# $CO_2$ and Climate Change: Unveiling the Missing Experimental Evidence


## ABSTRACT

Human activities releasing greenhouse gases are identified as dominant contributors to the observed climate change including global warming and its acceleration.The consequences for humanity are predicted to be severe. Therefore, to mitigate global warming, significant efforts are being devoted to reducing $CO_2$ emissions and stabilizing (or even reducing) atmospheric $CO_2$ concentration. This enormous endeavor of 'decarbonization' comes with substantial costs, running into trillions of USD in Western countries alone.

Fundamentally, the entirety of endeavors, actions, and outcomes hinges upon the central hypothesis stating that the increase of $CO_2$concentration from approximately 0.03% to more than 0.04% causes a noticeable temperature rise. Given the paramount significance of this hypothesis, the generally accepted rules of science would necessitate rigorous scrutiny for substantiation. Such substantiation is typically provided by an experimental evidence.

Yet, surprisingly according to the results of this research, exactly this essential experimental evidence supporting the central hypothesis seems to be lacking, not fully adhering to fundamental principles of scientific analysis.Consequently, it is imperative to subject this central hypothesis to further investigation. Robust experimental evidence must be presented to substantiate the hypothesis, as the failure to do so would necessitate a reassessment of the emphasis on $CO_2$ emissions reduction as the primary solution to climate change.



Keywords: *"Experimental Evidence"; "Green House Gas Effect"; "$CO_2$ Concentration"; "Temperature Increase"; "Global Warming"; "Decarbonization"*




## 1 INTRODUCTION

The observed global warming and its acceleration in the past century have piqued scientific interest in understanding its underlying drivers. Recent research strongly supports the idea that human activities have become an (if not 'the') important contributor to climate change, in particular average global temperature increase, over the last 170 years. The primary reason for this global warming is strongly believed to be the enhanced greenhouse effect of the Earth's atmosphere caused by the release of greenhouse gases (GHGs) such as carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). Notwithstanding the fact that these gases constitute not more than 0.05% of the air, it is widely undisputed that these gases trap heat from the Sun, preventing some of it from escaping back into space, and result in warming the Earth's surface and atmosphere. Scientists are particularly concerned about $CO_2$, which is released in large quantities through burning fossil fuels and deforestation. Other significant greenhouse gases include methane from agriculture and landfills, nitrous oxide from agricultural activities and industries, and fluorinated gases used in various applications[1]. Hence, unless the increase of atmospheric $CO_2$ concentration is mitigated or halted, there is a projected continuation of global warming and anticipation of substantial repercussions for humanity.

Consequently, worldwide substantial efforts are being dedicated to reducing $CO_2$ emissions, with the primary aim of either decreasing or stabilizing the atmospheric $CO_2$ concentration to mitigate the escalation of global warming. To this, various countries are taking measures to curtail the utilization of fossil fuels, i.e., coal, oil products, and natural gas, with the intent of transforming the transportation, heating,

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[1] (World Meteorological Organization und United Nations Environment Programme 1988)is often cited as a turning point in the public's understanding of climate change. Here it is The IPCC report, which was authored by hundreds of scientists from around the world, concluded that it was "extremely likely" that human activities were the main cause of climate change.
See also, inter alia, (Schneider 1989) (Revelle und Suess 1957) (Callendar 1938)

and energy sectors. However, this transition to alternative energy sources is expected to entail considerable costs, reaching trillions of USD in Western countriesalone.

In the face of this colossal and epochal undertaking known as 'decarbonization', with its potential consequences for the very survival of humanity, there can be no room for complacency. Hence, it is imperative that the investigation of fundamental hypotheses is approached with unrelenting, unwavering, and ruthless scientific scrutiny (see the short description in 2.1).

# 2 METHODOLOGY

## 2.1 Background: Scientific scrutiny and the significance of experiments

*"The principle of science, the definition, almost, is the following: The test of all knowledge is experiment. Experiment is the sole judge of scientific 'truth'."*[2]I.e., any scientific hypothesis is not considered to be scientifically meaningful until it has been tested and supported by experimental evidence. In other words, essential for testing hypotheses is experimentation and the experimental verification which helps to avoid the illusion of knowledge ("*The greatest enemy of knowledge is not ignorance; it is the illusion of knowledge*"[3]).

Typically, the scientific method is a systematic approach to gathering and evaluating evidence to determine the validity of a hypothesis[4]. The method can be described by the following five steps:

1. Observation;
2. Hypothesis, i.e., developing a tentative explanation for the observation or question;
3. Experiment[5];
4. Data analysis; and
5. Conclusion

Consequently, when checking the validity of a hypothesis scientific scrutiny includes:

- Empirical evidence: hypotheses must be supported by observable and measurable evidence obtained through experiments or observations.
- Falsifiability: hypotheses should be formulated in a way that they can be tested and potentially disproven through experiments or observations[6].
- Openness to revision: as a consequence of falsifiability, hypotheses are open to revision based on new evidence or advancements in knowledge.
- Reproducibility: scientific findings should be replicable if the same methods and data are used.

