



United Nations

FCCC/PA/CMA/2023/12



Framework Convention on
Climate Change

Distr.: General
14 November 2023

English only

**Conference of the Parties serving as the meeting
of the Parties to the Paris Agreement**

Fifth session

United Arab Emirates, 30 November to 12 December 2023

**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 25 September 2023.



Contents

	<i>Page</i>
Abbreviations and acronyms	3
I. Executive summary	4
II. Mandate	10
III. Introduction	11
A. Background and scope	11
B. Approach	12
IV. Synthesis of information contained in nationally determined contributions	13
A. Overview	13
B. Scope and coverage	13
C. Time frames and/or periods of implementation	16
D. Quantifiable information on the reference point (including, as appropriate, a base year)	17
E. Assumptions and methodological approaches, including for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals	17
F. Planning and implementation processes	20
G. Mitigation co-benefits resulting from adaptation action and/or economic diversification plans	23
H. Fairness and ambition in the light of national circumstances	24
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	25
J. Adaptation	31
K. Domestic mitigation measures	35
L. Means of implementation	43

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
CDM	clean development mechanism
CH ₄	methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COP	Conference of the Parties
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
LT-LEDS	long-term low-emission development strategy(ies)
LULUCF	land use, land-use change and forestry
N ₂ O	nitrous oxide
NAP	national adaptation plan
NDC	nationally determined contribution
NF ₃	nitrogen trifluoride
PFC	perfluorocarbon
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SDG	Sustainable Development Goal
SF ₆	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

* Used exclusively in figures.

I. Executive summary

1. This report has been prepared in response to the request from CMA 3¹ for the secretariat to annually update the NDC synthesis report.² This version of the report synthesizes information from the 168 latest available NDCs, representing 195 Parties to the Paris Agreement, including the 153 new or updated NDCs communicated by 180 Parties, recorded in the NDC registry³ as at 25 September 2023, covering 94.9 per cent of the total global emissions in 2019, which are estimated at 52.6 Gt CO₂ eq without LULUCF.⁴ A total of 20 Parties have communicated new or updated NDCs since 23 September 2022 (the cut-off date for submissions covered in the previous version of this report), which includes a Party that ratified the Paris Agreement after that date.⁵

2. The COP and CMA guidance⁶ 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. All Parties provided information on mitigation targets or 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) 80 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) In terms of GHGs, all NDCs cover CO₂ emissions, 91 per cent cover CH₄, 89 per cent cover N₂O, 54 per cent cover HFCs, 36 per cent cover PFCs and SF₆ and 26 per cent cover NF₃;

(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, 30 per cent indicated that they started implementing their NDC in or before 2020 and 5 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

¹ Decision 1/CMA.3, para. 30.

² See document FCCC/PA/CMA/2022/4, Corr.1 and Corr.2 for the previous version.

³ Available at <https://unfccc.int/NDCREG>.

⁴ 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.

⁵ Eritrea deposited its instrument of accession to the Paris Agreement on 7 February 2023 and, in accordance with Article 21, para. 3, of the Paris Agreement, it entered into force on 7 March 2023. Therefore, this report takes into account the NDC submitted by Eritrea on 19 June 2018.

⁶ 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, 77 per cent of Parties stated that they plan to or will possibly use at least one type of voluntary cooperation under Article 6 of the Paris Agreement. Use of cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement was most frequently communicated by Parties (53 per cent), followed by use of the mechanism established by Article 6, paragraph 4 (35 per cent), and general use of voluntary cooperation (23 per cent).

8. Total global GHG emissions (without LULUCF) taking into account implementation of the latest NDCs⁷ are estimated to be around 53.2 (51.6–54.8) Gt CO₂ eq in 2025⁸ and 51.6 (48.3–54.8) Gt CO₂ eq in 2030,⁹ which are:¹⁰

(a) In 2025, 55.2 per cent higher than in 1990 (34.3 Gt CO₂ eq), 12.2 per cent higher than in 2010 (47.4 Gt CO₂ eq) and 1.0 per cent higher than in 2019 (52.6 Gt CO₂ eq);¹¹

(b) In 2030, 50.5 per cent higher than in 1990, 8.8 per cent higher than in 2010 and 2.0 per cent lower than in 2019, as well as 3.1 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 23 September 2022) presented in the previous version of this report were estimated to be around 53.4 (51.8–55.0) Gt CO₂ eq in 2025 and 52.4 (49.1–55.7) Gt CO₂ eq in 2030. Those levels are very similar (at 0.2 Gt CO₂ eq higher for 2025 and 0.8 Gt CO₂ 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 implies an even stronger possibility of global emissions peaking before 2030 than estimated in the previous version of this report, with the lower bound of the 2030 emission level (48.3 Gt CO₂ eq) estimated to be up to 8.2 per cent below the 2019 emission level (52.6 Gt CO₂ eq) and 6.3 per cent below the lower bound of the estimated 2025 emission level (51.6 Gt CO₂ 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 5.3 (2.3–8.2) 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 1.4 per cent higher emissions in 2030 than in 2019 (ranging from 1.5 per cent lower to 4.2 per cent higher).

12. The contribution of Working Group III to the AR6¹² concludes that, in scenarios of limiting warming to 1.5 °C (with over 50 per cent likelihood by 2100) with no or limited

⁷ 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.

⁸ 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.

⁹ 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.

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

¹¹ 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 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*

overshoot over the course of the century,¹³ 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.¹⁴

13. The Synthesis Report of the AR6¹⁵ 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 37 (21–59) per cent below the 2019 level.

14. The absolute difference in the level of emissions by 2030 according to the latest NDCs and these IPCC scenarios¹⁶ 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 15.1 (11.1–18.5) Gt CO₂ 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 22.9 (21.3–27.9) Gt CO₂ eq. However, assuming full implementation of all latest NDCs, including all conditional elements, the gap is slightly narrowed, towards 11.6 (7.6–15.1) Gt CO₂ eq in relation to the aforementioned 2 °C scenarios and towards 19.5 (17.8–24.4) Gt CO₂ eq in relation to the aforementioned 1.5 °C scenarios.

15. Taking into account 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 CO₂), cumulative CO₂ emissions in 2020–2030 based on the latest NDCs would likely use up 87 per cent of the remaining carbon budget, leaving a post-2030 carbon budget of around 70 Gt CO₂, which is equivalent to approximately two years of projected total global CO₂ 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 CO₂ from 2020 onward), cumulative CO₂ emissions in 2020–2030 based on the latest NDCs would likely use up around 38 per cent of the remaining carbon budget. For comparison, total global CO₂ emissions between 1850 and 2020 are estimated by the IPCC¹⁷ to have amounted to 2,390 (2,150–2,630) Gt CO₂.

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/>.

- ¹³ 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, 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.
- ¹⁴ 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.
- ¹⁵ 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/>.
- ¹⁶ The differences are calculated between emission levels according to the NDCs and under IPCC scenario categories “C1a” and “C3a” respectively.
- ¹⁷ 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*

17. A total of 48 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 38.8 (36.8–40.7) Gt CO₂ eq in 2030, which is 5 per cent higher than in 2010 (with a range from 1 per cent lower to 10 per cent higher) and 5 (0–10) per cent lower than in 2019.¹⁸

18. Mindful of the inherent uncertainty of such long-term estimates, the information indicates that these Parties' total GHG emission level could be 64.0 (60.0–68.0) per cent lower in 2050 than in 2019 and their annual per capita emissions would be 2.3 (2.0–2.6) t CO₂ 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 CO₂ 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 CO₂ 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 CO₂ eq.¹⁹

19. A total of 97 per cent of Parties explained their approach to NDC preparation and implementation, and 58 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, 65 per cent of Parties highlighted policy coherence and synergies between their domestic mitigation measures²⁰ 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 increasingly²¹ recognizing gender integration as a means to enhance the ambition and effectiveness of their climate action: 79 per cent of Parties provided information related to gender in their NDCs and 33 per cent affirmed that they will take gender into account in implementing them.²² Of the Parties that referenced gender, 38 per cent had not included reference to gender in their previous NDCs, while 18 per cent considered gender to a similar extent to previously. Of the Parties that referenced gender in their previous NDCs, 68 per cent elaborated more on the topic in their updated NDCs.

23. A total of 40 per cent of Parties described the role of local communities and the role, situation and rights of Indigenous Peoples in the adaptation components of their NDCs, describing the specific vulnerabilities of Indigenous Peoples that are particular to their circumstances, the importance of drawing on Indigenous and local knowledge to strengthen climate efforts, and arrangements to enable greater participation in and contributions to climate action by Indigenous Peoples.

Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press. Available at <https://www.ipcc.ch/report/ar6/wg1/>.

¹⁸ 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.

¹⁹ 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.

²⁰ In this report, (domestic) mitigation measures refers 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.

²¹ The share of Parties that referred to gender and consider it a cross-cutting issue in the new or updated NDCs has increased significantly since their previous NDCs.

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

24. In addition, 98 per cent of Parties provided information on using one or more ACE elements²³ 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 water resources, food production and nutrition security, 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. Concerning industry, the second largest source of global GHG emissions with the second highest annual growth rate of GHG emissions among the priority areas, 50 per cent of Parties mentioned associated measures, which is less frequently than for other priority areas (77–93 per cent).

29. Domestic mitigation measures for renewable energy generation were most frequently mentioned by 90 per cent of Parties, followed by measures for improving energy efficiency of buildings (73 per cent). A total of 14 per cent of Parties communicated quantitative targets for the share of total renewable energy in electricity generation by 2030 that fall within or above the SR1.5²⁴ range of 47–65 per cent consistent with 1.5 °C pathways. Further, 6 per cent of Parties indicated quantitative targets that are consistent with or beyond the 1.5 °C pathways in the 2023 update of the IEA Net Zero Roadmap²⁵ of tripling total installed capacity of renewables-based electricity generation by 2030.

30. Parties identified mitigation options costing less than USD 20/t CO₂ 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 required for being on 1.5 °C pathways by 2030. Such mitigation options with the highest estimated net emission reduction potential (in parentheses) include:

²³ 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).

²⁴ 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.

²⁵ IEA. 2023. *Net Zero Roadmap: A Global Pathway to Keep the 1.5C Goal in Reach – 2023 Update*. Paris: IEA. All rights reserved. Available at <https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach>.

- (a) Solar energy (3.3 Gt CO₂ eq/year), with 50 per cent of Parties communicating corresponding measures;
- (b) Wind energy (3.08 Gt CO₂ eq/year), with 36 per cent of Parties indicating corresponding measures;
- (c) Reducing conversion of forests and other ecosystems (2.28 Gt CO₂ eq/year), with 38 per cent of Parties reporting corresponding measures;
- (d) Improving energy efficiency in industry (1.14 Gt CO₂ eq/year), with 30 per cent of Parties identifying corresponding measures;
- (e) Reducing fluorinated gas emissions (0.94 Gt CO₂ eq/year), with 39 per cent of Parties including corresponding measures.

31. For those mitigation options, Parties communicated measures for achieving conditional mitigation targets in their NDCs more frequently than measures for achieving unconditional mitigation targets by 65 per cent in relation to wind energy, 56 per cent for solar energy, 38 per cent for reducing conversion of forests and other ecosystems and 24 per cent for improving energy efficiency in industry.

