Performance Distributions Tool User guide

2023 webtool version

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Disclaimer

The content of this user guide is subject to ongoing revision and improvement. In case you have suggestions, please contact our team. The responsibility for the content of this publication lies with the author(s).

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Introduction

The Global Stocktake is a process that assesses countries' collective progress towards the goals of the Paris Agreement and informs them on how to increase ambition (Nascimento *et al.*, 2023).

The Performance Distributions Tool website creates a distribution based on user-defined parameters. This distribution is displayed as a histogram that organises countries according to how they fare in a particular indicator (Figure 1). The indicator is presented on the horizontal axis and the number of countries within the ranges covered by each bar is shown in the vertical axis. The indicator can be selected by the user.

The performance distribution plots show a box with descriptive statistics and the number of outliers that were excluded from the plot. The descriptive statistics shown are the maximum, the minimum, the mean, the median, and the number of countries. These statistics refer to the countries plotted, excluding the outliers.

The code to generate the charts to visualise collective progress as distributions are stored and free to use at: https://github.com/https-github-com-NewClimateInstitute/performance-distribution-tools. The code is published under the GPL-3.0 license[1].

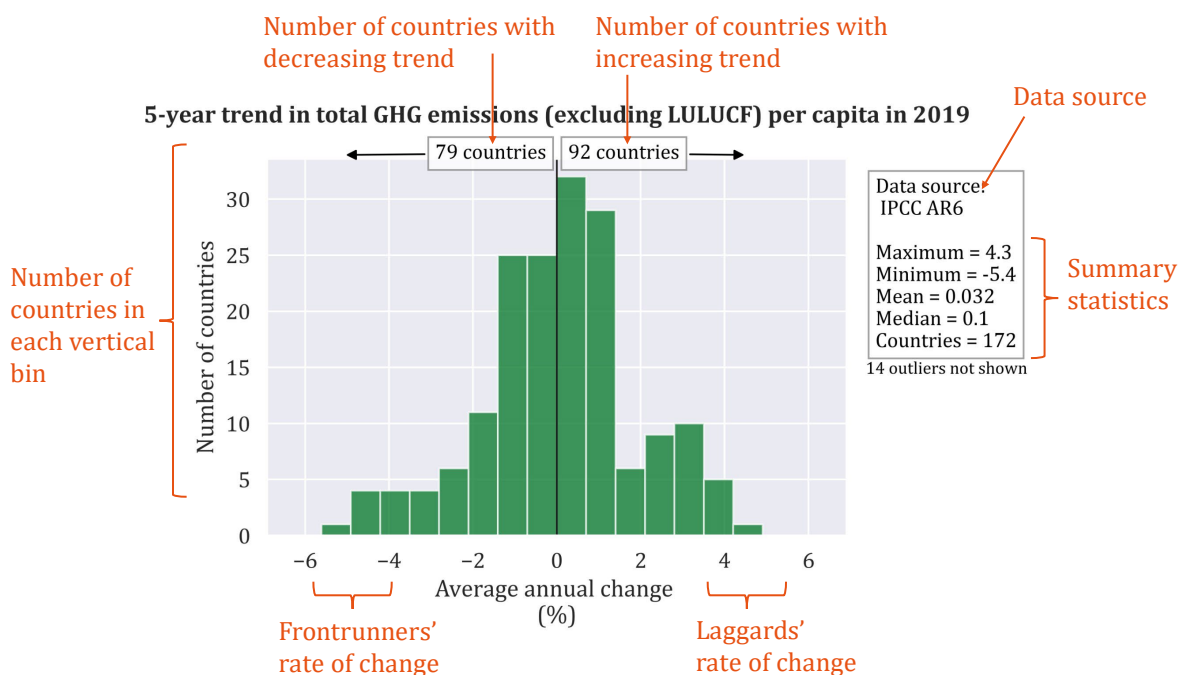Figure 1 shows how to read the performance distribution generated on the tool's website.

Figure 1: How to read a performance distribution.

