

# WHY WAXMAN/MARKEY WON'T WORK

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A cost-effectiveness metric for CO<sub>2</sub> mitigation policies

*by Christopher Monckton of Brenchley*



SPPI ORIGINAL PAPER ♦ May 18, 2009

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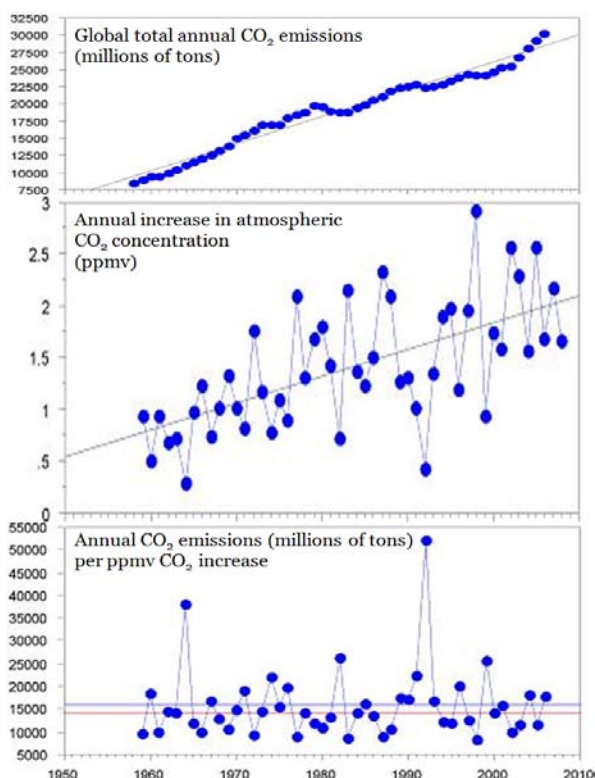
## A cost-effectiveness metric for CO<sub>2</sub> mitigation policies

by Christopher Monckton of Brenchley | May 18, 2009

A simple, robust metric to analyze the cost-effectiveness of measures to mitigate anthropogenic CO<sub>2</sub> emissions, expressed not – as now – in tonnes of CO<sub>2</sub> emission foregone but in Kelvin degrees of warming prevented, is described, evaluated, and applied to various currently-proposed mitigation policies, all of which prove disproportionately costly and ineffective. *Results:* To reduce mean global surface temperature by 1K, CO<sub>2</sub> emissions of **2-20 teratonnes** must be foregone. Full implementation of the Waxman-Markey Climate Bill of 2009 would reduce mean global surface temperature by **0.00025-0.0025 K/year** at a cost of **\$60-600 trillion** for each 1 K reduction in mean global surface temperature, and reducing temperature by 1 K via the Bill would take **400-4000 years**. Shutting down the entire global economy would reduce temperature by **0.0035-0.035 K/year**. Implications for global macroeconomic policy are considered.

*The question, then, is how many tonnes *n* of CO<sub>2</sub> emission we must forego to prevent 1K of “global warming”. On this crucial value the cost-effectiveness of any given mitigation strategy depends.*

Traditionally but misleadingly, policies to mitigate anthropogenic CO<sub>2</sub> emissions are presented in terms of “carbon-footprint” reduction. However, reducing CO<sub>2</sub> emissions is not an end in itself: its declared aim is to prevent resultant increases in global mean surface temperature. The question, then, is how many tonnes *n* of CO<sub>2</sub> emission we must forego to prevent 1K of “global warming”. On this crucial value the cost-effectiveness of any given mitigation strategy depends.



**Figure 1**

### Annual CO<sub>2</sub> emissions (Mt) per unit part per million atmospheric CO<sub>2</sub> increase

**Top:** Annual global CO<sub>2</sub> emissions (millions of metric tons), 1958-2006.

**Center:** Annual change in atmospheric CO<sub>2</sub> concentration (ppmv), 1959-2006.

**Bottom:** Annual CO<sub>2</sub> emissions (millions of metric tons) per 1 ppmv change in atmospheric CO<sub>2</sub> concentration (top divided by center), 1959-2006. **Blue level:** 1959-2006 mean 15,700 Mt CO<sub>2</sub>/ppmv. **Red level:** 1959-2006 mean ~14,150 Mt CO<sub>2</sub>/ppmv excluding the volcano-influenced years 1964, 1982, 1992.

