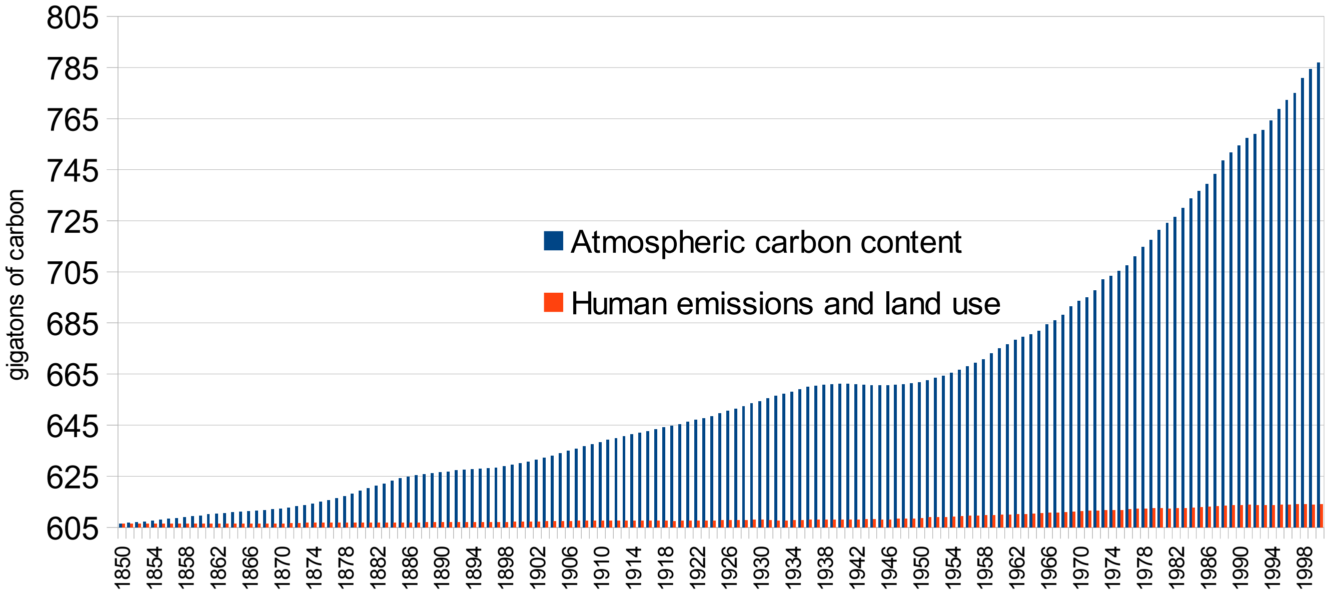
# Does Anthropogenic Accumulation make sense?

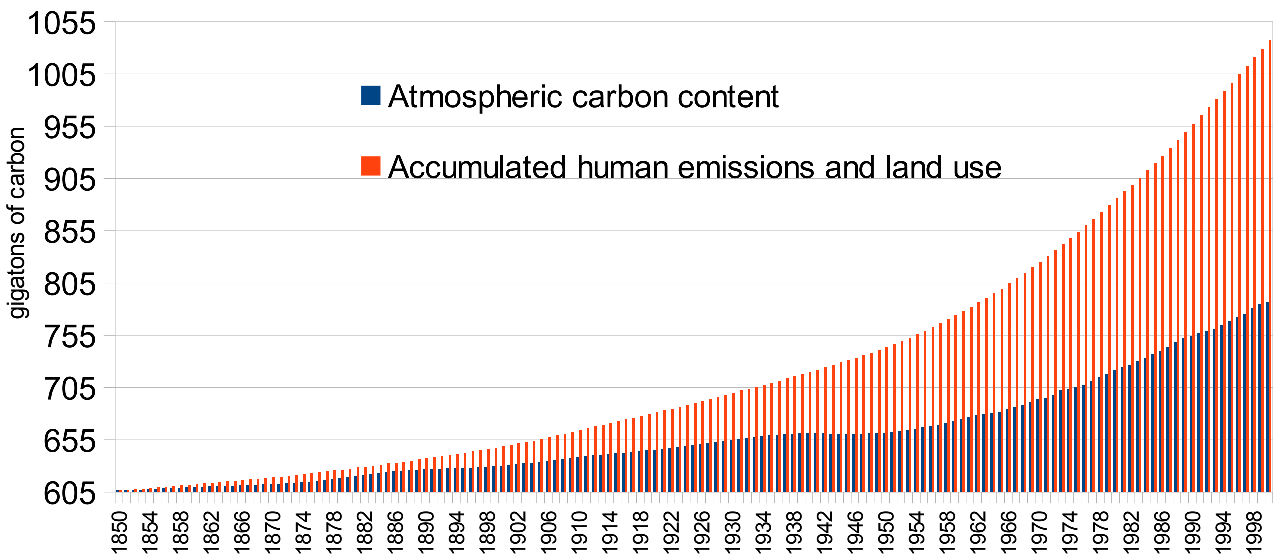
Let's start by quoting an authoritative U.S. government agency:

