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**Nationally determined contributions under the Paris  
Agreement**

**Synthesis report by the secretariat**

*Summary*

This report synthesizes information from the 168 latest available nationally determined contributions communicated by 195 Parties to the Paris Agreement and recorded in the registry of nationally determined contributions as at 9 September 2024.



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## Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
ACE	Action for Climate Empowerment
AFOLU	agriculture, forestry and other land use
AR	Assessment Report of the Intergovernmental Panel on Climate Change
CCS	carbon dioxide capture and storage
CCUS	carbon dioxide capture, use and storage
CH <sub>4</sub>	methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
COP	Conference of the Parties
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
GWP-100*	global warming potential values with a 100-year time-horizon
HFC	hydrofluorocarbon
IEA	International Energy Agency
INDC	intended nationally determined contribution
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
IRENA	International Renewable Energy Agency
LT-LEDS	long-term low-emission development strategy(ies)
LULUCF	land use, land-use change and forestry
N <sub>2</sub> O	nitrous oxide
NAP	national adaptation plan
NDC	nationally determined contribution
NF <sub>3</sub>	nitrogen trifluoride
PFC	perfluorocarbon
SDG	Sustainable Development Goal
SF <sub>6</sub>	sulfur hexafluoride
SLCP*	short-lived climate pollutant
SR1.5	Intergovernmental Panel on Climate Change Special Report on Global Warming of 1.5 °C
SSP	Shared Socioeconomic Pathway
UNEP	United Nations Environment Programme

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\* Used exclusively in figures.

## I. Executive summary

1. This report has been prepared in response to the request from CMA 3<sup>1</sup> for the secretariat to annually update the NDC synthesis report.<sup>2</sup> This version of the report synthesizes information from the 168 latest available NDCs, representing 195 Parties to the Paris Agreement,<sup>3</sup> including the 153 new or updated NDCs communicated by 180 Parties, recorded in the NDC registry<sup>4</sup> as at 9 September 2024, covering 95 per cent of the total global emissions in 2019, which are estimated at 52.9 Gt CO<sub>2</sub> eq without LULUCF.<sup>5</sup> A total of 34 Parties have communicated new or updated NDCs since 25 September 2023 (the cut-off date for submissions covered in the previous version of this report).
2. The COP and CMA guidance<sup>6</sup> on the information necessary for clarity, transparency and understanding of NDCs was used as a framework for synthesizing the relevant information contained in the communicated NDCs, which was supplemented by the synthesis of other information included in the NDCs but not covered by the guidance. The synthesized information is presented for all the represented Parties taken together.
3. A total of 95 per cent of Parties provided the information necessary to facilitate clarity, transparency and understanding of their NDCs in accordance with the COP guidance, with 94 per cent of Parties that submitted new or updated NDCs already applying the relevant further CMA guidance.
4. Parties provided information on mitigation targets as well as mitigation co-benefits resulting from adaptation actions and/or economic diversification plans. The mitigation targets range from economy-wide absolute emission reduction targets to strategies, policies, plans and actions for low-emission development. In their NDCs:
  - (a) 94 per cent of Parties provided quantified mitigation targets, expressed as clear numerical targets, while 6 per cent included strategies, policies, plans and actions for which there is no quantifiable information as components of their NDCs;
  - (b) 81 per cent of Parties communicated economy-wide targets, covering all or almost all sectors defined in the 2006 IPCC Guidelines, with an increasing number of Parties moving to absolute emission reduction targets in their new or updated NDCs;
  - (c) 100 per cent of Parties covered CO<sub>2</sub> emissions, 91 per cent covered CH<sub>4</sub>, 89 per cent covered N<sub>2</sub>O, 54 per cent covered HFCs, 35 per cent covered PFCs and SF<sub>6</sub> and 26 per cent covered NF<sub>3</sub>;
  - (d) 46 per cent of Parties provided information on mitigation co-benefits resulting from their adaptation actions and/or economic diversification plans, mostly in combination with other targets.
5. A total of 93 per cent of Parties communicated an NDC implementation period of until 2030, while 7 per cent specified an implementation period of until 2025, 2035, 2040 or 2050. While 54 per cent of Parties identified 1 January 2021 as their starting date for NDC implementation, 29 per cent indicated that they started implementing their NDC in or before 2020 and 6 per cent mentioned starting implementation in 2022.
6. In addition, 96 per cent of Parties provided quantified information on their mitigation targets and reference points. Of the Parties that submitted new or updated NDCs, 84 per cent updated the basis for defining their targets, including reference points and/or ‘business as

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<sup>1</sup> Decision [1/CMA.3](#), para. 30.

<sup>2</sup> See document [FCCC/PA/CMA/2023/12](#) for the 2023 report.

<sup>3</sup> The European Union and its 27 member States communicated one joint NDC in accordance with Article 4, paras. 16–18, of the Paris Agreement, which for this report has been counted as one NDC representing 28 Parties and reflecting the inclusion of particular information by all of them.

<sup>4</sup> Available at <https://unfccc.int/NDCREG>.

<sup>5</sup> Unless otherwise noted, in this report global GHG emission totals exclude emissions from forestry and other land use or LULUCF but include emissions from international maritime transport and international aviation.

<sup>6</sup> Decisions [1/CP.21](#), para. 27; and [4/CMA.1](#) and annex I.

usual' scenarios. Such updates lead to higher-quality NDCs and, for some Parties, to significant changes in the estimated emission levels for 2025 and 2030.

7. Furthermore, Parties are increasingly indicating their use of voluntary cooperation under Article 6 of the Paris Agreement, with 78 per cent stating that they plan to or will possibly use at least one type. Use of cooperative approaches referred to in Article 6, paragraph 2, was most frequently communicated (by 52 per cent of Parties), followed by use of the mechanism established by Article 6, paragraph 4, (34 per cent) and general use of voluntary cooperation (25 per cent). Parties mentioned general use of voluntary cooperation, rather than reporting planned or possible use of specific scopes of voluntary cooperation, more frequently than indicated in previous versions of this report.

8. Total global GHG emissions (without LULUCF) taking into account implementation of the latest NDCs<sup>7</sup> are estimated to be around 53.0 (51.4–54.5) Gt CO<sub>2</sub> eq in 2025<sup>8</sup> and 51.5 (48.3–54.7) Gt CO<sub>2</sub> eq in 2030,<sup>9</sup> which are:<sup>10</sup>

(a) In 2025, 54.0 per cent higher than in 1990 (34.4 Gt CO<sub>2</sub> eq), 11.3 per cent higher than in 2010 (47.6 Gt CO<sub>2</sub> eq) and approximately the same as in 2019 (52.9 Gt CO<sub>2</sub> eq);<sup>11</sup>

(b) In 2030, 49.8 per cent higher than in 1990, 8.3 per cent higher than in 2010 and 2.6 per cent lower than in 2019, as well as 2.8 per cent lower than the estimated level for 2025, indicating the possibility of global emissions peaking before 2030.

9. In comparison, the total GHG emission levels resulting from implementation of NDCs (those submitted by 25 September 2023) presented in the previous version of this report were estimated to be around 53.2 (51.6–54.8) Gt CO<sub>2</sub> eq in 2025 and 51.6 (48.3–54.8) Gt CO<sub>2</sub> eq in 2030. Those levels are very similar (at 0.2 Gt CO<sub>2</sub> eq higher for 2025 and 0.1 Gt CO<sub>2</sub> eq higher for 2030) to the levels presented in this report, the estimates of which reflect a slight increase in aggregate NDC ambition level and updated emission data.

10. The projected total global GHG emission level taking into account full implementation of all latest NDCs continues to imply a possibility of global emissions peaking before 2030, with the lower bound of the 2030 emission level (48.3 Gt CO<sub>2</sub> eq) estimated to be up to 8.6 per cent below the 2019 emission level (52.9 Gt CO<sub>2</sub> eq) and 6.0 per cent below the lower bound of the estimated 2025 emission level (51.4 Gt CO<sub>2</sub> eq). However, in order to achieve that peaking, the conditional elements of the NDCs need to be implemented, which depends mostly on access to enhanced financial resources, technology transfer and technical cooperation, and capacity-building support; availability of market-based mechanisms; and absorptive capacity of forests and other ecosystems.

11. Full implementation of all latest NDCs is estimated to lead to a 5.9 (3.2–8.6) per cent emission reduction by 2030 relative to the 2019 level; while implementation of all latest NDCs excluding any conditional elements is estimated to result in 0.8 per cent higher emissions in 2030 than in 2019 (ranging from 1.8 per cent lower to 3.4 per cent higher).

<sup>7</sup> Unless otherwise noted, "implementation of NDCs" comprises cases of full implementation of all (conditional and unconditional) NDC elements and cases of implementation of unconditional elements only. For the quantitative results of that implementation, an average and a range of the projected outcomes are presented. "Full implementation" of NDCs refers to implementing all conditional elements as well as any unconditional elements.

<sup>8</sup> Unless otherwise noted, for this report GWP values with a 100-year time-horizon from the AR6 have been used. For NDCs that include estimates of GHG emissions calculated using other GWP values (e.g. from previous ARs), a conversion has been applied. For further information, including on estimation methods and approaches, see document [FCCC/PA/CMA/2021/8/Add.3](#).

<sup>9</sup> Unless otherwise noted, in this report the average of the quantification is followed by a range that represents the minimum and maximum values after aggregation, since several Parties presented conditional and unconditional elements of their NDCs and, in some cases, ranges of values for both.

<sup>10</sup> Percentages are the average of the changes in the lower- and higher-end emission quantifications.

<sup>11</sup> Changes in quantitative results since the previous version of this report, such as the stated percentage changes in projected 2025 or 2030 emission levels relative to 1990, reflect any increases in aggregate NDC ambition level and/or any updates to emission projections and historical emission estimates.

12. The contribution of Working Group III to the AR6<sup>12</sup> concludes that, in scenarios of limiting warming to 1.5 °C (with over 50 per cent likelihood by 2100) with no or limited overshoot over the course of the century,<sup>13</sup> GHG emissions are reduced by 43 (34–60) per cent by 2030 relative to the 2019 level. In scenarios of keeping warming likely below 2 °C (with over 67 per cent likelihood) with mitigation action starting in 2020, emissions in 2030 are 27 (13–45) per cent below the 2019 level.<sup>14</sup>

13. The Synthesis Report of the AR6<sup>15</sup> indicates that, to be in line with global modelled pathways to limiting warming to 1.5 °C (with over 50 per cent likelihood) with no or limited overshoot and those to limiting warming to 2 °C (with over 67 per cent likelihood), GHG emissions have to be reduced by 60 (49–77) per cent by 2035 relative to the 2019 level and by 35 (22–55) per cent by 2035 relative to the 2019 level respectively.

14. The absolute difference in the level of emissions by 2030 according to the latest NDCs and these IPCC scenarios<sup>16</sup> is sizeable, despite progress compared with the level according to the INDCs as at 4 April 2016. The difference between the projected emission levels that do not take into account implementation of any conditional elements of NDCs and the emission levels in the scenarios of keeping warming likely below 2 °C (with over 67 per cent likelihood) by 2030 is estimated to be 14.9 (10.9–18.3) Gt CO<sub>2</sub> eq. In relation to the scenarios of limiting warming to 1.5 °C (with over 50 per cent likelihood) and achieving net zero emissions this century, the gap is even wider, at an estimated 22.7 (21.2–27.7) Gt CO<sub>2</sub> eq. However, assuming full implementation of all latest NDCs, including all conditional elements, the gap is slightly narrowed, towards 11.3 (7.3–14.7) Gt CO<sub>2</sub> eq in relation to the aforementioned 2 °C scenarios and towards 19.2 (17.6–24.1) Gt CO<sub>2</sub> eq in relation to the aforementioned 1.5 °C scenarios.

15. Taking into account the implementation of NDCs up until 2030, projected global mean temperatures are subject to significant uncertainty owing to the range of emission levels estimated for 2030 resulting from implementation of NDCs (including whether conditional elements are implemented or not), the range of illustrative emission extensions beyond 2030 and inherent climate system uncertainties. The best estimate of peak temperature in the twenty-first century (projected mostly for 2100 when temperature continues to rise) is in the range of 2.1–2.8 °C depending on the underlying assumptions.

16. In the context of the carbon budget consistent with 50 per cent likelihood of limiting warming to 1.5 °C (500 Gt CO<sub>2</sub>), cumulative CO<sub>2</sub> emissions in 2020–2030 based on the latest NDCs would likely use up 86 per cent of the remaining carbon budget, leaving a post-2030 carbon budget of around 70 Gt CO<sub>2</sub>, which is equivalent to approximately two years of projected total global CO<sub>2</sub> emissions by 2030. Similarly, in the context of the carbon budget consistent with a likely chance of keeping warming below 2 °C (estimated by the IPCC to be 1,150 Gt CO<sub>2</sub> from 2020 onward), cumulative CO<sub>2</sub> emissions in 2020–2030 based on the latest NDCs would likely use up around 37 per cent of the remaining carbon budget. For

<sup>12</sup> IPCC. 2022. Summary for Policymakers. In: PR Shukla, J Skea, R Slade, et al. (eds.). *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge and New York: Cambridge University Press. Available at <https://www.ipcc.ch/report/ar6/wg3/>.

<sup>13</sup> The 1.5 and 2 °C warming levels in scenarios are usually considered to be 20-year averages of warming, with warming in individual years – owing to natural variability – being potentially higher than those levels. According to the Synthesis Report of the AR6 (see footnote 15 below), the occurrence of individual years with global surface temperature change above a certain level does not imply that this global warming level has been reached.

<sup>14</sup> The categories of scenarios referred to in this paragraph are “C1” and “C3a” respectively in table SPM.2 of the contribution of Working Group III to the AR6.

<sup>15</sup> IPCC. 2023. *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Core Writing Team, H Lee, and J Romero (eds.). Geneva: IPCC. Available at <https://www.ipcc.ch/report/ar6/syr/>.

<sup>16</sup> The differences are calculated between emission levels according to the NDCs and under IPCC scenario categories “C1a” and “C3a” respectively.

comparison, total global CO<sub>2</sub> emissions between 1850 and 2020 are estimated by the IPCC<sup>17</sup> to have amounted to 2,390 (2,150–2,630) Gt CO<sub>2</sub>.

17. A total of 50 per cent of Parties provided information on long-term mitigation visions, strategies and targets for up until and beyond 2050. Their total GHG emission level is estimated to be 39.2 (37.2–41.1) Gt CO<sub>2</sub> eq in 2030, which is 4 per cent higher than in 2010 (with a range from 1 per cent lower to 9 per cent higher) and 6 (1–10) per cent lower than in 2019.<sup>18</sup>

18. Mindful of the inherent uncertainty of such long-term estimates, and the need for full implementation of NDCs and LT-LEDS, the information indicates that these Parties' total GHG emission level could be 63 (59–67) per cent lower in 2050 than in 2019 and their annual per capita emissions would be 2.4 (2.1–2.6) t CO<sub>2</sub> eq by 2050. Under scenarios of limiting warming to likely below 2 °C (with over 67 per cent likelihood), annual per capita emissions are 2.4 (1.6–3.1) t CO<sub>2</sub> eq; hence the estimated long-term per capita emissions of these Parties are at a level consistent with 2 °C scenarios. However, for scenarios of limiting warming to 1.5 °C (with 50 per cent likelihood by 2100) and achieving net zero CO<sub>2</sub> emissions around 2050 and net zero GHG emissions this century, annual per capita emissions by 2050 are required to be two to three times lower, at 1.3 (0.6–2.1) t CO<sub>2</sub> eq.<sup>19</sup>

19. A total of 97 per cent of Parties explained their approach to NDC preparation and implementation, and 59 per cent of Parties linked their NDCs to their commitment to transitioning to a sustainable and/or low-carbon and resilient economy, taking into account social, environmental and economic factors as well as the SDGs. In addition, 48 per cent of Parties indicated that they have integrated their NDC targets, goals and policies into national legislative, regulatory and planning processes as a means of ensuring implementation.

20. Furthermore, 66 per cent of Parties highlighted policy coherence and synergies between their domestic mitigation measures<sup>20</sup> and development priorities, which include the SDGs and, for some that submitted new or updated NDCs, LT-LEDS and green recovery from the coronavirus disease 2019 pandemic.

21. Of the 79 per cent of Parties that referred to formal arrangements in place for domestic stakeholder consultation, 93 per cent indicated that they conducted consultations and engagement in an inclusive and participatory manner and 81 per cent of those specifically referenced gender-sensitive consultations.

22. Parties are increasingly<sup>21</sup> recognizing gender integration as a means to enhance the ambition and effectiveness of their climate action: 82 per cent of Parties provided information related to gender in their NDCs and 48 per cent affirmed that they will take gender into account in implementing them.<sup>22</sup> Of the Parties that referenced gender, 32 per cent had not included reference to gender in their previous NDCs and 28 per cent considered gender to a similar extent to previously. Of the Parties that referenced gender in their previous NDCs, 28 per cent elaborated more on the topic in their updated NDCs.

23. In 60 per cent of the latest available NDCs, Parties recognized the rights and important role of Indigenous Peoples, as well as the role of local communities, in relation to climate

<sup>17</sup> IPCC. 2021. Summary for Policymakers. In: V Masson-Delmotte, P Zhai, A Pirani, et al. (eds.). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press. Available at <https://www.ipcc.ch/report/ar6/wg1/>.

<sup>18</sup> For more details on projected collective GHG emission levels based on long-term mitigation visions, strategies and targets in NDCs and LT-LEDS, see document [FCCC/PA/CMA/2023/10](https://www.fccc.org/publications/2023/10/FCCC/PA/CMA/2023/10).

<sup>19</sup> Per capita emission levels were calculated on the basis of the AR6 Working Group III scenario database (available at <https://data.ece.iiasa.ac.at/ar6/>) for the categories “C3a” and “C1a” respectively.

<sup>20</sup> In this report, (domestic) mitigation measures refer to specific domestic policies and actions that contribute to achieving mitigation objectives identified in NDCs, including adaptation actions and economic diversification plans with mitigation co-benefits.

<sup>21</sup> The share of Parties that refer to gender and consider it a cross-cutting issue in the new or updated NDCs is significantly increased since their previous NDCs.

<sup>22</sup> For more information on gender under the UNFCCC, see <https://unfccc.int/topics/gender/workstreams/chronology-of-gender-in-the-intergovernmental-process>.

adaptation efforts. They acknowledged the vulnerabilities faced by Indigenous Peoples and local communities, emphasized the importance of strengthening climate efforts through incorporation of traditional knowledge, Indigenous knowledge and local knowledge systems, and highlighted the need to enhance these groups' participation in and contributions to climate action.

