

## Joint technical note by United Nations Environment Programme (UNEP) and the United Nations Framework Convention on Climate Change (UNFCCC)

A comparison of the findings of the UNEP Emissions Gap Report 2024 and the UNFCCC Nationally Determined Contribution (NDC) Synthesis Report 2024

### Summary

This note provides an overview and comparison of the projections of global greenhouse gas (GHG) emissions and global warming reported in the 2024 editions of the UNEP Emissions Gap Report and the UNFCCC Nationally Determined Contribution (NDC) Synthesis Report. As for the 2023 editions, the two reports present fully consistent messages despite differences in approaches and modelling choices. A key difference between the two reports is that the UNEP Report is based on a consideration of recent scientific studies and modeling results focused on updates from key countries, whereas the UNFCCC report presents an analysis covering all countries (but without providing country-by-country detail). Both reports confirm that there continues to be a large gap in 2030 between the emissions resulting from full implementation of current country pledges and what science tells us is required to limit warming to well below 2°C and 1.5°C. Both reports are also consistent in clearly indicating that currently the world is far from a path that would limit global warming to well below 2°C or 1.5°C over the course of this century. Limiting global warming to 1.5°C with no or limited overshoot (>50 per cent chance) will become impossible unless emissions in 2030 are brought below the levels implied by current mitigation pledges. The next NDCs with mitigation targets for 2035 present an opportunity to bridge the emissions gap and put the world on track to net-zero emissions – limiting overshoot of 1.5°C as much as possible. Further details are provided in the summary table.

### Comparison of global greenhouse gas (GHG) emission levels and projections

Estimates of **global GHG emissions in 2019** are closely aligned across the two reports. The Emissions Gap Report estimates of total global GHG emissions in 2019 are 53.7 GtCO<sub>2</sub>e (excluding emissions and removals from land use, land-use change and forestry (LULUCF)) and 56.9 GtCO<sub>2</sub>e (including LULUCF emissions). These estimates are almost identical to those of the UNFCCC NDC Synthesis Report of 52.9 GtCO<sub>2</sub>e and 56.7 GtCO<sub>2</sub>e respectively.

There are only slight differences between the two reports in projected **trajectories of global GHG emissions**, assuming the full implementation of the latest NDCs of all Parties to the Paris Agreement. For projected global GHG emissions in 2030, the difference is less than 1 GtCO<sub>2</sub>e (as in last year's editions), which is well within the uncertainty ranges of the reports. Overall, the GHG emissions trajectory ranges are very similar in the two reports.

The **estimated aggregate effect on 2030 emissions of the new and updated NDCs** submitted since the twenty-seventh session of the Conference of the Parties to the United Nations Framework on Climate Change (COP 27) is amounting to a minimal 0.1–0.2 GtCO<sub>2</sub>e in the UNFCCC report and the

UNEP report's emission differences from last year's edition mainly result from methodological updates. Overall, slight differences between the reports arise due to differences in emissions data, NDC assessments and methodological choices underlying the respective reports. An important methodological difference between the two reports is that the UNFCCC NDC Synthesis Reports assume that emissions in 2030 will be at the level stated in NDCs, regardless of whether projected emissions assuming full implementation of the NDCs are higher than those projected based on policies currently in place. In contrast, the UNEP Emissions Gap Reports estimates, which are based on the findings of several studies, assume that current policy projections will be met, if these are lower than the NDC targets. If these differences are accounted for, estimates of future emission levels across the two reports are very similar.

### Comparison of global warming projections

A key difference between the two reports is that the Emissions Gap Report reports global warming estimates with a 66 per cent probability over the course of the 21<sup>st</sup> century along with minimum-maximum ranges that consider a variety of emission projection uncertainties, whereas the NDC Synthesis Report provides a best-estimate with a 50 per cent probability of limiting warming to a specific level along with 5 to 95 percentile ranges. Global warming projections with a 50 per cent probability are always lower than projections with 66 per cent probability for similar scenarios. To enable like-with-like comparisons, the Emissions Gap Report also includes global warming projections for other probabilities (i.e. 50 per cent and 90 per cent). For similar likelihoods, central estimates are quite similar across the UNEP and UNFCCC reports (see the summary table).