32. Parties also included in their NDCs mitigation options that have been addressed in recent CMA decisions.²⁶ For example, 90 per cent of Parties indicated measures for increasing low-emission energy; 90 per cent for increasing renewable energy; 9 per cent for phasing down unabated coal power generation; 4 per cent for phasing out inefficient fossil fuel subsidies; 15 per cent for reducing CH₄ emissions from fossil fuel operations; 39 per cent for reducing CH₄ and N₂O emissions in agriculture; and 56 per cent for ecosystem restoration, afforestation and reforestation.

33. For those mitigation options, Parties reported measures for achieving conditional mitigation targets in their NDCs more frequently than measures for achieving unconditional mitigation targets by 42 per cent in relation to reducing CH₄ and N₂O emissions in agriculture, 38 per cent for ecosystem restoration, afforestation and reforestation, and 20 per cent for reducing CH₄ emissions from oil and gas.

34. 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.

35. 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.

36. Of the 106 NDCs of island and coastal States submitted from 1 January 2020 to 11 October 2022, 73 per cent included at least one target, policy or measure aimed at ocean-based climate action, of which 59 per cent included ocean-based adaptation action, 48 per cent ocean-based mitigation action and 13 per cent action that links to both mitigation and adaptation goals.²⁷

37. New or updated NDCs reflect an increased recognition of the ocean's role in strengthening climate action.²⁸ A total of 10 per cent of the 148 new or updated NDCs

²⁶ For example, decisions 1/CMA.3 and 1/CMA.4.

²⁷ Khan, M., and E. Northrop. 2022. *Analysis of Ocean-Based Climate Action in Nationally Determined Contributions*. Technical Note. Washington, DC: World Resources Institute. Available at doi.org/10.46830/writn.22.00063.

²⁸ Lecerf M, Herr D, Thomas T, et al. 2021. *Coastal and marine ecosystems as Nature-based Solutions*

submitted between 29 March 2019 and 1 October 2023²⁹ include a reference to ocean changes, such as acidification and coral bleaching, and/or climate-driven impacts on the ocean such as sea level rise. A total of 56 per cent of the 148 Parties integrated coastal and marine nature-based solutions within new or updated NDCs as part of mitigation or adaptation measures.

38. Of the 158 Parties with an adaptation component in their NDCs, 30 per cent identified ocean ecosystems as a priority sector for adaptation and 11 per cent developed quantified targets for both fisheries and ocean ecosystems.

39. A total of 95 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.

40. In their new or updated NDCs, 46 per cent of Parties provided quantitative estimates of financial support needs for NDC implementation, with 27 per cent providing updated quantitative estimates and 13 per cent providing such estimates for the first time.

41. A total of 61 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 (24 per cent). Since the previous version of this report, the share of Parties (4 per cent) referring in their NDCs 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 has grown.

42. Finally, 75 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 the new or updated NDCs, compared with in their previous NDCs, more Parties expressed capacity-building needs for adaptation.

II. Mandate

43. 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.³⁰ The communicated NDCs are to be recorded in the NDC registry, maintained by the secretariat.

44. 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.³¹

45. COP 21 requested Parties whose INDC pursuant to decision 1/CP.20 contains a time frame:

in new or updated Nationally Determined Contributions. Ocean & Climate Platform, Conservation International, IUCN, GIZ, Rare, The Nature Conservancy and WWF.

²⁹ Among the 148 submissions, six countries that are referred to as "new" (i.e. Brunei Darussalam, Ecuador, Holy See, Philippines, Senegal, South Sudan) submitted their first NDCs during this period.

³⁰ Article 4, paras. 2, 3 and 11, of the Paris Agreement.

³¹ Decision 1/CP.21, para. 22.

(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.³²

46. 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.³³

47. CMA 4 requested Parties to revisit and strengthen the 2030 targets in their NDCs as necessary to align with the Paris Agreement temperature goal by the end of 2023 and urged Parties that have not yet communicated new or updated NDCs to do so as soon as possible in advance of CMA 5.³⁴

III. Introduction

A. Background and scope

48. The secretariat notified Parties on 18 April 2023 of its plan to base the 2023 version of the NDC synthesis report on the NDCs recorded in the registry as at 25 September 2023.

49. This report synthesizes information from the 168 latest available NDCs, representing 195 Parties to the Paris Agreement,³⁵ recorded in the NDC registry as at 25 September 2023. A total of 20 Parties have communicated new or updated NDCs since 23 September 2022 (the cut-off date for submissions covered in the previous version of this report).³⁶

50. The 168 NDCs comprise 153 new or updated NDCs from 180 Parties³⁷ and 15 NDCs from Parties that have not communicated new or updated NDCs in response to paragraphs 23–24 of decision 1/CP.21.

³² Decision 1/CP.21, paras. 23–24.

³³ Decision 1/CMA.3, para. 30.

³⁴ Decision 1/CMA.4, paras. 22–23.

³⁵ 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.

³⁶ Andorra, Bahamas, Egypt, Equatorial Guinea, Eritrea, Holy See, Kazakhstan, Kiribati, Mexico, Micronesia (Federated States of), Norway, Singapore, Thailand, Timor-Leste, Türkiye, Turkmenistan, Tuvalu, United Arab Emirates, Uruguay and Viet Nam.

³⁷ 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.

51. 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.³⁸

52. 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 2.³⁹

53. 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 2020.⁴⁰

54. 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.⁴¹

B. Approach

55. 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,⁴² 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.

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

57. 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.

58. 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”).

³⁸ Article 4, para. 8, of the Paris Agreement.

³⁹ Decisions 1/CP.21, para. 27; and 4/CMA.1, para. 9.

⁴⁰ Decision 4/CMA.1, paras. 6–10 and annex I.

⁴¹ Decision 4/CMA.1, para. 8.

⁴² As per decision 1/CP.21, para. 25.

IV. Synthesis of information contained in nationally determined contributions

A. Overview

59. This report considers the 168 latest available NDCs, representing 195 Parties to the Paris Agreement, covering 94.9 per cent of total global emissions in 2019, which are estimated at 52.6 Gt CO₂ eq⁴³ without LULUCF (and around 56.3 Gt CO₂ eq with LULUCF⁴⁴).

60. 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 or updated NDCs, 94 per cent provided such elements of information, already applying the CMA guidance referred to in paragraph 53 above.

61. 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.

62. 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

63. 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

⁴³ 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.

⁴⁴ 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 CO₂ concentrations and can hence be regarded as indirect (but not direct) anthropogenically induced sinks (also referred to as CO₂ 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.

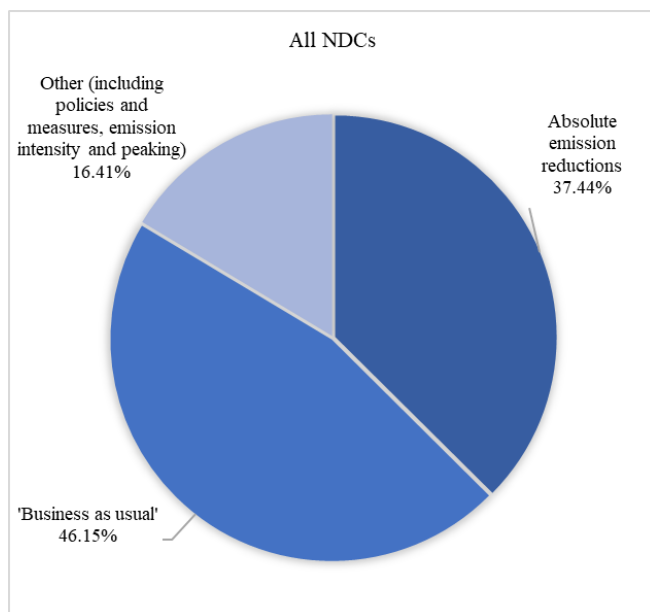
targets for reducing specific GHG emissions per unit of gross domestic product relative to a base-year (e.g. 1990) level;

(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



64. Total global GHG emissions (without LULUCF) taking into account implementation of the latest NDCs are estimated to be around 53.2 (51.6–54.8) Gt CO₂ eq in 2025 and 51.6 (48.3–54.8) Gt CO₂ eq in 2030 (see figure 2).

65. 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 53.4 (51.8–55.0) Gt CO₂ eq in 2025 and 52.4 (49.1–55.7) Gt CO₂ eq in 2030. The levels presented in this report, which reflect a slight increase in aggregate NDC ambition level and updated emission data, are therefore 0.2 Gt CO₂ eq (or 0.4 per cent) lower for 2025 and 0.8 Gt CO₂ eq (or 1.6 per cent) lower for 2030 than the estimated emission levels indicated previously.

66. 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 54.0 (53.3–54.8) Gt CO₂ eq in 2025 and 53.4 (51.9–54.8) Gt CO₂ 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 52.5 (51.6–53.4) Gt CO₂ eq, and in 2030, at 49.9 (48.3–51.4) Gt CO₂ eq.

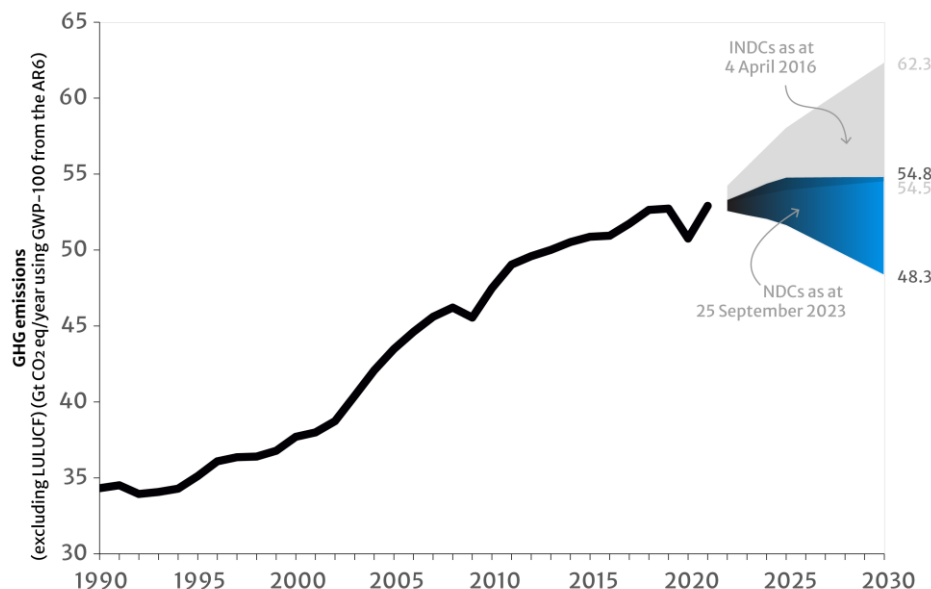
67. When considering only the new or updated NDCs, the total GHG emissions of the relevant Parties are estimated to be around 48.0 (46.5–49.5) Gt CO₂ eq in 2025 and 46.9 (43.9–49.9) Gt CO₂ eq in 2030.

68. 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 CO₂); emissions from international maritime transport of 755 Mt CO₂ 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 INDCs and latest NDCs includes the difference in assumed bunker emissions (approximately 423 (349–497) and 583 (462–704) Mt CO₂ eq lower emissions in 2025 and 2030 respectively).

