Counting the numbers: EU carbon budget not compatible with 1.5°C target
About the author: Wendel Trio is a climate and energy policy expert from Belgium. He has over 30 years of experience working for NGOs on human rights and environmental challenges and has taken up leadership roles with Oxfam, Greenpeace and Climate Action Network.

Cover illustration: Sven Ångermark/Monoclick.

Cover Photo: veeterzy/Unsplash

Layout: Sven Ångermark/Monoclick

Language consultant: Malcolm Berry, Seven G Translations, UK

Published in May 2022 by the Air Pollution & Climate Secretariat (Reinhold Pape).

Address: AirClim, Första Långgatan 18, 413 28 Göteborg, Sweden.

Phone: +46(0)31 711 45 15

Website: http://www.airclim.org.

The Secretariat is a joint project by Friends of the Earth Sweden, Nature and Youth Sweden, the Swedish Society for Nature Conservation and the World Wide Fund for Nature Sweden. The report is also available in pdf format at www.airclim.org. The views expressed here are those of the authors and not necessarily those of the publisher.
## Contents

Making the EU ETS and ESR legislation compatible with the Paris Agreement........ 4

Current legislation, proposed revision and alternative pathways ........................ 5

Stronger rebasing and higher 2030 targets needed to be consistent with Paris Agreement ........................................................................................................ 7

Annex 1: Pathways for strengthening the ETS and ESR ........................................ 8

1. ESR starting levels .............................................................................................. 8
2. ESR reduction pathways ..................................................................................... 9
3. ESR targets ......................................................................................................... 10
4. ESR scenarios .................................................................................................... 10
5. ETS starting level and rebasing .......................................................................... 10
6. Linear reduction Factor ..................................................................................... 11
7. ETS scenarios ................................................................................................... 11

Annex 2: Calculating the EU’s carbon budget ......................................................... 11
Counting the numbers: EU carbon budget not compatible with 1.5°C target

Since the IPCC’s first publication of global carbon budget estimates, huge scientific progress has been made to tackle the uncertainties in the use of this concept. The latest numbers as contained in the WG I contribution to the IPCC’s Sixth Assessment Report are now much more robust. This briefing calculates the EU’s carbon budget under currently agreed targets and compares this to the remaining global carbon budget. The conclusion is that the EU aims to emit at least double the amount of its per capita share of the remaining global 1.5°C compatible carbon budget. It is thus fair to say that the EU’s targets are not consistent with a 1.5°C pathway and it would be good if EU decision-makers could acknowledge that current policies are not in line with the 1.5°C target of the Paris Agreement.

1. THE GLOBAL CARBON BUDGET

There is robust scientific understanding that global temperature rise is near-linear proportional to the total amount of CO₂ that the world emits¹. This knowledge has led to the development of the global carbon budget concept which identifies the cumulative amount of total CO₂ that can be emitted (between pre-industrial times and the moment net zero CO₂ emissions are achieved) to stay within a certain temperature limit. The level of certainty with which this remaining budget can be defined has improved substantially over the last decade², as reflected by its inclusion in the Glasgow Climate Pact³ (COP26, November 2021): “Expresses “alarm and utmost concern that human activities have caused around 1.1 °C of warming to date, that impacts are already being felt in every region, and that carbon budgets consistent with achieving the Paris Agreement temperature goal are now small and being rapidly depleted”.

The IPCC WG I report from August 2021 now considers that to have a higher than 50% likelihood of limiting temperature rise to 1.5°C, global CO₂ emissions between 2020 and the moment global emissions reach net zero should be limited to 300 to 400 GtCO₂ (see table SPM.2 from WG I/AR6 below).

¹ Note that this link is only established between CO₂ and temperature levels and this is not the case for the other greenhouse gases, hence the carbon budget only applies to CO₂ emissions


2. SHARING THE REMAINING GLOBAL CARBON BUDGET

On the basis of the estimations of the remaining global carbon budget, we can compare whether EU policies and targets are in line with the challenging limitations on the amount of CO\textsubscript{2} the world can still emit, while acknowledging that the concept of how to share the global effort to tackle climate changes is a moral/political question and not a scientific one. The central issue lies with the concept of fairness, one of the core principles of international climate cooperation, as reflected in the 1992 Framework Convention on Climate Change, which states that countries “should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”

Many proposals have been developed to suggest how the effort can be shared among countries, and they can roughly be divided into three categories:

- **Per capita** approaches whereby countries are assigned a slice of the budget on the basis of their share of the global population;

- **Equity** approaches whereby countries are assigned a slice of the budget taking into account not only their size of the population but also their historical responsibility and/or capacity to act. The most explicit proposal here is the Greenhouse Development Rights/Climate Equity Reference Project\(^5\) that assigns each country a certain responsibility for global (not just domestic) emission reductions;

- **Best potential** approaches whereby countries are assigned a slice of the budget taking into account a country’s potential for emission reductions and potentially also the costs of such reductions.