**Data source:** Carbon Dioxide Information Analysis Center.

**Evaluation:** Dr. Patrick Michaels.

In Figure 1, annual CO<sub>2</sub> emissions  $a$  in millions of metric tons (Mt) (upper panel) divided by the annual change  $\Delta C$  in CO<sub>2</sub> concentration (ppmv) (center panel) yield the volume  $v = a/\Delta C$  (Mt/ppmv) of emissions required to raise CO<sub>2</sub> concentration by 1 ppmv (lower panel). According to Dr. Patrick Michaels, whose values for  $v$  are our starting-point, there has been no trend since 1959:  $v$  is near-constant at 15,700 Mt CO<sub>2</sub>/ppmv including volcanic effects, or **14,150 Mt CO<sub>2</sub>/ppmv** excluding volcanic effects. Since large eruptions are intermittent, we shall use the latter value.

In 2000, mean atmospheric CO<sub>2</sub> concentration  $C_0$  was 368 ppmv (NOAA global index). On the A2 “business-as-usual” scenario, IPCC (2007) predicts CO<sub>2</sub> concentration  $C = 836$  [730, 1020] ppmv by 2100. Adhering henceforth to central estimates for simplicity, the IPCC projects an increase  $\Delta C_{C21} = (C - C_0) = 468$  ppmv in CO<sub>2</sub> concentration over the 21<sup>st</sup> century. Also on the A2 scenario, the 21<sup>st</sup>-century temperature change is given by IPCC (2007) as 3.4 K. Then our central estimate of the increase  $w$  in CO<sub>2</sub> concentration that would warm the world by 1 K is  $w = \Delta C_{C21}/\Delta T_{C21} \approx 468/3.4 \approx$  **140 ppmv/K**. We now evaluate the crucial quantity –

$$n = vw \approx 14,150 \text{ Mt CO}_2/\text{ppmv} \times 140 \text{ ppmv/K} \\ \approx \mathbf{2,000,000 \text{ Mt CO}_2/\text{K}}.$$

Therefore, to prevent a “global warming” of only 1 K we must forego the emission of approximately  $2 \times 10^{12}$  tonnes (2 teratonnes) CO<sub>2</sub> – a very large number.

It has been calculated theoretically (e.g. Lindzen, 2007; Schwartz, 2007; Monckton, 2008) and confirmed empirically by direct measurement of outgoing long-wave radiation from the Earth’s characteristic-emission level (e.g. Covey, 1995; Wielicki, Wong *et al.*, 2002 [but see Wong, Wielicki *et al.*, 2006]; Chen *et al.*, 2002; Cess & Udelhofen, 2003; Hatzidimitriou *et al.* 2004; Clement & Soden, 2005) and by direct measurement of ocean temperatures in the mixed layer (Lyman *et al.*, 2006 as amended; Gouretski & Koltermann, 2007; Willis, 2008; and Loehle, 2009 all show ocean cooling; Willis *et al.*, 2009 show no ocean warming); that the IPCC’s central estimate of climate sensitivity to atmospheric CO<sub>2</sub> enrichment may be exaggerated, perhaps by as much as an order of magnitude. If so, a corresponding increase in the value of  $n$  is mandated.

***The threatened shutdown of five-sixths of today’s US economy, which would in effect allow electricity and automobile use for just one day per week, would reduce mean global surface temperature by 1K in 400-4000 years.***

Accordingly,  $n = \mathbf{2-20 \text{ teratonnes CO}_2/\text{K}}$ , where the lower value is based on the UN’s central estimate of climate sensitivity to atmospheric CO<sub>2</sub> concentration and the higher value is based on the real possibility that the UN has exaggerated climate sensitivity tenfold.

Temperature change  $\Delta T_{\text{mit}}$  resulting from any proposed mitigation strategy is  $\Delta T_{\text{mit}} = \Delta C_{\text{mit}} / n$ , where  $\Delta C_{\text{mit}}$  is the reduction in CO<sub>2</sub> emission that the strategy is expected to achieve. For instance, the Waxman/Markey Bill currently before the US Congress ambitiously (and damagingly) declares that CO<sub>2</sub> emissions in the US in the year 2050 will have been cut by five-sixths of the 2005 US value  $a \approx 6000$  Mt. Thus, the annual temperature reduction resulting from full implementation of the Bill would be  $\Delta T_{\text{mit}} = 5000 \text{ Mt} / n = 0.00025\text{-}0.0025 \text{ K/yr}$ .

