METHODOLOGY: Nationally Determined Contribution Benchmarks for 2035

For the values in this post, we used the followed methodologies and sources. Summary analysis for each scenario is available here.

Historic Data

Historic data for each country were based upon emissions from their Biennial Transparency Reports (BTRs) to the UNFCCC, where available from the country. These values were updated from the previous analysis which used the emissions from their Biennial Update Reports (BURs) to the UNFCCC. These values vary from their national inventories as included in the UNFCCC database. We also include WRI's Climate Watch data using: "Climate Watch" "Total including LUCF", and "All GHG", as the UNFCCC BTR data doesn't include all historic data used in the analysis for every country. We also included 2019-2023 values from Rhodium Group using: Climate Deck, Global Greenhouse Gas Emissions: 1990-2022 and Preliminary 2023 Estimates. For the Russian Federation we used the historic values from their 2022 Common Reporting Format (CRF) table, using the values from the Climate Action Tracker, as subsequent national emissions inventories included a significantly higher value for land-use change and forestry (LUCF) than previous inventories from the country. For India, we use the historic values from WRI Climate Watch, except for 2019 values where India's Fourth Biennial Update Report includes values for 2019. For Saudi Arabia, we use values from WRI's Climate Watch, as Saudi Arabia's Second Biennial Update Report only includes data for 2019, and that reporting only includes CO_2, CH_4, N_20, and LUCF (i.e., doesn't include emissions of HFCs, PFCs, SF_6, and NF3.

Straight-Line to Net Zero

Straight-line values used different: (1) starting dates for the beginning of the decline; and (2) net zero end dates.

(1) Starting Date

We assessed various starting dates to begin the straight-line decline using different formulations:

For countries that have peaked, the starting point of straight-line decline to Net Zero was set using the historic data (as described above). We show three start dates: (a) 1990 reflecting a date used by several countries as the base year for their targets; (b) 2005 reflecting the date that many countries use as the base year for comparing their targets; (c) 2015 reflecting the date that the Paris Agreement was adopted.

For countries that haven't peaked, the starting point of straight-line decline to Net Zero was set using two different start years: (a) 2025; and (b) 2030, as described below.

- *2025 data for the starting point* were based upon using Climate Action Tracker (CAT) estimates for countries using their "Policies and Actions" scenario which accounts for the government's current policies and actions. The Policies and Action scenario shows a max and a min, so we show the range. Since this CAT data doesn't include LUCF, we have assumed that the LUCF remains constant at the most recent data from the BTR for the country (either 2021 or 2022). Where the country didn't have a BTR, the LUCF value uses WRI's 2021 Climate Watch data (i.e., for India and Saudi Arabia). LUCF values used are reported in the summary spreadsheet ("Historic & Future Emissions" worksheet under column AB).

- *2030 data for the starting point* were based upon using Climate Action Tracker estimates for countries using their "unconditional" NDC values. For each country the data were collected by going to the country page and then clicking the "Data Download" tab under the graph and choosing "scenario data". The Unconditional scenario shows a max and a min, so we show the range. A similar exercise could be done using the "conditional" NDC values or the 2030 "Policies and Actions" values, but we haven't included those values as a starting point for this analysis. Since this CAT data doesn't include LUCF, we have assumed that the LUCF remains constant at the most recent data from the BTR for the country (either 2021 or 2022). Where the country didn't have a BTR, the LUCF value uses WRI's Climate Watch 2021 data. LUCF values used are reported in the summary spreadsheet ("Historic & Future Emissions" worksheet).

(2) Net Zero End Date

We assessed the scenarios using various net zero end dates (i.e., the date by which the total emissions for the country with LUCF reaches zero) using different formulations:

For countries that have peaked, net zero end date included two scenarios: (a) net zero by 2050 as reflected by many countries; and (b) net zero by 2045 to reflect an earlier date as called for by a number of experts and policymakers (e.g., the UN Secretary General).

For countries that haven't peaked, net zero end date included three scenarios: (a) by 2050 as reflected by many countries; (b) by 2060 only for those countries that have a 2060 net zero target or a net zero target of 2070; and (c) 2070 only for those countries that have a 2070 target. Note for Turkey we analyzed both 2050 and 2053, as 2053 is the target date they have set. All net zero scenarios assume those dates are inclusive of all GHGs, even if the country hasn't formally announced that the target includes all GHGs. Specifically, for China and Saudi Arabia we have assumed that their 2060 targets include all GHGs. Net zero dates for each country are based on WRI's "net zero tracker". For Mexico, we only included a 2050 scenario as the current government announced it would set such a target.