24. In addition, 98 per cent of Parties provided information on using one or more ACE elements<sup>23</sup> to promote implementation of mitigation and adaptation activities, and in their new or updated NDCs Parties generally communicated more clearly and in more detail on general principles, past achievements, future commitments, and needs and gaps in relation to ACE.

25. Furthermore, 81 per cent of Parties included an adaptation component in their NDCs and 13 per cent of the adaptation components were designated as adaptation communications. Parties provided information in particular on adaptation-related research; risks and vulnerabilities; adaptation strategies, policies and plans; sectoral adaptation measures; contingency measures; synergies with mitigation and other global frameworks; and monitoring and evaluation of adaptation.

26. In comparison with Parties' previous NDCs, more of the NDCs contain adaptation information. The adaptation components of the NDCs, where included, indicate an increased focus on national adaptation planning, in particular on the process to formulate and implement NAPs. The new or updated NDCs include, in comparison with the same Parties' previous NDCs, more information on time-bound quantitative adaptation targets and the associated indicator frameworks, more specific information on the contribution of adaptation efforts towards achieving the SDGs, and more specific information on synergies and co-benefits between adaptation and mitigation.

27. In terms of adaptation priorities, the NDCs illustrate that Parties continue to focus on food production and nutrition security, water resources, terrestrial and wetland ecosystems, key economic sectors and services, and human health; followed by disaster risk management, coastal and low-lying areas, urban areas and human habitats, livelihoods and poverty, and ocean ecosystems (see figure 10).

28. A total of 99 per cent of Parties outlined domestic mitigation measures as key instruments for achieving mitigation targets for their NDCs and/or for priority areas, such as energy supply, transport, buildings, industry, AFOLU and waste. Parties communicated mitigation measures most frequently in the priority area of energy supply (95 per cent of Parties), followed by AFOLU (89 per cent) and transport (87 per cent).

29. Parties identified mitigation options costing less than USD 20/t CO<sub>2</sub> eq, which are projected in the contribution of Working Group III to the AR6 to account for more than half of the total emission reduction potential that is required for being on 1.5 °C pathways with no or limited overshoot by 2030. Such mitigation options with the highest estimated net emission reduction potential (in parentheses) include:

(a) Solar energy (3.3 Gt CO<sub>2</sub> eq/year), with 51 per cent of Parties communicating corresponding measures;

(b) Wind energy (3.08 Gt CO<sub>2</sub> eq/year), with 36 per cent of Parties indicating corresponding measures;

(c) Reducing conversion of forests and other ecosystems (2.28 Gt CO<sub>2</sub> eq/year), with 47 per cent of Parties reporting corresponding measures;

(d) Improving energy efficiency in industry (1.14 Gt CO<sub>2</sub> eq/year), with 30 per cent of Parties identifying corresponding measures;

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<sup>23</sup> ACE denotes work under Article 12 of the Paris Agreement; its objective is to empower all members of society to engage in climate action through education, training, public awareness, public participation, public access to information, and international cooperation on these issues (the six ACE elements).



(e) Reducing fluorinated gas emissions (0.94 Gt CO<sub>2</sub> eq/year), with 26 per cent of Parties including corresponding measures.

30. For these feasible, effective and low-cost mitigation options,<sup>24</sup> Parties communicated measures for achieving conditional mitigation targets in their NDCs most frequently in relation to solar energy (42 per cent of Parties), followed by those relating to reducing conversion of forests and other ecosystems (31 per cent), wind energy (30 per cent) and improving energy efficiency in industry (22 per cent). The largest conditionality gap<sup>25</sup> in terms of the difference between the shares of Parties referring to mitigation options for achieving conditional and unconditional mitigation targets was found in relation to solar energy (at 17 percentage points), followed by wind energy (13 percentage points) and reduced conversion of forests and other ecosystems (8 percentage points). These indicate Parties' need for enhanced support and cooperation for effectively implementing these mitigation options.

31. Parties reported in their NDCs mitigation measures that contribute to global efforts and mitigation options that have been covered in recent CMA decisions.<sup>26</sup> Parties have also domestically announced pledges (targets, policies, plans and projects) that relate to these global efforts and mitigation options, including, but not limited to, increasing installed capacity of renewables-based electricity generation by 2030, enhancing production of low-carbon hydrogen and expanding capture capacity for CCUS. The combined effects of realizing those pledges related to the global efforts are projected to be significantly higher than the aggregated 2030 targets pertaining to those global efforts indicated in the current NDCs.

32. A total of 46 per cent of Parties considered mitigation co-benefits resulting from their adaptation action and/or economic diversification plans. In their new or updated NDCs more Parties reported on mitigation co-benefits of adaptation action and economic diversification plans, including information on specific projects, measures and activities with the resulting co-benefits, compared with the information in their previous NDCs. Similarly, more Parties provided information on their consideration of social and economic consequences of response measures, and of just transition and/or economic diversification.

33. Adaptation actions and economic diversification plans with mitigation co-benefits include afforestation and reforestation activities, climate-smart agriculture, reducing food waste, vertical farming, adapting coastal ecosystems, conservation plans for protected areas, nature-based solutions, increasing the share of renewable sources in energy generation, improving energy efficiency, carbon dioxide capture and storage, fuel switch and fuel price reforms in the transport sector, and moving to circular economy for better waste management.

34. Parties continued to report ocean-based measures to demonstrate climate action. Of the Parties that included an adaptation component in their NDCs, 31 per cent identified ocean ecosystems as a priority sector for adaptation and 13 per cent have quantified targets for fisheries; while 12 per cent included reference to human- and climate-induced ocean changes such as acidification, extreme weather events, sea level rise, storms and drought. Of the 21 per cent of Parties that included information on ocean or blue carbon as a priority sector for reducing GHG emissions, 71 per cent mentioned specific ocean-based mitigation measures.

35. A total of 91 per cent of Parties provided information on some or all means of implementation in their NDCs, although the structure and depth of that information varied significantly. While 61 per cent included a section on means of implementation or separate sections on finance, technology and/or capacity-building, 69 per cent mentioned or referred to aspects of means of implementation in other sections of their NDCs.

<sup>24</sup> As referred to in decision [1/CMA.5](#), para. 16(c).

<sup>25</sup> Calculated by subtracting the share of Parties referring to mitigation options for achieving unconditional mitigation targets from that for achieving conditional mitigation targets. For example, the conditionality gap for solar energy (17 percentage points) is the difference between the share of Parties referring to using solar energy measures for achieving conditional mitigation targets (42 per cent) and that for achieving unconditional mitigation targets (25 per cent).

<sup>26</sup> Decisions [1/CMA.3](#), [1/CMA.4](#) and [1/CMA.5](#).

36. A total of 91 per cent of Parties provided information on finance as a means of NDC implementation, with 69 per cent characterizing finance in terms of international support needed and 24 per cent mentioning finance from domestic sources only. In addition, 46 per cent of Parties provided quantitative estimates of financial support needs, which were often expressed as total amounts over the time frame of the NDC. Of those, 29 per cent provided updated quantitative estimates of financial support needs for the first time in their new or updated NDCs.

37. A total of 62 per cent of Parties identified certain types of technology that they intend to use for implementing adaptation and mitigation actions, most frequently related to the energy, agriculture, water and waste sectors. Technology needs mentioned by Parties were mainly (41 per cent) of a cross-cutting nature addressing both adaptation and mitigation, followed by those focused on mitigation (33 per cent) or adaptation (23 per cent). Over 50 per cent of Parties referred to policy, regulatory and legal measures, and innovation, research and development for promoting and adopting low-carbon and climate-resilient technologies in different sectors such as energy, agriculture, industry and transport.

38. Finally, 76 per cent of Parties identified capacity-building as a prerequisite for NDC implementation. Capacity-building needs for formulating policy, integrating mitigation and adaptation into sectoral planning processes, accessing finance and providing the information necessary for clarity, transparency and understanding of NDCs were identified. In their new or updated NDCs, 20 per cent of Parties highlighted the importance of capacity-building for transfer of low-carbon and green technologies, and of collaboration for effectively implementing NDCs.

## II. Mandate

39. In accordance with the Paris Agreement, each Party is to prepare, communicate and maintain successive NDCs that it intends to achieve and each successive NDC will represent progression reflecting the Party's highest possible ambition. Moreover, a Party may at any time adjust its existing NDC with a view to enhancing the level of ambition.<sup>27</sup> The communicated NDCs are to be recorded in the NDC registry, maintained by the secretariat.

40. COP 21 invited Parties to communicate their first NDC no later than when the Party submits its respective instrument of ratification, acceptance or approval of or accession to the Paris Agreement. A Party is also considered to have satisfied this provision, unless the Party decides otherwise, if it had communicated an INDC prior to becoming a Party to the Paris Agreement.<sup>28</sup>

41. COP 21 requested Parties whose INDC pursuant to decision [1/CP.20](#) contains a time frame:

(a) Up to 2025: to communicate by 2020 a new NDC and to do so every five years thereafter pursuant to Article 4, paragraph 9, of the Paris Agreement;

(b) Up to 2030: to communicate or update by 2020 their NDC and to do so every five years thereafter pursuant to Article 4, paragraph 9, of the Paris Agreement.<sup>29</sup>

42. CMA 3 requested the secretariat to annually update the NDC synthesis report and to make it available to the CMA at each of its sessions.<sup>30</sup>

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<sup>27</sup> Article 4, paras. 2, 3 and 11, of the Paris Agreement.

<sup>28</sup> Decision [1/CP.21](#), para. 22.

<sup>29</sup> Decision [1/CP.21](#), paras. 23–24.

<sup>30</sup> Decision [1/CMA.3](#), para. 30.

### III. Introduction

#### A. Background and scope

43. This report synthesizes information from the 168 latest available NDCs, representing 195 Parties to the Paris Agreement,<sup>31</sup> recorded in the NDC registry as at 9 September 2024. A total of 34 Parties<sup>32</sup> have communicated new or updated NDCs since 25 September 2023 (the cut-off date for submissions covered in the previous version of this report).

44. The 168 NDCs comprise 153 new or updated NDCs from 180 Parties<sup>33</sup> and 15 NDCs from Parties that have not communicated new or updated NDCs in response to paragraphs 23–24 of decision [1/CP.21](#).

45. Under the Paris Agreement, in communicating their NDCs, Parties are to provide the information necessary for clarity, transparency and understanding in accordance with decision [1/CP.21](#) and any relevant decisions of the CMA.<sup>34</sup>

46. For first NDCs, including those communicated or updated by 2020, this information may cover, as appropriate, quantifiable information on the reference point (including, as appropriate, a base year); time frames and/or periods of implementation; scope and coverage; planning processes; assumptions and methodological approaches, including for estimating and accounting for anthropogenic GHG emissions and, as appropriate, removals; and how the Party considers that its NDC is fair and ambitious in the light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2.<sup>35</sup>

47. CMA 1 adopted further guidance on the information necessary for clarity, transparency and understanding of NDCs. In communicating their second and subsequent NDCs, Parties shall provide the information necessary for clarity, transparency and understanding contained in annex I to decision [4/CMA.1](#) as applicable to their NDCs. In addition, CMA 1 strongly encouraged Parties to provide this information in relation to their first NDC, including when communicating or updating it by 2020.<sup>36</sup>

<sup>31</sup> The European Union and its 27 member States communicated one joint NDC in accordance with Article 4, paras. 16–18, of the Paris Agreement, which for this report has been counted as one NDC representing 28 Parties and reflecting the inclusion of particular information by all of them.

<sup>32</sup> Azerbaijan, Brazil, European Union and its 27 member States, Madagascar, Namibia, Oman and Panama.

<sup>33</sup> Albania, Andorra, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia (Plurinational State of), Bosnia and Herzegovina, Brazil, Brunei Darussalam, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Côte d'Ivoire, Cuba, Democratic People's Republic of Korea, Democratic Republic of the Congo, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, European Union (and its 27 member States), Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Haiti, Holy See, Honduras, Iceland, India, Indonesia, Iraq, Israel, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Monaco, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, New Zealand, Nicaragua, Niger, Nigeria, North Macedonia, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Qatar, Republic of Korea, Republic of Moldova, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, State of Palestine, Sudan, Suriname, Switzerland, Tajikistan, Thailand, Timor-Leste, Togo, Tonga, Tunisia, Türkiye, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Zambia and Zimbabwe.

<sup>34</sup> Article 4, para. 8, of the Paris Agreement.

<sup>35</sup> Decisions [1/CP.21](#), para. 27; and [4/CMA.1](#), para. 9.

<sup>36</sup> Decision [4/CMA.1](#), paras. 6–10 and annex I.

48. The guidance on the information necessary for clarity, transparency and understanding is without prejudice to the inclusion of components other than information on mitigation in an NDC.<sup>37</sup>

## **B. Approach**

49. The guidance on the information necessary for clarity, transparency and understanding of NDCs was used as a framework for synthesizing the relevant information contained in the communicated NDCs,<sup>38</sup> which was supplemented by the synthesis of other information included in the NDCs but not covered by the guidance, such as on adaptation, means of implementation necessary for NDC implementation, domestic mitigation measures, and economic diversification plans and response measures.

50. The synthesis covers only the information communicated by Parties in their NDCs and the synthesized information is presented for all those Parties taken together.

51. The approach to and methods for estimating projected emission levels resulting from NDC implementation are consistent with those set out in document [FCCC/PA/CMA/2021/8/Add.3](#).

52. For this report, projected emission levels resulting from implementation of the NDCs were compared with emission scenarios assessed by the IPCC, specifically categories of scenarios from the contribution of Working Group III to the AR6 (table SPM.2). Different categories cover scenarios of limiting warming to different levels. For example, there are 204 scenarios assessed by the IPCC of limiting warming likely below 2 °C (with over 67 per cent chance) with concerted mitigation action having started by 2020 (category “C3a”); and there are 50 scenarios assessed by the IPCC of keeping warming at around 1.5 °C with no or limited overshoot and achieving net zero emissions in the latter half of this century in line with Article 4, paragraph 1, of the Paris Agreement (category “C1a”).

## **IV. Synthesis of information contained in nationally determined contributions**

### **A. Overview**

53. This report considers the 168 latest available NDCs, representing 195 Parties to the Paris Agreement, covering 95 per cent of total global emissions in 2019, which are estimated at 52.9 Gt CO<sub>2</sub> eq<sup>39</sup> without LULUCF (and around 56.7 Gt CO<sub>2</sub> eq with LULUCF<sup>40</sup>).

54. A total of 95 per cent of Parties provided the information necessary for clarity, transparency and understanding of their NDCs in accordance with Article 4, paragraph 8, of the Paris Agreement and paragraph 27 of decision [1/CP.21](#). Of the Parties that submitted new

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<sup>37</sup> Decision [4/CMA.1](#), para. 8.

<sup>38</sup> As per decision [1/CP.21](#), para. 25.

<sup>39</sup> Including emissions from countries that are not Parties to the Paris Agreement, a harmonization factor to ensure comparability with SSP scenarios assessed by the IPCC, and emissions from international aviation and maritime transport, which accounted for approximately 1.2 and 1.5 per cent, respectively, of total global emissions in 2019.

<sup>40</sup> In line with anthropogenic land-use emissions and removals in the scenarios assessed by the IPCC, although aggregate global net emissions estimated on the basis of national GHG inventories would be lower. The difference mainly reflects whether forest sinks in areas of managed land are defined as anthropogenic. A large fraction of these forest sinks is part of the natural carbon cycle response to elevated CO<sub>2</sub> concentrations and can hence be regarded as indirect (but not direct) anthropogenically induced sinks (also referred to as CO<sub>2</sub> fertilization effect). Note that land-use emissions are generally subject to relatively large uncertainties. The chosen harmonized emission level facilitates comparability between aggregate emissions according to NDCs, emissions in IPCC-assessed scenarios and IPCC-reported emission milestones (see table SPM.2 in the contribution of Working Group III to the AR6) or timing of achievement of net zero emissions.

or updated NDCs, 94 per cent provided such elements of information, already applying the CMA guidance referred to in paragraph 47 above.

55. In addition, 81 per cent of Parties provided information on adaptation, with 13 per cent of Parties identifying the adaptation component of their NDC as their adaptation communication, and 2 per cent provided information organized around the elements identified in the annex to decision [9/CMA.1](#).

56. Furthermore, almost all Parties provided other information, such as on the means of implementation necessary for NDC implementation; domestic mitigation measures; and/or economic diversification plans and response measures.

## **B. Scope and coverage**

57. All Parties provided information on mitigation targets or mitigation co-benefits resulting from adaptation actions and/or economic diversification plans in their NDCs (see figure 1), which range from economy-wide absolute emission reduction targets to strategies, policies, plans and actions for low-emission development, to be implemented within a specified time frame or implementation period:

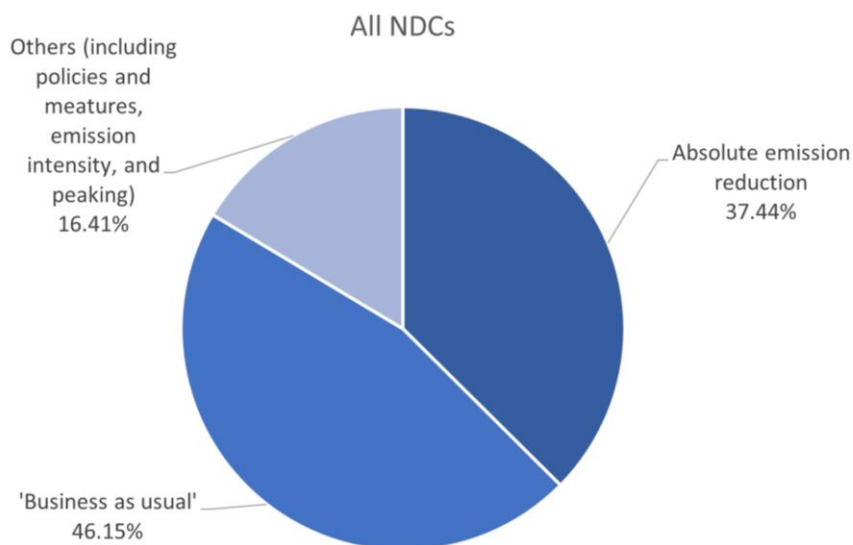
(a) 37 per cent included absolute emission reduction targets expressed as an emission reduction from the level in a specified base year, ranging from 7.2 to 88.0 per cent, while 4 per cent specified a year or time frame in which their emissions are expected to peak or reach a maximum level of absolute emissions (e.g. by 2030). In addition, 2 per cent of Parties expressed their target as a carbon budget in addition to the absolute target, establishing an overall limit on GHGs to be emitted over a specified period of time (e.g. between 2021 and 2030);

(b) 46 per cent included relative targets for reducing emissions below the 'business as usual' level by a specified target year, either for the whole economy or for specific sectors, ranging from 5 to 100 per cent and thus achieving carbon neutrality; or emission intensity targets for reducing specific GHG emissions per unit of gross domestic product relative to a base-year (e.g. 1990) level;

(c) 51 per cent included strategies, plans and actions for low-emission development reflecting their particular national circumstances;

(d) 46 per cent provided information on mitigation co-benefits resulting from their adaptation actions and/or economic diversification plans, mostly in combination with other targets.