The threatened shutdown of five-sixths of today's US economy, which would in effect allow electricity and automobile use for just one day per week, would reduce mean global surface temperature by 1K in 400-4000 years.

***The cost of reducing mean global surface temperature by 1 K via the Waxman/Markey Bill would accordingly be \$60-600 trillion.***

The Obama White House has estimated the cost of implementing the Waxman/Markey Bill at \$1.8 trillion over the next decade: i.e. \$180 billion/year to reduce global temperature by 0.0025-0.00025 K/year. The cost of reducing mean global surface temperature by 1 K via the Waxman/Markey Bill would accordingly be \$60-600 trillion.

Though it is not suggested here that the Bill will be the only such mitigation measure proposed worldwide, to facilitate comparisons the simple and robust cost-effectiveness metric that we have described is denominated as financial cost per 1 K mean global surface temperature increase prevented.

Nevertheless, it is of course possible that other legislatures might allow reason to prevail, whereupon only the United States would actually go so far as to shut down her entire economy. Shutting down five-sixths of that very large fraction of the economy that is necessarily and absolutely dependent upon the manufacture, vecture, or consumption of fossil fuels would have knock-on effects that would fling the remainder of the economy into the Stone Age. It is the whole US economy that the Bill throws into senseless jeopardy.

***The principal stated purpose of giving away free permits to emit CO2 in an otherwise-crippling cap-and-tax regime is “to protect consumers from electricity price increases”. However, if consumers are protected from higher electricity costs they will continue to consume as much electricity as before, so that during the two transitional decades the impact of the Bill on the climate will be even more negligible than when (or, rather, if) it is implemented in full.***

In the real world, however, the effectiveness of the Waxman/Markey Bill will be very much less than its wildly ambitious target for closing down the US economy suggests. For after unanimous and understandable protests from the industries and enterprises most directly affected by the Bill's menace of total economic shutdown it has belatedly been made clear that the bulk of the damage caused by this legislative wrecking-ball is to be deferred until 20 years from now.

Scant days before the Bill was due to be marked up in the Energy and Commerce Committee of Congress, some 280 pages were suddenly added

to this already long, diffuse document. Among these additional pages, which few Honorable Members will have had time to read before they begin enacting the economic and political destruction of the United States into law, there is a document under the names of the Bill's eponymous Congressional sponsors entitled *Proposed Allowance Allocation*.

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For instance, the hastily-added rider to the Bill says –

**Protection from Electricity Price Increases:** The electricity sector will receive 35% of the [free] allowances, representing 90% of current utility emissions. Local electric distribution companies, whose rates are regulated by the states, will receive 30% of the allowances, which they must use to protect consumers from electricity price increases. Merchant coal and long-term power purchase agreements will receive 5% of the allowances. These allowances will be distributed according to a formula recommended by the utility industry and will phase out over a five-year period from 2026 through 2030.

Of the free allowances, 9% will go to local natural-gas distribution companies, 1.5% will go to states to allow them to subsidize heating oil and propane, and 15% will be auctioned, with the proceeds distributed to low-income families to protect them from “other energy cost increases”.

In addition, 15% of the free allowances will go to industries that depend most heavily on fossil fuels; 2% will go to oil refiners; up to 5% will pay for “carbon capture and sequestration”; up to 10% will go to States for energy-efficiency “investment”; up to 3% will be spent on “investments” in electric vehicles; and 1% will go to university research into clean energy.

The wish-list continues. Up to 5% of the free allowances will “prevent tropical deforestation”; up to 8% will go to “domestic adaptation”; up to 8% to “international adaptation”; and up to 1% to “worker assistance and job training”.

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Rightly, the Republican Minority has written to the Bill’s sponsors asking them not to railroad this immature measure through Congress. Instead, the Minority sensibly recommend that, at the very least, Hon. Members should be given the time actually to read the confetti of belatedly-added pages before they attempt to mark up the Bill.

However, it is clear from the long list of exemptions to the cap-and-tax regime that is the cornerstone of the Bill that yet another massive and costly bureaucratic mechanism will be inflicted on the American people without the slightest scientific justification and without even the smallest discernible impact on mean global surface temperature.

