



**Addendum to the synthesis report for the technical
assessment component of the first global stocktake**

**State of greenhouse gas emissions by sources and removals by sinks and
mitigation efforts undertaken by Parties, including the information
referred to in Article 13, paragraph 7(a), and Article 4, paragraphs 7,
15 and 19, of the Paris Agreement**

**Prepared by the secretariat under the guidance of the co-facilitators of the technical
dialogue of the first global stocktake**

Abbreviations and acronyms

BR	biennial report
BUR	biennial update report
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
CTF	common tabular format
EU	European Union
F-gas	fluorinated gas
GHG	greenhouse gas
GST	Global Stocktake
Gt	Gigatonne
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
NC	national communication
NDC	nationally determined contribution
USD	United States Dollar

I. Introduction

A. Mandate

1. As requested by the CMA, the secretariat prepared, for the technical assessment process of the global stocktake under the Paris Agreement, a synthesis report on the state of GHG emissions by sources and removals by sinks and mitigation efforts undertaken by Parties, including the information referred to in Article 13, paragraph 7(a), and Article 4, paragraphs 7, 15 and 19, of the Paris Agreement (hereinafter referred to as “synthesis report”). The synthesis report aimed to present at a collective level the information referred to above, taking into account previous experience in preparing such reports, with a view to serving as one of the inputs to the technical assessment process of the global stocktake.

2. Ahead of the third and final meeting of the first technical dialogue of the first GST, taking place in June 2023, this addendum aims to complement the synthesis report by highlighting new developments that have taken place and information that has become available since April 2022, and synthesizing additional information that is particularly relevant to the final phase of the technical assessment and the consideration of outputs component.

B. Scope of work

3. The addendum comprises two main chapters:

(a) Chapter II below on the state of and trends in GHG emissions by sources and removals by sinks provides an update on Parties’ total aggregate emissions and emissions, examining their levels and trends across the time series;

(b) Chapter III below on mitigation efforts undertaken by Parties includes a brief update on existing mitigation actions by type, scope, coverage and status. It presents an update on the LT-LEDS and related pledges to reach net zero CO₂ or GHG emissions by or around mid-century communicated by Parties and an assessment of how these relate to mitigation actions envisaged. In addition, this chapter provides an update on mitigation co-benefits resulting from Parties’ adaptation actions and/or economic diversification plans and their contribution to mitigation outcomes; and the social and economic consequences of response measures reported by Parties, and actions taken to address the concerns of the Parties with economies most affected by the impacts of response measures, particularly developing country Parties.

4. The addendum presents new information to complement rather than update the synthesis report given the lack of complete and consistent datasets as compared to those used for the synthesis report. It is important to note that detailed and updated analyses of the topics covered in the synthesis report will be included in other reports and mandated documentation, including the compilation and synthesis of the 5th BRs, which the secretariat will prepare subsequently.

II. State of and trends in greenhouse gas emissions by sources and removals by sinks

A. Overview

5. This chapter presents information on the state of and trends in global GHG emissions by sources and removals by sinks.

6. Because reporting under the enhanced transparency framework (ETF) of the Paris Agreement is not yet available, the information presented in this report is based on reporting under the Convention. To that end, totals are provided for 1990–2020 for countries that

provided GHG inventories annually under the Convention,¹ hereafter referred to as “developed country Parties” for the purposes of this report only. Information for other Parties that report GHG inventories through NCs and BURs are totalled separately due to differences in availability of data and coverage of reporting, hereafter referred to as “developing country Parties” for the purposes of this report only. The use of “developed” and “developing” country Parties in this report does not purport to define the lists of “developing” and “developed” country Parties under the Paris Agreement or for purposes of the global stocktake, nor does it set a precedent for how emissions data will be presented in reports and communications to be prepared for future global stocktakes.

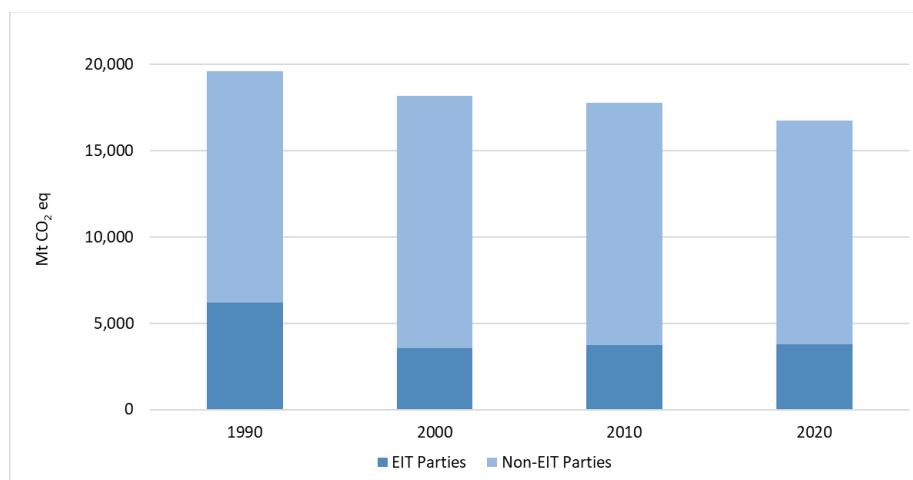
7. Information in this addendum is based on the most recent 2022 GHG inventories of developed country Parties and NCs and BURs of developing country Parties as at 10 February 2023. As GHG inventory data were not available for all developing country Parties for the entire time series, information is presented for 65 of these Parties for 2000–2016.² The time series and subset of Parties selected allow for a meaningful analysis of GHG emission trends for this group of developing country Parties, which accounted for a significant proportion (45 per cent) of total global GHG emissions in 2016.