The webtool builds on research by NewClimate Institute, Öko-Institut and Wuppertal Institute supporting the Global Stocktake process, especially:

- Jeffery, L., Siemons, A., Förster, H., Nissen, C., Hermwille, L., & Kreibich, N. (2021). *The Challenges of Assessing "Collective Progress": Design Options for an effective Global*

Stocktake process under the UNFCCC.
https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2021-04-29_cc_28-2021_collective_progress_0.pdf
- Jeffery, L., Siemons, A., Förster, H., & Hermwille, L. (2019). *Tackling the Challenges of Assessing Collective Progress for an Effective Global Stocktake (Executive Summary)*. https://www.umweltbundesamt.de/publikationen/global-stocktake-summary

Using the Performance Distributions Tool

Please follow the five sequential steps below to create plots using the Performance Distributions Tool (Figure 2). The tool is based on reactive user-selection filters: the options under each user parameter are adjusted to reflect previous choices. For example, once a user selects energy data, all emission-related indicators will disappear from the subsequent filters.
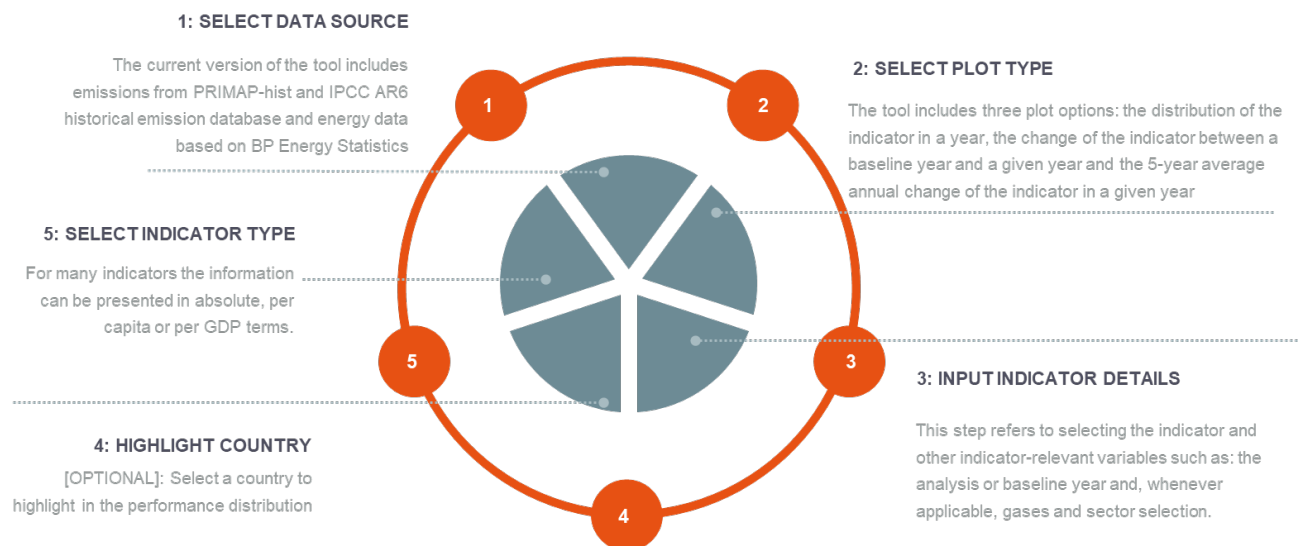

1: SELECT DATA SOURCE
The current version of the tool includes emissions from PRIMAP-hist and IPCC AR6 historical emission database and energy data based on BP Energy Statistics

2: SELECT PLOT TYPE
The tool includes three plot options: the distribution of the indicator in a year, the change of the indicator between a baseline year and a given year and the 5-year average annual change of the indicator in a given year

5: SELECT INDICATOR TYPE
For many indicators the information can be presented in absolute, per capita or per GDP terms.

3: INPUT INDICATOR DETAILS
This step refers to selecting the indicator and other indicator-relevant variables such as: the analysis or baseline year and, whenever applicable, gases and sector selection.

4: HIGHLIGHT COUNTRY
[OPTIONAL]: Select a country to highlight in the performance distribution

Figure 2: Overview of process to use the Performance Distributions Tool.