Figure 1  
**Types of mitigation target and share of Parties that communicated them in nationally determined contributions**



58. Total global GHG emissions (without LULUCF) taking into account implementation of the latest NDCs are estimated to be around 53.0 (51.4–54.5) Gt CO<sub>2</sub> eq in 2025 and 51.5 (48.3–54.7) Gt CO<sub>2</sub> eq in 2030 (see figure 2).

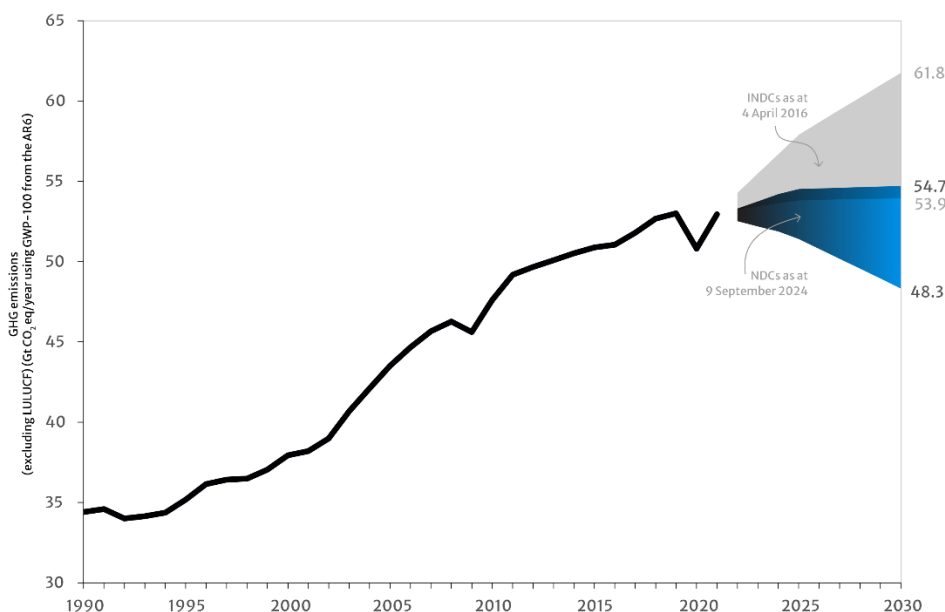
59. In comparison, the total GHG emission levels resulting from implementation of the NDCs presented in the previous version of this report were estimated to be around 53.2 (51.6–54.8) Gt CO<sub>2</sub> eq in 2025 and 51.6 (48.3–54.8) Gt CO<sub>2</sub> eq in 2030. The levels presented in this report, which reflect a stagnation in aggregate NDC ambition level and updated emission data, are therefore only 0.2 Gt CO<sub>2</sub> eq (or 0.5 per cent) lower for 2025 and 0.1 Gt CO<sub>2</sub> eq (or 0.1 per cent) lower for 2030 than the estimated emission levels indicated previously.

60. The NDCs of 82 per cent of Parties are unconditional, at least in part, with many including more ambitious conditional elements. The implementation of most conditional elements depends on access to enhanced financial resources, technology transfer and technical cooperation, and capacity-building support; availability of market-based mechanisms; and absorptive capacity of forests and other ecosystems. Total GHG emission levels resulting from implementation of the unconditional elements of the NDCs are estimated to be 53.8 (53.1–54.5) Gt CO<sub>2</sub> eq in 2025 and 53.3 (52.0–54.7) Gt CO<sub>2</sub> eq in 2030 (see figure 2). On the other hand, assuming full implementation of all NDCs, including explicitly conditional elements, emission levels are estimated to be lower in 2025, at 52.2 (51.4–53.0) Gt CO<sub>2</sub> eq, and in 2030, at 49.8 (48.3–51.2) Gt CO<sub>2</sub> eq.

61. When considering only the new or updated NDCs, the total GHG emissions of the relevant Parties are estimated to be around 47.8 (46.3–49.2) Gt CO<sub>2</sub> eq in 2025 and 46.8 (43.8–49.7) Gt CO<sub>2</sub> eq in 2030.

62. Of the Parties that submitted new or updated NDCs, 82 per cent included unconditional components and many included additional conditional elements, mainly conditional upon finance. Compared with their previous NDCs, 15 per cent more Parties included unconditional elements in their new or updated NDCs.

Figure 2  
**Projected range and progression of emission levels according to nationally determined contributions**



*Note:* The projected ranges cover the higher-emission end for unconditional elements of NDCs to the lower-emission end when also taking conditional elements of NDCs into account. Emissions from international aviation included are assumed constant by 2030 at the 2019 level (~619 Mt CO<sub>2</sub>); emissions from international maritime transport of 755 Mt CO<sub>2</sub> eq in 2018 are assumed to be 20–30 per cent below the 2008 level by 2030 and reach net zero by or around 2050 (implemented as a 90–100 per cent reduction below the 2008 level by 2050) in line with the international maritime sector’s revised 2023 GHG reduction strategy for global shipping (see <https://www.imo.org/en/OurWork/Environment/Pages/IMO-Strategy-on-reduction-of-GHG-emissions-from-ships.aspx>). The comparison of total emissions resulting from implementation of INDGs and latest NDCs includes the difference in assumed bunker emissions (approximately 423 (349–497) and 583 (462–704) Mt CO<sub>2</sub> eq lower emissions in 2025 and 2030 respectively).

63. All Parties provided information on the scope and coverage of their NDCs, including sectors and gases covered. The coverage of sectors and gases slightly increased in the new or updated NDCs compared with the Parties’ previous NDCs (see figure 3).

64. A total of 81 per cent of Parties have economy-wide NDCs, with 66 per cent covering all sectors defined in the 2006 IPCC Guidelines. All NDCs cover the energy sector, more than 80 per cent cover agriculture, LULUCF and waste and 76 per cent IPPU.

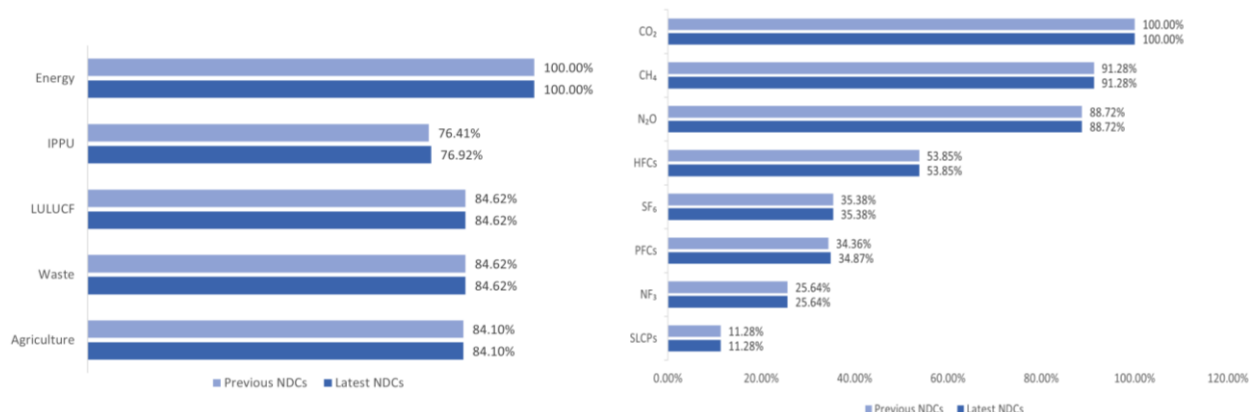
65. Of the Parties, 21 per cent provided information on coverage of specific sectors of national importance, which are often a subset of one or more IPCC sectors, such as shipping and aviation, cooling, food production, transport, mining or buildings, while others mentioned specific carbon pools, oceans or blue carbon.

66. Of the Parties, 100 per cent covered CO<sub>2</sub> emissions, while 91 per cent covered CH<sub>4</sub>, 89 per cent N<sub>2</sub>O, 54 per cent HFCs, 35 per cent PFCs, 35 per cent SF<sub>6</sub> and 26 per cent NF<sub>3</sub>. In addition, 11 per cent of Parties included additional gases or emissions, including short-lived climate pollutants, such as black carbon, sulfur dioxide and non-methane volatile organic compounds.



Figure 3

### Sectors and greenhouse gases covered by Parties that communicated them in nationally determined contributions



67. A total of 81 per cent of Parties provided information on how they are striving to include all categories of anthropogenic emissions and removals in their NDCs over time, as well as explanations for the exclusion of any categories: 45 per cent stated that they already have economy-wide NDCs including all sectors and GHGs, while 43 per cent explained why certain sectors and/or gases had been excluded, such as owing to categories being negligible or insignificant, data unavailability or inaccuracy, or lack of technical capacity.

68. In addition to communicating information on mitigation targets or plans for the near to medium term, 52 per cent of Parties provided information on long-term mitigation visions, strategies or targets for up to and beyond 2050 that either have already been formulated or are under preparation in the LT-LEDS.<sup>41</sup>

### C. Time frames and/or periods of implementation

69. All Parties communicated in their NDCs the time frame and/or period of implementation, which refers to a time in the future by or in which an objective is to be achieved.

70. A total of 93 per cent of Parties communicated a time frame and/or period of implementation of until 2030, while 7 per cent of Parties specified periods of until 2025, 2035, 2040 or 2050. Further, 54 per cent of Parties indicated 1 January 2021 as their starting date for NDC implementation; 29 per cent started implementing their NDC in or before 2020; and 5 per cent mentioned starting implementation in 2022.

71. All Parties communicated a target year, expressing a single-year target, a multi-year target (i.e. for a period of consecutive years) or multiple target years (i.e. several non-consecutive target years) depending on the target. Of the Parties, 87 per cent communicated a single-year target for 2030 and 5 per cent indicated a single-year target for 2025, 2035 or 2040, while 9 per cent communicated multiple target years, including when target years were associated with the implementation of different policies and measures. Other Parties (10 per cent) indicated having a multi-year target for NDC implementation.

<sup>41</sup> As at 9 September 2024, 73 LT-LEDS had been communicated, representing 80 Parties, 68 of which had communicated a new or updated NDC. In addition, 19 Parties communicated long-term mitigation visions, strategies or targets in their NDCs. For a list of communicated LT-LEDS, see <https://unfccc.int/process/the-paris-agreement/long-term-strategies>. For more details on LT-LEDS, see document [FCCC/PA/CMA/2023/10](https://unfccc.int/process/the-paris-agreement/long-term-strategies).



## **D. Quantifiable information on the reference point (including, as appropriate, a base year)**

72. While 94 per cent of Parties provided quantified mitigation targets, expressed as clear numerical targets, 6 per cent included strategies, policies, plans and actions as referred to in Article 4, paragraph 6, of the Paris Agreement or policies and measures for which there is no quantifiable information as components of their NDCs (see para. 57 above).

73. In addition, 91 per cent of Parties provided information on the reference year, base year, reference period or other starting point for measuring progress towards the target, with 23 per cent selecting 1990 and 62 per cent selecting a year between 2000 and 2020. Of the Parties that provided information on the starting point for measuring progress, 75 per cent are measuring achievement of their targets against a base-year level; 18 per cent have chosen to measure progress in terms of a deviation from a level in the target year, with most selecting 2030; and 7 per cent provided a reference period.

74. Further, 94 per cent of Parties provided information on the reference indicator used to express their target: 74 per cent chose absolute GHG emissions as the reference indicator, 13 per cent the ‘business as usual’ GHG emission level and 5 per cent a GHG emission budget or emission intensity per unit of gross domestic product or sectoral ‘business as usual’ levels. Some 72 per cent of Parties provided a quantified value for their reference indicator for either the base year, the target year or both, as appropriate.

75. Of the Parties that submitted new or updated NDCs, 84 per cent updated the basis for defining their targets, including reference points and ‘business as usual’ scenarios. Although such updates lead to higher-quality NDCs, for some Parties they lead to significant changes in the estimated emission levels for 2025 and 2030, for reasons other than changes to target levels.

76. Most Parties that included strategies, plans and actions as referred to in Article 4, paragraph 6, of the Paris Agreement provided other information for clarification, including on expected levels of emission reduction or prevention, increased forest coverage, reduction of deforestation, energy efficiency targets, renewable energy share or other non-GHG policy targets.

77. A total of 84 per cent of Parties provided information on the sources of the emission data used for quantifying the reference point, including national inventory reports, biennial reports, biennial update reports and/or national communications. Other sources of information identified were national documents and statistics, such as sector activity reports; national development plans and/or strategies; sustainable development plans; economic development projections; national climate change plans; energy master plans; national statistics on economy, energy and/or trade; waste management strategies; national resource plans; energy road maps; national forest reports; and socioeconomic forecasts.

78. In addition, 74 per cent of Parties presented information on the reasons they might update the values of their reference indicators, such as owing to significant changes in specific financial, economic, technological and/or political conditions, impacts of extreme natural disasters or economics impacts of the pandemic; the scale of access to support and other means of implementation, expected improvements or modifications to activity data, variables or methodologies used in estimating national emissions, baselines or projections; or to reflect the actual situation during the implementation period.

## **E. Assumptions and methodological approaches, including for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals**

### **1. Intergovernmental Panel on Climate Change methodologies and metrics**

79. Of the 82 per cent of Parties that communicated information on the IPCC methodologies that they used for estimating emissions and removals, 71 per cent referred to the 2006 IPCC Guidelines and 7 per cent to the *Revised 1996 IPCC Guidelines for National*

*Greenhouse Gas Inventories*, while 4 per cent mentioned that they used both sets of guidelines to cover different sectors.

80. Among the 65 per cent of Parties that provided information on the metrics that they used for estimating emissions and removals, all used GWP values over a 100-year time-horizon, with 47 per cent using such values from the AR5, 26 per cent from the AR4 and 25 per cent from the AR2. Other Parties used GWP values as well as global temperature potential values from the AR5 for estimating their mitigation targets.

81. Of the 84 per cent of Parties that communicated information on the assumptions and methodological approaches to be used for accounting anthropogenic GHG emissions and, as appropriate, removals, corresponding to their NDCs, 87 per cent referred to the 2006 IPCC Guidelines, while 11 per cent referred to the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Some 28 per cent of Parties also mentioned the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*, the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and/or the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*.

82. In addition, 15 per cent of Parties referred to the standard methods and procedures contained in the 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol and the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands.

## **2. Assumptions and methodological approaches**

83. A total of 46 per cent of Parties expressed mitigation targets as a deviation from a 'business as usual' level, with 86 per cent of those Parties presenting quantitative baselines and mitigation scenarios such as baselines and projections based on historical data and trends in emissions and economic parameters. Most of those Parties referred to key parameters and variables such as gross domestic product and population and growth thereof, and cost-benefit analysis. They provided sector-specific parameters, covering energy consumption, energy demand and production, electricity grid capacity, fossil fuel combustion, demographic and migratory forecasts, urbanization rate, transportation network changes and vehicle numbers, sectoral growth rate, forest growth rate, livestock trends, per capita waste generation, and energy and waste statistics per tourist.

84. Furthermore, 7 per cent of Parties communicated additional information on other approaches used for estimating sector- or activity-specific emissions or baselines, including using regional data sources for downscaling data or generating data at the national level, and calculation tools or approaches for estimating short-lived climate pollutants or precursor emissions. Meanwhile, 28 per cent of Parties mentioned using specific modelling tools for estimating their emissions or baselines, such as The Integrated Market Allocation-Energy Flow Optimization Model System, the Greenhouse Gas Abatement Cost Model, Green Economy Modelling, the Low Emissions Analysis Platform, the PROSPECTS+ emissions scenario tool and the Ex-Ante Carbon-balance Tool.

85. Of the Parties that submitted new or updated NDCs, 83 per cent provided more detailed information than previously on the assumptions, methodological approaches and procedures used for developing their baselines or mitigation scenarios.

## **3. Land use, land-use change and forestry**

86. While 51 per cent of Parties clarified how they intend to address emissions and subsequent removals due to natural disturbances on managed land if such events occur, a few of them mentioned that they may use a statistical approach to identifying natural disturbances following relevant IPCC guidance.

87. Some 39 per cent of Parties stated that emissions and removals from harvested wood products will be accounted for as part of their NDCs, with only a few of them (2 per cent of all Parties) mentioning the use of an approach other than the production approach.

88. Furthermore, 29 per cent of Parties mentioned that the effects of age-class structure in forests will be taken into account when estimating the mitigation contribution of forests.

#### 4. Voluntary cooperation under Article 6 of the Paris Agreement

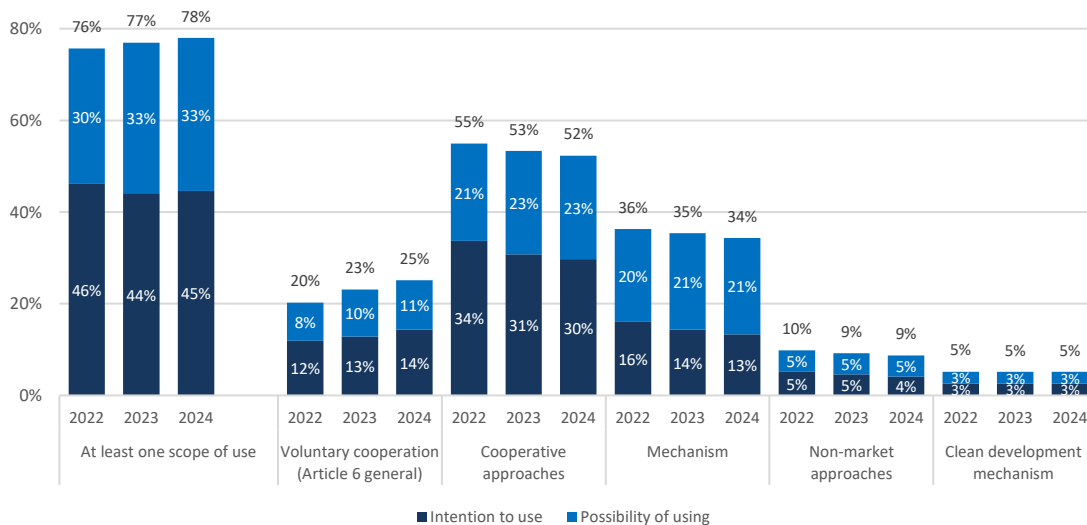
89. CMA 5 emphasized the urgent need for the use of voluntary cooperation referred to in Article 6, paragraph 1, of the Paris Agreement.<sup>42</sup>

90. A total of 78 per cent of Parties, in comparison with 76 and 77 per cent according to the 2022 and 2023 versions of this report respectively, communicated that they plan to or will possibly use at least one of the scopes of voluntary cooperation in implementing their NDCs (see figure 4) by directly or indirectly referring to the scopes in their NDCs: general use of voluntary cooperation under Article 6 of the Paris Agreement; use of cooperative approaches referred to in Article 6, paragraph 2; use of the mechanism established by Article 6, paragraph 4; use of non-market approaches under Article 6, paragraph 8; and use of the clean development mechanism.<sup>43</sup> The share of Parties that indicated that they plan to or will possibly use at least one of the scopes of voluntary cooperation increased to 82 per cent in the new or updated NDCs compared with 68 per cent in their previous NDCs.