B. Emission trends

8. Between 1990 and 2020, total aggregate GHG emissions without LULUCF for all developed country Parties taken together decreased by 20.7 per cent, from 19,611.70 to 15,542.63 Mt CO₂ eq. Similarly, total GHG emissions with LULUCF decreased by 25.3 per cent (see figure 1).

Figure 1

Greenhouse gas emissions of developed country Parties in 1990–2020



9. For the group of 65 developing country Parties, total GHG emissions without LULUCF increased by 76.0 per cent (from 12,887.18 to 22,678.13 Mt CO₂ eq) between 2000

¹ Countries that reported annual GHG emission inventories: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Kazakhstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, Ukraine, United Kingdom of Great Britain and Northern Ireland and United States of America.

² Countries that reported GHG emission information in NC and BURs: Afghanistan, Albania, Andorra, Antigua and Barbuda, Argentina, Azerbaijan, Belize, Benin, Bhutan, Bosnia and Herzegovina, Brazil, Burundi, Cambodia, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Dominica, Dominican Republic, Egypt, Ethiopia, Gabon, Georgia, Ghana, Grenada, Guatemala, Honduras, India, Israel, Jordan, Lebanon, Liberia, Malaysia, Mauritania, Mauritius, Mexico, Montenegro, Morocco, Mozambique, Namibia, Nigeria, North Macedonia, Oman, Panama, Papua New Guinea, Paraguay, Peru, Republic of Korea, Republic of Moldova, Rwanda, Saudi Arabia, Serbia, Singapore, South Africa, Tajikistan, Thailand, Togo, Uganda, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Viet Nam and Zimbabwe.

and 2016. Total GHG emissions with LULUCF increased by 63.6 per cent (from 13,026.79 to 21,309.75 Mt CO₂ eq) (see figures 2–3).

Figure 2
Greenhouse gas emissions without land use, land-use change and forestry in 1990–2020

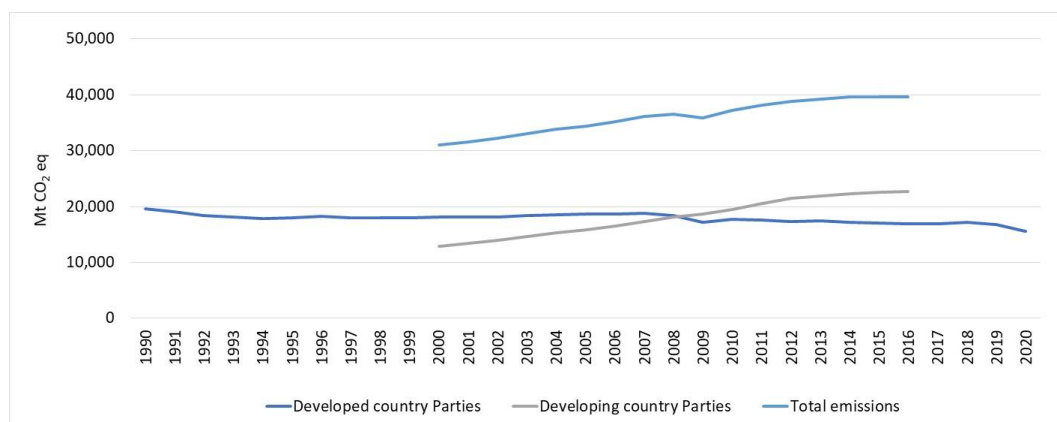
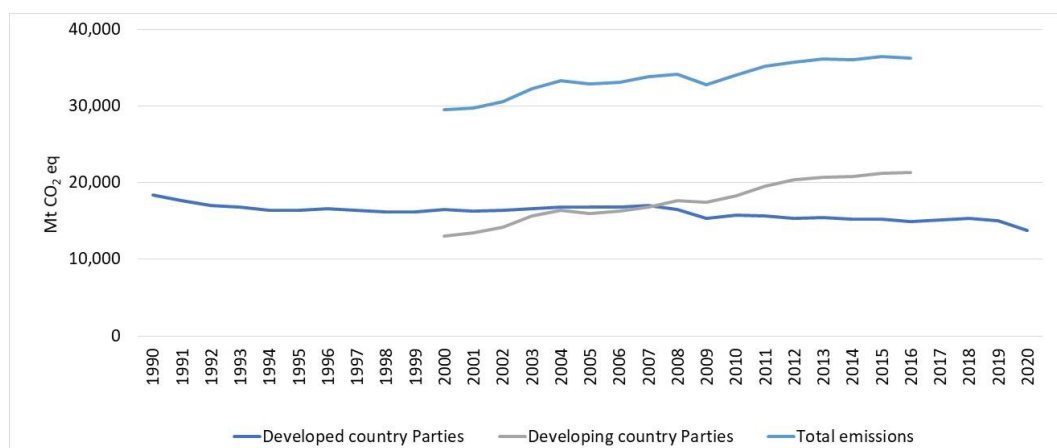