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2 (Feynman, Leighton und Sands 1963, 1-1)

3 Often attributed to Stephen Hawking, but also to(Boorstin 1993)

4 see similar, e.g., (Lexis und Julien 2017, 22); (Medicine 1992, 17 et seq.)

5 A physical experiment is a controlled and systematic procedure conducted to investigate, observe, and measure the behavior of natural phenomena, materials, or systems. In a physical experiment, researchers manipulate independent variables, while carefully controlling and monitoring other relevant constants or control variables, to observe and measure the dependent variables, which are the outcomes or responses of interest. The goal of a physical experiment is to test hypotheses or gain a deeper understanding of the underlying principles governing the observed phenomenon.
Key components of a physical experiment include:
- Manipulation: intentional variation of independent variables to observe their effects on the dependent variables.
- Control: To ensure the validity and reliability of the results, all factors that could potentially influence the dependent variable are carefully controlled.
- Randomization: assignment of participants or samples to different experimental conditions to reduce bias.
- Replication: Conducting the experiment multiple times enhances the robustness and generalizability of the results.

6 See e.g., (Popper 1959)

- Objectivity: the evaluation of hypotheses should be unbiased and free from personal beliefs or preconceived notions.
- Consistency with existing knowledge: typically (but not in all cases) hypotheses should be compatible with established scientific principles and theories.
- Logical coherence: hypotheses should have a clear and coherent structure, with well-defined predictions and explanations.

It is widely acknowledged that a scientific hypothesis can never be proven true, but it can only be falsified by experimental evidence. I.e., if the results of an experiment do not match the predictions of a hypothesis, then the hypothesis must be rejected[7].

## 2.2 Research

The experiment, including its description and results, imagined and sought, is supposed to demonstrate the validity of the central hypothesis.

As an extensive literature search failed to yield or find any relevant experiments confirming the central hypothesis positing that an increase in the atmospheric $CO_2$ concentration from approximately 0.03% to more than 0.04% induces a discernible rise in temperature, multiple institutions and experts in Germany, the Netherlands, Austria, the UK and the USA were consulted to seek their support and guidance in locating a reference to such an experiment. The answers, if received at all, were negative, i.e., also none of the experts was aware that such an experiment exists. The (anonymized) summary can be found in the Appendix.

# 3 DISCUSSION AND RESULTS

In brief: according to the research conducted there is no experimental evidence for the central hypothesis of all 'decarbonization' efforts, i.e., that an increase in the atmospheric $CO_2$ concentration from approximately 0.03% to more than 0.04% (or similar values in this magnitude) results in a measurable increase in temperature.

On the contrary,

- it has either been shown that increasing the $CO_2$ content does not increase the temperature: "*Based on the Stefan Boltzmann's law, this should increase the temperature of the air in the rear chamber by 2.4 to 4 degrees, but no such increase was found.*" (Seim und Olsen 2020, 168) and "*These findings might question the fundament of the forcing laws used by the IPCC.*" (Seim und Olsen 2020, 181) or
- experiments are presented, e.g. (Sahin und Schlüpmann 2021) or (Lesch o.J.)and (Scorza, et al. 2022)[8]which demonstrate, that even in a (nearly) pure $CO_2$-atmosphere - which does not correspond to the ~0.04% $CO_2$-concentration in air - the increase of temperature is in the range of 2 to 4 K (only).

# 4 CONCLUSION

Science relies on empirical evidence obtained through experiments or observations to support or refute hypotheses. Consequently, and with regard to its fundamental importance, it is necessary that the central hypothesis of climate change is evidenced experimentally.Neglect this, and science's principles falter.

Should experimental evidence of the central hypothesis of climate change prove elusive, it is not only permitted and reasonable but scientifically mandatory to question the central hypothesis.Then it might

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7 "*No amount of observational evidence can ever prove a scientific theory. But if it is contradicted by a single observation, the theory is falsified.*"(Popper 1959)

8 The explanation provided for the only slight increase of temperature despite the high concentration (Scorza, et al. 2022, 2) is neither evidenced nor theoretically supported.

become necessary to reevaluate the focus, i.e., other in-depth investigations into the various sources of climate change are warranted. Furthermore, a comprehensive explanation will be required to address the discrepancy between the prevailing 'scientific consensus'[9] on climate change and the absence of its experimental evidence.Such discussion should be conducted free from ideological bias and prejudice, while remaining receptive to new options.