> "Anthropogenic $CO_2$ comes from fossil fuel combustion, changes in land use (e.g., forest clearing), and cement manufacture. Houghton and Hackler have estimated land-use changes from 1850-2000, so it is convenient to use 1850 as our starting point for the following discussion. Atmospheric $CO_2$ concentrations had not changed appreciably over the preceding 850 years (IPCC; The Scientific Basis) so it may be safely assumed that they would not have changed appreciably in the 150 years from 1850 to 2000 in the absence of human intervention."

What the Carbon Dioxide Information Analysis Center (CDIAC) is saying here is that mankind is principally or wholly responsible for the increase of atmospheric carbon dioxide since the year 1850. Taken from their data, this is a year by year chart of atmospheric carbon change compared to human carbon emissions between 1850 and 2000.

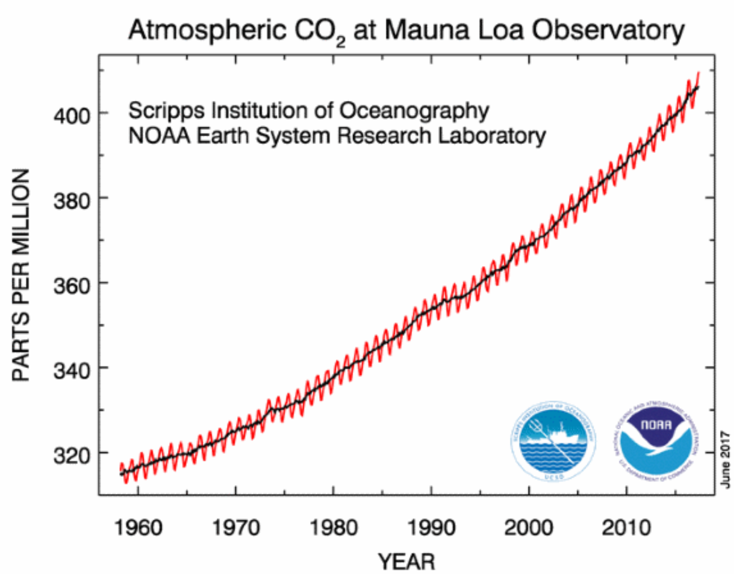



That puddle at the bottom of the chart is thought to be responsible for the magnitude that looms above it by means of accumulation, i.e., piling up every year due to its prolonged life in the atmosphere. Indeed, if we accumulate each annual human quantity we get a chart that looks like this.