There are significant differences in the global warming projection approaches of the two reports. The Emissions Gap Report explores structural modelling uncertainties more systematically than the NDC Synthesis Report, and this leads to much wider ranges around the central estimates. There are several other differences in the approaches between the two reports, including:

- a. Different post-2030 extension methods.
- b. Different climate emulators: the Emissions Gap Report uses [FaIR](#), while the UNFCCC NDC Synthesis Report uses [MAGICC](#). All other things assumed equal, using FaIR would result in slightly lower median warming projections compared with MAGICC. Both emulators are accurately calibrated to the IPCC AR6 WG1 physical science assessment with future warming projections differing by about 0.1°C (see [Box 7.1 Cross-Chapter Box 7.1](#) in IPCC AR6 WG1).
- c. The UNFCCC analysis does not limit emissions at 'current policy' estimates, so that if an NDC target is situated above the 'current policy' projection level, the NDC target emission level is nevertheless assumed to be achieved.

### Summary table: Comparison of key estimates in the 2023 editions of the UNEP Emissions Gap Report and the UNFCCC NDC Synthesis Report

	UNFCCC NDC Synthesis report 2024	UNEP Emissions Gap report 2024	Discussion / Reason for difference
GHG emissions, excl.	52.9 GtCO <sub>2</sub> e	53.7 GtCO <sub>2</sub> e	Small difference

<b>LULUCF in 2019</b>			
<b>GHG emissions, incl. LULUCF in 2019</b>	56.7 GtCO <sub>2</sub> e	56.9 GtCO <sub>2</sub> e	<b>Negligible difference</b>
<b>Aggregate impact on global GHG emissions in 2030 of new and updated NDCs submitted since COP 28</b>	~0.1 to 0.2 GtCO <sub>2</sub> e The updated NDCs led to emission estimates being minimally smaller.	Minor difference compared with last year, due to methodological updates	<b>Essentially the same.</b> Both reports indicate minimal changes due to updated NDCs.
<b>The implementation gap, i.e. the difference between emissions under current policies and NDC scenarios</b>	Not quantified. UNFCCC does not estimate emissions based on 'current policies'.	2 GtCO <sub>2</sub> e for unconditional NDCs and 5 GtCO <sub>2</sub> e for conditional NDCs.	Indicates how close countries are collectively to achieve their NDC targets.  Not quantified by the UNFCCC.
<b>Unconditional NDCs in 2030</b>	Total incl. LULUCF: 55.2 GtCO <sub>2</sub> e (range: 53.9–56.6)  Total excl. LULUCF: 53.3 GtCO <sub>2</sub> e (range: 52.0–54.7)	Total incl. LULUCF: 54.7 GtCO <sub>2</sub> e (range: 53.6–56.9)  Total excl. LULUCF: 53.2 GtCO <sub>2</sub> e (range: 51.5–54.2)	<b>Small difference.</b> The UNEP gap estimates are slightly lower, but all estimates are within the uncertainty ranges of both reports. Differences in single country estimates (like China and India) could explain the difference - with differences of more than 3 GtCO <sub>2</sub> e for China's unconditional pledge alone across the different sources included in the UNEP Gap report. Also, compensating differences are in play, as UNFCCC does not cap emission estimates at 'current policy' scenarios, which results in up to 3-4 GtCO <sub>2</sub> e differences. UNFCCC also includes NDCs of all countries, whereas UNEP Gap includes all NDCs (until COP 26), and for the updated NDCs since COP 26, it focuses on