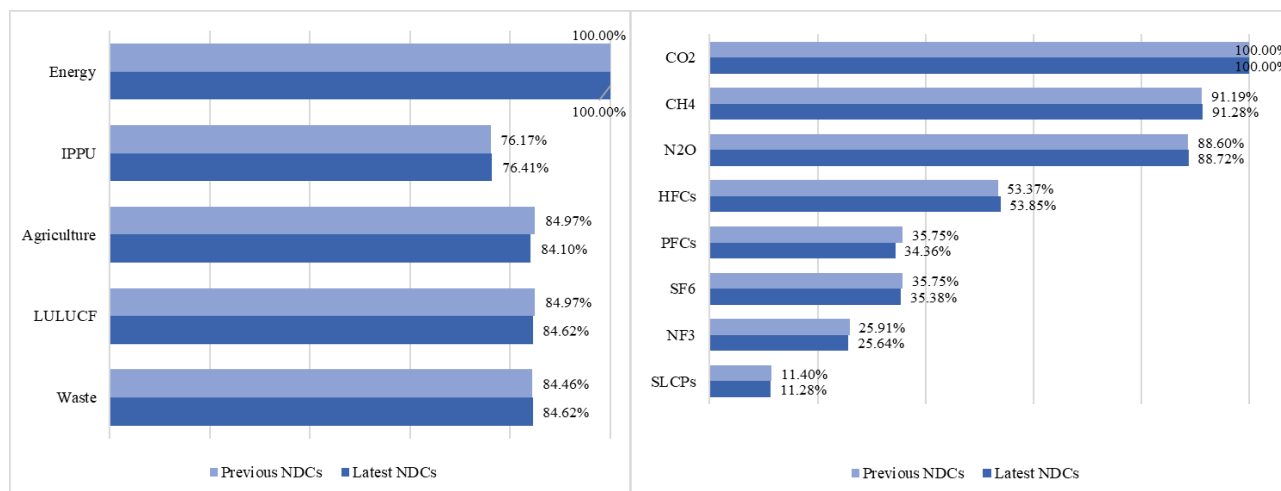
69. All Parties provided information on the scope and coverage of their NDCs, including sectors and gases covered. The coverage of sectors and gases slightly increased in the new or updated NDCs compared with the Parties’ previous NDCs (see figure 3).

70. 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.

71. 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.

72. All NDCs cover CO₂ emissions, while 91 per cent cover CH₄, 89 per cent N₂O, 54 per cent HFCs, 34 per cent PFCs, 35 per cent SF₆ and 26 per cent NF₃. Eleven 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



73. 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: 44 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.

74. In addition to communicating information on mitigation targets or plans for the near to medium term, 48 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.⁴⁵

C. Time frames and/or periods of implementation

75. 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.

76. 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; 30 per cent started implementing their NDC in or before 2020; and 5 per cent mentioned starting implementation in 2022.

77. 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, 86 per cent communicated a single-year target for 2030 and 6 per cent indicated a single-year target for 2025, 2035 or 2040, while 8 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.

⁴⁵ As at 25 September 2023, 68 LT-LEDS had been communicated, representing 75 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.

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

78. 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. 63 above).

79. 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.

80. 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.

81. 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.

82. 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.

83. 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.

84. 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

85. 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.

86. 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.

87. 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 10 per cent referred to the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Some 25 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*.

88. 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

89. 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.

90. 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.

91. 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

92. While 50 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.

93. 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) mentioning the use of an approach other than the production approach.

94. 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.

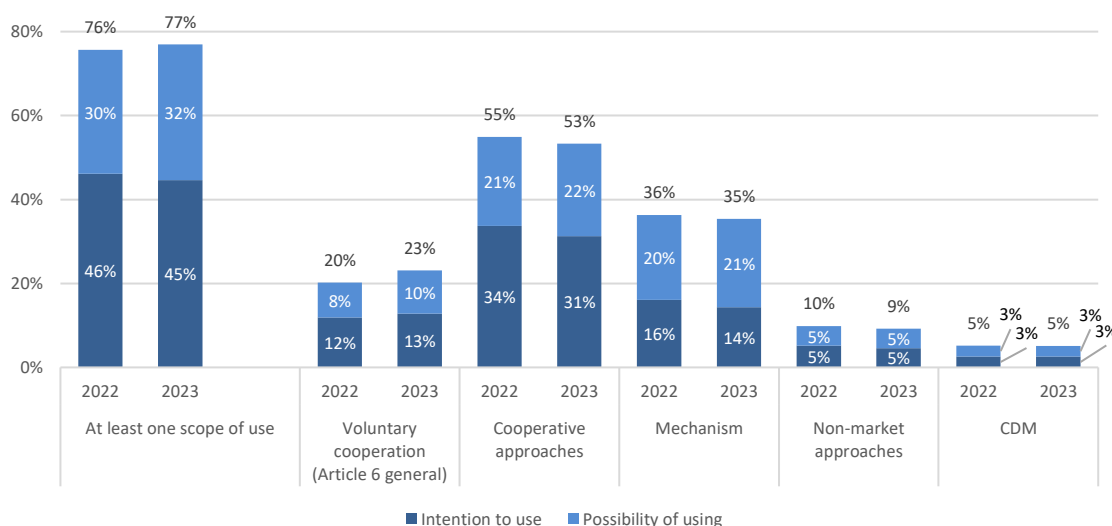
4. Voluntary cooperation under Article 6 of the Paris Agreement

95. In comparison with 76 per cent previously, 77 per cent of Parties 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.⁴⁶ 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 81 per cent in the new or updated NDCs compared with 52 per cent in their previous NDCs.

96. 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. Parties indicated general use of voluntary cooperation under Article 6, rather than reporting planned or possible use of specific scopes of voluntary cooperation, more frequently than previously (3 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



Note: Shares of Parties for 2023 and for 2022 refer to the shares presented in this report and those indicated in the previous version of this report respectively. The sums of the shares of Parties intending to use and possibly using non-market approaches for 2023 and the CDM for 2022 and 2023 do not match the totals presented owing to rounding.

97. The same share of Parties as reported previously (11 per cent) 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.

98. Compared with 34 per cent previously, 35 per cent of Parties 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, such as achieving targets primarily through domestic efforts but partially through voluntary cooperation; and 30 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

⁴⁶ 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.

reductions. The share of Parties that have set qualitative limits on their use of voluntary cooperation increased from 20 per cent for the previous NDCs to 33 per cent for the new or updated NDCs.

F. Planning and implementation processes

99. 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

100. 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.

101. 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.

102. One per cent of Parties mentioned the Marrakech Partnership for Global Climate Action,⁴⁷ 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, 5 per cent of Parties highlighted the voluntary commitments announced or pledged in collaboration with non-Party stakeholders.⁴⁸

103. 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.

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

⁴⁷ See <https://unfccc.int/climate-action/marrakech-partnership-for-global-climate-action>.

⁴⁸ 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/node/28387>).

2. Gender

105. In their NDCs, 79 per cent of Parties provided information related to gender and 33 per cent affirmed that they will take gender into account in implementing them.

106. While 60 per cent of Parties referred to relevant policies and legislation, 37 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 40 per cent on specific tools and methods, such as gender analyses or assessments, gender indicators, gender-disaggregated data, and gender-responsive budgeting, and 5 per cent included gender as a criterion for prioritizing activities.

107. Of the Parties that referred to gender in their NDCs, 54 per cent treated it as a cross-cutting issue to be addressed across adaptation and mitigation, with 12 per cent focusing on adaptation and 10 per cent considering gender exclusively in the context of adaptation.

108. Of the Parties, 33 per cent 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, disaster risk reduction, LULUCF, livestock, waste, fisheries and education.

109. Meanwhile, 34 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.

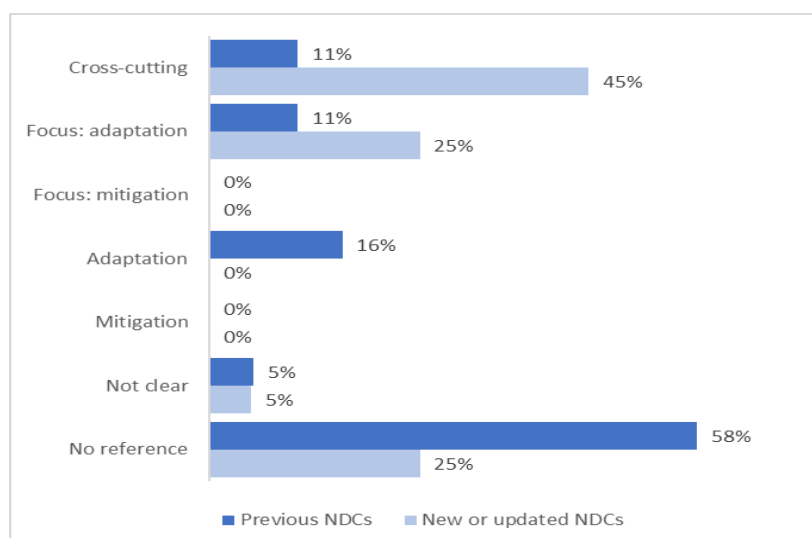
110. In addition, 10 per cent of Parties implicitly or explicitly considered gender as it intersects with other social factors; 37 per cent explicitly considered specific gender-differentiated needs and perspectives and gender-differentiated impacts of and contributions to climate change and climate action; 26 per cent framed women as being vulnerable; 19 per cent framed women as stakeholders or agents of change; and 7 per cent explicitly considered people of other genders.

111. 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. The share of Parties referring to gender in the new or updated NDCs compared with their previous NDCs has increased and the share of Parties considering gender as a cross-cutting issue has also risen (see figure 5).

112. Of the Parties that considered gender, 68 per cent elaborated more on the topic in their updated than in their previous NDCs, 38 per cent had previously not included any reference to gender in their NDCs, and 21 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

113. In the adaptation components of the new or updated NDCs, 40 per cent of Parties indicate an increased focus on the role of Indigenous Peoples and local communities including the situation and consideration of the rights of Indigenous Peoples at the national level, such as legal and consultative arrangements for protecting their rights. They emphasized the vulnerabilities of Indigenous Peoples relating to their intrinsic relationship with forests and ecosystems and conditions of poverty. The benefits of drawing on Indigenous knowledge and expertise, in particular for adaptation, were highlighted, as was the importance of combining traditional and modern practices and of ensuring the participation and leadership of Indigenous Peoples in climate efforts. Parties outlined how Indigenous Peoples were engaged in NDC preparation, including through consultations on sectoral proposals, risk assessment and analysis of Indigenous knowledge. Parties also elaborated on how actions identified in the NDC aim to benefit Indigenous Peoples by, for example, enhancing access to finance and technology; building capacity for reducing vulnerabilities and for leadership, and Indigenous-led climate action; providing development opportunities; enhancing market access to Indigenous products; and diversifying livelihoods.

114. The share of Parties with adaptation components that specifically elaborated on the role of local communities in climate action increased from 18 per cent for the previous NDCs to 36 per cent for the new or updated NDCs. These Parties highlighted the importance of empowering local communities, building their capacity to adapt and ensuring their participation in related activities, such as through community-based adaptation plans, decentralization strategies and livelihood improvements, as well as through adaptation measures, such as mangrove restoration, that enhance the resilience of local communities to climate change.

4. Action for Climate Empowerment⁴⁹

115. 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.

116. 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.

117. While 49 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; 54 per cent of Parties included information on training measures, including integrating climate change into training programmes for civil servants and other stakeholders.⁵⁰ The need for training was also highlighted in the context of achieving just transition and accessing green jobs.

118. In addition, 65 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. 99–101 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.

⁴⁹ As footnote 23 above.

⁵⁰ See paras. 203–206 below for more information on training measures in the context of capacity-building.

5. Best practices and other contextual matters

119. A total of 64 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.

120. On the basis of their national circumstances and development pathways, 58 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.

121. 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.

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

122. A total of 45 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, 58 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 (26 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.

