

Die vorliegende Stellungnahme gibt nicht die Auffassung des Ausschusses wieder, sondern liegt in der fachlichen Verantwortung des/der Sachverständigen. Die Sachverständigen für Anhörungen/Fachgespräche des Ausschusses werden von den Fraktionen entsprechend dem Stärkeverhältnis benannt.

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**Statement of William Happer at the public hearing of the Bundestag, 21 July, 2021.**

**Ausschuss für Umwelt, Naturschutz und nukleare Sicherheit**

I am Dr. William Happer a Professor of Physics, Emeritus at Princeton University, located in the state of New Jersey of the United States of America.

Let me suggest why my comments today should be taken seriously.

I have published over 200 peer-reviewed scientific papers, many of them on the interaction of radiation with matter, the basic physics that determines how greenhouse gases influence Earth's climate.

I am the inventor of the sodium guide star, which is used in most new ground-based telescopes to measure and correct for the degradation of astronomical images by atmospheric turbulence.

I served as the Director of the Office of Energy Research of the US Department of Energy from 1990 to 1993, where I supervised a research budget of some \$3.5 billion. A sizable part of this was directed toward environmental and climate science.

From 2018 to 2019, I served as the Deputy Assistant to the President and Senior Director for Emerging Technologies at the National Security Council in the White House.

I have received a number of scientific awards, and I am a member of several scientific societies, including the American Physical Society, the US National Academy of Sciences and the Philosophical Society.

With this background, I know more than most scientists about how greenhouse gases work.

Increasing levels of the main anthropogenic greenhouse gas, carbon dioxide (CO<sub>2</sub>), will cause a small, beneficial warming of Earth's climate. More CO<sub>2</sub> will be very good for agriculture, forestry, and all photosynthetic life. Atmospheric CO<sub>2</sub> concentrations have been dangerously low in our contemporary geological period, with evidence of CO<sub>2</sub> starvation during the most recent glacial maximum ([https://www.jstor.org/stable/3374310?origin=JSTOR-pdf&seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/3374310?origin=JSTOR-pdf&seq=1#metadata_info_tab_contents), n.d.). Plants are already responding very positively to the CO<sub>2</sub> increases of the past century. Increasing concentrations of CO<sub>2</sub> and other greenhouse gases will not cause a climate emergency.

For saying this, many will demand that I be "reprobated and condemned," not unlike those in 15<sup>th</sup> century Germany who denied the existence of witches. In the introductory *Approbation* of Heinrich Kramer's celebrated *Malleus Maleficarum (The Hammer of Witches)* (<http://www.malleusmaleficarum.org/table-of-contents/letter-of-approbation/>, n.d.) we read:

Whereas some who have the charge of souls and are preachers of the word of God, have been so bold as to assert and declare publicly in discourses from the pulpit, yea, in sermons to the people, that there are no witches, or that these wretches cannot in any way whatsoever molest or harm either mankind or beasts, and it has happened that as a result of such sermons, which are much to be reprobated and condemned, the power of the secular arm has been hindered in the punishment of such offenders ... (<http://www.malleusmaleficarum.org/table-of-contents/letter-of-approbation/>, n.d.)

This pious nonsense continues for several more pages. The Faculty of Theology at the University of Cologne unanimously signed the Approbation in the year 1487. This was 100% academic consensus -- and 100% wrong.

The German reformation, which followed publication of *Malleus Maleficarum* by a few decades, made matters worse. The Lutheran and Catholic churches competed to save humanity from the witch emergency. There was unquestioning secular (government) support for the witch hunts. As H. L. Menken, the straight-talking American journalist of the first half of the 20<sup>th</sup> century, observed:

The whole aim of practical politics is to keep the populace alarmed (and hence clamorous to be led to safety) by an endless series of hobgoblins, most of them imaginary.

Climate change is the ultimate hobgoblin. Climate has changed since the world began. Climate will continue to change as long as the world exists. But humans have little to do with climate change. The Sun heats a dynamic, rotating planet Earth, where there are complicated interactions of two colossal, turbulent fluid systems, the atmosphere and the oceans. Fluids are notoriously fickle in their dynamics. Many of you probably know the comment, attributed to the great German physicist, Werner Heisenberg:

When I meet God I am going to ask him two questions: why relativity? and why turbulence? I really believe he will have an answer for the first.

The worthy but difficult goal of understanding climate change has been set back many decades by the politically imposed dogma that CO<sub>2</sub> is the main “control knob” of climate. This is clearly false since climate has changed dramatically in just the short 12,000 year span of our current interglacial period. CO<sub>2</sub> levels seem to have been nearly constant until 1850, when concentration’s began to increase at the same time that combustion of fossil fuels began to release significant amounts of CO<sub>2</sub>. Changes in the Sun, volcanic activity, internal variability of the atmosphere and oceans must have caused the earlier changes, many of which were larger than those observed in the past century.

Increasing CO<sub>2</sub> is a major benefit to photosynthetic life on Earth, but its changes have a very minor influence on Earth’s climate. This can be see clearly from the records of geological history. A major ice age occurred in the Ordovician, when atmospheric CO<sub>2</sub> levels were more than ten time larger than those today. CO<sub>2</sub> levels in Antarctic ice cores rise and or fall after temperature proxies rise or fall. During our current ice age of the past million years or so, temperature changes have caused CO<sub>2</sub> changes, not vice versa. CO<sub>2</sub> is not the control knob of Earth’s temperature or climate.

There is no theoretical support for CO<sub>2</sub> changes being a major factor in climate change. Instantaneously doubling CO<sub>2</sub> concentrations in the atmosphere, a 100% increase, only decreases the thermal radiation to space by about 1%. To first approximation, this would raise the average temperature of the Earth by a bit less than 1 C. To predict larger temperature rises, fanciful positive feedbacks have been added to climate models. But, as summarized by Le Chatelier’s Principle, most feedbacks in nature are negative, not positive:

When a settled system is disturbed, it will adjust to diminish the change that has been made to it. ([https://en.wikipedia.org/wiki/Le\\_Chatelier%27s\\_principle](https://en.wikipedia.org/wiki/Le_Chatelier%27s_principle), n.d.)

Feedbacks are more likely to reduce the 1 C direct warming from doubling CO<sub>2</sub> than to increase it.

Observations do not support the claim that most of the 0.8 C warming observed over the 20<sup>th</sup> century was due to CO<sub>2</sub> increases. The temperature increase for 1900 to 1950, when there was relatively little increase of CO<sub>2</sub>, was about the same as the increase from 1950 to 2000, when there was a much larger increase of CO<sub>2</sub>. Much of the temperature increase was part of the natural recovery from the low temperatures of the Little Ice Age.

There is no climate emergency, any more than there was a witch emergency 500 years ago. I hope the sensible members of this committee will not repeat past mistakes by advocating solutions of a non-problem, at great cost to the environment, the economy and human freedom.