



A Quantitative Look at Humanity's Progress on Fighting Climate Change



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Introduction

Every year, more people become exceedingly anxious about climate change. Yet, the world is constantly making progress towards a sustainable future. A lack of public understanding of the big-picture situation of climate change is one of the reasons for this disparity. So, a study is necessary to discover humanity's current quantitative progress on stopping and eventually reversing climate change. A finding would both motivate and inspire those with climate anxiety, and help propel the world as a whole forward into a more sustainable future.

Existing research

Existing research has shown a general trend: humanity is making some progress at decelerating GHG emissions and slowing down climate change, but it is not enough (Lamb et al., 2021). Globally, greenhouse gas reductions as a whole need to be accelerated.

Although certain studies have found more detailed information on climate progress trends (Lesnikowski et al., 2013) and how progress is distributed geographically and sectorally (Wei et al., 2021; Lamb et al., 2021), existing research does not define a quantitative amount of progress that has been globally made. Rosenstock et al. (2018) found that "success of global agreements depends on the ability to monitor progress toward goals." It is crucial, therefore, to discover humanity's current quantitative progress towards net-zero emissions and beyond.

Research methodologies

The researcher used descriptive research and descriptive statistics to analyze databases on temperature, emissions, population, and clean energy.

- 1) The researcher averaged the slope of the data before 2015 and the slope of the data after 2015. The difference was the average change in rate of change, which showed the researcher whether progress was accelerating or decelerating.
- 2) The researcher created predictions for each dataset based on years up to 2015. After finding the deviation between the actual versus predicted values after 2015, the researcher used the predictions as a baseline, the deviation as the current standing, and a global climate goal as the goal to find the percent of progress made.

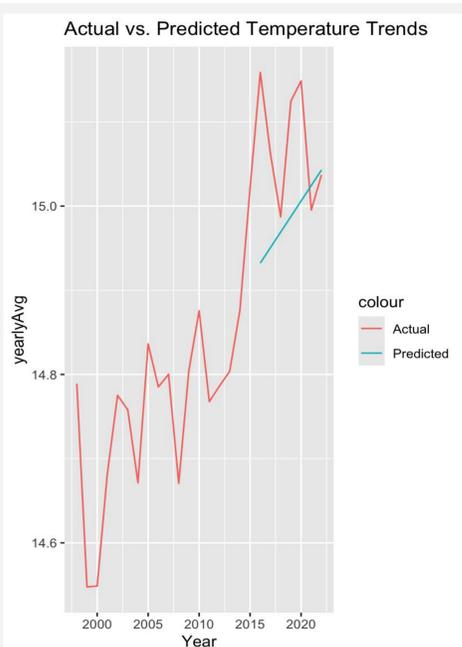


Figure 1. Graphic visualization of projected versus actual trends methodology. *Note.* From "Actual vs. Predicted Temperature Trends.png" by Miao, 2025.

Data and findings

Data found by comparing slopes across temperature, emissions, clean energy is displayed to the right. Data from comparing actual statistics to predicted data is visualized in the progress bars below.

	Average rate of change from 1850 to 2015	Recent average rate of change from 2016 to 2023 (inclusive)	Slope difference	Recent slope as percent of past rate
Temperature	0.02088546 C / year	0.02593476 C / year	0.005049297 C / year	124.18%
Greenhouse gas emissions	764.0573 Mt CO ₂ eq / year	449.7057 Mt CO ₂ eq / year	-314.3516 Mt CO ₂ eq / year	58.86%
Greenhouse gas emissions per capita	0.008983512 Mt CO ₂ eq / year	-0.0480076 tons CO ₂ eq / person / year	-0.05699112 tons CO ₂ eq / person / year	-534.39%
Clean energy	0.240865 percent clean energy / year	0.9747272 percent clean energy / year	0.7338623 percent clean energy / year	404.68%

Table 1. Statistics showing average rate of change across climate change metrics. *Note.* From "Data findings - Global quantitative progress on sustainability" by Miao, 2025.