For at least two decades, there will be so many exemptions that the cap-and-tax regime – aside from employing an army of bureaucrats to administer it, and enriching yet another army of portly middle-men trading in a new and unstable derivatives market worryingly similar to that which recently brought down the global

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Let us assume *ad argumentum*, and contrary to science, that The Planet needs Saving. It is clear that taxation of the harmless trace gas that we exhale every time we breathe out must fail, because in the end the people will not accept

Stone-Age conditions without better evidence that “global warming” – if and when it resumes after almost 15 years’ absence – may yet prove to be a global crisis. Since big government cannot Save the Planet, can individual citizens, on the Scottish principle that “mony a mickle maks a muckle”, Save The Planet instead? No. The mean annual emissions of an average US household are  $a \approx 24$  t CO<sub>2</sub>/year. Closing down the household altogether, and dividing the emission saving by 2-20 teratonnes, would prevent warming of **0.00000000000012-0.0000000000012 K/year**.

To take another “mony-a-mickle” example, the European Union has estimated that each of the following self-denying ordinances would earn an indulgence of one-third of a tonne of CO<sub>2</sub>:

- missing a short-haul flight;
- using a bicycle rather than a car for a year’s short journeys;
- turning down the central-heating thermostat by 1 K for a year;
- adding more insulation to the average house;
- buying a car with greater fuel economy and using it for a year;
- turning off seven 60-watt lights for a year;
- turning off the air-conditioning for four hours daily throughout the summer;
- not using a tumble-dryer for a year;
- going 2000 miles by train rather than by car;
- or replacing a power-shower with a low-power shower-head for a year.

Doing all ten penances together would earn an indulgence of 3.333 tonnes CO<sub>2</sub>/year, preventing “global warming” of 0.0000000000000002-0.0000000000000002 K/year (i.e.  $2^{-15}$ - $2^{-16}$  K/year). Even if the entire population of the planet were to perform the ten pietisms (impossible because most of the world’s population is not

wealthy enough to qualify), only 0.0001-0.001 K/year of warming would be prevented – or 1 K in 1000-10000 years. Doing only one of the ten penances would reduce the indulgence (and the effect on temperature) tenfold. Potentially, therefore, the universal performance of one of the Ten Pious Penances of Brussels might take 10,000-100,000 years to prevent just 1 K of “global warming”.

In the European Union, a cap-and-tax regime functionally identical to that which the Waxman/Markey Bill proposes has already failed not once but twice. The first time, member-states granted themselves free permits that exceeded their total emissions and the price of a permit to emit a tonne of carbon dioxide fell to the market-clearing price: zero. The second time, the world economy collapsed, and the price of hot-air permits is again heading for the floor.

It has been well observed that the EU cap-and-tax regime was designed to fail, and – as the EU’s unelected masters proudly proclaim – it is performing as designed. The long list of free permits that the Waxman/Markey Bill proposes will similarly guarantee that the US cap-and-tax regime fails.

The sponsors of the Bill may imagine that it will start to become effective in Saving The Planet when most of their 153.5% free allowances are phased out in 2025-2030, long after they have themselves safely retired from the scene of the macroeconomic train-wreck that the Bill will have caused. However, by then it will have become all too painfully evident to the true believers in the New Religion that they have made the worst strategic mistake that any religion can make – namely, believing in a credo that is imminently susceptible of disproof both by science and by events. By 2020 at the latest, the continuing failure of global temperatures to rise as predicted will have brought the already-dying “global warming” story to an unlamented end.

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Why are all of the values we have calculated for preventing future “global warming” via cuts in emissions infinitesimal? The reason is that, even on the IPCC’s probably-exaggerated value for climate sensitivity, the megatonnage  $n$  of CO<sub>2</sub> emissions that must be foregone to reduce global temperature even by as little as 1 K is very large.

Even if the entire planet, at the Copenhagen conference of the states parties to the UN Framework Convention on Climate Change, were to shut down its entire economy and revert to the Stone Age, but without even the right to light fires in its caves, even if the whole of humanity were to stop breathing and were to emit not one nanogram of CO<sub>2</sub> ever again, the

rise in mean global surface temperature prevented by our universal self-immolation would be **0.0035-0.035 K/year**. The cost of this trivial prevention of a global temperature increase which, even if it occurred, would be largely harmless, would be nothing less than the entire annual output of the global economy.

The implications for economic policy of the substantial mismatch between the cost of mitigation and its effectiveness in preventing “global warming” are profound. In London in 2008, the House of Commons passed a “Climate Change Bill” (with only three dissenters) on the very evening when the first October snow in 74 years was falling in Parliament Square. Now there is a rapidly-expanding “Department of Energy and Climate Change”, electricity prices are needlessly higher, working people’s jobs are being destroyed, businesses are going bankrupt at a record rate, and City financiers are making fortunes “trading hot air” on carbon permit exchanges.