Figure 3
Greenhouse gas emissions with land use, land-use change and forestry in 1990–2020



10. Total aggregate emissions without LULUCF of all developed country Parties and the 65 developing country Parties amounted to 31,071.93 Mt CO₂ eq in 2000 and 39,585.34 Mt CO₂ eq in 2016, representing 82.2 and 77.8 per cent, respectively, of total global emissions.³ Over the period 2000–2016, total GHG emissions (without LULUCF) of these Parties rose by 27.4 per cent.

11. The contribution of Working Group III to the AR6⁴ indicated that global net anthropogenic GHG emissions were higher than any previous time during the decade 2010–2019, with emissions in 2019 being 59 ± 6.6 Gt CO₂ eq. This is about 54 per cent higher than in 1990 and about 12 per cent higher than in 2010. The GHG emissions implied by policies implemented by the end of 2020 are about 57 Gt CO₂ eq. Any comparison of emission trends should be undertaken with caution as the estimation methodology used, and sectors covered

³ For the values of total global emissions, see the update to the synthesis report on the overall effect of Parties' NDCs and overall progress of Parties in implementing their NDCs prepared for the global stocktake.

⁴ IPCC. 2022. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. P Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press. Available at <https://www.ipcc.ch/report/ar6/wg3/>.

in relation to the emission totals presented in this report are not the same as those in relation to the aforementioned estimated total global emissions.

III. Mitigation efforts undertaken by Parties

A. Overview

12. This chapter presents updated information on mitigation actions reported by Parties in their BRs, BURs and NCs as well as from the NDCs and LT-LEDS submitted under the Paris Agreement submitted by 20 February 2023⁵.

13. Since the publication of the synthesis report, updated information on mitigation actions of developed country Parties is available from the 5th BRs and 8th NCs of 34 developed country Parties.

14. The information on mitigation actions from developing country Parties in the synthesis report was based on the latest BURs and NCs from 151 developing country Parties received before August 2019. This report includes updated 80 BUR or NC submissions in this set of Parties received since August 2019⁶ The report does not include the most recent NC or BUR submissions of 20 developing country Parties for which the extraction and compilation of the data are still ongoing.

B. Domestic mitigation actions

15. In their latest BR5 submissions, developed country Parties reported a total of 2,980 mitigation actions. The total impacts of mitigation actions, for which this information was reported, were 3,985.47 Mt CO₂ eq for 2020 and 8,626.95 Mt CO₂ eq. for 2030. Taking into account the new NC/BUR submissions of 80 developing country Parties, developing country Parties reported a total of 2,674 mitigation actions.