91. Planned or possible use of cooperative approaches continued to be the scope of voluntary cooperation most frequently communicated by Parties, followed by planned or possible use of the mechanism established by Article 6, paragraph 4. Also, Parties mentioned general use of voluntary cooperation under Article 6, rather than reporting planned or possible use of specific scopes of voluntary cooperation, more frequently than indicated in the 2022 version of this report (5 percentage point increase).

Figure 4

**Share of Parties indicating in nationally determined contributions the intention to use or possibility of using specific scopes of voluntary cooperation under Article 6 of the Paris Agreement**



Notes: (1) Shares of Parties for 2024, 2023 and 2022 refer to the shares presented in this report and those indicated in the 2023 and 2022 versions of this report respectively. (2) The sums of the shares of Parties intending to use and possibly using cooperative approaches for 2023 and 2024, non-market approaches for 2023 and the clean development mechanism for 2022, 2023 and 2024 do not match the totals presented owing to rounding.

92. A total of 12 per cent of Parties, in comparison with 11 per cent according to the 2022 and 2023 versions of this report, communicated the use of voluntary cooperation as a condition for achieving their mitigation targets, including use of cooperative approaches to complement domestic mitigation measures for achieving the mitigation target.

93. A total of 36 per cent of Parties, in comparison with 34 and 35 per cent according to the 2022 and 2023 versions of this report respectively, have set limits on their use of voluntary cooperation: 3 per cent stated that they will use voluntary cooperation only as a means of achieving conditional elements of their mitigation targets; 5 per cent have set quantitative limits on their use of voluntary cooperation for achieving their mitigation targets,

<sup>42</sup> Decision [1/CMA.5](#), para. 31.

<sup>43</sup> Only direct references to use of the clean development mechanism were considered; references to, for example, “international market-based mechanisms” were not considered direct references.

such as achieving targets primarily through domestic efforts but partially through voluntary cooperation; and 32 per cent have set qualitative limits on their use of voluntary cooperation for achieving their mitigation targets, such as using units that adhere to standards and guidelines to ensure additionality, permanence or avoidance of double counting of emission reductions.

## **F. Planning and implementation processes**

94. A total of 97 per cent of Parties provided information on their NDC planning processes and most also referred to their implementation plans, communicating information on their institutional arrangements, stakeholder engagement processes and policy instruments, including legislation, strategies, plans and policies.

### **1. Domestic institutional arrangements**

95. Of the 88 per cent of Parties that indicated that domestic institutional arrangements are a key element of coordinating, planning and implementing climate change policy and action at the national and international level and fostering public participation, most of them referred to specific arrangements in place for NDC preparation, such as inter-institutional commissions, councils and committees, led by a designated entity with a coordination role and including members from public entities, the private sector, non-governmental organizations and/or academia. One per cent of Parties communicated that such arrangements are under development.

96. A total of 79 per cent of Parties referred to formal arrangements in place for consulting stakeholders, including the general public, local communities, Indigenous Peoples, private entities, business and trade associations, civil society organizations, youth associations, women's associations, regional development partners, academia and research communities: 93 per cent of those Parties indicated that they conducted such consultation and engagement processes in an inclusive and participatory manner; and 59 per cent specifically referenced gender-sensitive consultations, referring to specific guidelines for ensuring gender sensitivity, such as during public consultations, and highlighting the inclusion of national gender machineries, gender and women's groups, or non-governmental organizations in the process.

97. Overall, 1 per cent of Parties mentioned the Marrakech Partnership for Global Climate Action,<sup>44</sup> which, under the leadership of the high-level champions, supports implementation of the Paris Agreement by strengthening collaboration between national Governments and cities, subnational regions, businesses, investors and civil society to accelerate action on climate change. In this context, 7 per cent of Parties highlighted the voluntary commitments announced or pledged in collaboration with non-Party stakeholders.<sup>45</sup>

98. Regarding policy instruments such as energy and/or climate strategies, low-emission development strategies, NDC implementation road maps, NDC action plans, laws and regulations on climate change, sectoral national mitigation and adaptation plans, and NDC investment plans, 56 per cent of Parties mentioned specific policy instruments in place to facilitate NDC implementation in addition to institutional arrangements, and 25 per cent mentioned instruments being under development.

99. While 13 per cent of Parties included information on their domestic measurement, reporting and verification systems, 53 per cent indicated that such systems are under development. Those Parties acknowledged the important role of such systems in continuously monitoring and tracking the status and progress of their NDCs and mitigation efforts and highlighted that the results will be reflected in national inventory reports and/or biennial transparency reports, ensuring national and international transparency. About 3 per

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<sup>44</sup> See <https://unfccc.int/climate-action/marrakech-partnership>.

<sup>45</sup> Voluntary commitments by Parties and non-Party stakeholders are reported and tracked in order to capture the extent of climate action taken globally on the global climate action portal (<https://climateaction.unfccc.int/>) and in the Yearbook of Global Climate Action (available at [https://unfccc.int/yearbook\\_of\\_global\\_climate\\_action](https://unfccc.int/yearbook_of_global_climate_action)).

cent of Parties noted that the feedback from such systems will be used to guide the preparation of their subsequent NDCs.

## 2. Gender

100. In their NDCs, 82 per cent of Parties provided information related to gender and 48 per cent affirmed that they will take gender into account in implementing them.

101. While 63 per cent of Parties referred to relevant policies and legislation, 39 per cent affirmed a general commitment to gender equality. Others also included information on how gender had been or was planned to be mainstreamed in NDC implementation; for instance 41 per cent on specific tools and methods, such as gender analyses or assessments, gender indicators, gender-disaggregated data, and gender-responsive budgeting, and 6 per cent included gender as a criterion for prioritizing activities.

102. Of the Parties that referred to gender in their NDCs, 73 per cent treated it as a cross-cutting issue to be addressed across adaptation and mitigation, with 14 per cent focusing on adaptation and 9 per cent considering gender exclusively in the context of adaptation.

103. Overall, 48 per cent of Parties referred to their planned gender-responsive and 19 per cent to gender-sensitive climate action or generally elaborated on gender aspects in the context of specific sectors, including agriculture, energy, health, water, LULUCF, disaster risk reduction, livestock, waste, education, fisheries and transport.

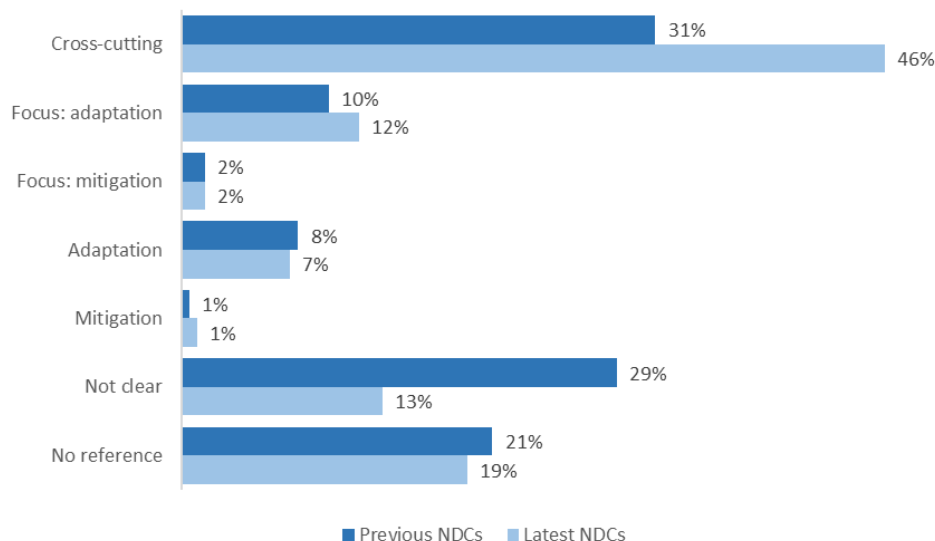
104. Meanwhile, 36 per cent of Parties highlighted the importance of providing capacity-building, finance and technology for gender-specific action and of these means of implementation being gender-responsive.

105. In addition, 11 per cent of Parties implicitly or explicitly considered gender as it intersects with other social factors; 56 per cent explicitly considered specific gender-differentiated needs and perspectives and gender-differentiated impacts of and contributions to climate change and climate action; 30 per cent framed women as being vulnerable; 37 per cent framed women as stakeholders or agents of change; and 7 per cent explicitly considered people of other genders.

106. Parties are increasingly considering gender in their NDCs and recognizing gender integration as a means of increasing the ambition and effectiveness of their climate action. A greater share of Parties referred to gender in the new or updated NDCs compared with in their previous NDCs and the share of Parties considering gender as a cross-cutting issue has also risen (see figure 5).

107. Of the Parties that considered gender, 60 per cent elaborated more on the topic in their updated than in their previous NDCs, 32 per cent had previously not included any reference to gender in their NDCs, and 30 per cent considered gender to a similar or decreased extent compared with previously.

Figure 5  
**Reference to gender in nationally determined contributions**



**3. Indigenous Peoples and local communities**

108. In the adaptation components of the new or updated NDCs, 60 per cent of Parties indicated an increased focus on the role of Indigenous Peoples and local communities in adaptation planning and implementation. In the new or updated NDCs, 44 per cent of Parties included information on the involvement of Indigenous Peoples at the national level, including legal and consultative approaches for protecting their rights, compared with 40 per cent in the previous NDCs. Parties emphasized the vulnerabilities of Indigenous Peoples, particularly their profound relationship with forests and ecosystems, and conditions of poverty. They highlighted the benefits of making use of traditional knowledge and knowledge of Indigenous Peoples, especially for climate adaptation. They also stressed the importance of combining traditional and modern practices while ensuring the participation and leadership of Indigenous Peoples in climate efforts.

109. Parties outlined how Indigenous Peoples were involved in NDC preparation, including through consultations on sectoral proposals, risk assessment and the application of traditional knowledge and knowledge of Indigenous Peoples. Parties elaborated on actions within the NDC designed to benefit Indigenous Peoples, including:

- (a) Improving access to finance and technology;
- (b) Building capacity for leadership and Indigenous-led climate action;
- (c) Providing sustainable development opportunities;
- (d) Enhancing market access to Indigenous products;
- (e) Diversifying livelihoods.

110. In the adaptation components of the new or updated NDCs, 42 per cent of Parties addressed the role of local communities in climate adaptation compared with 36 per cent in the previous NDCs. These Parties highlighted the importance of empowering local communities, building their capacity to adapt, and involving them in the design and implementation of climate action. This includes creating community-based adaptation plans, promoting decentralization strategies, and improving livelihoods, as well as implementing measures such as mangrove restoration that enhance the climate resilience of local communities while restoring the health of ecosystems.

#### 4. Action for Climate Empowerment<sup>46</sup>

111. A total of 98 per cent of Parties provided information on using one or more ACE elements to promote implementation of mitigation and adaptation activities. In the new or updated NDCs, Parties generally communicated more clearly, and in more detail, than previously on general principles, past achievements, future commitments, and needs and gaps in relation to ACE.

112. More Parties are referring to ACE as a necessary means of mobilizing and empowering society to deliver the mitigation and adaptation objectives outlined in their NDCs, including by developing national ACE strategies, incorporating ACE and its elements into general climate policies and plans, upholding ACE as a guiding principle and cross-cutting priority for climate action, and setting specific ACE-related targets.

113. While 64 per cent of Parties elaborated on climate education measures such as updating formal, informal and non-formal education curricula and programmes, mainstreaming climate change in national education policies and plans, and providing training and resources for teachers and educators; 69 per cent of Parties included information on training measures, including integrating climate change into training programmes for civil servants and other stakeholders.<sup>47</sup> The need for training was also highlighted in the context of achieving just transition and accessing green jobs.

114. In addition, 80 per cent of Parties provided information on measures for raising public awareness, such as developing communication strategies and disseminating knowledge through awareness-raising campaigns for specific sectors, such as health, biodiversity and energy efficiency. Furthermore, 93 per cent of Parties mentioned public participation, including information on institutional arrangements (see paras. 94–99 above), and 36 per cent of Parties included information on public access to information, providing details on developing regulations and systems to guarantee and facilitate access to climate information and data.

#### 5. Best practices and other contextual matters

115. A total of 65 per cent of Parties communicated best practices for NDC preparation, such as institutionalizing climate policy development within joint planning frameworks; strengthening stakeholder capacity to participate more substantively in NDC preparation and implementation; designing planning and reporting systems for transparency and public scrutiny; incorporating experience and lessons learned from INDC preparation and implementation efforts; conducting extensive stakeholder consultation and peer review to enhance their understanding of the NDC; conducting a preliminary assessment of pre-2020 efforts to identify gaps and needs and develop an NDC road map; mainstreaming NDC goals in existing strategies, plans and policies to obtain political support and benefit from existing arrangements; partnering with regional and international organizations to develop a robust NDC; and establishing a scientific and quantitative system for analysing and assessing progress of implementation.

116. On the basis of their national circumstances and development pathways, 59 per cent of Parties highlighted other contextual aspirations and priority areas, such as maximizing synergies between short- and long-term climate commitments and the SDGs; adaptation and climate-resilient development; collaboration and provision of adequate support by developed country Parties and international organizations; deploying low-emission technologies to drive emission reduction, safeguarding food security and eradicating poverty; involving youth, local governments and communities and/or Indigenous groups in a gender-responsive manner; just transition of the workforce; social and climate justice; circular economy; integrated resource management; oceans or blue carbon; disaster risk reduction; human health; producing energy from renewable sources and/or energy efficiency; and reducing risks caused by loss and damage.

<sup>46</sup> As footnote 23 above.

<sup>47</sup> See paras. 195–198 below for more information on training measures in the context of capacity-building.

117. Of the Parties that submitted new or updated NDCs, 31 per cent provided information on how their NDC preparation was informed by activities or events relevant to the collective assessment of progress in addressing climate change, such as the United Nations Secretary-General's calls to strengthen climate action and ambition during the 2018 high-level event on climate change, the recommendations from the Talanoa Call for Action and/or the best available science, such as the SR1.5.<sup>48</sup>

## **G. Mitigation co-benefits resulting from adaptation action and/or economic diversification plans**

118. A total of 44 per cent of Parties considered mitigation co-benefits resulting from their adaptation action and/or economic diversification plans and 3 per cent mentioned that such co-benefits have been taken into account in their mitigation efforts. Of those Parties, 65 per cent considered social and economic consequences of response measures and included an economic diversification plan and/or a just transition or social pillar for designing climate policies. Some other Parties (21 per cent) considered positive and/or negative economic and social consequences of response measures without linking them to the mitigation co-benefits of their adaptation action and/or economic diversification plans. Mitigation and adaptation plans presented by Parties cover various sectors, such as agriculture, business, energy, forestry, tourism, transport and manufacturing, and serve as models for national transition or diversification plans.

119. Parties highlighted unequal impacts on different groups<sup>49</sup> of society or the workforce as consequences of response measures, with impacts on the workforce being the most frequently mentioned, and 34 per cent of Parties plan to address social and economic impacts by including the concept of just transition in their overall NDC implementation, such as a just transition mechanism, just transition funds and establishment of a committee to oversee the just transition process; laws and strategies for protecting workers; mechanisms and strategies for job creation, skills development and employment policies; and a consultation process and social dialogue. Some 22 per cent of Parties paid special attention to addressing impacts of response measures on vulnerable groups and communities in relation to poverty, job opportunities and inequality during transition.

120. Of the 21 per cent of Parties that referenced economic diversification as part of their national development plans and climate policies to boost the country's resilience to climate change and response measures, 76 per cent linked such plans to an existing poorly diversified economy and the impact of response measures on sectors of high economic importance, such as extraction of fossil fuels. Those Parties specifically mentioned economic diversification plans or actions focused on high-emitting sectors and sectors of economic importance with high secondary mitigation benefits such as enhanced air quality and energy security through the adoption of, for instance, clean energy technologies. Such plans include enhancing education; increasing the share of energy generation using renewable sources; improving energy efficiency through regulatory measures, pricing signals and technology deployment in the fisheries, industry and buildings sectors; carbon dioxide capture and storage in the oil and gas industry; implementing fuel switch and fuel price reforms in the transport sector; moving to circular economy for better waste management; adopting sustainable tourism practices; fostering financial services to increase investment and growth in non-fossil-fuel sectors; promoting investment in forestry for sustainable logging and wood processing; and product diversification in the agriculture sector.

121. Of the Parties that included an adaptation component in their NDCs, 46 per cent described how their adaptation actions contribute to reducing emissions, including their intention to consider mitigation co-benefits in NAP formulation. Examples of co-benefits

<sup>48</sup> IPCC. 2018. *IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. V Masson-Delmotte, P Zhai, H-O Pörtner, et al. (eds.). Geneva: World Meteorological Organization. Available at [www.ipcc.ch/sr15](http://www.ipcc.ch/sr15).

<sup>49</sup> Such as low-income groups, women, young people, Indigenous Peoples and people with disabilities.



include climate-smart agricultural, livestock and fishery practices, sustainable land use, reduction of food waste, crop diversification and improved soil management. Adaptation of terrestrial, marine and coastal ecosystems was highlighted as another source of co-benefits, in particular conservation of existing forests and increase of green areas, planting mangroves, tidal marshes and seagrasses, and including disaster risk reduction (such as wildfire prevention) in adaptation planning. Other sectors with potential co-benefits mentioned were water resources, energy, transportation, urban areas and settlements, and infrastructure.