123. Parties highlighted unequal impacts on different groups⁵¹ of society or the workforce as consequences of response measures, with impacts on the workforce being the most frequently mentioned, and 31 per cent of Parties plan to address such impacts by including the concept of just transition in their overall NDC implementation, such as a just transition mechanism and just transition funds; laws and strategies for protecting workers; a social mechanism for job creation, skills development and employment policies; and a consultation process for social protection. Some 5 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.

⁵¹ Such as low-income groups, women, young people, Indigenous Peoples and people with disabilities.

124. 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.

125. Some Parties described how their adaptation action contributes to emission reduction, including their intention to consider mitigation co-benefits in NAP formulation. In terms of sectors, some described the potential co-benefits of various agricultural adaptation measures, including climate-smart agriculture, reducing food waste, vertical farming, crop diversification and improving water and soil management. Adaptation of coastal ecosystems was highlighted as another source of co-benefits, in particular planting mangroves and seagrass beds as well as including natural disaster risk reduction (such as wildfire prevention projects) in adaptation planning. Other sectors with potential co-benefits mentioned were forestry, natural resources and the environment, energy and waste.

126. Most Parties identified agriculture as a high priority for adaptation, either explicitly or as part of cross-sectoral adaptation efforts, and most are aiming to use mitigation opportunities in the sector. Many Parties highlighted the need to focus on activities that have positive effects on mitigation and adaptation while ensuring food security.

H. Fairness and ambition in the light of national circumstances

127. 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.⁵²

128. Those Parties included qualitative and/or quantitative information on how their NDCs represent progression⁵³ 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.

⁵² 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.

⁵³ 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 25 September 2023. 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 25 September 2023 (blue shading), aggregated in this report.

129. 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 128 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.

130. Meanwhile, 60 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.

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

132. Compared with the projected emissions according to the INDCs as at 4 April 2016,⁵⁴ according to the latest NDCs total global GHG emissions are estimated to be on average around 2.8 Gt CO₂ eq, or 5.0 per cent, lower by 2025, and 6.8 Gt CO₂ eq, or 11.7 per cent, lower by 2030.

133. When considering only the emissions of Parties with new or updated NDCs, emissions are estimated according to the latest NDCs to be 6.1 (5.5–6.6) Gt CO₂ eq, or 11.5 (11.2–11.7) 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 Agreement⁵⁵

134. 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:⁵⁶

- (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.

135. 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.

136. 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.

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

- (a) 55.2 (50.5–59.9) per cent higher than in 1990 (34.3 Gt CO₂ eq);
- (b) 41.3 (37.0–45.5) per cent higher than in 2000 (37.7 Gt CO₂ eq);
- (c) 22.5 (18.8–26.2) per cent higher than in 2005 (43.4 Gt CO₂ eq);
- (d) 12.2 (8.8–15.6) per cent higher than in 2010 (47.4 Gt CO₂ eq);

⁵⁴ 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 25 September 2023.

⁵⁵ See document FCCC/PA/CMA/2021/8/Add.3 for additional information, including on estimation methods and assumptions used.

⁵⁶ See decision 4/CMA.1, annex I, para. 7.

- (e) 4.6 (1.4–7.7) per cent higher than in 2015 (50.9 Gt CO₂ eq);
- (f) 1.0 per cent higher (ranging from 2.0 per cent lower to 4.1 per cent higher) than in 2019 (52.6 Gt CO₂ eq).

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

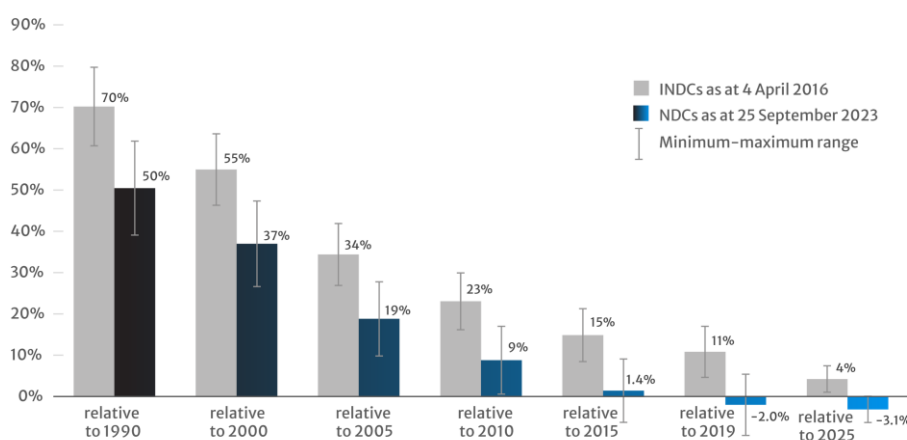
- (a) 50.5 (41.0–60.0) per cent higher than in 1990;
- (b) 37.0 (28.3–45.6) per cent higher than in 2000;
- (c) 18.8 (11.3–26.3) per cent higher than in 2005;
- (d) 8.8 (1.9–15.7) per cent higher than in 2010;
- (e) 1.4 per cent higher than in 2015 (ranging from 5.0 per cent lower to 7.8 per cent higher);
- (f) 2.0 per cent lower than 2019 (ranging from 8.2 per cent lower to 4.2 per cent higher);
- (g) 3.1 per cent lower than the projected emissions for 2025 (ranging from 6.3 per cent lower to 0.1 per cent higher).

139. In comparison, the estimated total GHG emission level for 2030 associated with implementation of Parties’ INDCs implied a stronger emission increase above historical levels: 70.2 (58.8–81.6) per cent above the 1990 level, 23.0 (14.8–31.3) per cent above the 2010 level and 10.8 (3.4–18.2) per cent above the 2019 level (see figure 6).

140. For Parties that communicated new or updated NDCs, their total GHG emissions are estimated at 47.1 Gt CO₂ eq in 2019, and the total GHG emission level resulting from implementation of their NDCs is estimated to also be around 48.0 (46.5–49.5) Gt CO₂ eq by 2025 and a bit lower at 46.9 (43.9–49.9) Gt CO₂ 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 13.9 (10.4–17.3) per cent higher by 2025 and 11.1 (4.0–18.2) per cent higher by 2030. Compared with their 2019 emission level, these Parties’ emission level is estimated to be 2.0 per cent higher by 2025 (with a range from 1.1 per cent lower to 5.1 per cent higher) and very similar by 2030 (0.5 per cent lower with a range from 6.8 per cent lower to 5.9 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



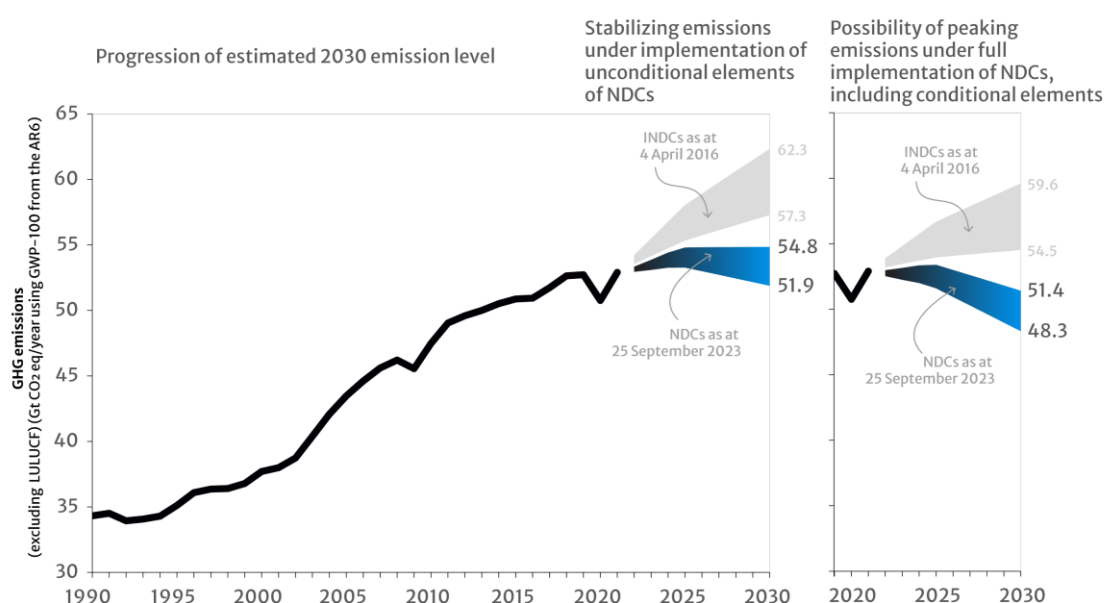
141. The total GHG emission level resulting from implementation of the unconditional elements of the NDCs is projected to be 1.4 per cent higher in 2030 than in 2019 (with a range from 1.5 per cent lower to 4.2 per cent higher); whereas the total GHG emission level resulting from the full implementation of the NDCs including conditional elements is projected to be 5.3

(2.3–8.2) per cent lower in 2030 than in 2019. This indicates that if all NDCs (including all conditional elements) are fully implemented, there is an even stronger possibility of a peaking of global emissions before 2030 than 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.

142. 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 8.2 (3.4–13.0) 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 13.4 (8.6–18.2) 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 be 55.4 (54.0–56.9) Gt CO₂ eq considering unconditional elements and 51.9 (50.4–53.5) Gt CO₂ eq assuming full implementation.

143. According to the latest NDCs, the Parties' per capita emissions will equal 6.5 (6.3–6.7) t CO₂ eq in 2025 and, slightly lower, 6.1 (5.7–6.4) t CO₂ eq in 2030, which is, on average, 4.2 (1.4–7.1) per cent lower in 2025 and 11.0 (5.4–16.6) per cent lower in 2030 than in 2019.

144. A total of 48 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 38.8 (36.8–40.7) Gt CO₂ eq in 2030, which is 5 per cent above (with a range from 1 per cent lower to 10 per cent higher) their emissions in 2010 and 5 (0–10) per cent below their emissions in 2019.

145. 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 14.7 (13.0–16.4) Gt CO₂ eq. Mindful of the inherent uncertainty of such long-term estimates, the information indicates that these Parties' total GHG emission level could be 64 (60–68) per cent lower in 2050 than in 2019 and their annual per capita emissions would be 2.3 (2.0–2.6) t CO₂ 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 CO₂ 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 CO₂ eq.

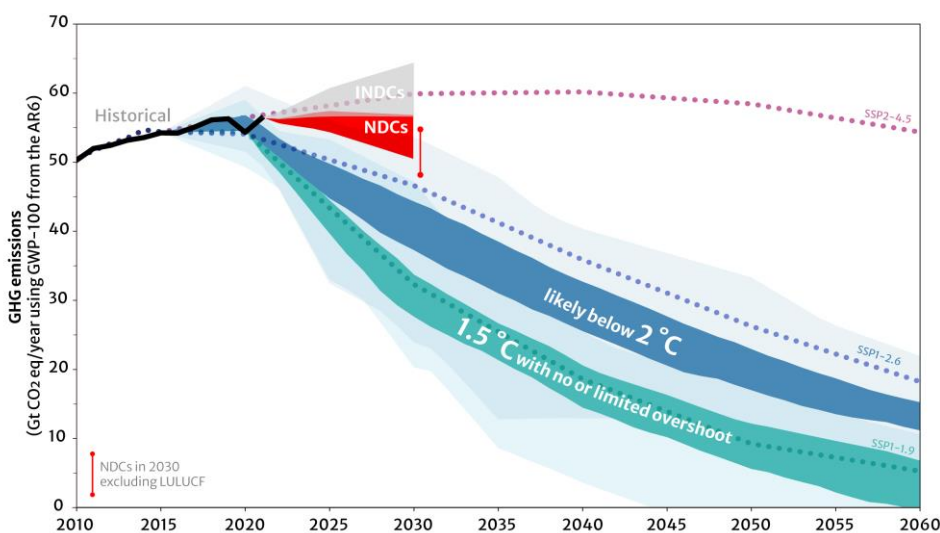
Comparison with scenarios considered by the Intergovernmental Panel on Climate Change

146. 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).