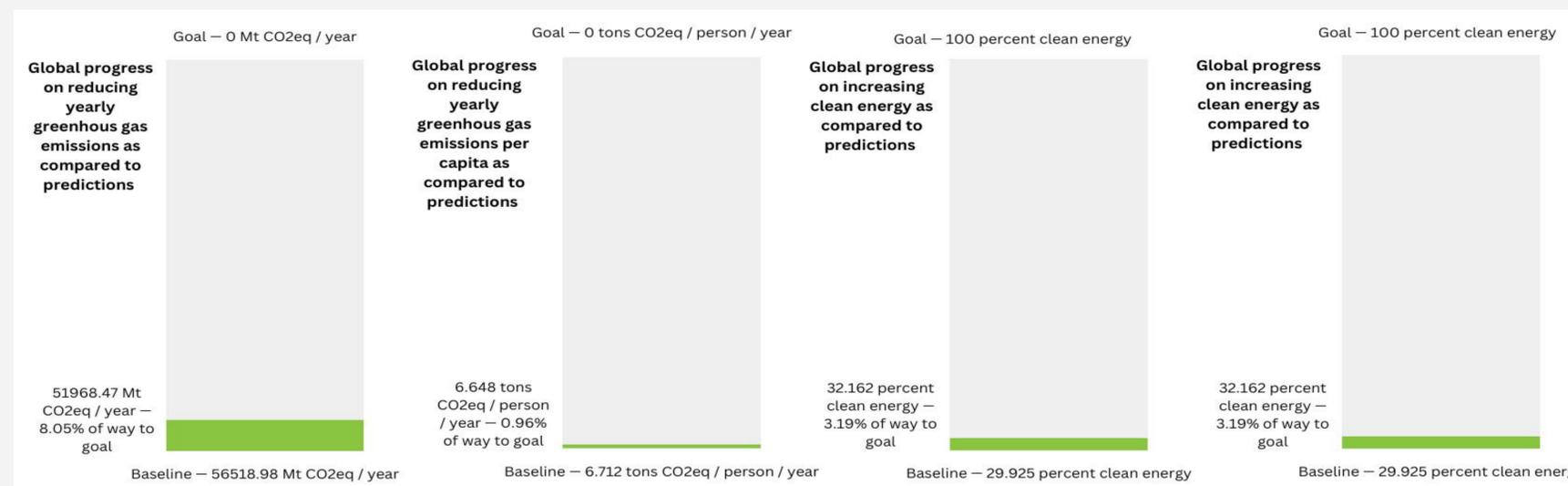


Figure 2. Progress bars displaying quantitative progress across temperature, emissions, and more. *Note.* From "Progress bars 1680x600" by Miao, 2025.

Analysis and conclusions

This research study successfully answered the question: What is the quantitative amount of progress the world has made on fighting climate change? Across all four metrics tested, the average percent of progress was around 3.21%, with GHG reductions as high as 8.05% of the way to net-zero. While 3.21% may seem relatively insignificant, it is heartening to know that action has led to progress.

Additionally, while temperature is increasing by more and more each year (as expected even with significant progress (IPCC, 2023)), greenhouse gas emissions and clean energy percentage are all decelerating (or accelerating positively in clean energy's case) significantly, with percentages well below 100% (or above 100% in clean energy's case). Emissions per capita even indicates a complete reversal of "velocity," with negative percentages, a potentially unrealistic value that could be due to a lack of recent data.

To sum up, the quantitative amount of progress the world has made on fighting climate change has been found to be 3.21% of the way to zero greenhouse gas emissions, restored temperatures, and 100 percent clean energy as compared to no actions made to fight climate change since 2015.

Implications and next steps

The findings made in this study are important for a large number of reasons, but is primarily vital in fighting climate anxiety. By attributing a concrete number to climate change progress, those with climate anxiety or anyone concerned about the climate can feel assured that progress is happening. Researchers, advocacy groups, and others can also use these findings to recognize that their work is creating positive change.

To the more general population, this research could provide perspective for other climate research papers (of which their research aligns with many of the findings in this study), and also provide a visualization that is more accessible to everyone who cares about sustainability.

This paper also leads to more questions related to climate change progress. Perhaps the most important next step is to incorporate more metrics and use more advanced techniques to model progress as accurately as possible.

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