---


\(^5\) see: [climateequityreference.org](http://climateequityreference.org)
Equity approaches are closest in line with the UNFCCC principles, though as indicated above such approaches often translate into a country’s responsibility for reducing global greenhouse gas emissions thereby combining domestic emission reduction efforts with support for emission reductions abroad. This paper does not aim to dive deep into this concept and hence takes a very simplistic approach by using a per capita comparison while acknowledging that, for the EU, domestic emission reduction efforts need to be complemented by the provision of substantial climate finance support for poorer countries, not only to reduce emissions, but also to compensate for loss and damage happening in poorer countries due to our high historical emissions. To respect the principles of equity and fairness, such financial support would likely need to be beyond 100 billion euro/year, for the EU alone.

The EU currently represents 5.78% of the world’s population⁶. This is expected to drop to 4.36% in 2050.⁷ The average for the 2020–2050 period is thus 5.07%. This would mean that the EU’s per capita share of the 2020 to 2050 CO₂ budget to limit temperature rise to 1.5°C would be 20.28 GtCO₂ for a likelihood of 67%, and 15.21 GtCO₂ for a likelihood of 83%.

3. THE EU’S CURRENT CARBON BUDGET: DOUBLE ITS PER CAPITA SHARE

While the European Commission has not supported the concept of developing an EU-wide carbon budget, current EU climate policies do have a budget approach as they go beyond end-year targets and allow for the impact of the EU’s overall emissions to be calculated. Emission pathways have been developed for both the Emissions Trading Scheme (ETS) and the Effort Sharing Regulation (ESR) that foresee annual emissions budgets which, when taken together, inform the EU emissions budget.

Based on the changes to the three key pieces of climate legislation as proposed by the Commission in June 2021, we can calculate the amount of total emissions and removals that can be assumed under the ETS Directive, the Effort Sharing Regulation and the Land Use, Land-Use Change and Forestry Regulation (see table 1).

---


Table 1: Total allowable greenhouse gas emissions (in MtCO₂-e) for the EU for the period 2021 to 2030 under the European Commission’s legislative proposals on Emissions Trading, Effort Sharing and LULUCF of June 2021

<table>
<thead>
<tr>
<th>Year</th>
<th>Emissions Trading Sectors (ETS) (1)</th>
<th>Non-ETS Sectors (ESR) (2)</th>
<th>Land Use, Land-Use Change and Forestry (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>1.572</td>
<td>2.226</td>
<td>-225</td>
</tr>
<tr>
<td>2022</td>
<td>1.529</td>
<td>2.142</td>
<td>-225</td>
</tr>
<tr>
<td>2023</td>
<td>1.486</td>
<td>2.060</td>
<td>-225</td>
</tr>
<tr>
<td>2024</td>
<td>1.286</td>
<td>1.977</td>
<td>-225</td>
</tr>
<tr>
<td>2025</td>
<td>1.204</td>
<td>1.894</td>
<td>-225</td>
</tr>
<tr>
<td>2026</td>
<td>1.122</td>
<td>1.922</td>
<td>-267</td>
</tr>
<tr>
<td>2027</td>
<td>1.040</td>
<td>1.812</td>
<td>-278</td>
</tr>
<tr>
<td>2028</td>
<td>0.958</td>
<td>1.702</td>
<td>-289</td>
</tr>
<tr>
<td>2029</td>
<td>0.876</td>
<td>1.592</td>
<td>-299</td>
</tr>
<tr>
<td>2030</td>
<td>0.794</td>
<td>1.482</td>
<td>-310</td>
</tr>
<tr>
<td>Total</td>
<td><strong>11.867</strong></td>
<td><strong>18.809</strong></td>
<td><strong>-2.568</strong></td>
</tr>
</tbody>
</table>

Total ETS+ESR: 30.676
Total ETS+ESR-LULUCF: 28.108

(1) Numbers from Commission presentation on “Cap and Linear reduction factor” to European Council Working Party on Environment of 5 November 2021, excl. maritime cap; (2) Numbers calculated based on the June 2021 proposal and assuming emissions in 2021–2023, which form the basis for calculating emission allowances for the period 2026–2030, are equal to the allowances foreseen under the Regulation⁸; (3) Numbers calculated based on the June 2021 LULUCF proposal and assuming the annual removal budget for the period 2021 to 2025 is 225 MtCO₂ which also informs the starting point for linear reductions applied from 2026⁹.

On top of this, emissions after 2030 can be calculated assuming a linear reduction between 2030 and 2050 (when greenhouse gas emissions should reach net zero), while also assuming the total removal capacity set for 2030 in the LULUCF Regulation will remain the same for the period 2031–2050. Total emissions then amount to 17.354 MtCO₂-e for the period 2031 to 2040, and 7.524 MtCO₂-e for the period 2041–2050, while removals would amount to 6.200 MtCO₂-e for the period 2031 to 2050.

As the carbon budget only relates to CO₂ while the above policies cover all greenhouse gases, a calculation is made under the assumption that the share of CO₂ in total greenhouse gas emissions would remain fairly stable (as has been the case in the last decade). The total amount of CO₂ emissions is set based on the EU’s average percentage of CO₂ emissions over the last decade, which is 81.49%¹⁰.