			G20 plus other key countries.
<b>Conditional NDCs in 2030</b>	Total incl. LULUCF: 51.7 GtCO <sub>2</sub> e (range:50.2–53.1)  Total excl. LULUCF: 49.8 GtCO <sub>2</sub> e (range: 48.3–51.2)	Total incl. LULUCF: 51.4 GtCO <sub>2</sub> e (range: 47.7–54.7)  Total excl. LULUCF: 49.0 GtCO <sub>2</sub> e (range: 48.3–51.6)	<b>Very Similar.</b> Similar reasoning as for unconditional NDCs. Slightly stronger improvement in UNFCCC, as unconditional emissions were not capped by ‘current policy’ scenarios and differences in methodological choices.
<b>Emissions gap in 2030 with respect to 2°C pathways (67% probability) assuming full implementation of all unconditional NDCs</b>	14.9 Gt CO <sub>2</sub> e (range: 10.9–18.3)	14 GtCO <sub>2</sub> e (range: 13–16)	<b>Similar</b> and within the uncertainty range of UNFCCC. Methodological choices (UNFCCC reports the 5–95% range across a Monte Carlo uncertainty analysis) explain the wider range reported by UNFCCC.  Exclusion of scenarios that peak below 1.8C in case of both reports.
<b>Emissions gap in 2030 with respect to 1.5°C pathways assuming full implementation of all unconditional NDCs</b>	22.7 GtCO <sub>2</sub> e (range: 21.2–27.7)	22 GtCO <sub>2</sub> e (range: 21–24)	<b>Very similar</b> and within the uncertainty range of UNFCCC.
<b>Reduction of these gaps if conditional NDCs are also fully implemented</b>	~ -3.6 GtCO <sub>2</sub> e	-3.5 GtCO <sub>2</sub> e	<b>Very similar.</b> Slightly stronger reduction in the UNFCCC report due to inclusion of higher emissions in unconditional cases (as emissions are not capped by ‘current policy’ scenarios).
<b>Projected global warming over the 21<sup>st</sup> century (peak warming) with a 66% probability assuming that all the unconditional NDCs are</b>	Not provided in the report, but if it was stated it would be 2.7–3.1°C (range of 67% percentile peak warming for different emission	2.8 °C (range: 1.9–3.7 °C)	<b>Similar.</b> The UNEP Gap central estimate with a 66% probability is within the range of the UNFCCC report estimate. The range in the UNEP Gap

<p><b>fully achieved and that the mitigation efforts implied by those are continued over the century</b></p>	<p>implementations).  The UNFCCC report provides the 5%-95% uncertainty of peak warming for unconditional NDCs with 1.7°C to 4.1°C.</p>		<p>report is wider. The methodological approaches are different, which makes a stronger difference in the tails of the distribution – even though the median projection (see below) is very similar. The full 5%-95% uncertainty range reported by UNFCCC encompasses the UNEP Gap report 66% percentile estimate.</p>
<p><b>Projected global warming over the 21<sup>st</sup> century (peak warming) with a 66% probability assuming that all the conditional NDCs are fully achieved and that the mitigation efforts implied by those are continued over the century</b></p>	<p>Not provided in the report, but if it was stated it would be 2.3–2.5 °C (range of 66% percentile peak warming for different emission implementations).</p>	<p>2.6°C (range 1.9–3.6 °C)</p>	<p><b>Similar</b>, except that stated ranges under UNEP Gap report are much wider for methodological reasons. The central 66% percentile value of 2.6°C is within the range of the UNFCCC report. The methodological difference of including (UNFCCC) or excluding (UNEP GAP report) “hot air” plays less of a role under the stronger conditional targets.</p>
<p><b>Median peak warming projections for unconditional 2030 NDCs (50% probability)</b></p>	<p>2.4–2.8 °C (median range)</p>	<p>2.6 °C (range: 1.8–3.4)</p>	<p><b>Very similar.</b> UNEP Gap report and UNFCCC estimates match well. Compensating effects can be at play, i.e., different climate emulators; different treatment of “hot air”; different post-2030 extension methods.</p>
<p><b>Median peak warming projections for conditional 2030 NDCs (50% probability)</b></p>	<p>2.1–2.3 °C (range of medians for different emission implementations)</p>	<p>2.4 °C (range: 1.8–3.3)</p>	<p><b>Similar.</b> UNEP Gap report estimates are slightly higher. Compensating effects could be at play, i.e., different climate emulators; different treatment of “hot air”;</p>



			different post-2030 extension methods.
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