147. 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 CO₂ emissions by 2050 (99 per cent CO₂ emission reduction relative to the 2019 level).⁵⁷

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

⁵⁷ See table SPM.1 in the Synthesis Report of the AR6.

line with the NDCs is 51.6 (48.3–54.8) Gt CO₂ eq excluding LULUCF (red vertical bar) and 53.7 (50.4–56.9) Gt CO₂ eq when – in line with shown IPCC scenarios – including LULUCF.

148. The total global GHG emission level in 2030 taking into account implementation of the latest NDCs is expected to be 8.8 (1.9–15.7) per cent above the 2010 level and 2.0 per cent below the 2019 level (with a range from 8.2 per cent below to 4.2 per cent above). This is slightly lower than the expected level presented in the previous version of this report (10.6 per cent above the 2010 level and 0.3 per cent lower than the 2019 level).

149. Taken together with the information in figure 8 and paragraphs 141, 146 and 148 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 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 CO₂ 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 CO₂ eq from 2020 to 2030 and 1.1 (0.6–1.7) Gt CO₂ eq from 2030 to 2040 (see figure 8).

150. 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)⁵⁸ 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 13.3 (9.4–17.1) Gt CO₂ eq in 2030. Assuming all conditional elements of NDCs are implemented, the difference is reduced to 11.6 (7.6–15.1) Gt CO₂ eq. Without any implementation of conditional elements of NDCs, the gap is wider, at 15.1 (11.1–18.5) Gt CO₂ eq. The gap in the case of 1.5 °C scenarios that feature net zero emissions this century is wider still, at 21.6 (19.0–26.0) Gt CO₂ eq. Assuming all conditional elements of NDCs are implemented, the difference in relation to these 1.5 °C scenarios is somewhat narrowed to 19.5 (17.8–24.4) Gt CO₂ eq. Without implementation of any conditional elements, the difference amounts to 22.9 (21.3–27.9) Gt CO₂ eq (see figure 8).

151. Taking into account 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.⁵⁹ The best estimate of peak temperature in the

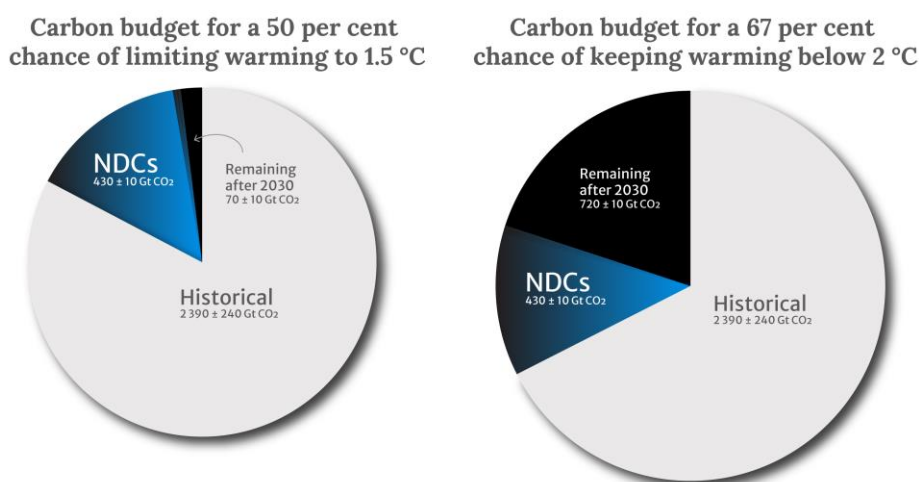
⁵⁸ The IPCC scenario categories are “C3a” for likely below 2 °C scenarios and “C1a” for 1.5 °C with no or limited overshoot scenarios with net zero emissions this century (see table SPM.2 in the contribution of Working Group III to the AR6). The differences are calculated as a Monte Carlo sampling with 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.

⁵⁹ 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,

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.⁶⁰ Without implementation of 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.

152. On the basis of the latest NDCs, cumulative CO₂ emissions in 2020–2030 are estimated to be around 430 (420–440) Gt CO₂. When rounding to the nearest 10 Gt CO₂, these estimated cumulative CO₂ 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 CO₂), cumulative CO₂ emissions in 2020–2030 based on the latest NDCs would likely use up 87 per cent of the remaining carbon budget. That would leave a post-2030 carbon budget of around 70 (60–80) Gt CO₂, which is equivalent to approximately two years of projected global total CO₂ 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 CO₂ from 2020 onward), cumulative CO₂ emissions in 2020–2030 based on the latest NDCs would likely use up 38 per cent of the remaining carbon budget (see figure 9). By comparison, total global historical CO₂ emissions up until 2020 are estimated by the IPCC to have amounted to 2,390 (2,150–2,630) Gt CO₂.

Figure 9
Carbon budgets



Note: The contribution of Working Group I to the AR6 provides an estimate of CO₂ emissions from 1850 to 2020 of 2,390 ± 240 Gt CO₂. For staying below 1.5 °C warming relative to the 1850–1900 level, an estimated 500 Gt CO₂ can be emitted from 2020 onward. Under implementation of the NDCs as at 25 September 2023, CO₂ emissions from 2020 to 2030 would amount to 430 ± 10 Gt CO₂, leaving the equivalent of approximately two years of emissions (70 ± 10 Gt CO₂) for thereafter, when rounding to the nearest 10 Gt CO₂. 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 CO₂ and approximately 720 ± 10 Gt CO₂ would remain for thereafter.

the 2030–2050 global emissions are better constrained as 81 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).

⁶⁰ 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.

153. 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 CO₂ emissions as a prerequisite for halting warming at any level.

J. Adaptation

154. 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

155. 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.

156. 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) With an adaptation component, from 80 to 81 per cent, which indicates the continued importance attached to adaptation by Parties from all regions and groups;

(b) That describe the status of the NAP process and demonstrate how the NAP was established as the main national instrument for adaptation, from 68 to 70 per cent.

157. Compared with their previous NDCs, Parties that communicated new or updated NDCs provided more detailed information on, in particular:

(a) Their national frameworks, thereby describing more integrated frameworks than the multiple frameworks and individual projects described previously;

(b) Time-bound quantified adaptation targets (from 32 to 34 per cent of NDCs), with 16 per cent of Parties reporting developing the indicator frameworks that they intend to use for monitoring progress;

(c) Synergies and co-benefits between adaptation and mitigation actions (27 per cent of NDCs), as well as linkages between adaptation and efforts towards the SDGs (26 per cent of NDCs).

158. Of the Parties, 13 per cent identified the adaptation component 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

159. Of the adaptation components, 91 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.

160. A total of 57 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, 55 per cent of Parties specifically emphasized the vulnerability of coastal areas and islands, mountains, deserts and grasslands. As factors of vulnerability, 90 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

161. 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.

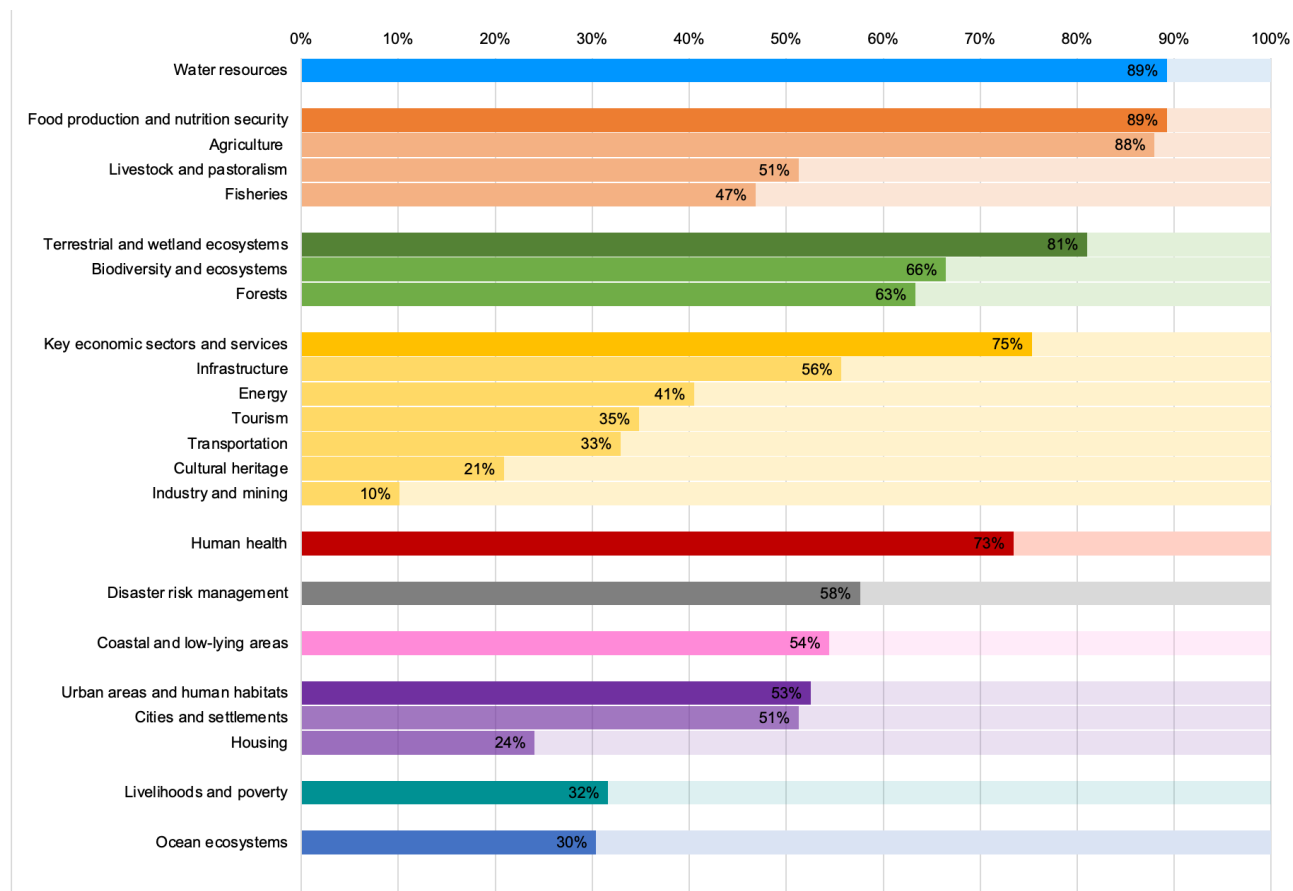
4. Pre-emptive adaptation

162. The share of Parties that described in their adaptation component the process for formulating and implementing their NAP and its status increased from 68 per cent for the previous NDCs to 70 per cent for the new or updated NDCs. While 24 per cent of Parties indicated that they have developed a NAP, 46 per cent reported their intention to do so, including a timeline for completion or update and/or implementation. In addition, 49 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.

163. In comparison with previous NDCs, 2 per cent more of the new or updated NDCs with an adaptation component (96 per cent) described 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.