122. Of the new or updated NDCs with an adaptation component, 90 per cent identified food production and nutrition security (encompassing agriculture, livestock and fisheries) as a high priority for adaptation, either explicitly or as part of cross-sectoral adaptation efforts, with Parties typically aiming to take advantage of mitigation opportunities in this sector. Parties highlighted the need to focus on activities that have positive impacts on mitigation and adaptation while ensuring food production and nutrition security.

## H. Fairness and ambition in the light of national circumstances

123. A total of 98 per cent of Parties explained, using different metrics, how they consider their NDCs to be fair and ambitious in the light of their national circumstances.<sup>50</sup>

124. Those Parties included qualitative and/or quantitative information on how their NDCs represent progression<sup>51</sup> and highest possible ambition, such as through increased estimated level of emission reductions; earlier projected peaking of emissions; enhancing mitigation efforts; prioritizing adaptation actions with mitigations co-benefits over mitigation; increasing unconditional elements; including long-term targets; introducing and/or enhancing policies; elaborating on adaptation action; integrating climate goals into national policy instruments; enhancing linkages with the SDGs; using more accurate data and moving to higher-tier estimation; establishing arrangements for monitoring and/or tracking progress of implementation; enhancing the stakeholder consultation process; developing sector-based action plans for implementation; and presenting additional information to facilitate clarity, transparency and understanding.

125. A total of 56 per cent of Parties framed fairness consideration within their past, current, and future share in global and/or per capita emissions compared with global averages, or in relation to the trends in one or several of the metrics referred to in paragraph 124 above, with 15 per cent indicating that, despite the pandemic and its impacts on their economies, they are committed to implementing their NDCs to address climate change.

126. Meanwhile, 61 per cent of Parties provided information on ambition by linking their NDCs to their commitment to transition to a sustainable and/or low-carbon and resilient economy; 32 per cent expressed that they have incorporated their NDC goals and policies into national legislative, regulatory and planning processes as a means of ensuring implementation; and 10 per cent addressed ambition in the context of the inclusive design of their NDCs, considering various cross-cutting aspects, such as investment plans, gender-responsiveness, education and just transition.

127. Further, 52 per cent of Parties stated that their NDCs are in line with the long-term goals of the Paris Agreement or with the mitigation pathways for limiting global warming to well below 2 or 1.5 °C above pre-industrial levels. Of the Parties that submitted new or

<sup>50</sup> Metrics include capabilities; historic and current responsibility; climate justice; share in global emissions; level of per capita emissions; vulnerability to the adverse impacts of climate change; development and/or technological capacity; mitigation potential; cost of mitigation actions; degree of progression or progression beyond the current level of effort; and link to objectives of the Paris Agreement and its long-term global goals.

<sup>51</sup> In this report, the term “progression” is used to refer to the difference between the estimated emission levels associated with implementation of Parties’ INDCs communicated to the secretariat as at 4 April 2016 and those according to the NDCs available in the NDC registry as at 9 September 2024. In the figures in this report the progression is shown from INDCs as at 4 April 2016 (grey shading), covered in document [FCCC/CP/2016/2](#), to NDCs as at 9 September 2024 (blue shading), aggregated in this report.

updated NDCs, 66 per cent highlighted that they have enhanced their mitigation and/or adaptation contributions.

128. Compared with the projected emissions according to the INDCs as at 4 April 2016,<sup>52</sup> according to the latest NDCs total global GHG emissions are estimated to be on average around 2.9 Gt CO<sub>2</sub> eq, or 5.2 per cent, lower by 2025, and 6.3 Gt CO<sub>2</sub> eq, or 10.9 per cent, lower by 2030.

129. When considering only the emissions of Parties with new or updated NDCs, emissions are estimated according to the latest NDCs to be 5.6 (5.0–6.2) Gt CO<sub>2</sub> eq, or 10.7 (10.3–11.1) per cent, lower by 2030 than projected according to the INDCs as at 4 April 2016.

## **I. Contribution towards achieving the objective of the Convention as set out in its Article 2, and towards Article 2, paragraph 1(a), and Article 4, paragraph 1, of the Paris Agreement<sup>53</sup>**

130. The information necessary to facilitate clarity, transparency and understanding of NDCs, which 95 per cent of Parties communicated, includes information on how the NDC contributes towards:<sup>54</sup>

- (a) Achieving the objective of the Convention as set out in its Article 2;
- (b) Article 2, paragraph 1(a), and Article 4, paragraph 1, of the Paris Agreement.

131. A total of 55 per cent of Parties indicated that their level of emissions in the future is expected to fall within the scope of a global emission pathway that is consistent with the goal of keeping the global average temperature increase below 2 or 1.5 °C.

132. In that context, Parties highlighted their national mitigation and/or adaptation efforts, NDC targets, LT-LEDS, development pathways for decoupling emissions from economic growth, and mobilization of domestic and international support.

133. The projected total global GHG emission level for 2025 in line with the latest NDCs is:

- (a) 54.0 (49.4–58.5) per cent higher than in 1990 (34.4 Gt CO<sub>2</sub> eq);
- (b) 39.6 (35.5–43.7) per cent higher than in 2000 (37.9 Gt CO<sub>2</sub> eq);
- (c) 21.7 (18.2–25.3) per cent higher than in 2005 (43.5 Gt CO<sub>2</sub> eq);
- (d) 11.3 (8.0–14.6) per cent higher than in 2010 (47.6 Gt CO<sub>2</sub> eq);
- (e) 4.1 (1.0–7.1) per cent higher than in 2015 (50.9 Gt CO<sub>2</sub> eq);
- (f) Approximately the same (0.1 per cent higher (ranging from 2.8 per cent lower to 3.1 per cent higher) than in 2019 (52.9 Gt CO<sub>2</sub> eq).

134. For 2030, the projected total global GHG emission level in line with the latest NDCs is:

- (a) 49.8 (40.5–59.0) per cent higher than in 1990;
- (b) 35.8 (27.4–44.2) per cent higher than in 2000;
- (c) 18.4 (11.1–25.8) per cent higher than in 2005;
- (d) 8.3 (1.6–15.0) per cent higher than in 2010;
- (e) 1.3 per cent higher than in 2015 (ranging from 5.0 per cent lower to 7.5 per cent higher);

<sup>52</sup> The aggregate effect of the implementation of INDCs as at 4 April 2016 was estimated using the same updated inventory data and methodology as for the estimate of the aggregate effect of the implementation of all NDCs as at 9 September 2024.

<sup>53</sup> See document [FCCC/PA/CMA/2021/8/Add.3](#) for additional information, including on estimation methods and assumptions used.

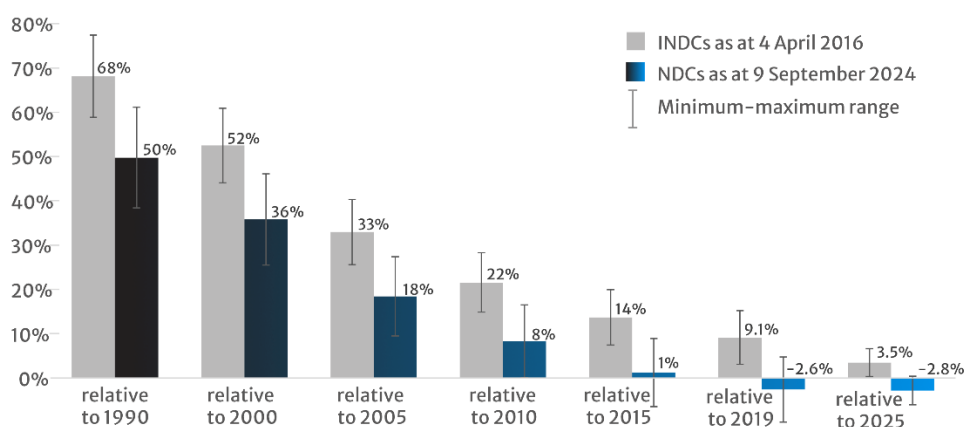
<sup>54</sup> See decision [4/CMA.1](#), annex I, para. 7.

- (f) 2.6 per cent lower than 2019 (ranging from 8.6 per cent lower to 3.4 per cent higher);
- (g) 2.8 per cent lower than the projected emissions for 2025 (ranging from 6.0 per cent lower to 0.4 per cent higher).

135. In comparison, the estimated total GHG emission level for 2030 associated with implementation of Parties’ INDCs implied a stronger emission increase above historical levels: 68.1 (56.8–79.5) per cent above the 1990 level, 21.5 (13.3–29.8) per cent above the 2010 level and 9.1 (1.8–16.5) per cent above the 2019 level (see figure 6).

136. For Parties that communicated new or updated NDCs, their total GHG emissions are estimated at 47.3 Gt CO<sub>2</sub> eq in 2019, and the total GHG emission level resulting from implementation of their NDCs is estimated to also be around 47.8 (46.3–49.2) Gt CO<sub>2</sub> eq by 2025 and a bit lower at 46.8 (43.8–49.7) Gt CO<sub>2</sub> eq by 2030. Compared with their 2010 emission level, the emission level of the Parties that communicated new or updated NDCs is projected to be about 13.1 (9.8–16.5) per cent higher by 2025 and 10.7 (3.8–17.7) per cent higher by 2030. Compared with their 2019 emission level, these Parties’ emission level is estimated to be 1.1 per cent higher by 2025 (with a range from 1.9 per cent lower to 4.1 per cent higher) and slightly lower by 2030 (1.1 per cent lower with a range from 7.3 per cent lower to 5.1 per cent higher). This indicates the possibility of peaking of emissions for that group of Parties before 2030, if the lower end of the estimated emission level resulting from implementation of the NDCs, including conditional elements, is achieved.

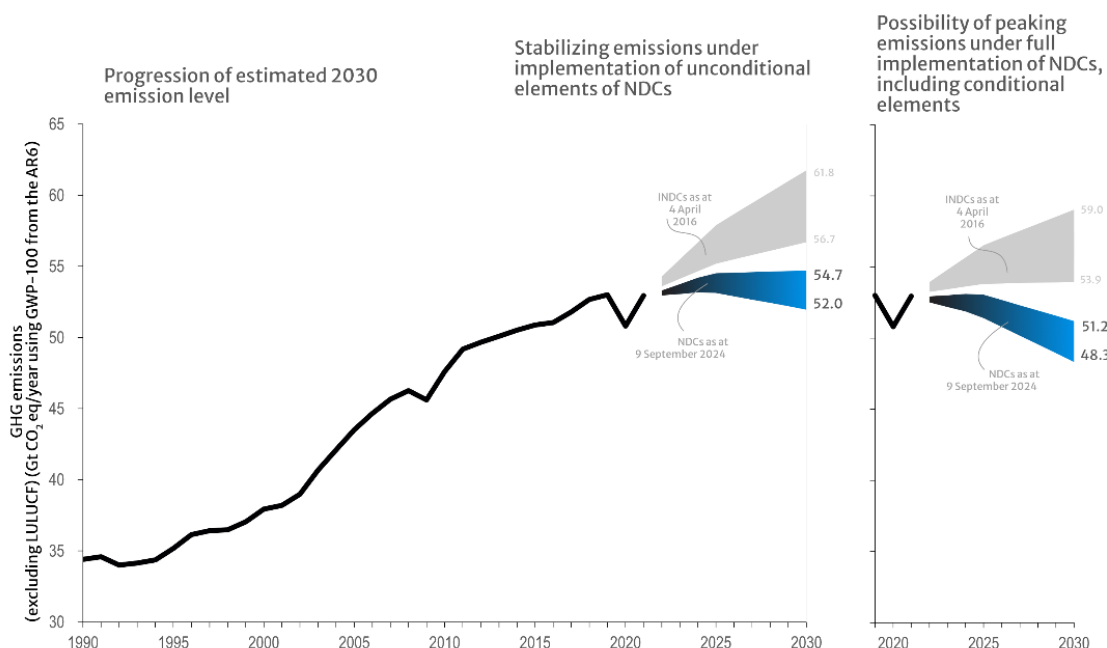
Figure 6  
**Projected total emission level in 2030 according to nationally determined contributions compared with historical levels and estimated 2025 level**



137. The total GHG emission level resulting from implementation of the unconditional elements of the NDCs is projected to be 0.8 per cent higher in 2030 than in 2019 (with a range from 1.8 per cent lower to 3.4 per cent higher); whereas the total GHG emission level resulting from the full implementation of the NDCs including conditional elements is projected to be 5.9 (3.2–8.6) per cent lower in 2030 than in 2019. This indicates that, if all NDCs (including all conditional elements) are fully implemented, peaking of global emissions before 2030 is likely, as indicated in the previous versions of this report (see figure 7). However, in order to achieve that peaking, the conditional elements of the NDCs need to be implemented, which depends mostly on access to enhanced financial resources, technology transfer and technical cooperation, and capacity-building support; availability of market-based mechanisms; and absorptive capacity of forests and other ecosystems.

138. In comparison, assuming full implementation of INDCs (including all conditional elements), a continuously increasing trend in emissions up until 2030 is estimated, resulting in a global emission level of approximately 6.6 (1.8–11.4) per cent above the 2019 level. Implementation of only the unconditional elements of the INDCs was estimated to result in a global emission level by 2030 of approximately 11.7 (7.0–16.5) per cent above the 2019 level (see figure 7).

Figure 7  
**Historical and projected total global emissions according to nationally determined contributions**



Note: For comparison, global emissions with LULUCF in 2030, when taking into account implementation of the new or updated NDCs (blue areas), are estimated to 55.2 (53.9–56.6) Gt CO<sub>2</sub> eq considering unconditional elements and 51.7 (50.2–53.1) Gt CO<sub>2</sub> eq assuming full implementation.

139. According to the latest NDCs, the Parties’ per capita emissions will equal 6.5 (6.3–6.7) t CO<sub>2</sub> eq in 2025 and, slightly lower, 6.1 (5.7–6.4) t CO<sub>2</sub> eq in 2030, which is, on average, 5.1 (2.3–7.9) per cent lower in 2025 and 11.5 (6.1–17.0) per cent lower in 2030 than in 2019.

140. A total of 50 per cent of Parties provided quantifiable information on their long-term mitigation visions, strategies and targets for up until and beyond 2050, many of which communicated LT-LEDS in line with Article 4, paragraph 19, of the Paris Agreement. The total GHG emissions of those Parties are estimated to be 39.2 (37.2–41.1) Gt CO<sub>2</sub> eq in 2030, which is 4 per cent above (with a range from 1 per cent lower to 9 per cent higher) their emissions in 2010 and 6 (1–10) per cent below their emissions in 2019.

141. On the basis of the information provided on long-term mitigation visions, strategies and targets in the NDCs and LT-LEDS, the total emissions in 2050 of the Parties with long-term targets are estimated at 15.4 (13.8–17.0) Gt CO<sub>2</sub> eq. Mindful of the inherent uncertainty of such long-term estimates, and the need for full implementation of NDCs, the information indicates that these Parties’ total GHG emission level could be 63 (59–67) per cent lower in 2050 than in 2019 and their annual per capita emissions would be 2.4 (2.1–2.6) t CO<sub>2</sub> eq by 2050. Under scenarios of limiting warming to likely below 2 °C (with over 67 per cent likelihood), annual per capita emissions are 2.4 (1.6–3.1) t CO<sub>2</sub> eq; hence the estimated long-term per capita emissions of these Parties are at a level consistent with 2 °C scenarios. However, for scenarios of limiting warming to 1.5 °C (with 50 per cent likelihood by 2100) and achieving net zero emissions this century, annual per capita emissions by 2050 are required to be two to three times lower, at 1.3 (0.6–2.1) t CO<sub>2</sub> eq.

**Comparison with scenarios considered by the Intergovernmental Panel on Climate Change**

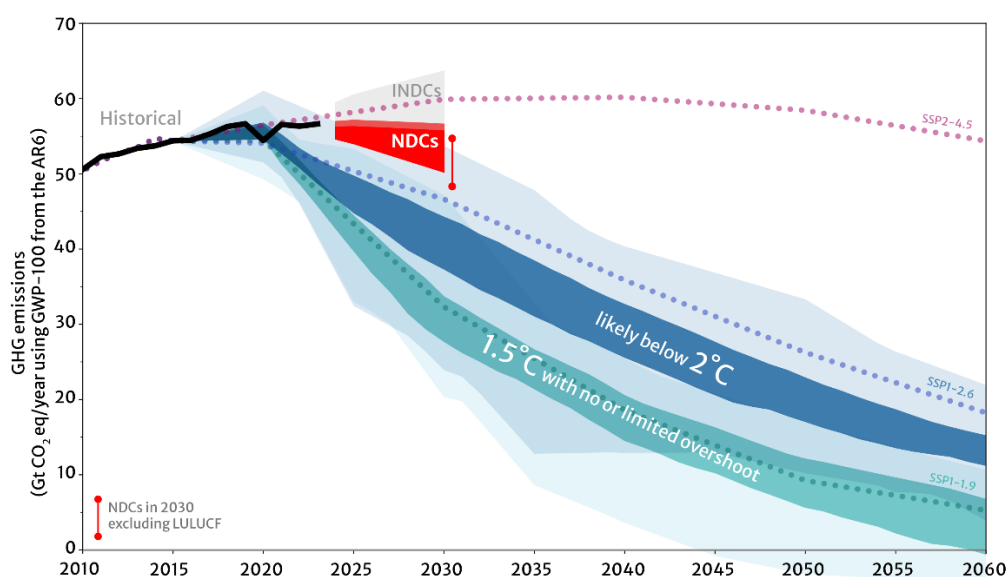
142. The contribution of Working Group III to the AR6 concludes that, in scenarios of limiting warming to 1.5 °C (with over 50 per cent likelihood) with no or limited overshoot, GHG emissions are reduced by 43 (34–60) per cent by 2030 relative to the 2019 level. For the subgroup of scenarios in which net zero GHG emissions are also achieved in line with Article 4, paragraph 1, of the Paris Agreement, the emission reductions are slightly less, at 41 (31–59) per cent by 2030, and for those in which net zero GHG emissions are not achieved this century, the near-term emission reductions until 2030 tend to be slightly stronger, at 48

(35–61) per cent, relative to the 2019 level. In scenarios of keeping warming to likely below 2 °C (with over 67 per cent likelihood) with mitigation action starting in 2020, emissions in 2030 are 27 (13–45) per cent below the 2019 level (see figure 8).