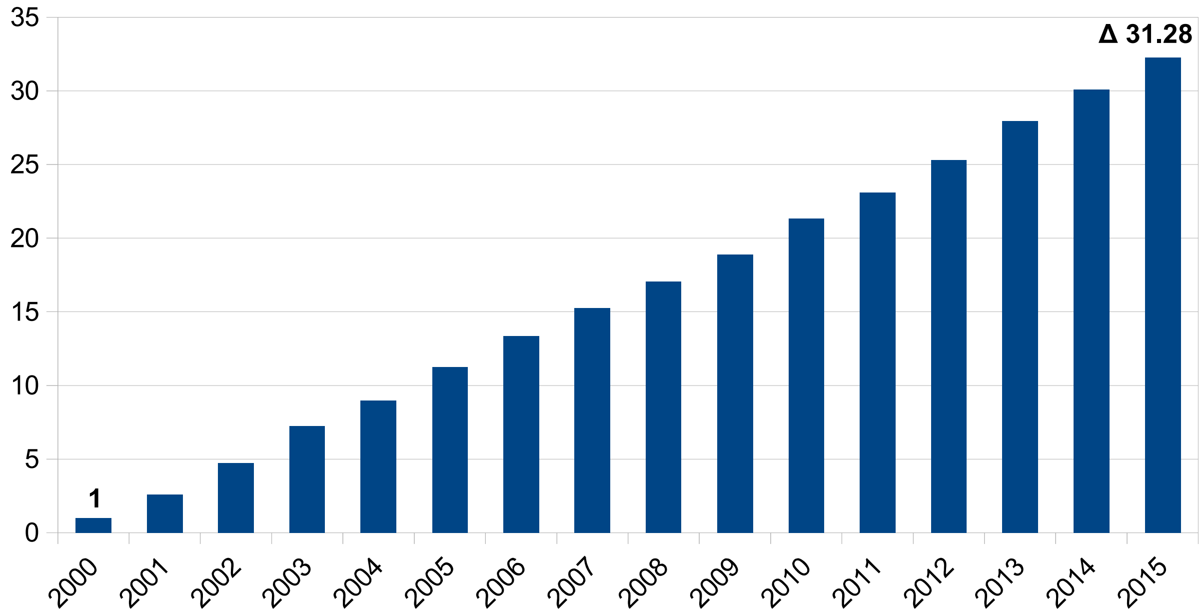



This reverses the proportions to a large extent. In agreement with the CDIAC that "[about 40%]" has remained in the atmosphere, this chart depicts a 42% remainder (approximately 181/431), meaning that 58% is no longer floating around.

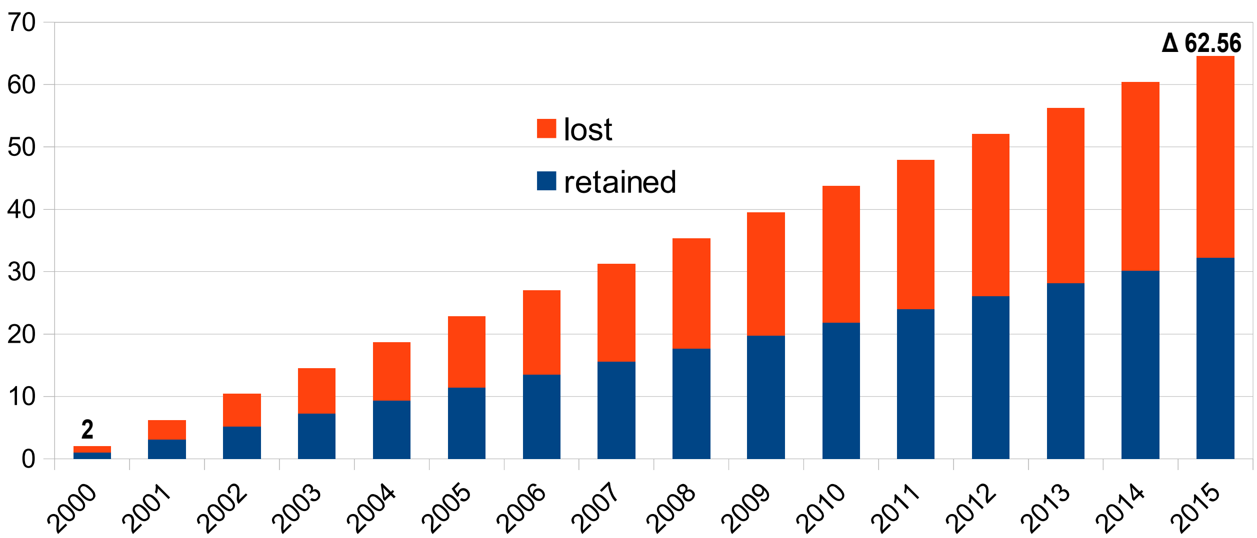
Important to observe about the anthropogenic accumulation postulate is that despite the yearly [up and down changes] of $CO_2$ documented by the Mauna Loa system, the presumed accumulation of human emissions proceeds in a fairly linear fashion.