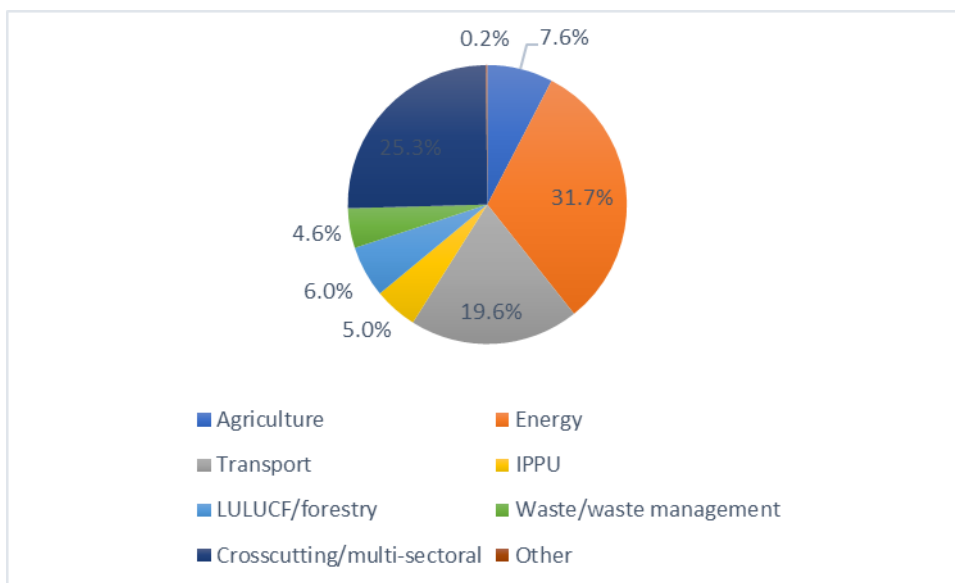
1. Sectors

16. The sectoral focus of mitigation actions reported by developed country Parties was largely consistent with that of the mitigation actions reported in their BR4s with nearly half of the mitigation actions targeting energy or transport sectors (see figure 4), although there is a decrease in the proportion of mitigation actions targeting the energy sector and an increase in the proportion of mitigation actions targeting the transport sector as compared to those of the mitigation actions reported in BR4s (48.3 and 11.6 per cent respectively). The proportions of mitigation actions targeting the agriculture, LULUCF/forestry and waste/waste management sectors are larger than those reported in the BR4s (2.1, 0.2 and 4.9 per cent respectively), while the proportion of the mitigation actions targeting the IPPU sector was smaller than that of mitigation actions reported in the BR4s (12.6 per cent). Significantly the proportion of crosscutting or multi-sectoral mitigation actions reported in BR5s is larger than that of such mitigation actions reported in BR4s (18.9 per cent). This seems to suggest that developed country Parties are increasingly focusing on crosscutting mitigation actions that target multiple sectors.

⁵ As at 20 February 2023, 33 developed country Parties (including the EU) had submitted BR5s (including CTF tables), namely: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Cyprus, Czechia, Estonia, EU, Finland, Germany, Greece, Ireland, Italy, Japan, Kazakhstan, Latvia, Malta, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Switzerland, United Kingdom of Great Britain and Northern Ireland and United States of America. 151 developing country Parties had submitted an NC and/or a BUR.

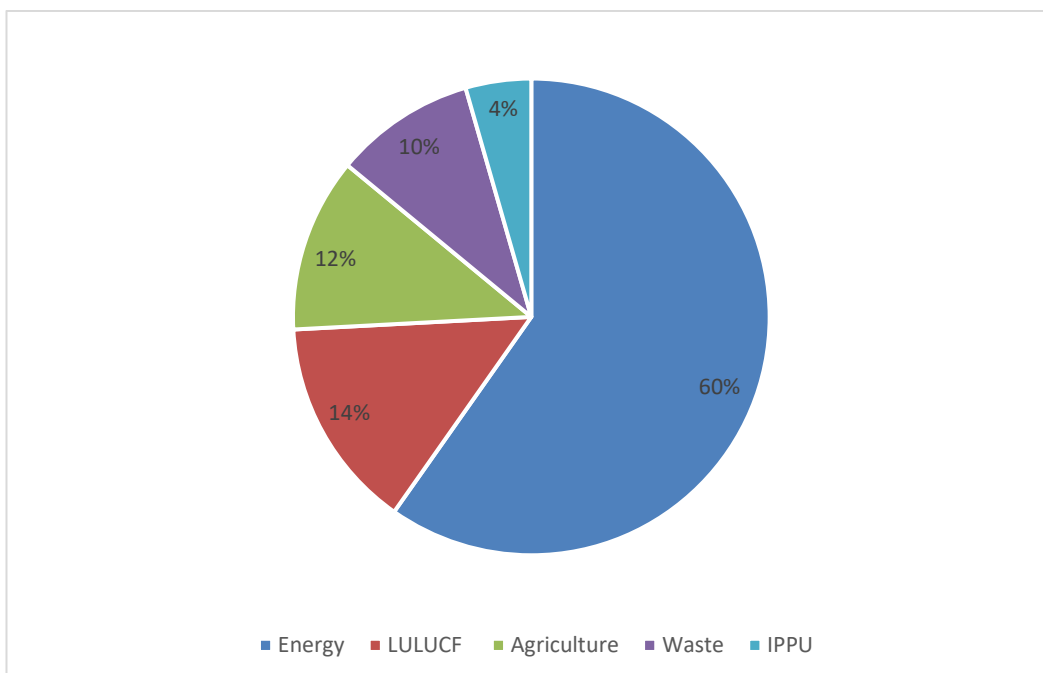
⁶ These comprise 32, 9, 9 and 11 first, second, third, fourth BUR submissions respectively and 1, 5, 11 and 1 first, second, third and fourth NC submissions.

Figure 4
Distribution of mitigation actions by sector reported by developed country Parties in their fifth biennial reports



17. The sectoral distribution of mitigation actions in developing country Parties remains consistent with what was reported in the synthesis report with the predominance of actions in the energy sector at 60 per cent (see figure 5). Those actions mainly focus on increasing the share of renewable energy in the countries' energy mix and on promoting energy efficiencies in residential and in transport sectors. The mitigation actions in LULUCF and agriculture sectors constitute respectively 14 per cent and 12 per cent of the total mitigation actions reported. The shares of actions in the waste and IPPU sectors remain unchanged from the synthesis report.