143. The Synthesis Report of the AR6 indicates that the emission reductions until 2030 will have to be further enhanced for 2035 and beyond to be in line with pathways to limiting warming to 1.5 °C (with over 50 per cent likelihood in 2100) with no or limited overshoot over the course of the century. In those scenarios, GHG emissions are reduced by 60 (49–77) per cent by 2035 relative to the 2019 level. In scenarios of keeping warming likely below 2 °C (with over 67 per cent likelihood), emissions in 2035 are 35 (22–55) per cent below the 2019 level. For 2040 and 2050, further emission reductions are indicated to be needed in order to limit warming to below 1.5 °C with no or limited overshoot, including net zero CO<sub>2</sub> emissions by 2050 (99 per cent CO<sub>2</sub> emission reduction relative to the 2019 level).<sup>55</sup>

Figure 8

**Comparison of scenarios assessed in the Intergovernmental Panel on Climate Change Sixth Assessment Report with projected total and per capita global emissions according to nationally determined contributions**



*Note:* The assessed global emissions (including LULUCF) for the scenarios assessed in the AR6 are provided for the medium (SSP2-4.5), low (SSP1-2.6) and very low (SSP1-1.9) scenarios of IPCC Working Group I (dotted lines). The IPCC scenario categories are shown with interquartile ranges (dark shading) and 5–95 per cent range (light shading). The two categories were assessed by the IPCC Working Group III to be consistent with a likely chance of staying below 2 °C (over 67 per cent chance) (category C3a; blue shading) and 1.5 °C warming (over 50 per cent chance by 2100) with net zero emissions this century (category C1a; teal shading). The illustrative SSP scenarios were assessed by IPCC to feature end-of-century warming of 2.7 (2.1–3.5) °C for SSP2-4.5 (purple dots), 1.8 (1.3–2.4) °C for SSP1-2.6 (blue dots) and 1.4 (1.0–1.8) °C for SSP1-1.9 (teal dots) (see table SPM.1 in the contribution of Working Group I to the AR6). The level of GHG emissions by 2030 estimated to be in line with the NDCs is 51.5 (48.3–54.7) Gt CO<sub>2</sub> eq excluding LULUCF (red vertical bar) and 53.4 (50.2–56.6) Gt CO<sub>2</sub> eq when – in line with shown IPCC scenarios – including LULUCF.

144. The total global GHG emission level in 2030 taking into account implementation of the latest NDCs is expected to be 8.3 (1.6–15.0) per cent above the 2010 level and 2.6 per cent below the 2019 level (with a range from 8.6 per cent below to 3.4 per cent above). This is slightly lower than the expected level presented in the previous version of this report (8.8 per cent above the 2010 level and 2.0 per cent lower than the 2019 level).

145. Taken together with the information in figure 8 and paragraphs 137, 142 and 144 above, the finding from the previous version of this report remains the same that this implies an urgent need for either a significant increase in the level of ambition of NDCs between now and 2030 or a significant overachievement of the latest NDCs, or a combination of both, in

<sup>55</sup> See table SPM.1 in the Synthesis Report of the AR6.

order to attain the cost-effective emission levels suggested in many of the scenarios considered by the IPCC. If emissions are not reduced by 2030, they will need to be substantially reduced thereafter to compensate for the slow start on the path to net zero emissions. The latest IPCC scenario data set does not contain scenarios of still reaching the goal of 1.5 °C with low or limited overshoot after 2030 if emission levels are kept in line with those based on implementation of the current NDCs up until 2030. The AR6 scenario database includes some scenarios of having a likely chance of staying below 2 °C warming without enhancement of NDC ambition before 2030. Those scenarios assume a strongly enhanced annual emission reduction rate of 2.3 (1.5–3.3) Gt CO<sub>2</sub> eq from 2030 to 2040. In scenarios that assume immediate mitigation action before 2030, warming is kept below 2 °C, with lower annual emission reduction rates of around 1.5 (0.7–2.5) Gt CO<sub>2</sub> eq from 2020 to 2030 and 1.1 (0.6–1.7) Gt CO<sub>2</sub> eq from 2030 to 2040 (see figure 8).

146. Comparing the level of emissions suggested in the IPCC scenarios that are categorized to be in line with immediate mitigation action from 2020 and limiting warming to likely below 2 °C (with an over 67 per cent chance) or below 1.5 °C (with an over 50 per cent chance)<sup>56</sup> with the total emission level by 2030 projected according to the NDCs, there is a large difference. The difference in the case of 2 °C scenarios is 13.1 (9.1–16.8) Gt CO<sub>2</sub> eq in 2030. Assuming all conditional elements of NDCs are implemented, the difference is reduced to 11.3 (7.3–14.7) Gt CO<sub>2</sub> eq. Without any implementation of conditional elements of NDCs, the gap is wider, at 14.9 (10.9–18.3) Gt CO<sub>2</sub> eq. The gap in the case of 1.5 °C scenarios that feature net zero emissions this century is wider still, at 21.4 (18.7–25.7) Gt CO<sub>2</sub> eq. Assuming all conditional elements of NDCs are implemented, the difference in relation to these 1.5 °C scenarios is somewhat narrowed to 19.2 (17.6–24.1) Gt CO<sub>2</sub> eq. Without implementation of any conditional elements, the difference amounts to 22.7 (21.2–27.7) Gt CO<sub>2</sub> eq (see figure 8).

147. Taking into account the implementation of NDCs up until 2030, projected global mean temperatures are subject to significant uncertainty owing to the range of emission levels estimated for 2030 resulting from implementation of NDCs (including whether conditional elements are implemented or not), the range of illustrative emission extensions beyond 2030 and inherent climate system uncertainties.<sup>57</sup> The best estimate of peak temperature in the twenty-first century (projected mostly for 2100 when temperature continues to rise) is in the range of 2.1–2.8 °C depending on the underlying assumptions.<sup>58</sup> Without implementation of

<sup>56</sup> The IPCC scenario categories are “C3a” for likely below 2 °C scenarios and “C1a” for 1.5 °C with no or limited overshoot scenarios with net zero emissions this century (see table SPM.2 in the contribution of Working Group III to the AR6). The differences are calculated as a Monte Carlo sampling with 100,000 members, sampling the minimum–maximum range, assumed as uniform distribution, of the quantifications for 2030 according to the NDCs and randomly the 2030 GHG emission levels of the scenarios within the harmonized and infilled “C1a” or “C3a” IPCC scenario categories. Reported ranges are medians and interquartile ranges.

<sup>57</sup> Temperature projections in this report build on a climate system uncertainty representation calibrated to findings in cross-chapter box 7.1 of the contribution of Working Group I to the AR6, namely the calibrated MAGICC7 climate emulator. For the emission time series, infilling and harmonization has been applied as for the scenarios in the contribution of Working Group III to the AR6. Illustrative post-2030 emission extensions project pre-2030 emission trends to up until 2050 and track thereafter the evolution of scenarios of similar to 2030 level emissions in the SR1.5 database using an adapted ‘equal quantile walk’ approach in line with approaches in existing scientific literature. When long-term visions, strategies and targets are taken into consideration for the post-2030 emission extension, the 2030–2050 global emissions are better constrained as 83 per cent of the 2019 global emissions are subject to long-term targets. These more constrained emissions also allow for more constrained (and lower) temperature projections. None of the temperature projections consider a possible overachievement of stated target levels. The stated warming ranges indicate best estimate (50 percentile) or 5 and 95 percentiles of peak temperature across NDC implementation (unconditional elements and full implementation).

<sup>58</sup> The stated emission ranges are ranges across best-estimate (median) emission projections for the range of considered emission scenarios in line with the NDCs. When including the climate uncertainty, the 5–95 percentile uncertainty range covers 1.5–4.1 °C. For the full implementation of NDCs (including all conditional elements), the 5–95 percentile uncertainty range (that includes both emission and climate uncertainties) covers 1.5–3.4 °C. For the scenarios assuming implementation of only unconditional elements of NDCs, the 5–95 percentile uncertainty range covers 1.7–4.1 °C.

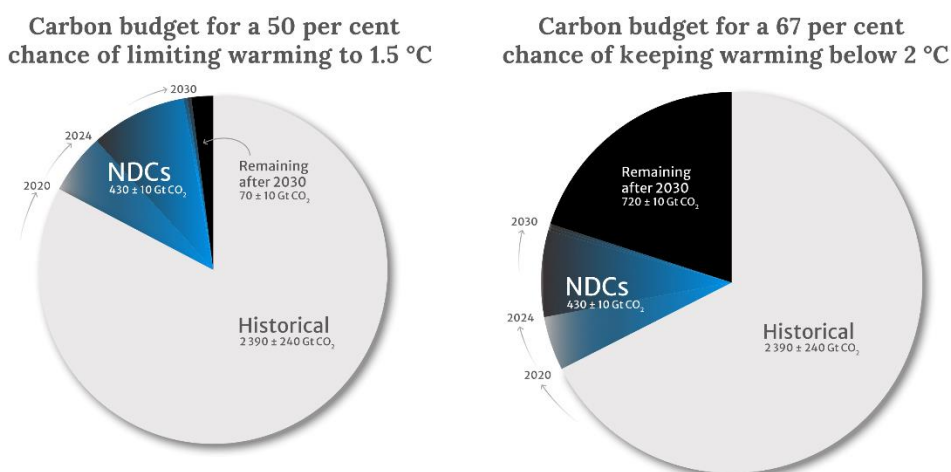


any conditional elements of NDCs, the best estimate of temperature change is 2.4–2.8 °C warming. Assuming full implementation of NDCs, including all conditional elements, the best estimate for peak global mean temperature is 2.1–2.3 °C.

148. On the basis of the latest NDCs, cumulative CO<sub>2</sub> emissions in 2020–2030 are estimated to be around 430 (420–440) Gt CO<sub>2</sub>. When rounding to the nearest 10 Gt CO<sub>2</sub>, these estimated cumulative CO<sub>2</sub> emissions did not change compared with the previous version of this report. Compared with the carbon budget consistent with 50 per cent likelihood of limiting warming to 1.5 °C (500 Gt CO<sub>2</sub>), cumulative CO<sub>2</sub> emissions in 2020–2030 based on the latest NDCs would likely use up 86 per cent of the remaining carbon budget. That would leave a post-2030 carbon budget of around 70 (60–80) Gt CO<sub>2</sub>, which is equivalent to approximately two years of projected global total CO<sub>2</sub> emissions by 2030. Similarly, in the context of the carbon budget consistent with a likely (67 per cent) chance of keeping warming below 2 °C (estimated by the IPCC to be 1,150 Gt CO<sub>2</sub> from 2020 onward), cumulative CO<sub>2</sub> emissions in 2020–2030 based on the latest NDCs would likely use up 37 per cent of the remaining carbon budget (see figure 9). By comparison, total global historical CO<sub>2</sub> emissions up until 2020 are estimated by the IPCC to have amounted to 2,390 (2,150–2,630) Gt CO<sub>2</sub>.

Figure 9

### Carbon budgets



*Note:* The contribution of Working Group I to the AR6 provides an estimate of CO<sub>2</sub> emissions from 1850 to 2020 of 2,390 ± 240 Gt CO<sub>2</sub>. For staying below 1.5 °C warming relative to the 1850–1900 level, an estimated 500 Gt CO<sub>2</sub> can be emitted from 2020 onward. Under implementation of the NDCs as at 9 September 2024, CO<sub>2</sub> emissions from 2020 to 2030 would amount to 430 ± 10 Gt CO<sub>2</sub>, leaving the equivalent of approximately two years of emissions (70 ± 10 Gt CO<sub>2</sub>) for thereafter, when rounding to the nearest 10 Gt CO<sub>2</sub>. In the case of having a likely (67 per cent) chance of keeping warming to below 2 °C, the remaining carbon budget is 1,150 Gt CO<sub>2</sub> and approximately 720 ± 10 Gt CO<sub>2</sub> would remain for thereafter. These numbers, rounded to the nearest 10 Gt CO<sub>2</sub>, have not changed since the previous version of this report. Global total CO<sub>2</sub> emissions from the beginning of 2020 to the beginning of 2024 are indicated, amounting to approximately 160 Gt CO<sub>2</sub>.

149. The almost stagnant level of the aggregate effect of NDC implementation since the previous version of this report highlights an urgent need for either a significant increase in the level of ambition of NDCs between now and 2030 or a significant overachievement of the latest NDCs, or a combination of both, in order to achieve the cost-effective emission levels suggested in many of the scenarios considered by the IPCC for keeping warming well below 2 °C and limiting it to 1.5 °C. If emissions are not reduced by 2030, they will need to be substantially reduced thereafter to compensate for the slow start on the path to net zero emissions. The AR6 identifies net zero CO<sub>2</sub> emissions as a prerequisite for halting warming at any level.

## **J. Adaptation**

150. Adaptation involves responding to climate change by assessing impacts, vulnerability, and risk; planning and implementing adaptation; making contingency arrangements for when impacts occur; addressing losses; and monitoring and evaluating adaptation efforts. Arrangements have been developed under the Convention to facilitate adaptation, in particular NAPs, institutions such as the Adaptation Committee and the Least Developed Countries Expert Group, partnership structures for closing knowledge gaps, and provisions to facilitate support for, and transparency of, adaptation. Under the Paris Agreement, Parties may include an adaptation component in their NDCs.

### **1. Scope**

151. A total of 81 per cent of Parties included an adaptation component in their NDCs. In particular, they provided information on adaptation-related research; vulnerabilities; sectoral adaptation measures; adaptation strategies, policies and plans; contingency measures; synergies with mitigation and relevant global policy frameworks; and monitoring and evaluation of adaptation.

152. The information provided illustrates how Parties that have communicated new or updated NDCs have advanced adaptation since their previous NDCs. For example, there has been an increase in the share of NDCs:

(a) That describe the status of the NAP process and demonstrate how the NAP was established as the main national instrument for adaptation, from 70 to 75 per cent;

(b) That include time-bound quantified adaptation targets (from 34 to 37 per cent of NDCs), with 15 per cent of Parties reporting developing the indicator frameworks that they intend to use for monitoring progress;

(c) That identify synergies and co-benefits between adaptation and mitigation actions (from 27 to 29 per cent of NDCs) as well as linkages between adaptation and efforts towards achieving the SDGs (26 per cent of NDCs).

153. Compared with their previous NDCs, Parties that communicated new or updated NDCs provided more detailed information on, in particular, national adaptation frameworks, describing more integrated frameworks than the multiple frameworks and individual projects described previously.

154. Of the Parties that provided an adaptation component, 13 per cent identified the adaptation component of their NDC as their adaptation communication, while 2 per cent provided information organized around the elements set out in the annex to decision [9/CMA.1](#) and 9 per cent of Parties announced their intention to prepare an adaptation communication.

### **2. Impacts, risk and vulnerability**

155. Of the adaptation components, 92 per cent described key climatic changes, referring in particular to temperature increase, precipitation changes and sea level rise. These were identified as triggering various climate change hazards and impacts, in particular increases in frequency or intensity of drought, heavy rainfall, fluvial flooding, coastal erosion and flooding, saltwater intrusion, storms and cyclones, heatwaves and landslides, as well as increases in ocean acidification, ocean temperature, fires and thawing glacier, ice and permafrost. Parties described how impacts affect vulnerable sectors. Of particular concern are agriculture and other aspects of food security, water resources, terrestrial biodiversity and ecosystems, key economic sectors such as infrastructure, energy, transportation and tourism, human health, and coastal and low-lying areas.

156. A total of 59 per cent of Parties highlighted that women, children and youth, the elderly, rural populations, Indigenous Peoples, people with disabilities and low-income and displaced populations are particularly vulnerable to climate change. Similarly, 54 per cent of Parties specifically emphasized the vulnerability of coastal areas and islands, mountains, deserts and grasslands. As factors of vulnerability, 89 per cent of Parties highlighted, for



example, geographic location or characteristics, economic challenges and poverty, dependence on climate-sensitive sectors and natural resources, the pandemic, inequality, political instability and status as a small island developing State.

### **3. Enhancing adaptation-related research for policymaking**

157. Of the Parties that provided an adaptation component, 92 per cent considered how to enhance adaptation-relevant research, data, information and monitoring, and ensure that adaptation efforts are informed by science. Parties described efforts to enhance research through, for example, data-collection programmes, a national census on impacts, monitoring systems, observation networks, research centres, strengthened weather services, climate and risk modelling, risk maps with climate data and scenarios, and international cooperation.

### **4. Pre-emptive adaptation**

158. The share of Parties that described in their adaptation component the process for formulating and implementing their NAP and its status increased from 70 per cent for the previous NDCs to 75 per cent for the new or updated NDCs. While 37 per cent of Parties have developed a NAP, 38 per cent reported their intention to do so, including a timeline for completion or update and/or implementation. In addition, 52 per cent of Parties outlined links between their NAP and NDC, including how the NAP provided the basis for the adaptation component, how both build on the same vulnerability assessment, and how the NAP can provide a monitoring and evaluation framework for the NDC.

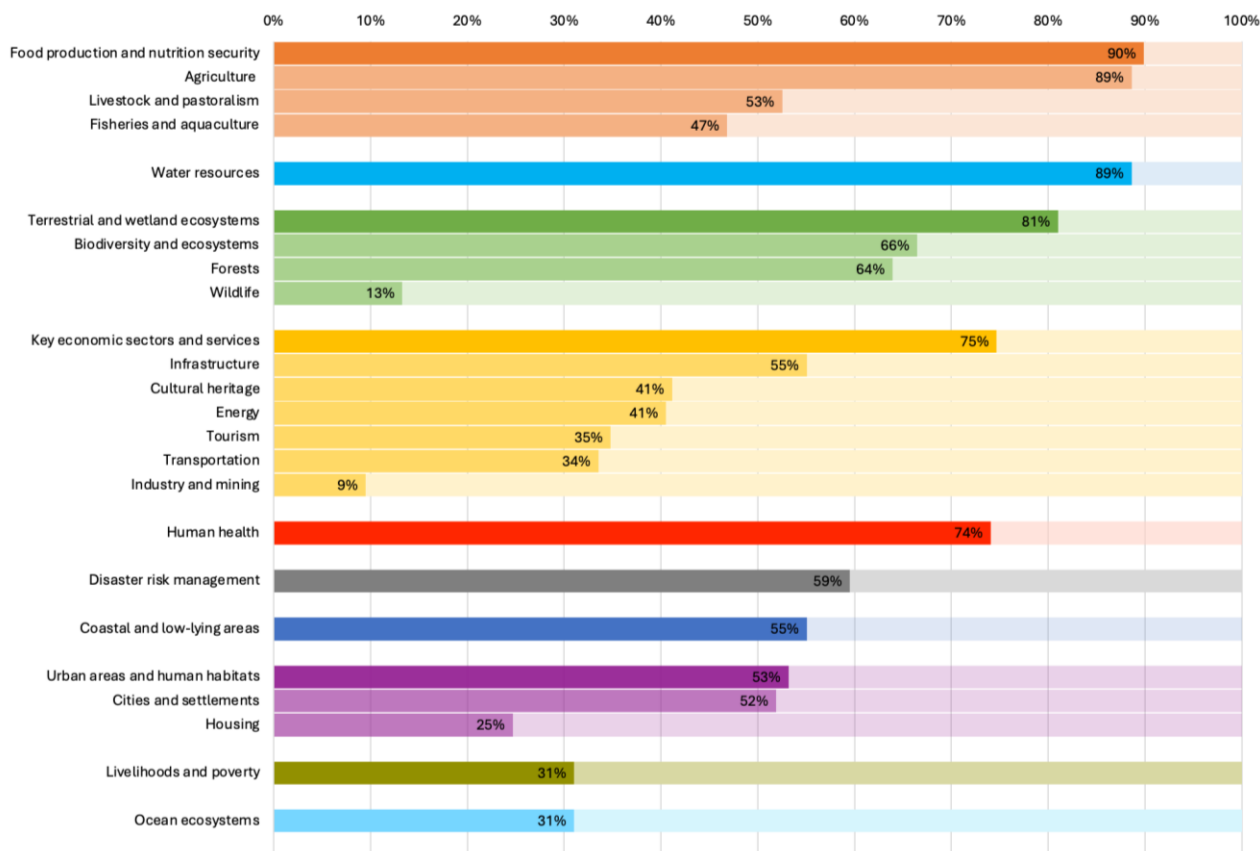
159. A total of 96 per cent of the new or updated NDCs with an adaptation component describe policy frameworks relevant to adaptation, including information on how such frameworks provide a basis for adaptation efforts and how adaptation is integrated into and strengthened under other frameworks, such as adaptation-specific frameworks, national climate plans, local government or community-level plans, sectoral plans relevant to adaptation priorities, disaster risk reduction policies, national and regional development frameworks and UNFCCC frameworks (e.g. national adaptation programmes of action, technology needs assessments and the economic diversification initiative). While 4 per cent of Parties highlighted the inclusion of adaptation considerations in their national constitution, 3 per cent of Parties declared a climate emergency in their country.