IPCC 1.5°C Scenarios

We extracted the national data from the IPCC AR6 Explorer and Database files. We extracted the absolute values for the Median, 5th Percentile, 95th Percentile, Maximum, and Minimum absolute values for pathways for a particular country. The IPCC data groups the scenarios into three categories: (1) "C1" is 1.5°C pathway with minimal or low overshoot; (2) "C2" is a 1.5°C pathway with high overshoot, and (3) "C3" is a 2°C pathway. For the analysis we show the C1 and C2 scenarios. IPCC values used include all GHGs and LUCF.

Climate Analytics 1.5°C Aligned Pathway

We compiled the national data from the Climate Analytics 1.5°C national pathways page. They use the global least-cost pathways assessed by the IPCC Special Report 1.5°C and the Sixth Assessment Report by only including those scenarios that are defined "as those that limit warming to 1.5°C with no or limited overshoot (<0.1°C)" and by excluding various scenarios using a set of criteria. (More on their methodology, including limitations of least-cost pathways and the basis they used for excluding scenarios in the IPCC database). Their analysis does not include sequestration from LUCF, so we have made a similar LUCF assumption as used in the "straight-line trajectory" scenarios. Specifically, on LUCF we have assumed that the LUCF value remains constant at the most recent levels from the BTR for the country, supplemented with the 2021 levels from WRI's Climate Watch data where the country didn't have a BTR. This has limitations, especially for countries with high current LUCF, such as Brazil and Indonesia. For example, without including LUCF Climate Analytics assesses a target of 26% below and 10% above 2005 levels for Brazil and Indonesia, respectively.

Climate Action Tracker "1.5°C Paris Agreement Compatible"

We compiled the national data from the Climate Action Tracker "1.5°C Paris Agreement Compatible" pathways using their data explorer page for each country. Values at or below the green line and green range (i.e., called "modelled domestic pathways: 1.5°C compatible") were used as the basis for the calculated level. Their analysis does not include sequestration from LUCF, so we have made a similar LUCF assumption as used in the "straight-line trajectory" scenarios. Specifically, on LUCF we have assumed that the LUCF remains constant at the most recent levels from the BTR for the country, supplemented with the 2021 levels from WRI's Climate Watch data where the country didn't have a BTR. CAT recently released analysis for seven countries that includes LUCF emissions. Those values differ from the ones presented here. This analysis shows with LUCF in 2035: Australia 77% below 2005 levels, EU 78% below 1990 levels, Japan 81% below 2013 levels, and US 80% below 2005 levels, China 78% below 2023 levels, India 5% above 2005 levels, Indonesia 51% below 2019 levels, and Brazil 85% below 2005 levels.

Center for Global Sustainability "High Ambition"

Data from the Center for Global Sustainability (CGS) at the University of Maryland analysis, *Enhancing Global Ambition for 2035: Assessment of High-Ambition Country Pathways*. Values include economy-wide emissions, with all GHGs and LUCF, from Table 2.1 using data from CGS.

Rhodium Group "Mid-Century" Scenarios

Data from the Rhodium Climate Outlook: Setting the Stage for Ambitious 2035 NDCs, November 2024. We show the two different mid-century scenarios shown in the Rhodium Group analysis – "Current Mid-Century Commitments" and "Enhanced Mid-Century Commitments". Rhodium conducts their own analysis of emission through 2030 for the country of meeting the most aggressive of the benchmarks in their 2030 unconditional NDC using their Rhodium Climate Outlook methodology. From those 2030 levels they assume a straight-line trajectory to the mid-century goal for the country. The "Current Mid-Century Commitments" scenario uses the net-zero or carbon neutrality targets for the country, depending on what the country has currently set. The "Expanded Mid-Century Commitments" scenario assumes: "countries with existing carbon neutrality-only goals (i.e., China and Saudi Arabia), expand coverage to include all greenhouse gases within the same timeframe as their current carbon commitments, while countries with no net-zero or carbon neutrality targets follow a straight-line path from their 2030 NDCs to net-zero by 2070." For Mexico they have assumed in the "Current Mid-Century Commitments" that the country follows their NDC pathway as the country hadn't set a mid-century goal at the time of their analysis. For "Expanded Mid-Century Commitments" Mexico's value is based upon a 2070 net zero target.

Comparing Percent Reduction

For comparing to historic data – 1990, 2005, and 2019 – we use the values as described above for "historic data" for consistency across all the benchmarks.

For comparing to future years – 2025 – we used the values from CAT that were used for the "straight-line scenario" where the starting decline date was 2025. Those values are shown in the "Historic & Future Emissions" worksheet (column V-W). For the Rhodium Group scenarios for "non-peaked countries", we also included a comparison to the average 2030 "current NDC" values from the Rhodium Group analysis as detailed in the "Historic & Future Emissions" worksheet (column AD).

Values used for all comparisons are in the "Historic & Future Emissions" worksheet under columns AH-AO.