METHODOLOGY: *Nationally Determined Contribution Benchmarks for 2035*

For the values in this post, we used the followed methodologies and sources.

Historic Data

Historic data for each country were based upon emissions from their national inventories reported to the UNFCCC where the country has reported historic data for the years used for comparison. This was supplemented, where available, with historic data in the countries Biennial Update Reports (BURs) to the UNFCCC. For all other countries, we used WRI's Climate Watch data using: "Climate Watch" "Total including LUCF", and "All GHG". Note, this shows a different emissions cut for Brazil as included in their 2035 NDC announcement which uses their 2005 level from their UNFCCC reporting. Since this UNFCCC data doesn't include all the years that we use for a comparison – e.g., 2019 – we have chosen to show the Brazil comparisons against a common dataset across all the comparison years.

Straight-Line to Net Zero

The "straight-line to net zero" scenario used the historic data (as described above), with 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 began the declines using the historic data and beginning the decline from that point towards the net zero date. 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 used two different dates to begin the decline starting in: (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 2021 levels from WRI's Climate Watch data.

- *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 was based upon going to the country page and then clicking the "Data Download" tab under the graph and choosing "scenario data". The Conditional 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 2021 levels from WRI's Climate Watch data.

(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, a net zero target of 2070, or don't yet have a net zero target; 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. Net zero dates for each country are based on WRI's "net zero tracker".

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 remains constant at the 2021 levels from WRI's Climate Watch data. 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 2021 levels from WRI's Climate Watch data. This has similar limitations as identified above for Climate Analytics. 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.

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 used for the "straight-line scenario" where the starting decline date was 2025.