Figure 10

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



164. Parties provided a wide range of information on adaptation in various priority areas (see figure 10). The new or updated NDCs illustrated that Parties continue to focus on water resources, food production and nutrition security, 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.

5. Contingency measures

165. 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 27 to 34 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

166. 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 64 to 68 per cent since their previous NDCs. Of those Parties, 34 per cent identified and described their intention to apply time-bound quantified adaptation targets for monitoring the progress of adaptation measures and 16 per

cent of Parties reported developing the indicator frameworks that they intend to use for monitoring progress.

7. Synergies with mitigation and sustainable development

167. 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 27 per cent in the new or updated NDCs from 22 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).

168. In the adaptation components of the new or updated NDCs, compared with the previous NDCs, an increased share of Parties (40 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, 26 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.

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

Adaptation priority sector	Sustainable Development Goal																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Food production and nutrition security	Dark	Dark	Light	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	Dark	Light	Light	Light	Light	Light	Light
Key economic sectors and services	Light	Light	Light	Light	Light	Light	Light	Dark	Dark	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

169. The UNEP *Emissions Gap Report 2022* projects that, in 2020, approximately 37 per cent (20 Gt CO₂ eq) of global GHG emissions came from energy supply, 26 per cent (14 Gt CO₂ eq) from industry, 18 per cent (9.5 Gt CO₂ eq) from AFOLU, 14 per cent (7.6 Gt CO₂ eq) from transport and 5.7 per cent (3.1 Gt CO₂ eq) from buildings.⁶¹ 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.

170. 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.

171. A total of 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, which are often a subset of one or more IPCC sectors, including energy supply, transport, buildings, industry,⁶² AFOLU and waste. Specifically, 93 per cent of Parties communicated measures in the priority area of energy supply (see figure 12); while 50 per cent indicated measures in industry, the second largest source of GHG emissions with the second highest annual emission growth rate among the priority areas, which is less frequently than for other priority areas (77–93 per cent), although 77 per cent included IPPU as a sector in the NDCs.

172. In addition, 76 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), followed by AFOLU (47 per cent) and cross-cutting or other (44 per cent), while they were much less frequently indicated in the other priority areas (5–20 per cent). Renewable energy generation targets were the most frequently communicated quantitative mitigation targets specific to sub-areas (55 per cent). As non-CO₂ emission targets for cross-cutting or other, 17 per cent of Parties specified fluorinated gas emission targets and 4 per cent indicated CH₄ emission targets.

173. While 69 per cent of Parties communicated domestic mitigation measures for achieving unconditional mitigation targets in their NDCs,⁶³ 66 per cent included measures for achieving conditional mitigation targets and 26 per cent reported measures for achieving both unconditional and conditional mitigation targets. Measures for achieving conditional mitigation targets were most frequently identified by Parties in energy supply (63 per cent), followed by transport (55 per cent) and buildings (52 per cent). Parties reported measures for achieving conditional mitigation targets 25 per cent more frequently than measures for achieving unconditional mitigation targets in relation to industry, which is a higher percentage difference than for any other priority area (–10–7 per cent).

2. Mitigation options under priority areas

174. Renewable energy generation continued to be the most frequently indicated mitigation option, followed by improving energy efficiency of buildings; cross-cutting measures in AFOLU; afforestation, reforestation and revegetation; and improving energy efficiency of transport (see figure 12). A total of 23 per cent of Parties communicated quantitative targets for the share of total renewable energy in electricity generation by 2030 (ranging from 15 to

⁶¹ UNEP. 2022. *Emissions Gap Report 2022: The Closing Window — Climate crisis calls for rapid transformation of societies*. Nairobi: UNEP. Available at <https://www.unep.org/emissions-gap-report-2022>. The UNEP *Emissions Gap Report 2022* 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.

⁶² 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.

⁶³ 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.

100 per cent); and 14 per cent, accounting for 2.4 per cent of total global electricity generation from fossil fuels in 2021,⁶⁴ communicated target shares falling within or above the interquartile range in the SR1.5 of 47–65 (median 54) per cent for the global share of renewables in electricity generation by 2030 consistent with 1.5 °C pathways with no or limited overshoot. Further, 15 per cent of Parties indicated quantitative targets for increasing total renewable energy capacity by 2030; and some of them (6 per cent), accounting for 2.2 per cent of total global electricity generation from fossil fuels in 2021,⁶⁵ reported targets that are consistent with or beyond the 1.5 °C pathways with no or limited overshoot in the 2023 update of the IEA Net Zero Roadmap⁶⁶ of tripling total global installed capacity of renewables-based electricity generation by 2030.⁶⁷

175. For the Parties that communicated new or updated NDCs, as in the previous NDCs, renewable energy generation continued to be the most frequently indicated mitigation option and focus of quantitative mitigation targets, with the share of Parties indicating this option and targets sharply increasing from 62 to 91 per cent and from 39 to 56 per cent respectively since the previous NDCs.

⁶⁴ Estimated on the basis of data from IEA. 2023. *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.

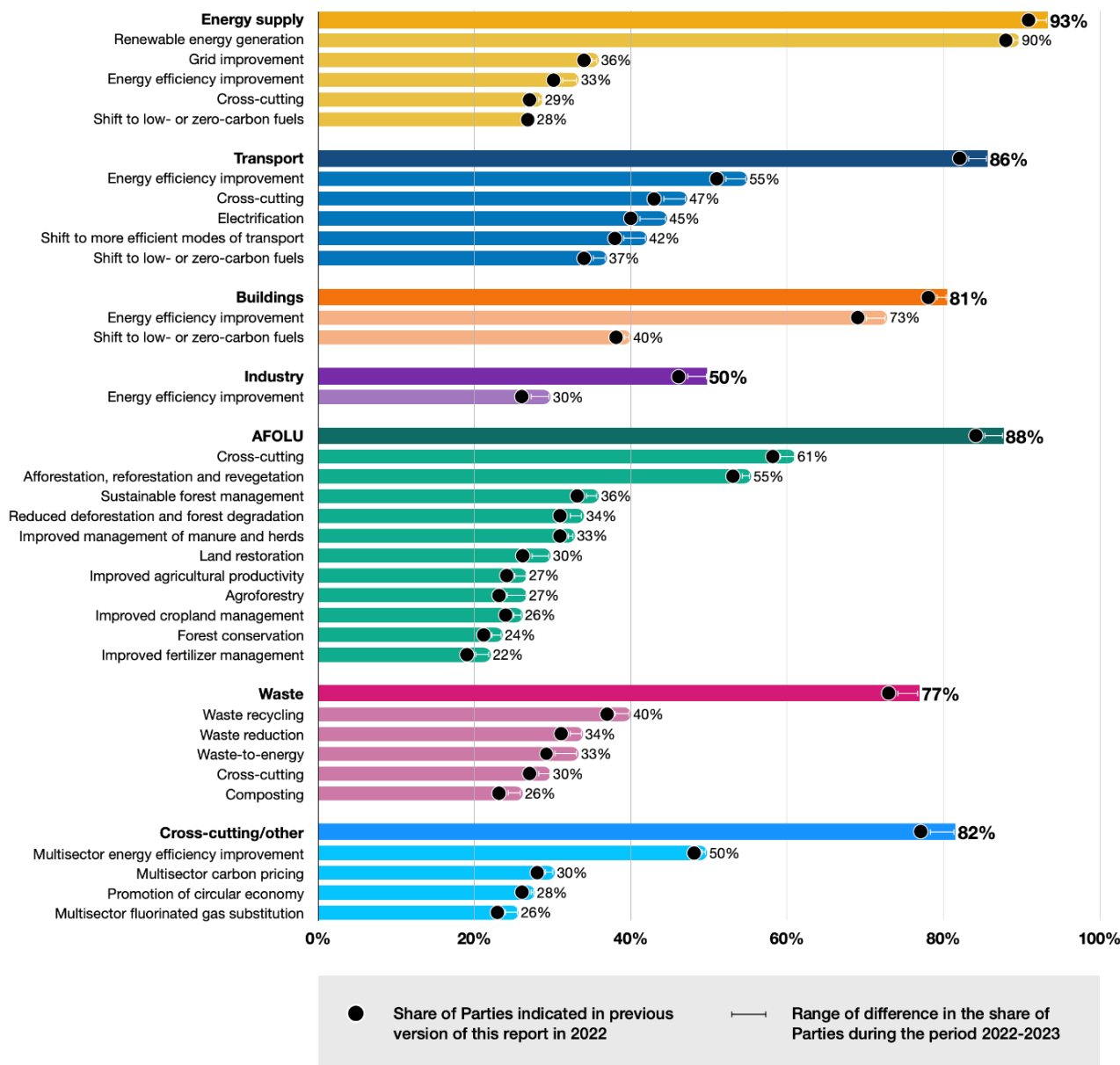
⁶⁵ As footnote 64 above.

⁶⁶ As footnote 25 above. According to the IEA 2023 Net Zero Emissions by 2050 Scenario, the global share of renewables in electricity generation will increase from 30 per cent in 2022 to 59 per cent by 2030, 77 per cent by 2035 and 89 per cent by 2050.

⁶⁷ Estimated on the basis of data from IRENA. 2023. *Renewable Energy Statistics 2023*. Abu Dhabi: IRENA. Available at <https://www.irena.org/Publications/2023/Jul/Renewable-energy-statistics-2023>; as modified by the secretariat.

Figure 12

Share of Parties referring to the specific priority areas and frequently indicated mitigation options in nationally determined contributions



Note: If a Party communicated more than one measure for a specific priority area or one of the frequently indicated mitigation options, it was counted as one Party communicating measures for that area or option respectively.

176. In the priority areas related to supply and end use of energy (such as energy supply, transport, buildings and industry), renewable energy generation, grid improvement and shifting to low- or zero-carbon fuels including biofuels and hydrogen continued to be frequently or widely indicated as key mitigation options relevant to reducing the carbon intensity of electricity and fuels (see figure 12);⁶⁸ electrification was mentioned in relation to increasing the share of electricity in final energy consumed and switching fuel use from fossil fuels to electricity in end-use sectors such as transport and buildings, with the sectors benefiting from electricity with reduced carbon intensity for further decarbonization; and

⁶⁸ The 2023 update to the IEA Net Zero Roadmap indicates that the average annual rate of improvement in energy intensity, an amount of primary energy needed to produce a United States dollar of economic output, needs to be doubled compared with the 2022 level to 4.1 per cent through to 2030 to be on 1.5 °C pathways with no or limited overshoot.

improving energy efficiency, grid improvement and shifting to more efficient modes of transport were often referenced in relation to reducing energy demand.

177. More broadly across all priority areas, Parties frequently indicated waste reduction, waste-to-energy, improved management of manure and herds, and fluorinated gas substitution as key mitigation options relevant to reducing non-CO₂ emissions, including CH₄. In addition, Parties often communicated mitigation options related to circular economy, including reducing and recycling waste, and waste-to-energy. Measures related to multisector carbon pricing were frequently identified as efficient ways of incentivizing low-carbon behaviours and technologies by putting a price on GHG emissions.

178. In terms of mitigation options relevant to enhancing carbon sequestration in soils or vegetation,⁶⁹ Parties most frequently indicated afforestation, reforestation and revegetation; sustainable forest management; and reducing deforestation and forest degradation, which 34 per cent of Parties referred to, including through efforts to implement REDD+ activities. Parties highlighted the importance of socioeconomic and environmental non-carbon benefits resulting from these mitigation options, including for adaptation.