Let's verify that basic linearity. Between 2000 and 2015, for instance, carbon dioxide rose by 31.28 parts per million (ppm). Assigning the year 2000 a value of 1 ppm, then, this is what the slope looked like.

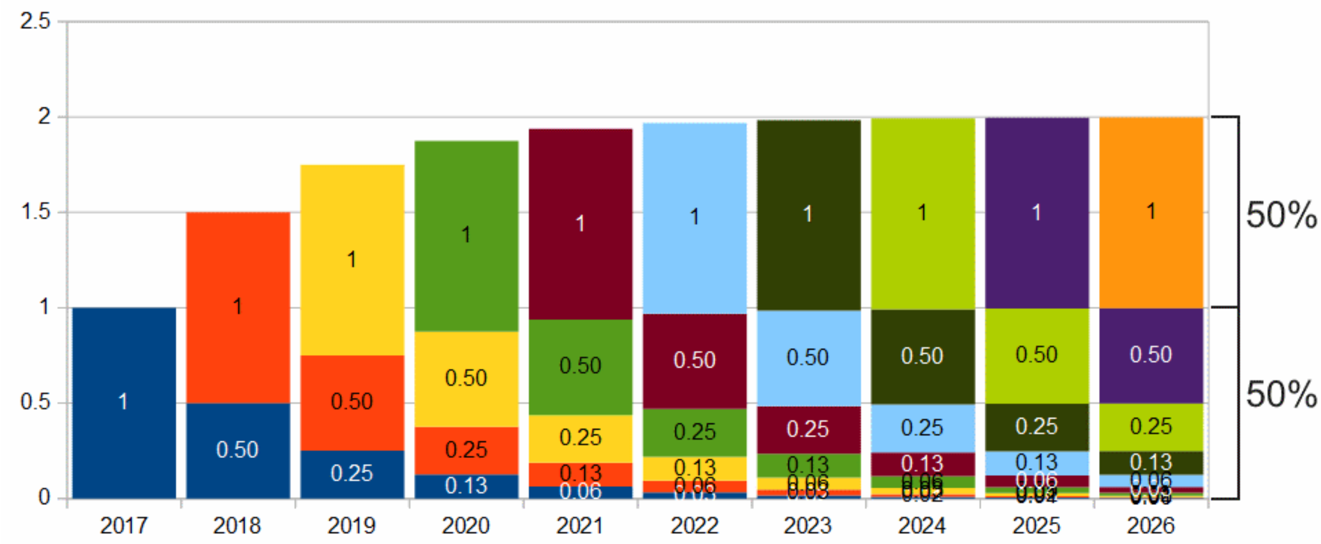



Now, in accordance with a CDIAC accumulation scenario, let us impose a simple 50/50 ratio between emission and absorption. A 31.28 ppm anthropogenic increase over 15 years, then, will look like this in terms of each year's total emissions.