Step 1: Select data source

Users can select one of five different data source options, four focusing on greenhouse gas emissions and one on energy-related indicators:

1. Emissions (prioritised country-reported data from the PRIMAP-hist dataset)
2. Emissions (prioritised third-party data from the PRIMAP-hist dataset)
3. Emissions (IPCC AR6 data)
4. Emissions (IPCC AR6 data with indirect emissions)
5. Energy data (BP dataset)

We include a short description of each dataset below.

PRIMAP-hist dataset

The PRIMAP-hist dataset is compiled by Gütschow et al. (2016; 2023). It contains both country-reported UNFCCC and third-party data, uses global warming potentials from the IPCC's Fourth Assessment Report (AR4), and is based on the IPCC's 2006 reporting guidelines. It covers the 1750–2019 period, including all UNFCCC countries and most non-UNFCCC territories. LULUCF data is not included due to data availability and methodological challenges. For some sectors, gases, and developing countries,

the data for the last years of the time series were extrapolated, so the authors advise caution when making statements about short-term emission trends. To determine which data points were extrapolated, please compare with the non-extrapolated dataset (Gütschow and Pflüger, 2023).

IPCC AR6 dataset

This dataset was compiled by Minx, Lamb et al. (Lamb *et al.*, 2021; Minx *et al.*, 2022). It is based on the EDGAR dataset, which itself includes data on CO_2 emissions from fossil fuel combustion from the IEA (IEA, 2020), CH_4 and N_2O emissions from savanna burning from the FAO (FAO, 2023), and CH_4 and N_2O emissions from forest and peat fires from the Global Fire Emissions Database (van der Werf *et al.*, 2017). To complement the EDGAR dataset, the authors added CO_2 emissions and removals from land-use change and management, using the averaging convention established by the Global Carbon Project (Friedlingstein *et al.*, 2019). The dataset uses 100-year global warming potentials from the IPCC's Sixth Assessment Report (AR6). It follows AR6 in allocating emissions to five sectors, with a sub-sector classification added by the authors, and distinguishes between direct and indirect emissions. For an explanation on how indirect emissions are allocated to sectors, please see Lamb et al. (2021).

BP dataset

This dataset was produced by British Petroleum for its Statistical Review of World Energy (BP, 2022), an annual publication that provides comprehensive global data on energy production, consumption, and trends. It includes a wide range of energy sources, like oil, gas, coal, nuclear, hydroelectric, and renewable energy, and includes information on prices, trade, and emissions. Data provided in the Statistical Review are used to estimate the energy indicators in the Performance Distributions Plot, that is: energy use per capita, share of fossil fuels in primary energy consumed, and share of renewables in electricity. Due to limitations in the public dataset, fewer countries are included in the performance distribution plots when using the BP Statistical Review dataset.

Step 2: Select plot type

Select the plot type. There are three options:

- Distribution of the indicator in a year
- Change of the indicator between a baseline year and a given year
- Average annual change of the indicator in a 5-year period up to a given year

Step 3: Input indicator details

Years

Select the year of interest and select the baseline year if option 2 is chosen in step 2.

Energy indicators

Energy indicators only appear if the BP dataset is selected. These are the indicators available:

- Energy use per capita
- Share of fossil fuels in primary energy consumed
- Share of renewables in electricity generation

Note on indicator estimation:

- Energy use per capita was estimated using the *primary_ej* variable from BP (2022) and population data from the World Bank (World Bank, 2022).

$$energy\ use\ per\ capita = \frac{primary\_ej}{population}$$

- Share of fossil fuels in primary energy consumed was estimated using the *coalcons_ej*, *gascons_ej*, *oilcons_ej*, and *primary_ej* variables from BP (2022).

$$\% \; fossil \; fuels \; in \; primary \; energy = \frac{coalcons\_ej \; + \; gascons\_ej \; + \; oilcons\_ej}{primary\_ej} * 100$$

- Share of renewables in electricity generation was estimated using the *ren_power_twh*, *hydro_twh*, and *elect_twh* variables from BP (2022).

$$\% \; renewable \; electricity = \frac{ren\_power\_twh \; + \; hydro\_twh}{elect\_twh} * 100$$

