriname started the process of conducting a Technology Needs Assessment, to be concluded by December 2020. Three priority sectors have been identified (the relevant technologies identified for assessment are given in brackets):</p> <ul style="list-style-type: none"> - Agriculture (Climate resilient crop varieties and livestock breeds, Water use efficiency and Integrated farming systems); - Water Management (water 27modeling, water resource mapping, and water storage and harvesting); and, - Infrastructure and Housing (Infrastructure: Forest Specific Land Use Planning; Housing: Energy Efficient Building Design).” |