In Japan, utilities are voluntarily spending hundreds of billions of yen of their customers’ and shareholders’ money on “carbon offsets”, significantly but pointlessly increasing the price of electric power and of everything that depends upon it.

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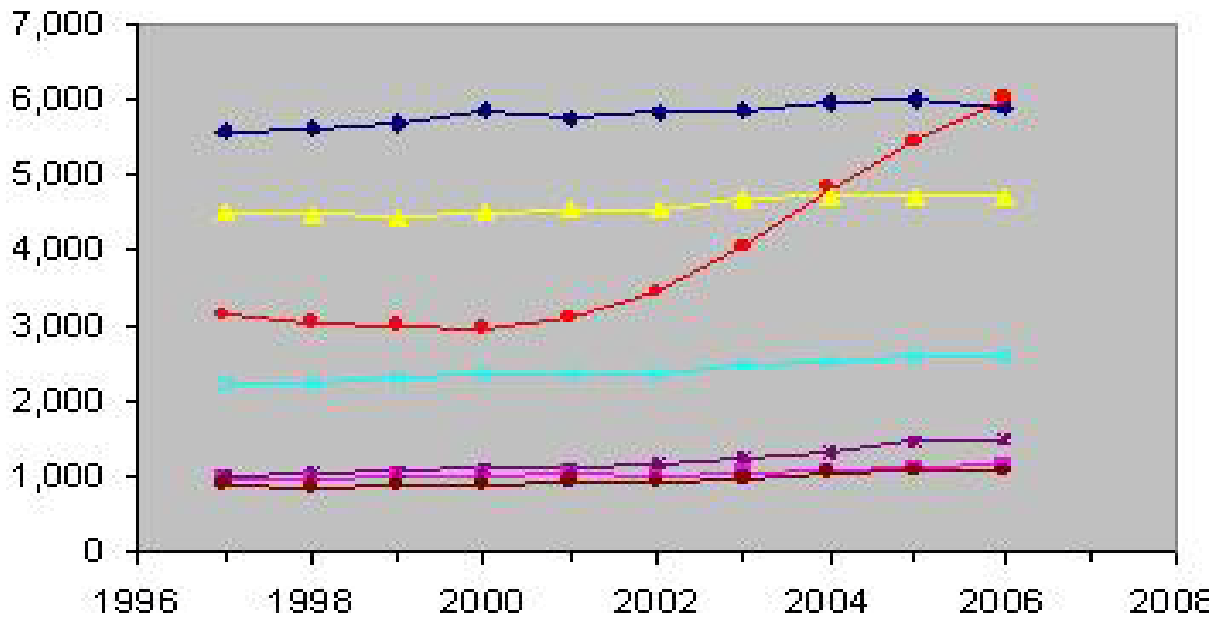
Who would be the beneficiaries, to the extent that – *per impossibile* – mitigation measures might eventually work? China, India, Russia, Indonesia, Brazil, and the other substantial, emerging, third-world economies would benefit, because if we voluntarily closed down our economies and they did not, we should merely export our jobs and our enterprises to them, paradoxically increasing the planet’s carbon footprint because their emissions per unit of production are far higher than ours. They would also benefit because we should no longer be competing with them for finite natural resources.

China and India have already made it abundantly plain that they will not, under any circumstances, make significant cuts in their already-low *per-capita* emissions. Though their emissions are low *per capita*, they are high in absolute terms because there are so many *capita*. Figure 2 shows that emissions growth everywhere in the world except China has been negligible over the past decade: but China, in her dash for the prosperity that is the necessary precondition for stabilizing her population, is understandably, and rightly, fast increasing her consumption of fossil fuels. Rightly, because without prosperity the Chinese population would continue to rise, ultimately creating a far larger carbon footprint –



Figure 2

## Annual energy-related CO2 emissions



Annual energy-related emissions (Mt CO<sub>2</sub>) in **the US**, **South America**, **Europe**, **Eurasia**, **the Middle East**, **Africa**, and **China**.