179. Almost all frequently indicated mitigation options in the NDCs saw an increase in the share of Parties mentioning them since the previous version of this report (see figure 12), such as waste-to-energy (by 3.3 percentage points), followed by electrification in transport and shifting to more efficient modes of transport (by 3.2 percentage points) and energy efficiency improvement in transport (by 3.1 percentage points). On the other hand, the share of Parties referring to shifting to low- or zero-carbon fuels slightly declined.

180. Parties identified measures for achieving conditional mitigation targets in their NDCs more frequently than measures for achieving unconditional mitigation targets by 124 per cent in relation to waste-to-energy, 100 per cent for composting, 76 per cent for agroforestry, 72 per cent for shift to low- or zero-carbon fuels in transport and 61 per cent for grid improvement. This conditionality gap has most increased since the previous version of this report in relation to shifting to low- or zero-carbon fuels in transport (by 68 percentage points), followed by grid improvement and agroforestry (by 55 percentage points).

181. According to the contribution of Working Group III to the AR6, mitigation options costing USD 100/t CO₂ eq or less (with estimated net mitigation potential of 31–44 Gt CO₂ 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 CO₂ eq account for over 50 per cent of the net mitigation potential.⁷⁰ Many of these options have been assessed to be technically viable and are supported by the public. Parties reported such cost-effective mitigation options in their NDCs (see figure 13). Options costing less than USD 20/t CO₂ eq with the highest estimated net mitigation potential (in parentheses) include:

(a) Solar energy (3.3 Gt CO₂ eq/year), with 50 per cent of Parties, accounting for 55 per cent of total global electricity generation from fossil fuels in 2021,⁷¹ 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 CO₂ eq/year) costs less than USD 0/t CO₂ eq;

(b) Wind energy (3.08 Gt CO₂ eq/year), with 36 per cent of Parties, accounting for 55 per cent of total global electricity generation from fossil fuels in 2021,⁷² indicating corresponding measures, including increasing installed wind power capacity. Most of the

⁶⁹ In the contribution of Working Group III to the AR6, carbon dioxide removal, such as through afforestation and reforestation, and bioenergy with carbon dioxide capture and storage, is considered essential on 1.5 °C pathways with no or limited overshoot and 2 °C pathways to compensate for hard-to-abate residual emissions and to achieve net negative CO₂ emissions in the long term.

⁷⁰ 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 13, such as efficient lighting, appliances and equipment and fuel-efficient light-duty vehicles, are estimated to be less than zero.

⁷¹ As footnote 64 above.

⁷² As footnote 64 above.

estimated net mitigation potential of this option (2.31 Gt CO₂ eq/year) costs less than USD 0/t CO₂ eq;

(c) Reduced conversion of forests and other ecosystems (2.28 Gt CO₂ eq/year), with 38 per cent of Parties, accounting for 38 per cent of total global forest cover in 2020⁷³ and 13 per cent of total global wetland area,⁷⁴ 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 CO₂ eq/year), with 30 per cent of Parties, accounting for 59 per cent of total global final energy consumption in industry in 2021,⁷⁵ 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 CO₂ eq/year), with 39 per cent of Parties, accounting for 63 per cent of 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 CO₂ eq/year) costs less than USD 0/t CO₂ eq.

182. For most options with high mitigation potential costing less than USD 20/t CO₂ eq in 2030, there has been an increase in the share of Parties mentioning them since the previous version of this report (see figure 13), such as for reducing fluorinated gas emissions (by 3.2 percentage points), followed by efficient lighting, appliances and equipment (by 3.1 percentage points), shifting to bikes and e-bikes (by 2.9 percentage points) and energy efficiency improvement in industry (by 2.8 percentage points). On the other hand, the share of Parties referring to nuclear energy, reducing CH₄ emissions from coal mining, shipping – efficiency and optimization, and biofuels in transport has not changed or slightly declined.

183. Further, for the options with high mitigation potential costing less than USD 20/t CO₂ eq in 2030, Parties communicated measures for achieving conditional mitigation targets in their NDCs more frequently than measures for achieving unconditional mitigation targets by 100 per cent in relation to biofuels in transport, 80 per cent for reducing CH₄ emissions from wastewater, 65 per cent for wind energy, 64 per cent for efficient lighting, appliances and equipment, 56 per cent for solar energy, 38 per cent for reduced conversion of forests and other ecosystems, and 24 per cent for energy efficiency improvement in industry. This conditionality gap has most increased since the previous version of this report in relation to biofuels in transport (by 25 percentage points).

184. The Synthesis Report of the AR6 states that scaling up near-term climate actions will mobilize a mix of low-cost and high-cost options that are needed to avoid future lock-ins, foster innovation and initiate transformational change.⁷⁶

⁷³ Estimated on the basis of data from the 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; as modified by the secretariat. 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.

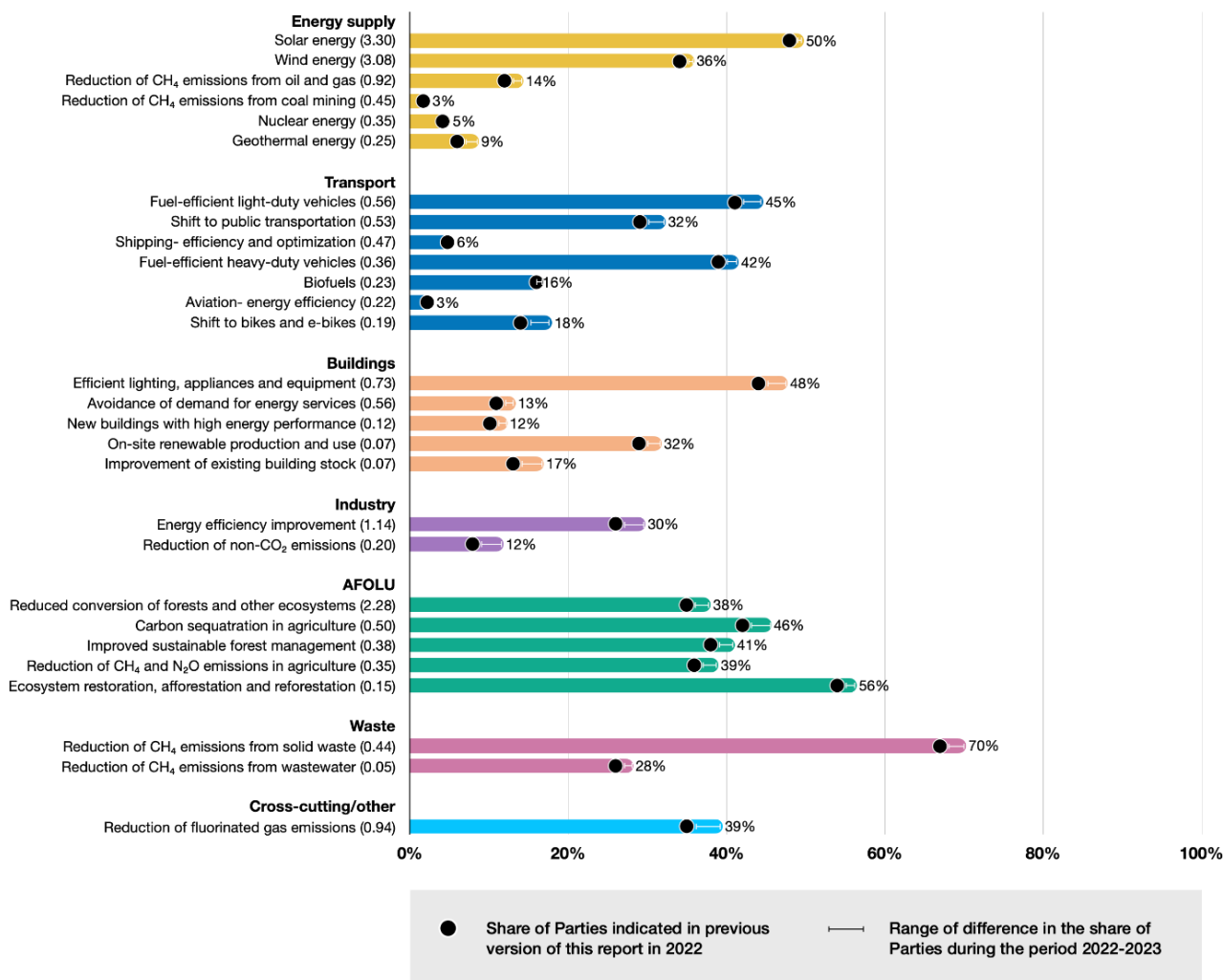
⁷⁴ Estimated on the basis of data from the Center for International Forestry Research global wetlands map, available at <https://www2.cifor.org/global-wetlands/> (accessed 29 September 2023); and Xu J, Morris P, Liu J, et al. 2018. PEATMAP: Refining estimates of global peatland distribution based on a meta-analysis. *Catena*. 160: pp.134–140. Available at <https://core.ac.uk/download/pdf/227455185.pdf>; as modified by the secretariat.

⁷⁵ As footnote 64 above.

⁷⁶ As footnote 15 above.

Figure 13

Share of Parties referring to mitigation options with high mitigation potential costing below USD 20/t CO₂ eq in 2030 in nationally determined contributions



Note: If a Party communicated more than one measure for a mitigation option, it was counted as one Party communicating measures for that option. The estimated net mitigation potential (in Gt CO₂ eq/year) of each option costing below USD 20/t CO₂ eq in 2030 is presented in parentheses, estimated on the basis of 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.

185. Parties also included in their NDCs mitigation options that have been addressed in recent CMA decisions,⁷⁷ including:

(a) Increasing low-emission energy,⁷⁸ which has estimated net mitigation potential of 3.3 Gt CO₂ eq/year for solar energy, 3.08 Gt CO₂ eq/year for wind energy, 0.25 Gt CO₂ eq/year for geothermal energy and 0.35 Gt CO₂ eq/year for nuclear energy, at costs below USD 20/t CO₂ eq in 2030 (see figure 13), and 0.27 Gt CO₂ eq/year for carbon dioxide capture and storage at costs below USD 100/t CO₂ eq in 2030. A total of 90 per cent of Parties, accounting for 94 per cent of total global electricity generation from fossil fuels in 2021, indicated corresponding measures, such as investing in constructing a four-reactor nuclear energy plant and implementing research and development programmes for carbon capture and storage. Of the 23 per cent of Parties that indicated quantitative targets for increasing the

⁷⁷ For example, decisions 1/CMA.3 and 1/CMA.4.