160. Parties provided a wide range of information on adaptation in various priority areas (see figure 10). The new or updated NDCs illustrate that Parties continue to focus on food production and nutrition security, water resources, terrestrial and wetland ecosystems, key economic sectors and services, and human health; followed by disaster risk management, coastal and low-lying areas, urban areas and human habitats, livelihoods and poverty, and ocean ecosystems (see table 1 of the document on additional information from adaptation components of NDCs<sup>59</sup> for examples of Parties' adaptation measures).

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<sup>59</sup> Available at <https://unfccc.int/documents/641770>.

Figure 10  
**Share of adaptation components of nationally determined contributions referring to specific adaptation priority areas and sectors**



161. Of the Parties that provided an adaptation component, 41 per cent referred to the importance of transformational adaptation, including measures related to agriculture, fisheries and livestock, terrestrial and coastal ecosystems and biodiversity, urban areas and settlements, and disaster risk management. The aim of these measures is to promote technological innovation and policy or legal reform, build institutional capacity for transformational adaptation, create new financing mechanisms and influence the behavioural change needed for transformational adaptation. The importance of promoting gender-inclusive approaches to transformational adaptation and the need for a deeper understanding of fairness and just transition in transformational adaptation were also highlighted.

## 5. Contingency measures

162. Of the Parties that communicated new or updated NDCs, the share of adaptation components that reported contingency measures for dealing with emergencies and impacts that occur regardless of adaptation efforts increased from 34 to 35 per cent since the previous NDCs. Contingency measures include strengthening resilience to impacts beyond the limits of adaptation through NAPs; search and rescue, contingency or emergency plans and systems; emergency shelters; humanitarian assistance civil defence; evacuation procedures; emergency or contingency funding; food reserves; disaster insurance schemes; livelihood protection policies; and support for displaced persons. These measures were typically suggested for agriculture, livestock, fisheries, coastal areas, water resources, human health, infrastructure and energy, and tourism.

## 6. Monitoring and evaluation, and understanding progress

163. The share of Parties with adaptation components that described their efforts to enhance monitoring and evaluation of adaptation, such as by focusing on tracking progress, reducing vulnerability, improving efficiency and effectiveness of actions, and NAP implementation and support, increased from 68 to 69 per cent since their previous NDCs. Of

those Parties, 37 per cent identified and described their intention to apply time-bound quantified adaptation targets for monitoring the progress of adaptation measures (see table 2 of the document on additional information from adaptation components of NDCs<sup>60</sup>) and 15 per cent of Parties reported developing the indicator frameworks that they intend to use for monitoring progress.

## 7. Synergies with mitigation and sustainable development

164. The share of Parties that identified in their adaptation component synergies between adaptation and mitigation, particularly in the terrestrial and marine ecosystem and biodiversity, agriculture, energy, water resources and human health sectors, increased to 29 per cent in the new or updated NDCs from 27 per cent in their previous NDCs (mitigation co-benefits of adaptation actions are covered in chap. IV.G above). Examples of synergies include increasing the resilience of mangroves and seagrasses (nature-based solutions) to reduce flooding and increase carbon sequestration; improving forest carbon stock through restoration, afforestation and conservation of native forest species; implementing climate-smart agriculture and agroforestry practices in order to diversify crops, foster soil conservation, control diversification and increase carbon sequestration; using renewable energy and improving energy efficiency to enhance energy security; improving water reservoirs and pumped storage schemes to ensure water security; reusing treated wastewater to contribute to saving freshwater resources; and reducing respiratory diseases through reduced use of fossil fuels (pollution).

165. In the adaptation components of the new or updated NDCs, compared with the previous NDCs, an increased share of Parties (41 per cent) described how adaptation actions relate to sustainable development frameworks, describing the overall linkages and synergies between their adaptation efforts and efforts towards the SDGs; identifying the essential role of adaptation in the achievement of SDGs, as well as the role of sustainable development in successful adaptation; and emphasizing the importance and benefits of integrating implementation of climate and SDG-related efforts. Further, 25 per cent of Parties specified how adaptation in specific priority areas contributes to achieving individual SDGs. Figure 11 provides an overview of the specific synergies identified between sectoral adaptation efforts and the SDGs.

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<sup>60</sup> Available at <https://unfccc.int/documents/641770>.

Figure 11  
**Synergies between efforts in adaptation priority sectors and efforts towards the Sustainable Development Goals identified in nationally determined contributions**

	SDG																
Adaptation priority sector	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Food production and nutrition security	Dark	Dark	Dark	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Water resources	Light	Light	Light	Light	Light	Dark	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Urban areas and human habitats	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Key economic sectors and services	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Terrestrial and wetland ecosystems	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Dark	Light	Light
Ocean ecosystems	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Coastal and low-lying areas	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Livelihoods and poverty	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Human health	Light	Light	Dark	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light

Note: The shading reflects how frequently linkages were identified by Parties: the darker the shading, the more frequently linkages were identified.

## K. Domestic mitigation measures

### 1. Priority areas and quantitative mitigation targets

166. In the *Emissions Gap Report 2023*, UNEP estimates that, in 2022, approximately 36 per cent (21.0 Gt CO<sub>2</sub> eq) of global GHG emissions came from energy supply, 25 per cent (14.0 Gt CO<sub>2</sub> eq) from industry, 18 per cent (10.0 Gt CO<sub>2</sub> eq) from AFOLU, 14 per cent (8.1 Gt CO<sub>2</sub> eq) from transport and 7 per cent (3.8 Gt CO<sub>2</sub> eq) from buildings.<sup>61</sup> It found that in most global sectors emissions had fully rebounded from the drop in 2020 induced by the pandemic and were exceeding the 2019 level. According to the contribution of Working Group III to the AR6, GHG emissions continuously increased in all sectors in 2010–2019, but most rapidly in transport and industry with average annual emission growth rates of about 2.0 and 1.4 per cent respectively.

167. Under Article 4, paragraph 2, of the Paris Agreement, Parties shall pursue domestic mitigation measures with the aim of achieving the objectives of their NDCs. CMA 5 emphasized the urgent need for accelerated implementation of domestic mitigation measures.<sup>62</sup>

168. As reported in the 2023 version of this report, 99 per cent of Parties outlined in their NDCs domestic mitigation measures as key instruments for achieving mitigation targets for their NDCs and/or specific priority areas of national importance, including energy supply, transport, buildings, industry,<sup>63</sup> AFOLU and waste. Specifically, Parties communicated

<sup>61</sup> UNEP. 2023. *Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again)*. Nairobi: UNEP. Available at <https://doi.org/10.59117/20.500.11822/43922>. The UNEP *Emissions Gap Report 2023* and the contribution of Working Group III to the AR6 include estimates of GHG emissions from waste and cross-cutting or other under these sectors.

<sup>62</sup> Decision 1/CMA.5, para. 31.

<sup>63</sup> Covers measures targeting emissions from fuel use in industry, industrial process emissions and emissions from product use. For the scopes of the other priority areas, including cross-cutting or other, see document [FCCC/PA/CMA/2021/8/Add.2](https://www.fccc.org/public/doc.cfm?id=11822).

measures most frequently in the priority area of energy supply, followed by AFOLU and transport (see figure 12).

169. In addition, compared with 79 and 81 per cent according to the 2022 and 2023 versions of this report respectively, 82 per cent of Parties communicated one or more quantitative mitigation targets specific to priority areas or sub-areas, which support and underpin their overall mitigation targets. Such quantitative mitigation targets were provided most frequently for energy supply (59 per cent of Parties), followed by AFOLU (53 per cent) and cross-cutting or other (49 per cent), while they were much less frequently indicated in the other priority areas (5–30 per cent). Renewable energy generation targets were the most frequently communicated quantitative mitigation targets specific to sub-areas (55 per cent). As non-CO<sub>2</sub> emission targets for cross-cutting or other, 5 per cent of Parties specified CH<sub>4</sub> emission targets and 3 per cent indicated fluorinated gas emission targets.

170. While 69 per cent of Parties communicated domestic mitigation measures for achieving unconditional mitigation targets in their NDCs,<sup>64</sup> 67 per cent included measures for achieving conditional mitigation targets. Measures for achieving conditional mitigation targets were most frequently identified by Parties in energy supply, followed by transport and buildings (see figure 13). The share of Parties indicating measures for achieving conditional mitigation targets has increased most since the 2022 version of this report in relation to industry (by 6 percentage points), followed by cross-cutting or other (by 5 percentage points) and transport and waste (by 4 percentage points).

## 2. Feasible, effective and low-cost mitigation options in priority areas

171. CMA 5 noted that feasible, effective and low-cost mitigation options are already available in all sectors to keep the 1.5 °C temperature goal within reach in this critical decade with the necessary cooperation on technologies and support. Further, it welcomed that over the past decade mitigation technologies have become increasingly available, and that the unit costs of several low-emission technologies have fallen continuously, notably wind power and solar power and storage, while recognizing the need to increase the affordability and accessibility of such technologies.<sup>65</sup>

172. According to the contribution of Working Group III to the AR6, mitigation options costing USD 100/t CO<sub>2</sub> eq or less (with an estimated net mitigation potential of 31–44 Gt CO<sub>2</sub> eq/year) could reduce global GHG emissions by at least half of the 2019 level by 2030, and options costing less than USD 20/t CO<sub>2</sub> eq account for over 50 per cent of the net mitigation potential;<sup>66</sup> and many of these options have been assessed to be technically viable and are supported by the public. Parties reported such feasible, effective and low-cost mitigation options in their NDCs (see figure 12). Options costing less than USD 20/t CO<sub>2</sub> eq with the highest estimated net mitigation potential (in parentheses) include:

(a) Solar energy (3.3 Gt CO<sub>2</sub> eq/year), with 51 per cent of Parties (compared with 49 per cent in the 2022 version of this report), accounting for 56 per cent of total global electricity generation from fossil fuels in 2022,<sup>67</sup> communicating corresponding measures, such as developing several large-scale photovoltaic power plants. Most of the estimated net mitigation potential of this option (2.7 Gt CO<sub>2</sub> eq/year) comes at a negative cost;<sup>68</sup>

<sup>64</sup> Such measures refer to those for achieving unconditional mitigation targets and those for achieving both unconditional and conditional mitigation targets. The same approach applies to measures for achieving conditional mitigation targets.

<sup>65</sup> Decision [1/CMA.5](#), paras. 16(c) and 30.

<sup>66</sup> The contribution of Working Group III to the AR6 presents net mitigation potential as the sum of reduced emissions and/or enhanced sinks compared with the current-policy scenarios for 2015–2019. It refers to the costs as net lifetime discounted costs of avoided GHG emissions relative to a reference technology. Costs of some mitigation options in figure 12, such as efficient lighting, appliances and equipment and fuel-efficient light-duty vehicles, are estimated to be less than zero. Negative costs mean that lifetime monetary revenues are higher than lifetime monetary costs.

<sup>67</sup> Estimated on the basis of data from IEA. 2024. *World Energy Balances*. Paris: IEA. All rights reserved; as modified by the secretariat. IEA data used in this report are subject to IEA terms and conditions, available at [www.iea.org/terms](http://www.iea.org/terms).

<sup>68</sup> As footnote 66 above.

(b) Wind energy (3.08 Gt CO<sub>2</sub> eq/year), with 36 per cent of Parties (compared with 35 per cent in the 2022 report), accounting for 55 per cent of total global electricity generation from fossil fuels in 2022,<sup>69</sup> indicating corresponding measures, including developing offshore wind power capacity. Most of the estimated net mitigation potential of this option (2.31 Gt CO<sub>2</sub> eq/year) comes at a negative cost;

(c) Reduced conversion of forests and other ecosystems (2.28 Gt CO<sub>2</sub> eq/year), with 47 per cent of Parties (compared with 44 per cent in the 2022 report), accounting for 56 per cent of total global forest cover in 2020<sup>70</sup> and 13 per cent of total global wetland area,<sup>71</sup> reporting corresponding measures, such as drafting and implementing zero-deforestation agreements with landowners and stakeholders, and protecting coastal wetlands reported in the national wetlands inventory;

(d) Energy efficiency improvement in industry (1.14 Gt CO<sub>2</sub> eq/year), with 30 per cent of Parties (compared with 27 per cent in the 2022 report), accounting for 59 per cent of total global final energy consumption in industry in 2022,<sup>72</sup> identifying corresponding measures, including introducing grant schemes to cover the high upfront cost of investing in improving energy efficiency;

(e) Reducing fluorinated gas emissions (0.94 Gt CO<sub>2</sub> eq/year), with 26 per cent of Parties (compared with 36 per cent in the 2022 report), accounting for 56 per cent of total global fluorinated gas emissions in 2020, indicating corresponding measures, including phasing out ozone-depleting substances covered under the Montreal Protocol. Some of the estimated net mitigation potential of this option (0.26 Gt CO<sub>2</sub> eq/year) comes at a negative cost.

173. For most of the feasible, effective and low-cost mitigation options, there has been an increase in the share of Parties mentioning them since the 2022 version of this report (see figure 12). The largest increases were seen in relation to electric light-duty vehicles (by 7 percentage points from 34 to 41 per cent), followed by geothermal energy (by 6 percentage points) and reducing non-CO<sub>2</sub> emissions in industry and ecosystem restoration, afforestation and restoration (by 5 percentage points). On the other hand, the share of Parties mentioning them has most declined in relation to fuel-efficient heavy-duty vehicles (by 13 percentage points from 40 to 27 per cent), followed by fuel-efficient light-duty vehicles and reducing CH<sub>4</sub> emissions from solid waste (by 12 percentage points), and reducing fluorinated gas emissions (by 10 percentage points).

<sup>69</sup> As footnote 67 above.

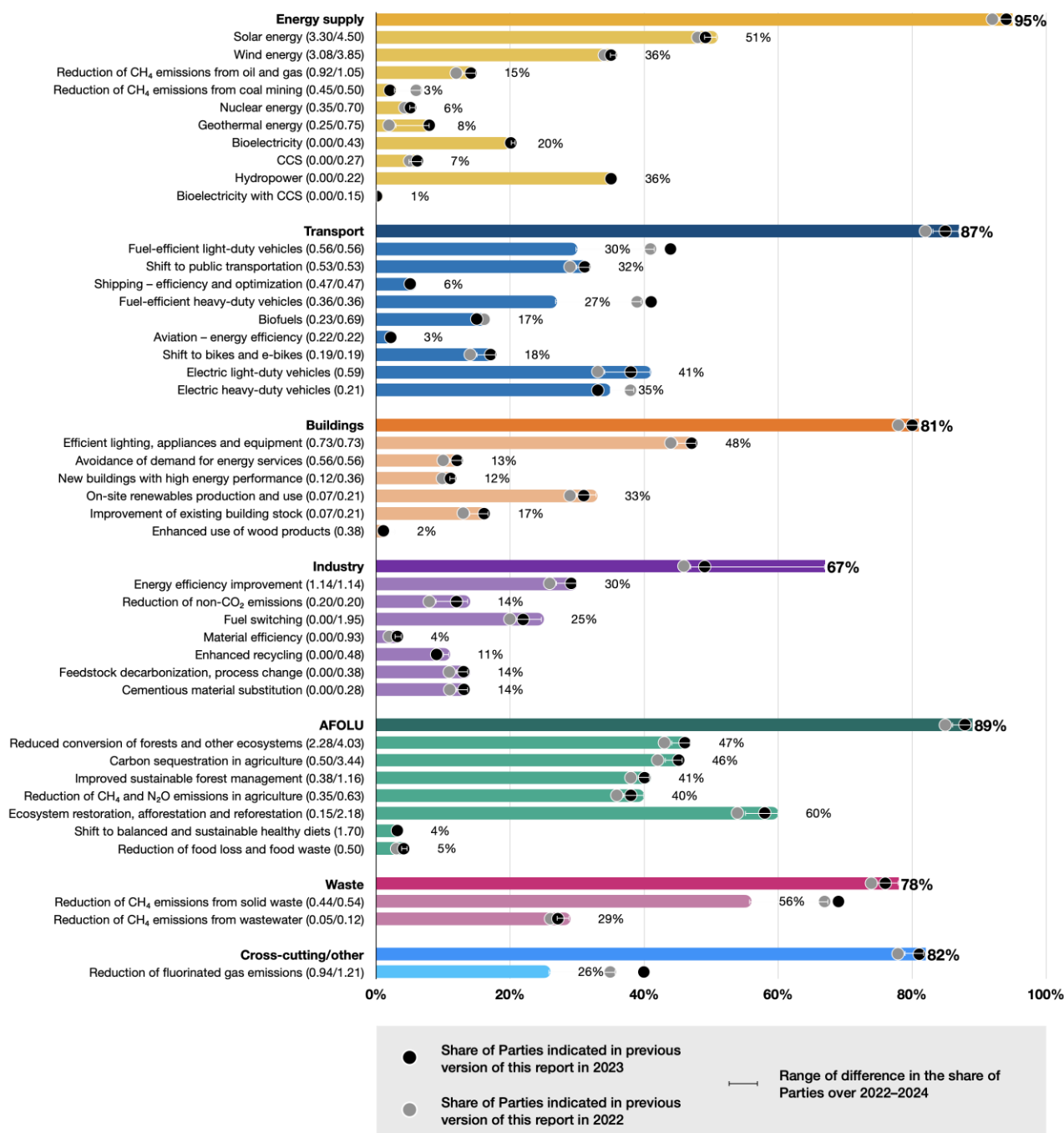
<sup>70</sup> Estimated on the basis of data from Food and Agriculture Organization of the United Nations. 2020. *Global Forest Resources Assessment 2020*. Rome: Food and Agriculture Organization of the United Nations. Available at [www.fao.org/documents/card/en/c/ca9825en](http://www.fao.org/documents/card/en/c/ca9825en). The world has lost 420 million ha forest through deforestation since 1990, with an estimated annual deforestation rate of 10 million ha in 2015–2020.