[9] i.e., the general acceptance of the causality between an increase of the $CO_2$-concentration in the atmosphere and the average temperature, see, e.g., (Oreskes 2004), (Cook, et al. 2013), and the overview (NASA 2023)

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## 6 APPENDIX - SUMMARY OF ANSWERS RECEIVED

The institutions approached were asked the following question:

1. in English: "*Together with my colleagues, I have developed a lecture series titled "Sustainability, Environment, and Responsibility" at the University …. …In order to provide more substantive content in this initial part, I intend to showcase not only the "classic" theoretical explanation of the greenhouse gas effect but also support it with the results of an experiment. It is precisely in this search for an experiment that I have encountered difficulties. Despite reaching out to colleagues from various other universities … and conducting a literature search, I have been unable to find relevant information. … I am searching for an experiment, including its description and results, which demonstrates that an increase in the atmospheric $CO_2$ concentration from 0.03% to 0.04% (or similar values within this range) results in a measurable increase in temperature within the respective system. (To narrow it down, I am not seeking an experiment that generally demonstrates the greenhouse gas effect.)"*
2. in German: *"… an der … habe ich mit weiteren Kollegen gemeinsam eine Ringvorlesung mit dem Titel „Nachhaltigkeit, Umwelt und Verantwortung" entwickelt. …Um in diesem ersten Teil etwas mehr inhaltliche Substanz zu vermitteln, beabsichtigte ich nicht nur die („klassische") theoretische Darstellung des Treibhausgaseffektes zu zeigen, sondern dies auch durch die Ergebnisse eines Experimentes zu untermauern. Und genau bei dieser Suche komme ich nicht weiter. Denn sowohl die Anfrage bei Kollegen, auch von einigen anderen Hochschulen, als auch die Literatursuche halfen bisher nicht weiter …. gesucht wird ein Experiment, bzw. dessen Beschreibung und dessen Ergebnisse, mit welchem gezeigt wurde/wird, dass bzw. unter welchen Bedingungen die Erhöhung des $CO_2$-Anteils in der Luft von 0,03% auf 0,04% (oder ähnliche Werte, aber in dieser Größenordnung) zu einem messbaren Anstieg der Temperatur führen (in dem entsprechenden System). (Um es ausschließend einzuschränken: ich suche nicht ein Experiment, welches mir allgemein den Treibhausgaseffekt zeigt.)*"

The answers to the questions are summarized in the table below.

| Institution | First request | Answer received | Second request | Answer received | Result | Translation or Remark |
|---|---|---|---|---|---|---|
| A | 13.05.2023 | | 29.05.2023 | 06.06.2023 | „Ein Labor-Experiment welches den $CO_2$ Anstieg von ~300 auf ~400 ppm in der Atmosphäre mit einem direkten, einfach messbaren Temperaturanstieg in Verbindung bringt, ist uns leider nicht bekannt.“ | *A laboratory experiment that directly correlates the increase of $CO_2$ from ~300 to ~400 ppm in the atmosphere with a measurable temperature rise is unfortunately not known to us.* |
| B | 21.06.2023 | 21.06.2023 | | | “Well, frankly, I am not so sure that there is some simple experiment for you to do that shows the correlative and causative effect of $CO_2$ and temperature, but there is certainly plenty of empirical evidence of the relationship…” | |
| C | 23.05.2023 | 25.05.2023 | | | „Ich habe das Video rausgesucht, in dem Harald Lesch nachweist, dass $CO_2$ für die Temperaturerhöhung verantwortlich ist – und wie der Zusammenhang aussieht. Er zeigt es anhand verschiedener einfacher Experimente. https://www.youtube.com/watch?v=lUucND1s0IM“ | *I have found the video in which Harald Lesch demonstrates that $CO_2$ is responsible for the temperature increase - and what the connection looks like. He illustrates it with various simple experiments.* (Remark: 100% $CO_2$atmoshphere) |

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| Institution | First request | Answer received | Second request | Answer received | Result | Translation or Remark |
|---|---|---|---|---|---|---|
| D | 23.05.2023 | | 20.06.2023 | 22.06.2023 | „Mir ist solches Experiment auch nicht bekannt.“ | *Such an experiment is not known to me.* |
| E | 03.02.2023 | 03.02.2023 | | | See "experimental proof of greenhouse gas effect" http://hharde.de/index_htm_files/Harde-Schnell-GHE-m.pdf | |
| F | 11.06.2023 | 07.07.2023 | | | „den Meteorologen selbst war dieses Experiment nicht geläufig, aber …. Im Internet finden sich dazu auch zahlreiche Anleitungen, wie z.B.: https://www.sonnentaler.net/aktivitaeten/meteorologie/klima/klima-planet-ich/ue3/co2.html“ | *The meteorologist were not familiar with this experiment, but... There are also numerous instructions for it on the internet, such as:* |
| G | 20.06.2023 | | 11.07.2023 | 11.07.2023 | “We have forwarded your request but so far, the request was turned down because there is no capacity.” | |
| H | 14.06.2023 | | 11.07.2023 | | No reaction | |
| I | 05.06.2023 | 05.06.2023 | | | Kein Experiment bekannt | *No experiment known* |
| J | 25.07.2023 | 01.08.2023 | | | „Leider bin ich derzeit aber so massiv mit Anfragen und Projekten aller Art ausgelastet, dass ich hier leider nicht für Sie tätig werden kann.“ | *Unfortunately, I am currently so heavily occupied with inquiries and projects of all kinds that I am unable to assist you here at the moment.* |
| K | 12.09.2023 | | 09.10.2023 | | No reaction | |
| L | 09.10.2023 | | 03.11.2023 | | No reaction | |