Figure 5
Distribution of mitigation actions by sector reported by developing country Parties in their national communications and biennial update reports



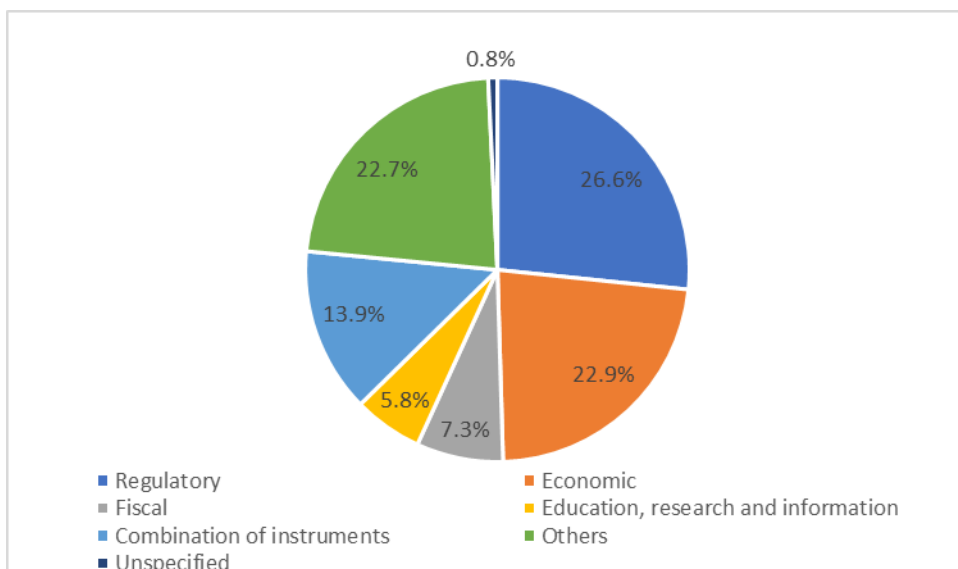
2. Instruments

18. Consistent with the pattern in the BR4s, in their BR5s, developed country Parties demonstrate a preference for using hard instruments (e.g. regulatory, economic, fiscal, and

voluntary agreement) or combinations of hard and soft instruments primarily, with soft instruments (e.g. research, information and education) accounting for a small share of the mitigation actions reported. Economic and regulatory instruments constituted the majority of the hard instruments (see figure 6).

Figure 6

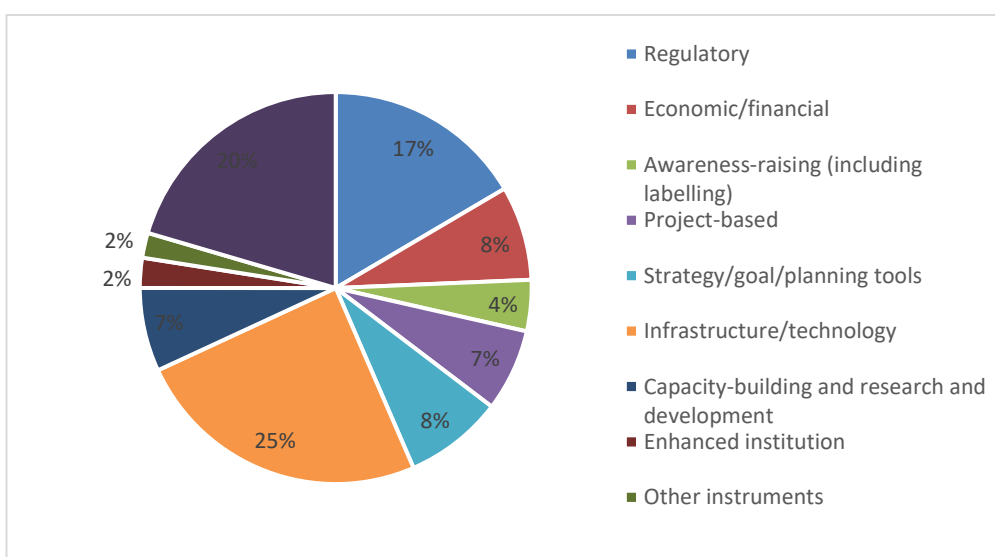
Distribution of mitigation actions by type of instrument reported by developed country Parties in their fifth biennial reports



19. Although reporting on the type of instruments used for mitigation actions is not required for developing country Parties, a considerable increase in the reporting of this type of information was observed in the recent BUR and NC submissions of developing country Parties. Infrastructure and technology have become the main instruments used (25 per cent) as compared to only 13 per cent in the synthesis report (see figure 7). Although regulatory instruments are no longer the predominating instrument, their share has increased from 14 per cent to 17 per cent. These are followed by the economic and financial instruments as well as those related to strategy, goals and planning tools and other instruments.

Figure 7

Distribution of mitigation actions by type of instrument reported by developing country Parties in their national communications and biennial update reports