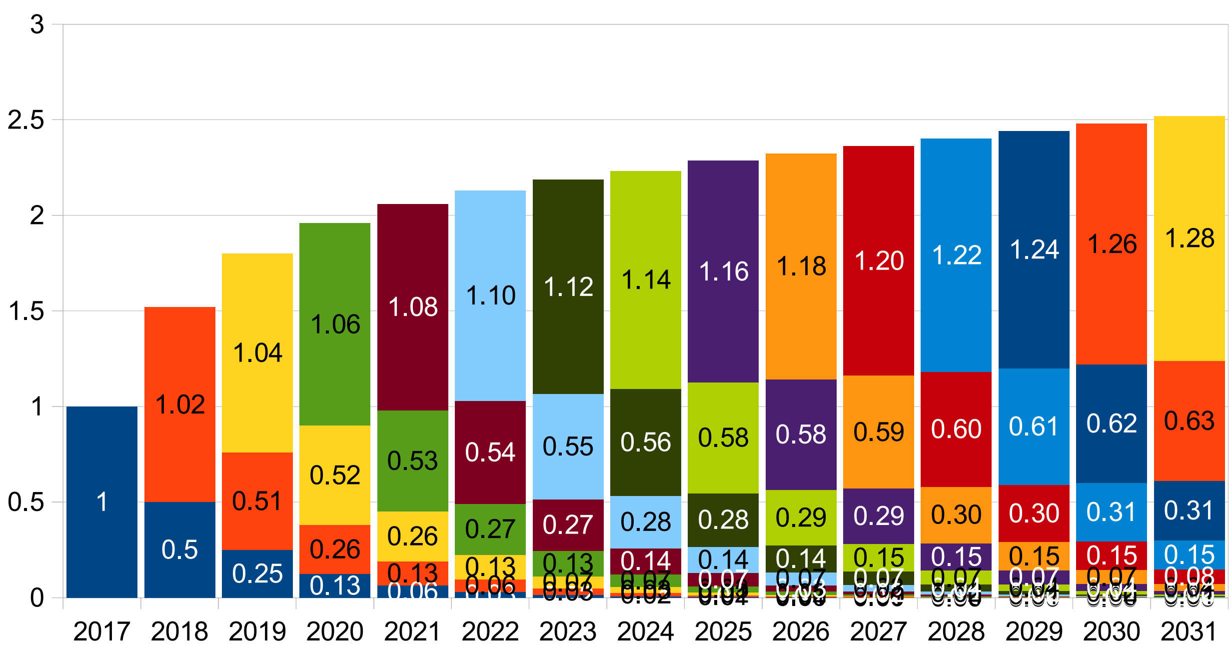



But what are we to propose to explain this? Why would Nature lop off half an annual emission, *irrespective of its size*, and then leave it alone to linger in the air for decades or centuries thereafter ? That makes no sense. What does make sense is that we're looking at a consistent rate of absorption here, a remarkably fast rate at that. Yet if the absorption rate is roughly equal to the emission rate, this directly implies that the residence time of airborne carbon dioxide is rather short, not long. Let's consider the ramifications of an absorption rate, then, and see if we can work it into a climbing linear slope.