<sup>71</sup> Estimated on the basis of data from the Center for International Forestry Research global wetlands map, available at <https://www2.cifor.org/global-wetlands/> (accessed 16 July 2024); and Xu J, Morris P, Liu J, et al. 2018. PEATMAP: Refining estimates of global peatland distribution based on a meta-analysis. *Catena*. 160: pp.134–140. Available at <https://core.ac.uk/download/pdf/227455185.pdf>.

<sup>72</sup> As footnote 67 above.

Figure 12

**Share of Parties referring to specific priority areas and mitigation options with high mitigation potential costing below USD 20/t CO<sub>2</sub> eq and/or USD 100/t CO<sub>2</sub> eq in 2030 in nationally determined contributions**



Notes: (1) If a Party communicated more than one measure for a mitigation option, it was counted as one Party communicating measures for that option. (2) The estimated net mitigation potential (in Gt CO<sub>2</sub> eq/year) of each option costing below USD 20/t CO<sub>2</sub> eq and USD 100/t CO<sub>2</sub> eq in 2030 is presented in parentheses as, for example, “(3.30/4.50)” in the case of solar energy. These estimates are based on data from the contribution of Working Group III to the AR6, which states that mitigation potentials and costs of individual technologies in a specific context or region may differ greatly from the provided estimates and are associated with uncertainties. (3) According to the contribution of Working Group III to the AR6, estimating the costs of mitigation potentials was not possible for options with only one mitigation potential listed (e.g. electric light-duty vehicles) owing to high variation in or lack of data.

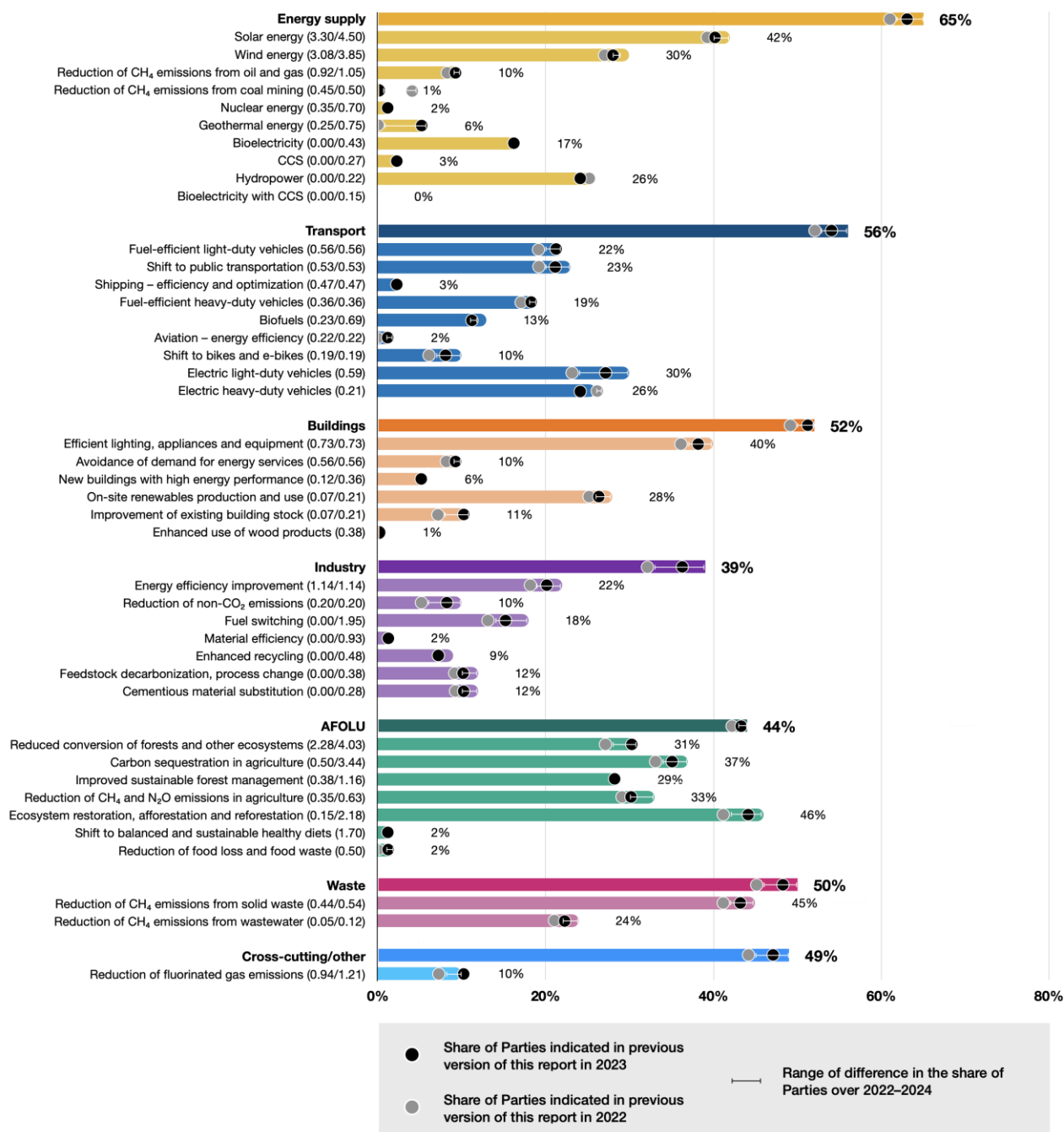
174. Further, for the feasible, effective and low-cost mitigation options, Parties communicated measures for achieving conditional mitigation targets in their NDCs most frequently in relation to ecosystem restoration, afforestation and reforestation, followed by reducing CH<sub>4</sub> emissions from solid waste, solar energy, and efficient lighting, appliances and equipment (see figure 13). The share of Parties indicating measures for achieving conditional mitigation targets has increased most since the 2022 version of this report in relation to



electric light-duty vehicles and geothermal energy (by 6 percentage points from 0 to 6 per cent), followed by reducing non-CO<sub>2</sub> emissions in industry, fuel switching in industry and carbon sequestration in agriculture (by 4 percentage points).

Figure 13

**Share of Parties referring to specific priority areas and mitigation options for achieving conditional mitigation targets with high mitigation potential costing below USD 20/t CO<sub>2</sub> eq and/or USD 100/t CO<sub>2</sub> eq in 2030 in nationally determined contributions**



Notes: (1) See notes to figure 12. (2) Specific priority areas and mitigation options for achieving conditional mitigation targets refer to those for achieving conditional mitigation targets and those for achieving both unconditional and conditional mitigation targets.

175. Moreover, for such options, the largest conditionality gap<sup>73</sup> in terms of the difference between the shares of Parties referring to mitigation options for achieving conditional and unconditional mitigation targets was found in relation to solar energy (17 percentage points), followed by efficient lighting, appliances and equipment and reducing CH<sub>4</sub> emissions from

<sup>73</sup> See footnote 25 above.



solid waste (16 percentage points), ecosystem restoration, afforestation and reforestation (14 percentage points), and wind energy (13 percentage points). This conditionality gap has increased most since the 2022 version of this report in relation to reducing CH<sub>4</sub> emissions from solid waste (by 16 percentage points), followed by fuel-efficient light-duty vehicles and fuel-efficient heavy-duty vehicles (by 14 percentage points).

### 3. Global efforts and mitigation options covered in recent decisions

176. The Synthesis Report of the AR6 states that scaling up near-term climate actions will mobilize a mix of low- and high-cost options that are needed to avoid future lock-ins, foster innovation and initiate transformational change.

177. Parties reported in their NDCs mitigation measures for global efforts and mitigation options that have been covered in recent CMA decisions<sup>74</sup> (see the document on additional information on domestic mitigation measures<sup>75</sup> for further information).

### 4. Coherence and synergies with development priorities

178. CMA 5 noted the importance of aligning NDCs with LT-LEDS and encouraged Parties to align their next NDCs with LT-LEDS. In addition, it noted that the global transition to low-emission and climate-resilient development provides opportunities and challenges for sustainable development and poverty eradication.<sup>76</sup>

179. A total of 66 per cent of Parties, compared with 64 and 65 per cent according to the 2022 and 2023 versions of this report respectively, highlighted policy coherence and synergies between their mitigation measures and development priorities. The share of Parties highlighting policy coherence and synergies has increased from 58 per cent in the previous NDCs to 75 per cent in the new or updated NDCs.

180. Of those Parties, 50 per cent (or 33 per cent of all Parties) identified domestic mitigation measures in the context of the longer-term measures and targets set out in their LT-LEDS and/or other national long-term low-emission development strategies or laws, including by identifying measures for the NDC on the basis of programmes of action or mitigation options set out in the LT-LEDS; by requiring the Government to report, review and calibrate measures in the NDC at least once every five years to ensure progress towards 2050 or net zero targets; and by establishing an independent statutory body that advises the Government on setting mitigation targets and measures for the NDC in the context of a legally binding net zero target.

181. In addition, compared with 22 per cent according to the 2022 and 2023 versions of this report, 24 per cent of Parties clarified the alignment between their mitigation measures and efforts towards achieving the SDGs, highlighting the multiple co-benefits of their measures for sustainable development and the cost-effectiveness of their measures in relation to sustainable development under fiscal constraints, including those due to the pandemic. For example, 16 per cent of Parties communicated one or several SDGs in relation to which there are synergies with their priority areas or mitigation measures (see figure 14), with energy supply measures contributing to achieving SDG 7 (affordable and clean energy) (12 per cent of Parties) and AFOLU measures contributing to achieving SDG 15 (life on land) (12 per cent) most frequently indicated. Just 1 per cent of Parties clarified trade-offs between their priority areas or mitigation measures and specific SDGs, such as potential forest degradation related to SDG 15 from renewable energy development, as a means of instituting necessary safeguard mechanisms for implementing the mitigation measures.

<sup>74</sup> As footnote 26 above.

<sup>75</sup> Available at <https://unfccc.int/documents/641771>.

<sup>76</sup> Decision [1/CMA.5](#), paras. 40 and 9 respectively.

Figure 14

**Share of Parties referring to synergies between efforts in mitigation priority areas and efforts towards the Sustainable Development Goals identified in their nationally determined contributions**

Mitigation priority area	SDG																
	1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS
Energy supply	3%	3%	3%	1%	4%	2%	12%	7%	7%	2%	7%	5%	9%	1%	1%	1%	2%
Transport	3%	1%	4%	1%	4%	0%	8%	7%	7%	2%	9%	6%	9%	1%	1%	1%	2%
Buildings	3%	2%	4%	0%	4%	1%	8%	5%	6%	2%	6%	4%	8%	1%	2%	1%	1%
Industry	2%	2%	1%	1%	2%	1%	5%	4%	5%	1%	3%	5%	5%	1%	1%	0%	1%
AFOLU	8%	10%	5%	2%	6%	7%	5%	8%	3%	3%	4%	7%	11%	4%	12%	3%	2%
Waste	1%	2%	6%	1%	2%	7%	3%	4%	4%	1%	7%	7%	6%	2%	2%	1%	2%
Cross-cutting/other	1%	1%	3%	1%	1%	1%	5%	3%	3%	2%	3%	4%	5%	1%	1%	1%	2%

Note: The shading reflects how frequently synergies were identified by Parties: the darker the shading, the more frequently synergies were identified.

**L. Means of implementation**

182. A total of 91 per cent of Parties provided information on some or all means of implementation in their NDCs, although the structure and depth of that information varied significantly. While 61 per cent included a section on means of implementation or separate sections on finance, technology and/or capacity-building, 69 per cent mentioned or referred to aspects of means of implementation in other sections of their NDCs.

183. A total of 67 per cent of Parties provided information on specific climate finance, technology and capacity-building projects, including, for some, detailed information on financial and technical requirements, implementing entities and time frames.

184. Some 8 per cent highlighted South–South, triangular or regional cooperation as support mechanisms for NDC implementation, including for specific aspects of financial assistance, capacity-building, and technology development and transfer.

**1. Finance**

185. A total of 91 per cent of Parties provided information on finance as a means of NDC implementation, with 69 per cent characterizing finance in terms of international support needed and 24 per cent mentioning finance from domestic sources only. Just 6 per cent mentioned finance in the context of providing financial support for other countries’ NDC implementation. Furthermore, 44 per cent provided qualitative information on how finance will be used as a means of implementation either in general or through specific actions for financing mitigation or adaptation, such as earmarking public expenditure, establishing climate funds or supporting financial systems; while 46 per cent of Parties included quantitative information on financial investment or expenditure to support their NDCs, such as on financing specific technology development funds, economy-wide budgetary programmes, thematic areas, or specific projects and needs for financial support.

186. In addition, 46 per cent of Parties provided quantitative estimates of financial support needs, which were often expressed as total amounts over the time frame of the NDC. Of those, 29 per cent provided updated quantitative estimates of financial support needs for the first time in their new or updated NDCs. Most of those Parties differentiated quantitative estimates for conditional actions reliant on international support from those for unconditional actions that may be financed from domestic sources.

187. Furthermore, 38 per cent of Parties provided information on financial support needs across mitigation and adaptation themes or sectors. Mitigation finance is needed across renewable energy, energy efficiency, transport and forestry, while adaptation finance is needed for activities related to water, agriculture, coastal protection and resilience.

## 2. Technology development and transfer

188. With regard to information on technology development and transfer for NDC implementation, 80 per cent of Parties covered qualitative aspects and 33 per cent provided information on both qualitative and quantitative aspects.

189. A total of 66 per cent of Parties referred to technology development and transfer in the context of actions that inherently address both adaptation and mitigation; and about the same proportion included information with a focus on mitigation, while 54 per cent made reference to climate technology for adaptation.

190. In terms of specific technologies that Parties intend to use for achieving their adaptation and mitigation targets, the most frequently identified were related to the energy sector (e.g. enhancing use of renewable energy and green hydrogen, and decarbonizing power systems and boosting their storage capacity), followed by agricultural technologies (e.g. climate-smart agriculture and smart irrigation technologies) and technologies related to water and waste management (e.g. waste-to-energy technologies and circular economy practices). There is a growing focus on digital technologies for improving monitoring and data and information systems, including for forecasting and early warning systems, and on ecosystem-based technologies and practices, in particular across the agrifood system.

191. Technology needs mentioned by Parties were mainly (41 per cent) of a cross-cutting nature, addressing both adaptation and mitigation, followed by those focused on mitigation (33 per cent) or adaptation (23 per cent). In most cases (38 per cent) the technology needs were associated with multiple sectors (e.g. promoting cross-sectoral efficiency in the use of energy and materials) or were stated in general terms. Some 13 per cent of Parties referenced technology needs assessments and technology action plans for identifying priority technology needs for adaptation and mitigation.

192. Actions concerning policy, regulatory and legal aspects were commonly referred to by 37 per cent of Parties, which include developing or updating policies and strategies to promote technology innovation, including by establishing funds for this purpose, promoting use of renewable energy, improving energy, water and waste management systems, and accelerating adoption and transfer of low-emission and climate-resilient technologies (e.g. zero-emission mobility). Parties also referred to policy and regulatory measures for promoting low-carbon and climate-resilient technologies towards implementing net zero strategies and decarbonization pathways at the national and sectoral level.

193. In addition, 31 per cent of Parties included information related to technology innovation, research and development, for instance with regard to promoting collaboration between countries and promoting institutions, mechanisms, tools and business models that foster progress in this area (e.g. smart agriculture, decarbonization of industrial processes). In most cases, identified measures were multisectoral (44 per cent), followed by agriculture (26 per cent) as the most cited area of focus for technology innovation, research and development.

194. A total of 8 per cent of Parties included specific information on their ongoing or intended provision of support to developing country Parties, including through South–South cooperation. In most cases the support targeted multiple sectors or was referred to in broad terms as relating to reducing GHG emissions and/or enhancing climate resilience.

## 3. Capacity-building

195. A total of 76 per cent of Parties identified capacity-building as a prerequisite for NDC implementation, while 50 per cent recognized capacity-building as a cross-cutting means of NDC implementation. Some 76 per cent of Parties did not provide information on capacity-building needs and gaps in a specific section but instead across different sections. Capacity-building needs were identified for formulating policies, integrating mitigation and adaptation into sectoral planning processes, accessing finance and providing the necessary information for clarity, transparency and understanding of NDCs.

196. Of the Parties, 56 per cent expressed needs for adaptation and 41 per cent needs for mitigation. In addition, 66 per cent of Parties identified capacity-building needs that are multisectoral or intersectoral, while others identified needs relating to specific sectors,

including, but not limited to, agriculture, buildings and infrastructure, energy, food, disaster management and response, ecosystems (marine, coastal and terrestrial), fisheries, forestry, tourism, health, transport, water, and national GHG data management and tracking of NDC implementation.

197. With regard to the type of capacity-building needed, 25 per cent of Parties referred to capacity-building, mainly for facilitating training, education, upskilling, awareness-raising, research, innovation, development, and providing incentives and support to businesses and entrepreneurs, as important for achieving just transition of the workforce and leveraging opportunities arising from the new green economy. Furthermore, 16 per cent of Parties emphasized the importance of institutional capacity-building to raise climate change awareness among government officials and human resource capability to manage climate risks and address loss or damage.

198. In the new or updated NDCs, 20 per cent of Parties referred to capacity-building as being important for transfer of low-carbon and green technologies, while 10 per cent of Parties recognized the importance of collaboration through capacity-building initiatives such as scientific research, policy analysis and the adoption of robust measurement, reporting and verification for effectively implementing NDCs. Further, 21 per cent of Parties continued to highlight the important need for capacity-building for women, youth and vulnerable groups to expand their participation in decision-making processes.

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