

## Web app: Calculation of Paris-compatible national CO2 budgets

The app is based on the distribution of a global CO2 budget using a weighted distribution key that takes into account the share of the global population and the share of global emissions of the selected country in a base year (*BY*). This makes it possible to map the two most important factors “climate justice” and “current reality”:

$$B^i = \left( C * \frac{P_{BY}^i}{P_{BY}} + (1 - C) * \frac{E_{BY}^i}{E_{BY}} \right) * B \quad \text{where}$$

$E_{BY}$  or  $E_{BY}^i$       global emissions or emissions of country *i* in the base year  
 $P_{BY}$  or  $P_{BY}^i$       global population or population of country *i* in the base year  
 $B$  or  $B^i$             global CO2 budget or national CO2 budget of the country *i*  
 $C$                     weighting of the population

**Database used:** (EDGAR, 2022) and (EEA, 2022)

With the **EDGAR** database, the EU provides the emissions of all countries in the world due to the **use of fossil fuels** (excluding international shipping and aviation; **ISA**) and **cement production**.

For the EU, data from the European Environment Agency (**EEA**) can also be accessed, which provides **total CO2 emissions** including Land-use changes (**LUC**) and ISA.

### Determination of the global CO2 budget to be distributed from and including 2020 onwards

[Here](#) we have summarised important statements of the IPCC on remaining global CO2 budgets from 2020 on. Detailed information here: (IPCC, 2021). The following is a condensed rendition:

Warming <i>Probabilities:</i>	Estimated remaining carbon budgets		
	50%	67%	83%
[°C]	[GtCO2 from 2020 on]		
1.5	500	400	300
1.6	650	550	400
1.7	850	700	550
1.8	1000	850	650

Global CO2 budgets for LUC and ISA emissions have to be subtracted from the global remaining CO2 budget when using the EDGAR database, as the country data do not include these emissions (see above).

[Here](#) is a paper on determining a global LUC budget (Wolfsteiner & Wittmann, 2022c). For orientation: ISA emissions currently account for 3% of global CO2 emissions (EDGAR, 2022). Global LUC emissions are estimated at +3.8 Gt and global CO2 emissions at 40.5 Gt in 2019 (Global Carbon Project, 2021).

### Weighting Population

In the web app, the year 2019 is used as the base year for calculating the weighted distribution key. The remaining global CO2 budget will be distributed from 2020. You can predefine the weighting of the population.

### Mobile Version

The [mobile version](#) is based only on the EDGAR database. “Year emissions neutrality” refers to a linear emission path with no net negative emissions.

### Detailed Excel tool

[Here](#) you will find a detailed Excel tool (Wolfsteiner & Wittmann, 2022b). There you can choose, for example, whether a global CO2 budget is to be distributed from 2016 or from 2020.

### Calculation of Paris-compatible emission paths

With our web app <http://espm.climate-calculator.info> or a corresponding more detailed [Excel tool](#) (Wolfsteiner & Wittmann, 2022a), plausible emission paths can be derived from the national budgets determined here.

## References

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