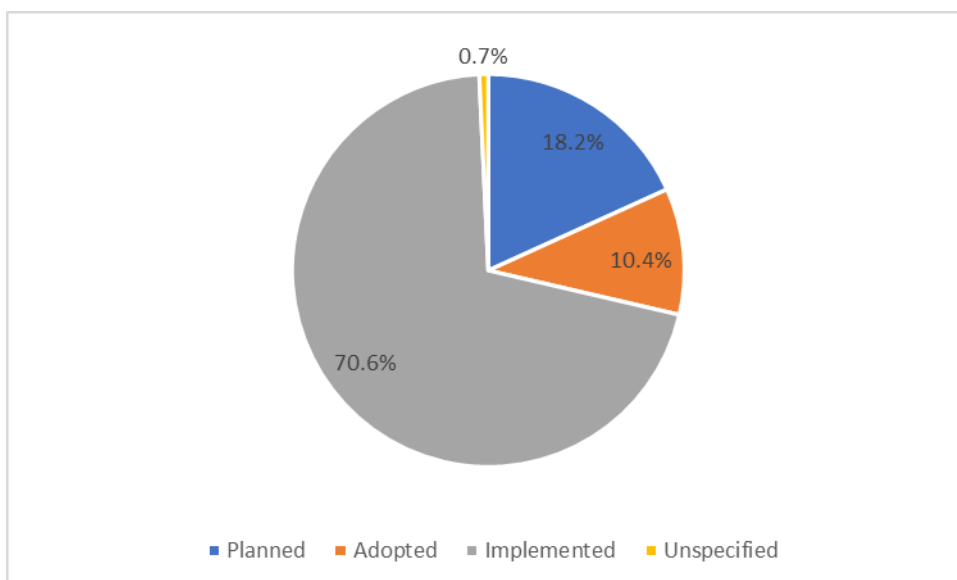


3. Status

20. In their BR5s, developed country Parties reported in their BRs the status of their mitigation actions as either adopted, planned or implemented. Consistent with the pattern of mitigation actions reported in BR4s, implemented actions account for a significant majority of the mitigation actions reported (see figure 8), with planned or adopted actions contributing only a small share of the total mitigation actions reported.

Figure 8

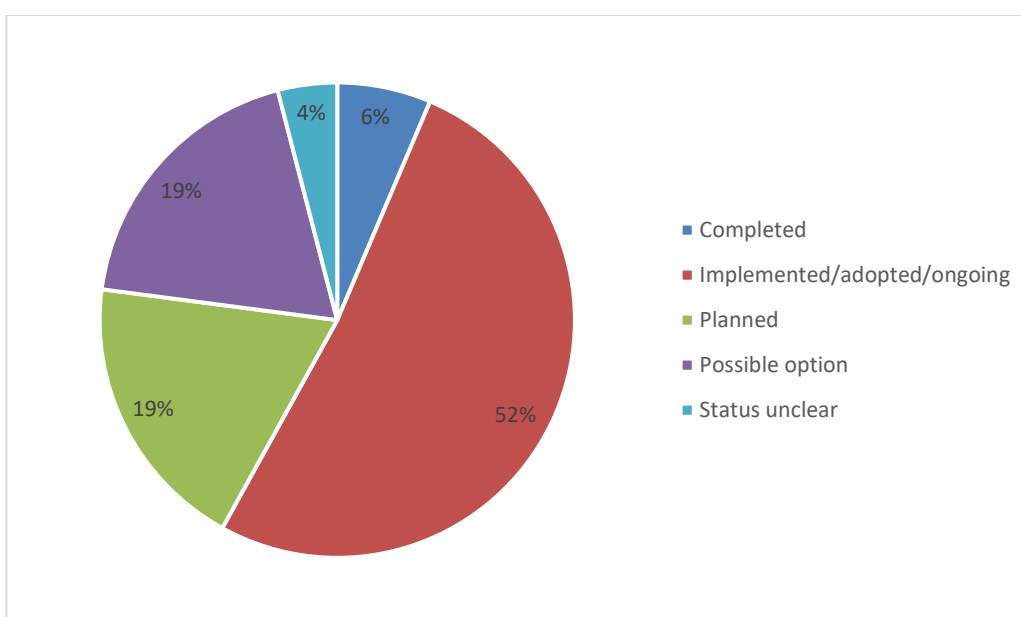
Distribution of mitigation actions by status reported by developed country Parties in their fifth biennial reports



21. Among the mitigation actions reported by developing country Parties, more than half are implemented, adopted or ongoing, which is quite a significant increase compared to the information reported in the synthesis report (41 per cent). The share of completed actions has also increased from 2 to 6 per cent, whereas the share of actions reported as 'possible option' has decreased significantly from 34 to 19 per cent (see figure 9).

Figure 9

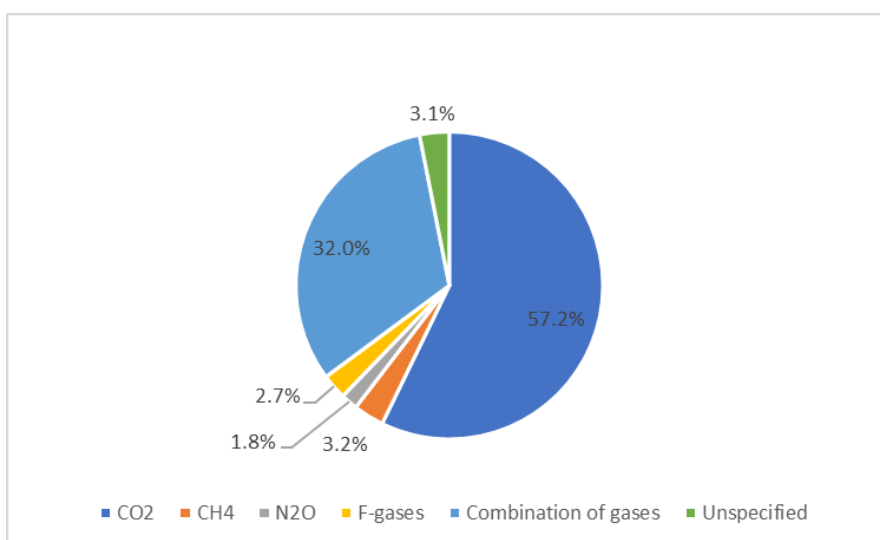
Distribution of mitigation actions by status reported by developing country Parties in their national communications and biennial update reports



