

Chapter I: Greenhouse Basics

AIT: “The atmosphere is thin enough that we are capable of changing its composition...In particular, we have vastly increased the amount of carbon dioxide—the most important of the so-called greenhouse gases.” (*AIT*, p. 25)

Comment: Water vapor, not carbon dioxide (CO₂), is the most important greenhouse gas. Computing the exact contribution of each type of greenhouse gas to the overall greenhouse effect is complicated, because the gases “overlap” in some of the spectra in which they absorb infrared radiation. Taking the overlaps into account, RealClimate.Org concludes that “water vapor is the single most important absorber (between 36% and 66% of the greenhouse effect), and together with clouds makes up between 66% and 85%. CO₂ alone makes up between 9 and 26%, while the O₃ and the other minor GHG absorbers consist of up to 7 and 8% of the effect, respectively.”¹

Gore editorializes when he says that we have “vastly” increased the amount of CO₂. The amount of carbon dioxide in the atmosphere is so small that CO₂ is referred to as a “trace gas.” Over the past century and a half, atmospheric CO₂ levels have risen from about 280 parts per million (ppm) to about 380 ppm—from roughly 3/100ths to roughly 4/100ths of one percent of the atmosphere.

The two-page photograph (pp. 24-25) accompanying Gore’s first mention of CO₂ shows an electric power plant belching what appears to be thick black smoke. A similar picture appears below.



The “smoke” is probably steam, but it looks dark and ominous against the inferno colors of a fading sunset. Thus, readers (and film viewers) are set up to believe they are literally seeing CO₂ spew out of smokestacks, even though CO₂ is as invisible as oxygen. Pictorially, *AIT* presents CO₂ as an air pollutant, anticipating Gore’s later oft-repeated description of CO₂ as “global warming pollution.” This iconic and rhetorical depiction of CO₂ as pollution is inaccurate and manipulative.

Carbon dioxide is a climate “forcing” agent, but so is water vapor—the atmosphere’s main greenhouse gas.² Anybody who called water vapor “pollution” would be laughed out of court, yet CO₂ is equally innocent of having adverse effects on air quality. That is why a central goal of the Clean Air Act for more than 30 years has been to make cars so clean burning that, ultimately, nothing comes out of the tailpipe except water vapor and CO₂.³ The phrase “global warming pollution” has no scientific meaning. It is designed to prejudice people against fossil energy use by conflating CO₂ with substances that degrade air quality.

AIT: “The greenhouse gases on Venus are so thick that its temperatures are far too hot for humans. The greenhouse gases surrounding Mars are almost nonexistent, so the temperature there is far too cold.” (AIT, p. 26)

Comment: This passage exaggerates CO₂’s importance as a climate driver. Carbon dioxide makes up about 95% of the atmospheres of both Venus and Mars. In contrast, CO₂ makes up only few hundredths of 1% of the Earth’s atmosphere. What makes Mars so cold is that it is about 44 million miles farther than the Earth from the Sun, and its *entire* atmosphere is only about 1% as dense as Earth’s atmosphere.⁴ By the same token, Venus, some 26 million miles closer than the Earth to the Sun, is very hot—hotter even than Mercury—because its atmosphere is so dense. “Per unit of surface area,” comments RealClimate.Org, “the atmosphere of Venus has as much mass as about 100 Earth atmospheres, and it is almost pure CO₂.”⁵

If AIT were a balanced presentation rather than a lawyer’s brief for alarm, it would have at least acknowledged the environmental and health benefits of CO₂ emissions. Carbon dioxide is not only a greenhouse gas; it is also plant food, an aerial fertilizer. Literally hundreds of scientific studies show that rising CO₂ levels help trees, crops, and green things generally grow faster and larger, produce more fruit, use water more efficiently, and resist stress from air pollution—the real stuff.

Based on experimental data, the Center for the Study of Carbon Dioxide and Global Change estimates that the 100-ppm increase in CO₂ levels since pre-industrial times has increased average crop yields by 60% for wheat, 33% for fruits and melons, 62% for legumes, 67% for root and tuber crops, and 51% for vegetables.⁶ An extraordinary positive externality, courtesy of the Industrial Revolution!

CO₂ aerial fertilization not only makes more of a good thing, it also makes good things better. More CO₂ boosts (a) the protein content of wheat, rice, and legumes, and (b) the antioxidant content of citrus and other fruit.⁷

In short, we find error, rhetorical manipulation, exaggeration, and rank selectivity in what should be a straightforward overview of carbon dioxide basics. This does not inspire confidence that subsequent, more complex topics will receive a balanced treatment.

¹ RealClimate.Org, “Water Vapor: Feedback or Forcing?” April 6, 2005, <http://www.realclimate.org/index.php?p=142>. See also Kiehl, T. J. and Kevin Trenberth. 1997. Earth’s Annual Global Mean Energy Budget. *Bulletin of the American Meteorological Society* 78, no. 2: 197–208,

<http://www.atmo.arizona.edu/students/courselinks/spring04/atmo451b/pdf/RadiationBudget.pdf>. This study estimates that in clear sky conditions, water vapor individually contributes 60 percent of the greenhouse effect; CO₂, 26 percent; ozone, 8 percent; and methane and nitrogen oxide, 6 percent.

² Roger Pielke Sr., "Is CO₂ a Pollutant?" 24 May 2006, <http://climatesci.atmos.colostate.edu/2006/05/24/is-co2-a-pollutant-part-ii>.

³ Consider 40 C.F.R. § 85.2122(a)(15)(ii)(A), which defines "catalytic converter" as a devices that "oxidize[s] hydrocarbon (HC) and carbon monoxide (CO) emissions to carbon dioxide (CO₂) and water vapor (H₂O)."

⁴ Davison E. Soper, "Atmosphere of Mars," Institute of Theoretical Science, University of Oregon, Eugene OR, <http://zebu.uoregon.edu/~soper/Mars/atmosphere.html>.

⁵ Rasmus Benestad and Ray Pierrehumbert, "Lessons from Venus," RealClimate.Org, April 11. 2006, <http://www.realclimate.org/index.php/archives/2006/04/lessons-from-venus>

⁶ Sherwood B. Idso, Craig D. Idso and Keith B. Idso, *Enhanced or Impaired? Human Health in a CO₂-Enriched Warmer World*, Center for the Study of Carbon Dioxide and Global Change, November 2003, p. 18, http://www.co2science.org/scripts/Template/0_CO2ScienceB2C/pdf/health2pps.pdf.

⁷ *Enhanced or Impaired?* pp. 19-24.