Emission indicators

When plotting emission indicators users must select both the sector and the relevant greenhouse gas. Although the greenhouse gas options have been harmonised across data sources, the sectoral classification is different between the PRIMAP and IPCC datasets (Figure 3).
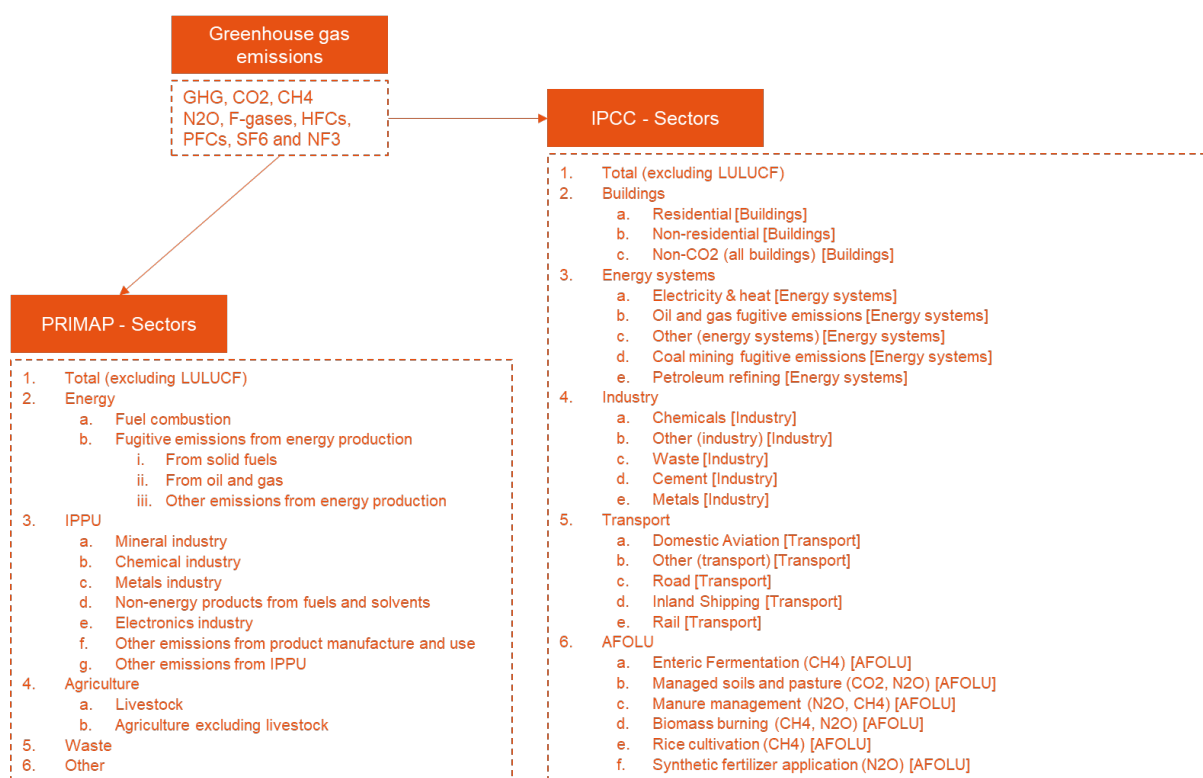

Figure 3: Overview of greenhouse gas and sector options.

Disclaimer: For the AFOLU subsectors relying on the IPCC database, users must select 'GHG', even though each subsector emits only one or two types of gases (in parentheses). For example, if the user selected 'CH4' to plot enteric fermentation emissions, the tool would not generate a plot, even though all enteric fermentation emissions are CH4. Selecting GHG instead of CH4 allow users to explore the emissions from the AFOLU sector. This limitation will be addressed in future versions of the tool.

Step 4: Highlight country

Although the global stocktake aims to assess collective progress, users can select individual countries in our webtool to support benchmarking efforts. This feature is optional.

Step 5: Select data type

Select the data type. Options are:

       a. Absolute data
       b. Per capita
       c. Per unit of gross domestic product (GDP) in USD

Normalisation of data by population (per capita) and by unit of GDP is done using population and GDP data from the World Development Indicators (World Bank, 2022).

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