4. Gases

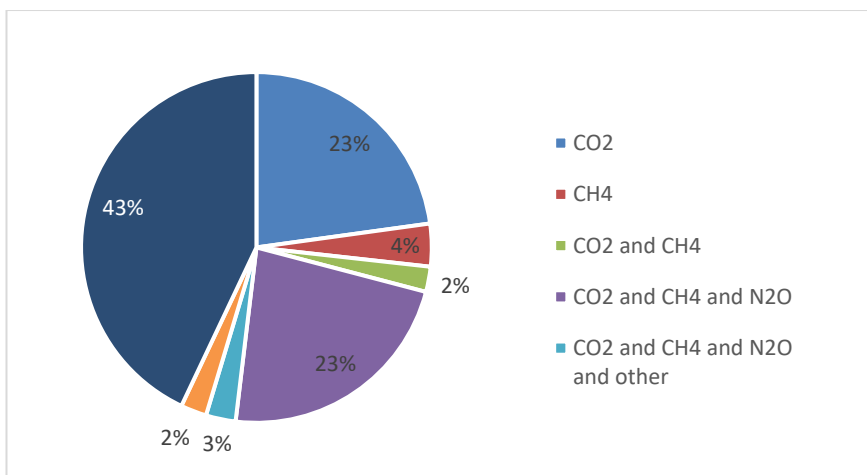
22. Consistent with the pattern in BR4s, mitigation actions targeting a single gas constitute a majority of the mitigation actions reported by developed country Parties in their BR5s, while those targeting multiple gases account for a much smaller share (see figure 10). The mitigation actions addressing CO₂ exclusively constitute more than half of the total mitigation actions reported, while the actions targeting CH₄ and N₂O had much smaller shares. Mitigation actions targeting combinations of gases reported by developed country Parties constitute the second largest share of the total mitigation actions reported and comprise cross-cutting measures and those targeting the energy sector, addressing areas such as energy efficiency and renewable energy.

Figure 10
Distribution of mitigation actions by gas reported by developed country Parties in their fifth biennial reports



23. For developing country Parties, the information on mitigation actions by gases reported in the synthesis report was based on the information on economy-wide quantitative goals of each Party. For this addendum, the analysis is based on the GHG affected by each mitigation action reported in the 80 updated NC/BUR submissions. It shows that the targeted gases are not reported for 43 percent of the mitigation actions. For those which are reported, the mitigation actions are mainly targeting CO₂ or a combination of CO₂, CH₄ and N₂O.

Figure 11. **Distribution of mitigation actions by gases addressed reported by developing country Parties in their national communications and biennial update reports**



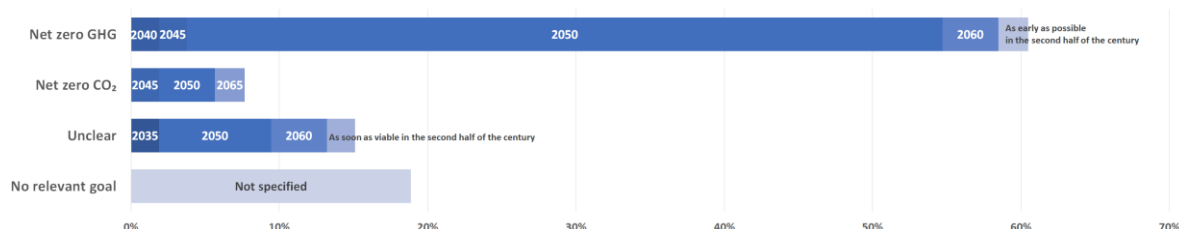
C. Long-term low-emission development strategies and pledges

24. This section summarizes information on long-term mitigation goals and mitigation measures contained in a synthesis report on LT-LEDS⁷ published by the secretariat on 26 October 2022, in response to Decision 1/CMA.3, paragraph 32, which synthesized information from the 53 latest available LT-LEDS, representing 62 Parties to the Paris Agreement, including 4 updated LT-LEDS from 4 Parties, communicated to the secretariat and published on the UNFCCC website as at 23 September 2022. Among the 53 latest available LT-LEDS, 3 LT-LEDS that were communicated between 1 January 2022 and 23 September 2022.

25. With regard to national long-term mitigation goals, many (62 per cent) LT-LEDS described long-term mitigation goals in terms of net zero GHG emissions, while a few (6 per cent) referred to net zero CO₂ emissions. The mitigation goal in some (15 per cent) cannot be classified as net zero GHG or net zero CO₂ emissions and some (19 per cent) did not refer to a concept related to net zero emissions and instead described absolute emission reduction levels compared with a base year or policies and actions without a quantifiable long-term mitigation goal (see figure 11).

