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DD(I), STAG, to Elon Musk, 2024 July 22

Dear Mr Musk

CO₂ toxicity

One of your many supporters has sent us a copy of the following tweet said to be by you, with a request that we should comment on its scientific assertions –

A CO₂ tax, properly applied, would change the tragedy of the commons that is the steadily rising CO₂ ppm level. If we're going to tax anything, then we should prioritize taxing the potentially bad over the potentially good, as we do with alcohol & cigarettes over vegetables & fruits. I disagree with those who view the climate risk as catastrophic in the 5 to 10 year range, but the long-term risk is very real, even if one simply considers quality of life at a given CO₂ level. The indoor CO₂ ppm level is significantly above the outdoor average. This means ~800 ppm for ~400 ppm ambient. Above 1000 ppm, people are noticeably negatively affected. Above 2000 ppm, it gets really painful.

The Royal Navy and the United States Navy both have long-term experience of exposure to CO₂ on board submarines, where the greatest alertness must be maintained at all times.

Scientific evidence from several studies shows that, though ambient CO₂ concentrations in submarines are often of order 10,000 parts per million by volume (i.e., 1%), and can reach 30,000 ppmv (3%), all-cause early mortality among submariners is 30% less than among the general population (Friedman-Jimenez *et al.*, 2022).

The 1000-ppmv threshold for noticeable negative effects that you mention has little scientific basis in fact, though it is a guideline often imposed by national regulatory authorities. Mendel *et al.* (2024) report that “Most guidelines provided no supportive evidence for specified limits: few provided persuasive evidence.”

Experiments on time-mated female rats (Howard *et al.*, 2019) conducted on behalf of the US Navy to ensure the safety of pregnant female submariners found no adverse effects below a CO₂ concentration of 30,000 ppmv (3%), and little harm even above it.

As to long-term risk from CO₂ emissions, a paper by climate researchers working with control theorists (draft summary for high-school seniors and college undergraduates attached) shows that the notion that global warming will be large enough to be dangerous is founded in an elementary error of control-theoretic physics. Climate scientists unfamiliar with control theory borrowed feedback analysis and misapplied it. In effect, at a crucial point in their calculations they forgot the Sun was shining.

After correction, only 1 C global warming is legitimately foreseeable this century, which would be net-beneficial. There has been little more than 1 C global warming over the past century, but – despite a quadrupling of global population – annually-averaged deaths by adverse weather have declined globally by 99% (OFDA/CRED disaster databases). There is no need to take any further action to reduce CO₂ emissions.

Even if all nations (rather than Western nations acting almost alone) were to attain net zero emissions by 2050, the world would be only 0.1 Kelvin cooler by then than if the long-established forcing-increase trajectory of 1/30th of a Watt per square meter per year were to continue.

The cost of attaining that small reduction, derived *pro rata* from the UK National Grid's estimated \$15.2 trillion cost of net-zeroing the British power grid, which accounts for 25% of British emissions, which in turn account for 0.8% of global emissions, would be of order \$2 quadrillion. Accordingly, each \$1 billion spent on emissions abatement worldwide would buy a reduction of order only one 20-millionth of a Kelvin in global temperature by 2050 even if all nations attained net zero by that target year.

However, most nations are paying no more than lip-service to the official climate-change narrative. One reason is that the fundamental error of physics perpetrated by climate scientists insufficiently familiar with a discipline in physics that was not their own is already well known in government circles: in China, India and Russia, to name but three.

Would you be kind enough to pass this letter and its attachment to your scientific staff, and invite them to send us their justification for suggesting that an ambient CO₂ concentration of as little as 1000 ppmv (0.1%) would be net-harmful, together with any comments that you or they may have on the attached draft for schools?

Yours truly,

DD(I), STAG

Attached: feedback-error-simply-explained.pdf (STAG, unclassified)

References

Friedman-Jimenez G, *et al.*, 2022, Mortality of enlisted men who served on nuclear-powered submarines in the United States Navy. *J. Occup. Envir. Med.* 64(2), 131-139, <https://doi.org/10.1097/JOM.0000000000002364>

Mendell M, *et al.*, 2024, Carbon dioxide guidelines for indoor air quality: a review. *J. Expo. Sci. & Envir. Epidem.*, <https://doi.org/10.1038/s41370-024-00694-7>

Howard WR, *et al.*, 2018, Submarine exposure guideline recommendations for carbon dioxide based on the prenatal developmental effects of exposure in rats. *Birth Defects Research* 111(1), 26-33, <https://doi.org/10.1002/bdr2.1417>