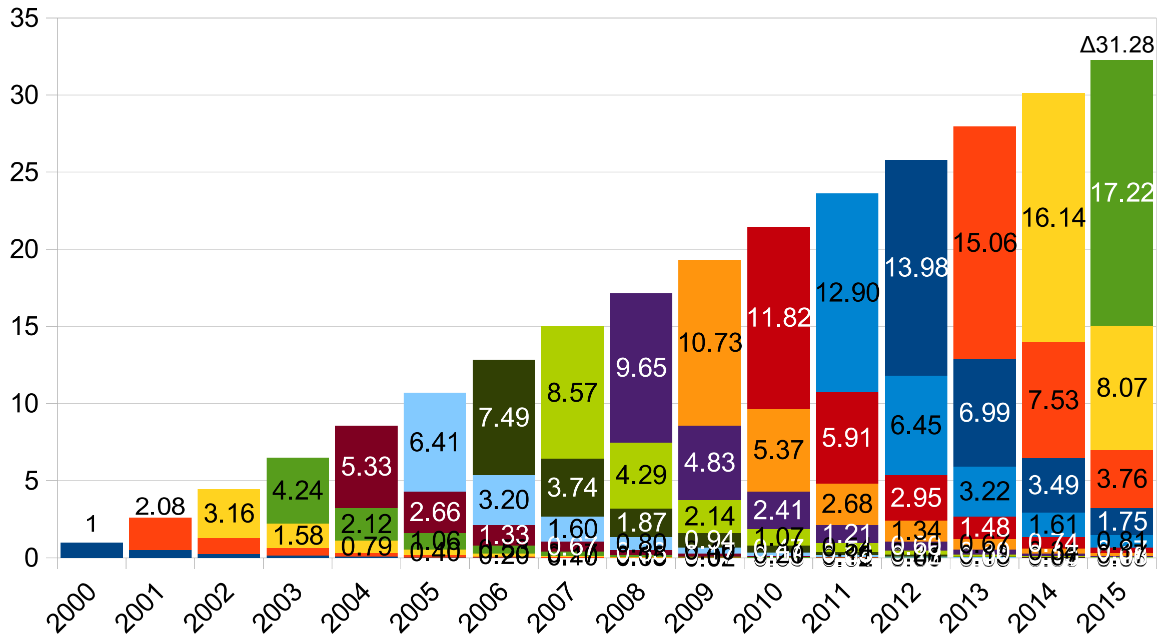
First, let's examine the simplest kind of scenario, where human-generated emissions are the same from year to year. As you can see, with a 50% absorption rate, the slope soon levels off.




A man-made $CO_2$ emission of 1 in 2017 (blue) is half that in 2018, half again in 2019, and so on. This happens to every year's emission, which eventuates in each annual emission sitting atop the previous ones with a ratio of 50/50. But notice how we can upset this equilibrium by imposing a yearly emission increase, say of 2%.

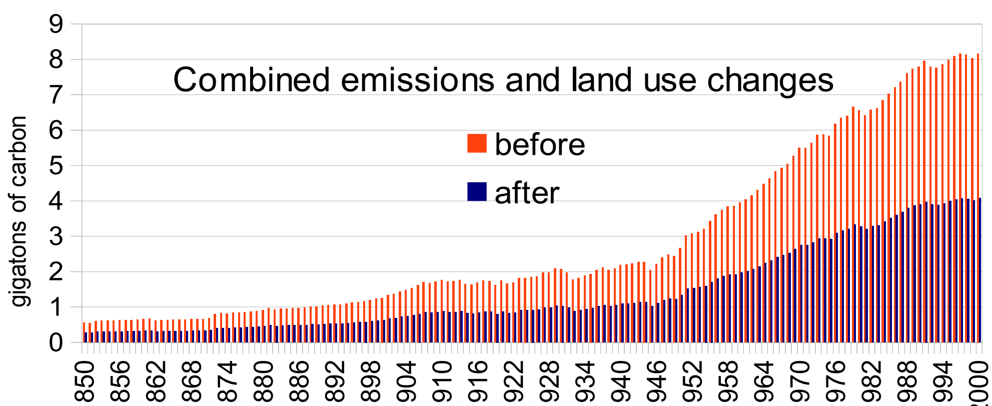



This faster rate of anthropogenic growth suggests that the built-in ***leveling off trend*** (flattening) can be employed to obtain a climbing, linear slope. All that one must do is increase the emissions rate till it matches what Mauna Loa has recorded between 2000 and 2015. Here is the result:



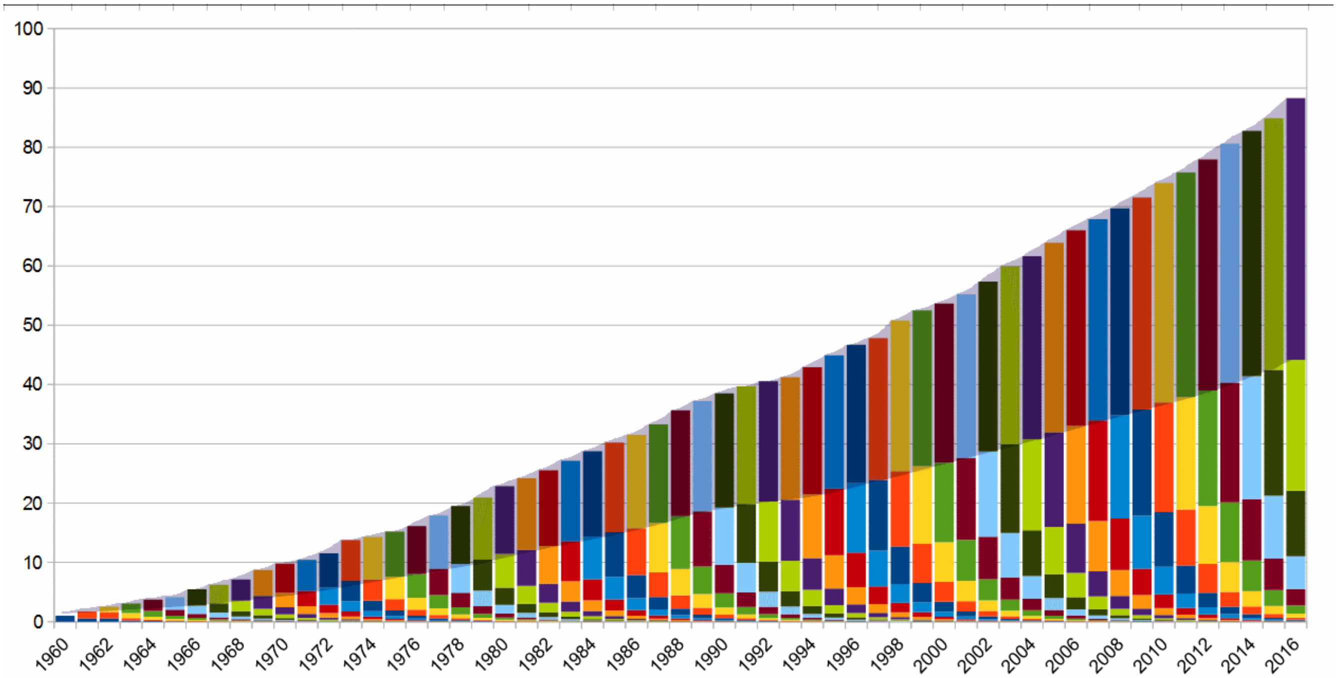

In this chart ~17 units sit atop the previous emissions, bringing the total to 32.28, a difference of 31.28 from the value of 1 in 2000. So we've got half absorbed, half remaining, just as the CDIAC model dictates. And we have also obtained a climbing linear slope, in accordance with the Mauna Loa record. In order to mimic that slope, however, we had to magnify human emissions by 17 times in the space of 15 years.

An emissions magnification of 17 times in 15 years? That makes no sense either. For consider: If a 50% reduction applies to $CO_2$ emissions both great and small, then this of course applies to the anthropogenic puddle that we saw at the beginning of this essay. No matter how tiny that puddle of raw emissions was, it should also have been cut in half.




The anthropogenic portion simply cannot accumulate in the way that CDIAC proposes. So have we actually been examining an anthropogenic phenomenon here? Or something else entirely?

Since Mauna Loa reports a steady $CO_2$ increase, let's take the entire record into account. This chart duplicates the slope from 1960 to 2016. As before, a 50% absorption rate has been applied throughout (even though CDIAC's own figures show a rate closer to 60%).




The shaded tier represents the annual human emissions that are required to fit the slope... and they are completely disproportionate to any realistic estimate.

The conclusion should be obvious: Working within CDIAC and Mauna Loa parameters produces an absurd result. Given the CDIAC's implicitly large rate of anthropogenic absorption, and assuming that Mauna Loa's slope generally reflects an actual trend, mankind is simply not producing anything close to the magnitude of carbon dioxide that the slope demands. In other words, most of the carbon dioxide in question has to be coming from another source.

Alan Siddons
August 2017