As indicated in Table 2 below, the EU’s carbon budget for the period from 2020 until the moment it reaches net zero emissions is approximately 40 GtCO₂. This is (more

---


than) double the per capita share of the global remaining budget to stay within the 1.5°C limit and represents 10% of the remaining global budget for a 67% likelihood to stay within the 1.5°C limit and 13% of the remaining budget for an 83% likelihood, whereas the EU’s population represents only 5.78% of the global population in 2020 and only 4.36% in 2050. One can thus safely conclude that the EU’s currently proposed and/or agreed targets and policies are not in line with a 1.5°C pathway.

Table 2: Total amount of greenhouse gas/CO₂ emissions and removals under current EU targets and policies for the period 2020 to 2050, in MtCO₂-e

<table>
<thead>
<tr>
<th>Year</th>
<th>Greenhouse gas emissions</th>
<th>CO₂ emissions (81.49%)</th>
<th>CO₂ removals</th>
<th>total CO₂ budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>3.377</td>
<td>2.752</td>
<td>-270</td>
<td>2.482</td>
</tr>
<tr>
<td>2021-2030</td>
<td>30.676</td>
<td>24.998</td>
<td>-2.568</td>
<td>22.430</td>
</tr>
<tr>
<td>2031-2040</td>
<td>17.354</td>
<td>14.141</td>
<td>-3.100</td>
<td>11.041</td>
</tr>
<tr>
<td>2041-2050</td>
<td>7.524</td>
<td>6.131</td>
<td>-3.100</td>
<td>3.031</td>
</tr>
<tr>
<td>Total</td>
<td>58.930</td>
<td>48.022</td>
<td>-9.038</td>
<td>38.984</td>
</tr>
</tbody>
</table>

In fact, if the global carbon budget was divided across countries on an equal per capita basis, the currently proposed EU budget would need a global carbon budget of approx. 800 GtCO₂, which would correspond to a global temperature rise of 1.8°C (with a 67% likelihood) or 1.9°C (with an 83% likelihood) according to the IPCC’s AR6.⁵¹

**4. THE EU’S CARBON BUDGET UNDER THE TARGETS PROPOSED BY CAN EUROPE**

Climate Action Network (CAN) Europe, the European federation of climate NGOs, believes the EU needs to do more than currently planned if it is to make a fair contribution to efforts to limit temperature rise to 1.5°C. It therefore calls for:

- Greenhouse gas emissions to be reduced by at least 65% by 2030;
- Carbon removals through LULUCF to be increased to at least 600 Mt CO₂ by 2030;
- Climate neutrality to be achieved by 2040;
- Total greenhouse emissions to be reduced by at least 90% by mid century.

On the basis of the above, an alternative carbon budget for the EU can be calculated. The total carbon budget for the EU for the period 2020 to 2050, when fully implementing CAN Europe’s proposals, would be 19 GtCO₂ (see table 3 below).

---


Table 3: Total amounts of greenhouse gas/CO\textsubscript{2} emissions and removals under CAN Europe’s policy proposals for the period 2020 to 2050, in MtCO\textsubscript{2}-e

<table>
<thead>
<tr>
<th></th>
<th>Greenhouse gas emissions</th>
<th>CO2 emissions (4)</th>
<th>CO2 removals (5)</th>
<th>Total carbon budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>3.377</td>
<td>2.752</td>
<td>-270</td>
<td>2.482</td>
</tr>
<tr>
<td>2021–2030 (1)</td>
<td>24.679</td>
<td>20.111</td>
<td>-4.515</td>
<td>15.596</td>
</tr>
<tr>
<td>2031–2040 (2)</td>
<td>11.058</td>
<td>9.011</td>
<td>-6.000</td>
<td>3.011</td>
</tr>
<tr>
<td>2041–2050 (3)</td>
<td>5.065</td>
<td>4.127</td>
<td>-6.000</td>
<td>-1.873</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44.179</strong></td>
<td><strong>36.001</strong></td>
<td><strong>-16.785</strong></td>
<td><strong>19.216</strong></td>
</tr>
</tbody>
</table>

(1) calculation made on the basis of a linear reduction from the EU’s 2020 emissions of 3.377 MtCO\textsubscript{2}-e to a 65% reduction by 2030; (2) calculation made on the basis of a linear 65% reduction by 2030 to a total maximum amount of emissions of 600 MtCO\textsubscript{2}-e (equal to the foreseen total removals through LULUCF in 2040); (3) calculation made on the basis of a linear reduction from a total amount of 600 MtCO\textsubscript{2}-e in 2040 to a 90% reduction by 2050; (4) calculated on the basis of a stable share of CO\textsubscript{2} in total greenhouse gas emissions of 81.49%; (5) calculated assuming that from 2030 onwards total removals from LULUCF would remain stable at 600 MtCO\textsubscript{2}/year.

_by Wendel Trio_

_May 2022_