Figure 11

Share of net zero emissions references and time frame indicated in long-term low-emission development strategies



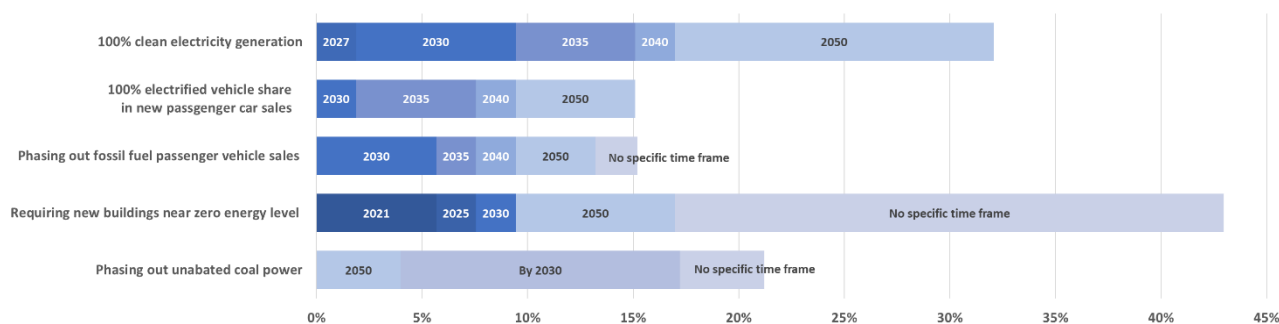
Note: The total percentage exceeds 100 per cent. For the purpose of analysis, multiple long-term mitigation goals in a single LT-LEDS were counted separately. For example, when a Party included both net zero CO₂ emissions and net zero GHG emissions with different time frames, both are counted in the figure.

26. Given that Parties have been urged to communicate LT-LEDS towards just transitions to net zero emissions by or around mid-century, taking into account different national circumstances in their LT-LEDS, 57 per cent LT-LEDS underlined Parties' commitment to just transition. Of the 43 per cent LT-LEDS that did not explicitly mention just transition, 23 per cent LT-LEDS illustrated elements that are linked with just transition, such as fairness, equity and inclusiveness (see figure 3 in LT-LEDS synthesis report for common elements of just transition described)..

27. 40 per cent LT-LEDS indicated that LT-LEDS will guide the development and ambition of the Parties' subsequent NDCs, 8 per cent mentioned that the latest NDCs are already aligned with the LT-LEDS and 49 per cent LT-LEDS did not provide information on how they relate to the NDCs. 19 per cent LT-LEDS referred to the anticipated timing of the peak of the Parties' emissions ranging from 2020 to 2025, 2026, 2027 and 2030. All LT-LEDS described mitigation measures to achieve their long-term mitigation goal that often concern a subset of one or more IPCC sectors. All LT-LEDS also communicated mitigation options in building, energy supply and transport, and almost all in agriculture, industry, LULUCF and waste (see figure 10 in LT-LEDS synthesis report for an overview of frequently mentioned mitigation). Most LT-LEDS provided information on several of mitigation options that cost USD 100/t CO₂ eq or less could reduce global emissions by at least half the 2019 level by 2030, as referred to in the contribution of Working Group III to the AR6 (see figure 11 in LT-LEDS synthesis report for the shares of LT-LEDS that mentioned the low-cost mitigation options). Many LT-LEDS included one or more quantitative targets on energy with a specific time frame to reflect long-term goals in near-term actions (see figure 12).

⁷ FCCC/PA/CMA/2022/8.

Figure 12
Quantitative targets on energy referred to in long-term low-emission development strategies



D. Impact of the implementation of response measures

28. Since the publication of the synthesis report, updated information on response measures is available in 5th biennial reports of 36 developed country Parties and 19 BURs received after 31 January 2022 (10, 1, 4, 2 and 2 first, second, third, fourth and fifth BURs respectively) up to 20 February 2023. In their latest submissions, 27 developed and 4 developing country Parties reported on impacts of response measures or Just Transition.

29. Similar to the information reported in previous synthesis report, Parties did not provide information on impacts of response measures by sector or policy and provided more information on positive impacts rather than negative impacts. Parties also did not include much quantitative information or information on tools used for the purpose.

30. The information on the social and economic consequences of response measures in the 5th BRs and latest BURs is essentially same as that reported in previous reports, with only a small amount of new information available. For instance, one developed country Party reported a new assessment, which was undertaken using new modeling tools to assess the economic impacts of the decarbonation plan at the domestic level, and several developed country Parties reorganized the information reported their previous BRs. One developing country Party briefly mentioned that a model-based study on assessing the economic and social impacts of the implementation of GHG reduction measures was carried out as part of the long-term national strategy.

31. Similarly, there was only a limited amount of new information reported in the latest reports on just transitions. Several Parties referred to the EU just transition fund⁸, which those Parties deployed to support the national plans for phasing out coal by 2030. Several developed country Parties reported that their just transition was incorporated into the latest national legislation or climate action plans.

32. No new information on economic diversification was identified in the latest reports.

⁸ Available at https://ec.europa.eu/regional_policy/funding/just-transition-fund_en