⁷⁸ Defined as renewables, fossil fuels with carbon dioxide capture and storage and nuclear power in accordance with the definition of “low-carbon energy” referred to in the contribution of Working Group III to the AR6.

share of low-emission sources of electricity⁷⁹ in electricity generation by 2030, 9 per cent, accounting for 0.04 per cent of total global electricity generation from fossil fuels in 2021,⁸⁰ reported target shares of 71 per cent or above consistent with 1.5 °C pathways with no or limited overshoot in the 2023 update to the IEA Net Zero Roadmap;⁸¹

(b) Increasing renewable energy, which has estimated net mitigation potential of 3.3 Gt CO₂ eq/year for solar energy, 3.08 Gt CO₂ eq/year for wind energy and 0.25 Gt CO₂ eq/year for geothermal energy, at costs below USD 20/t CO₂ eq in 2030 (see figure 13).⁸² Paragraphs 174–175 above refer to the share of Parties describing renewable energy generation as a mitigation option and the share of Parties communicating quantitative targets for increasing renewable energy consistent with 1.5 °C pathways with no or limited overshoot. According to the 2023 update to the IEA Net Zero Roadmap, tripling total global installed capacity for renewables-based electricity generation by 2030, together with doubling the annual rate of energy intensity improvement globally by 2030, will reduce fossil fuel demand and contribute to an immediate end to new approvals of unabated coal power plants;

(c) Phasing down unabated coal power generation. Coal-fired power generation was the single largest source of energy-related CO₂ emissions globally in 2021 (9.7 Gt CO₂), or 26 per cent, while there were more than 8,000 coal-fired power plants operating in some 90 countries and providing 2 million jobs.⁸³ 9 per cent of Parties, accounting for 58 per cent of total global electricity generation from coal in 2021,⁸⁴ indicated corresponding measures, such as replacing coal-fired power plants with combined-cycle gas power plants. In addition, 4 per cent of Parties mentioned the need and/or measures for a just transition for communities and workers dependent on coal. Moreover, 4 per cent of Parties, accounting for 0.6 per cent of total global electricity generation from coal in 2021,⁸⁵ communicated target shares of unabated coal in electricity generation by 2030 that fall below 13 per cent for the global share of unabated coal in electricity generation by 2030 consistent with 1.5 °C pathways with no or limited overshoot in the 2023 update to the IEA Net Zero Roadmap,⁸⁶ such as phasing out use of unabated coal to produce electricity by 2025;

(d) Phasing out inefficient fossil fuel subsidies and reforming fossil fuel subsidies. Removing fossil fuel subsidies is projected in the contribution of Working Group III to the AR6 to lead to global GHG emission reductions of up to 10 per cent by 2030 as well as yielding other environmental and financial benefits. According to the Fossil Fuel Subsidy Tracker, global fossil fuel subsidies doubled from USD 375 billion in 2020 to USD 732 billion in 2021⁸⁷ as energy prices rose with the rebound of the global economy. 4 per cent of

⁷⁹ Defined as electricity generated from renewables, fossil fuels with carbon dioxide capture, use and storage, nuclear, hydrogen and ammonia in accordance with the 2023 update to the IEA Net Zero Roadmap.

⁸⁰ As footnote 64 above.

⁸¹ As footnote 25 above. According to the IEA 2023 Net Zero Emissions by 2050 Scenario, low-emission sources of electricity expand rapidly from 39 per cent of total global generation in 2022, overtaking unabated fossil fuels just after 2025 and reaching 71 per cent by 2030, 91 per cent by 2035 and 100 per cent by 2050.

⁸² The aggregate net mitigation potential of “increasing renewable energy” is not estimated since the contribution of Working Group III to the AR6 states that the mitigation potentials are assessed independently for each option and cannot necessarily be summed. This also applies to the aggregate net mitigation potential of “increasing low-emission energy” and “reducing CH₄ emissions from fossil fuel operations”.

⁸³ IEA. 2022. *World Energy Outlook 2022*. Paris: IEA. All rights reserved. Available at <https://www.iea.org/reports/world-energy-outlook-2022>.

⁸⁴ As footnote 64 above.

⁸⁵ As footnote 64 above.

⁸⁶ As footnote 25 above. The share of unabated coal in total global electricity generation is expected to decline from 36 per cent in 2022 to 13 per cent by 2030, 3 per cent by 2035 and 0 per cent by 2040 under the 2023 IEA Net Zero Emissions by 2050 Scenario. In the contribution of Working Group III to the AR6, coal consumption without deployment of carbon dioxide capture and storage or carbon dioxide capture, use and storage is projected to fall by 67–82 per cent by 2030 on 1.5 °C pathways with no or limited overshoot.

⁸⁷ The Tracker is available at <https://fossilfuelsubsidytracker.org/> (accessed 29 September 2023). The global estimates are for 192 economies in 2020 and 82 major economies in 2021.

Parties, accounting for 3.5 per cent of total global fossil fuel subsidies in 2021,⁸⁸ identified corresponding measures, including gradually phasing out subsidies on electricity and fuels in tandem with social protection measures for low-income households;

(e) Reducing CH₄ emissions⁸⁹ from fossil fuel operations, which has estimated net mitigation potential of 0.92 Gt CO₂ eq/year for oil and gas operations and 0.45 Gt CO₂ eq/year for coal mining at costs below USD 20/t CO₂ eq in 2030. Some of the estimated net mitigation potential for oil and gas operations (0.31 Gt CO₂ eq/year) costs less than USD 0/t CO₂ eq. Fossil fuel operations, including production, processing, storage and transportation, were responsible for around 125 Mt CH₄ emissions in 2022,⁹⁰ equivalent to 3.5 Gt CO₂ eq. A total of 15 per cent of Parties, accounting for 59 per cent of total global CH₄ emissions from energy in 2022⁹¹ and 46 per cent of total global CH₄ emissions in 2020, communicated corresponding measures, such as achieving zero routine flaring by 2030, with a long-term goal to reduce flaring to the absolute minimum;

(f) Reducing CH₄ and N₂O emissions in agriculture, which has estimated net mitigation potential of 0.35 Gt CO₂ eq/year at costs below USD 20/t CO₂ eq in 2030 and 0.63 Gt CO₂ eq/year at costs below USD 100/t CO₂ eq in 2030. A total of 39 per cent of Parties, accounting for 43 per cent of total global CH₄ emissions from agriculture in 2021,⁹² 54 per cent of total global CH₄ emissions in 2020 and 58 per cent of total global N₂O emissions in 2020, communicated corresponding measures, such as providing training on better ruminant livestock feeding for key stakeholders to increase uptake of leguminous fodder shrubs, and constructing biodigesters at rural farms to replace fuelwood consumption with biogas from anaerobic digestion of manure;

(g) Ecosystem restoration, afforestation and reforestation, which has estimated net mitigation potential of 0.15 Gt CO₂ eq/year at costs below USD 20/t CO₂ eq in 2030 and 2.18 Gt CO₂ eq/year at costs below USD 100/t CO₂ eq in 2030. According to the Global Forest Resources Assessment 2020, the world has lost a net area of 178 million ha forest since 1990 with an estimated net forest loss of 4.7 million ha/year in 2010–2020.⁹³ The SR1.5 projects a significant increase in forest cover on 1.5 and 2 °C pathways compared with ‘no climate policy’ baselines⁹⁴ as a result of reduced deforestation and forest degradation, and afforestation, reforestation and revegetation. A total of 56 per cent of Parties, accounting for 63 per cent of total global forest cover in 2020⁹⁵ and 31 per cent of total global wetlands,⁹⁶ communicated corresponding measures, such as reforesting about 12,000 ha annually through community and school programmes and mobilizing private investment in peat restoration through a package of reforms to the national peatland code. A total of 14 per cent of Parties, accounting for 9 per cent of total global forest cover in 2020,⁹⁷ communicated quantitative targets for increasing national forest cover by 2030.

⁸⁸ Estimated on the basis of data from the Fossil Fuel Subsidy Tracker; as modified by the secretariat. “Total global fossil fuel subsidies in 2021” refers to those of 82 major economies, representing 94 per cent of total global energy supply from fossil fuels in 2021 and 91 per cent of total global final energy consumption of fossil fuels in 2021 (as footnote 64 above).

⁸⁹ According to the contribution of Working Group III to the AR6, for 1.5 °C pathways with no or limited overshoot, global CH₄ emissions need to be reduced by 34 per cent below the 2019 level by 2030, including to lower peak warming. In the IEA 2023 Net Zero Emissions by 2050 Scenario, CH₄ emissions from fossil fuel operations are expected to fall by more than 75 per cent by 2030.

⁹⁰ As footnote 25 above.

⁹¹ Estimated on the basis of data from IEA Methane Tracker Data Explorer, available at <https://www.iea.org/articles/methane-tracker-data-explorer> (accessed 29 September 2023). All rights reserved; as modified by the secretariat. Energy supply is estimated to be the second largest source of anthropogenic CH₄ emissions globally, responsible for 37 per cent, after agriculture (40 per cent).

⁹² As footnote 91 above.

⁹³ As footnote 73 above.

⁹⁴ According to the SR1.5, on 1.5 °C-consistent pathways, land needs to be converted to forest land at a rate of –4.8–23.7 Mha/year in 2010–2030 compared with ‘no climate policy’ baselines of –13.6–3.3 Mha/year. The extent of expansion of forest cover varies greatly across the models in the SR1.5, with some projecting virtually constant and some slightly declining forest cover.

⁹⁵ As footnote 73 above.

⁹⁶ As footnote 74 above.

⁹⁷ As footnote 73 above.

186. For the mitigation options that also relate to those referred to in the Sharm el-Sheikh Implementation Plan, Parties reported measures for achieving conditional mitigation targets in their NDCs more frequently than measures for achieving unconditional mitigation targets by 80 per cent in relation to reducing CH₄ emissions from wastewater, 42 per cent for reducing CH₄ and N₂O emissions in agriculture, 38 per cent for ecosystem restoration, afforestation and reforestation, 24 per cent for energy efficiency improvement in industry and 20 per cent for reducing CH₄ emissions from oil and gas.

3. Coherence and synergies with development priorities

187. A total of 65 per cent of Parties 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 to 70 per cent in the new or updated NDCs compared with the previous NDCs.

188. Half of those Parties, or 33 per cent of 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 domestic mitigation 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.

189. In addition, 22 per cent of Parties clarified the alignment between their mitigation measures and efforts towards 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) and AFOLU measures contributing to achieving SDG 15 (life on land) (12 per cent) most frequently indicated. One 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, to institute necessary safeguard mechanisms for implementing the mitigation measures.

Figure 14

Synergies between efforts in mitigation priority areas and efforts towards the Sustainable Development Goals identified in 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 GOALS
Energy supply	3%	3%	3%	1%	4%	2%	12%	7%	7%	1%	7%	5%	9%	1%	1%	1%	2%
Transport	3%	1%	4%	1%	4%	0%	8%	7%	7%	2%	9%	6%	8%	1%	1%	1%	2%
Buildings	3%	2%	4%	0%	4%	1%	8%	5%	6%	2%	6%	4%	8%	0%	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%	5%	7%	5%	8%	3%	3%	4%	7%	11%	4%	12%	2%	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%	4%	3%	3%	1%	3%	4%	5%	2%	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

190. A total of 95 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.

191. A total of 66 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.

192. Some 9 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

193. 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 22 per cent mentioning finance in relation to domestic implementation only. Just 7 per cent mentioned finance in the context of providing financial support for other countries' NDC implementation. Furthermore, 47 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.

194. 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, 27 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.

195. 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

196. With regard to information on technology development and transfer for NDC implementation, 80 per cent of Parties covered qualitative aspects and 31 per cent provided information on both qualitative and quantitative aspects.

197. 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.

198. 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.

199. 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 (24 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.

200. Actions concerning policy, regulatory and legal aspects commonly referred to by Parties 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.

201. In addition, 28 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 (49 per cent), followed by agriculture (25 per cent) as the most cited area of focus for technology innovation, research and development.

202. Eight 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

203. A total of 75 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 74 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.

204. Of the Parties, 55 per cent expressed needs for adaptation and 40 per cent needs for mitigation. In addition, 65 per cent of Parties identified capacity-building needs that were multisectoral or intersectoral, followed by some others that 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, forest, tourism, health, transport and water.

205. 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, 15 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.

206. In the new or updated NDCs, 40 per cent of Parties referred to capacity-building being important for technology transfer across different sectors to accelerate progress towards mitigation and adaptation objectives. A total of 25 per cent of Parties recognized the importance of policy instruments to facilitating the integration of adaptation and mitigation measures into their developmental planning processes. Further, 20 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.