And how are the Democrats proposing to deal with China's declaration that – except at the margins – she is not prepared to make cuts in *per-capita* emissions? They menacing China and India with a protectionist trade war if they do not consent to keep their people in poverty by cutting emissions that are not only harmless but

***Not only is the governing regime in Washington determined to destroy the US economy by closing down five-sixths of it from within: it is also determined to destroy the world economy by an international policy that has never yet been known to succeed and has always caused widespread economic damage – trade protectionism.***

among the lowest *per capita* in the world. Not only is the governing regime in Washington determined to destroy the US economy by closing down five-sixths of it from within: it is also determined to destroy the world economy by an international policy that has never yet been known to succeed and has always caused widespread economic damage – trade protectionism.

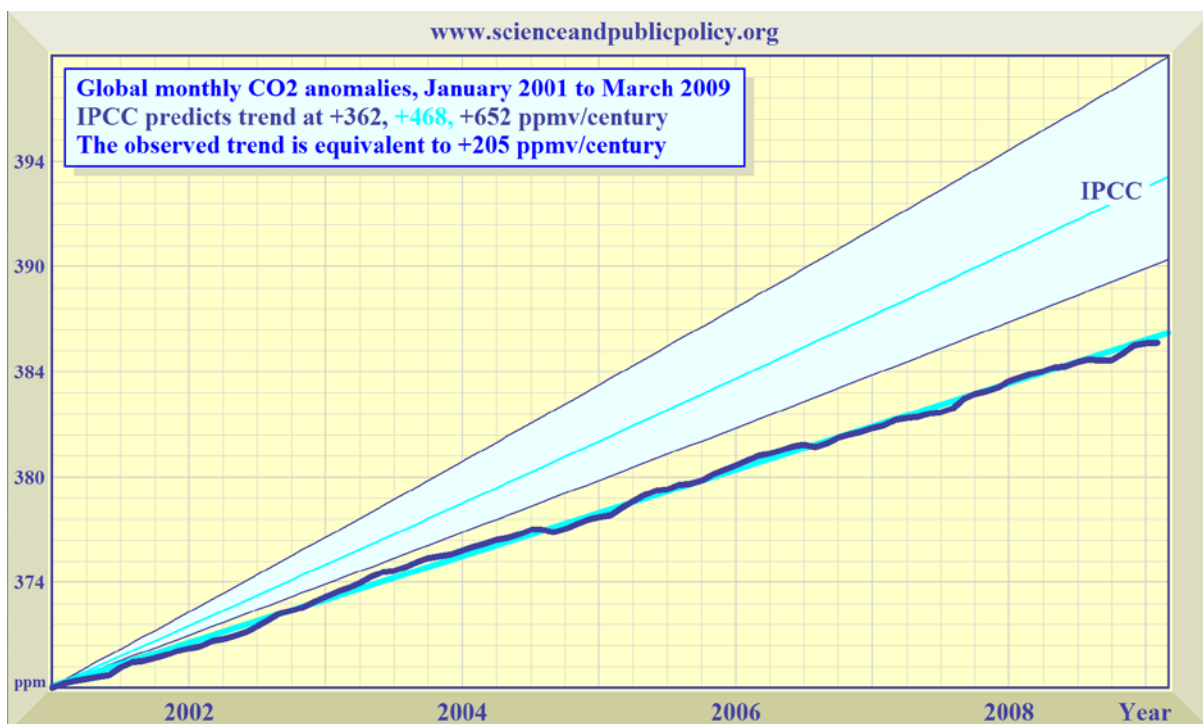
The world's economy is in enough trouble already, even without the damage caused by the Obama Administration's costly non-solutions to the non-problem of "global warming". Today, more than ever, we cannot afford to make costly and irrational macroeconomic mistakes such as those which the environmental lobbies demand that we should make in the name of saving a planet that does not need to be saved.

What, then, would be a rational, prudent, and beneficial policy?

**First**, we should study the carbon cycle a little more diligently. The IPCC was honest enough to admit in its 2001 assessment that it could not add up the global “carbon budget” to within a factor of two of the right answer. For some reason that the IPCC admits it cannot explain, atmospheric CO<sub>2</sub> concentration is rising at less than half the IPCC’s central estimate, as Figure 3 shows –

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**Figure 3**  
**CO<sub>2</sub> concentration is rising at half the predicted rate**



CO<sub>2</sub> is rising in a straight line, well below the IPCC’s projected range (pale blue region). The deseasonalized real-world data are shown as a thick, dark-blue line overlaid on the cyan least-squares linear-regression trend. There is no sign of the exponential growth predicted by the IPCC. **Data source:** NOAA.

*Since the turn of the millennium on 1 January 2001 there has been no statistically-significant “global warming”: indeed, there has been eight and a half years’ global cooling trend.*

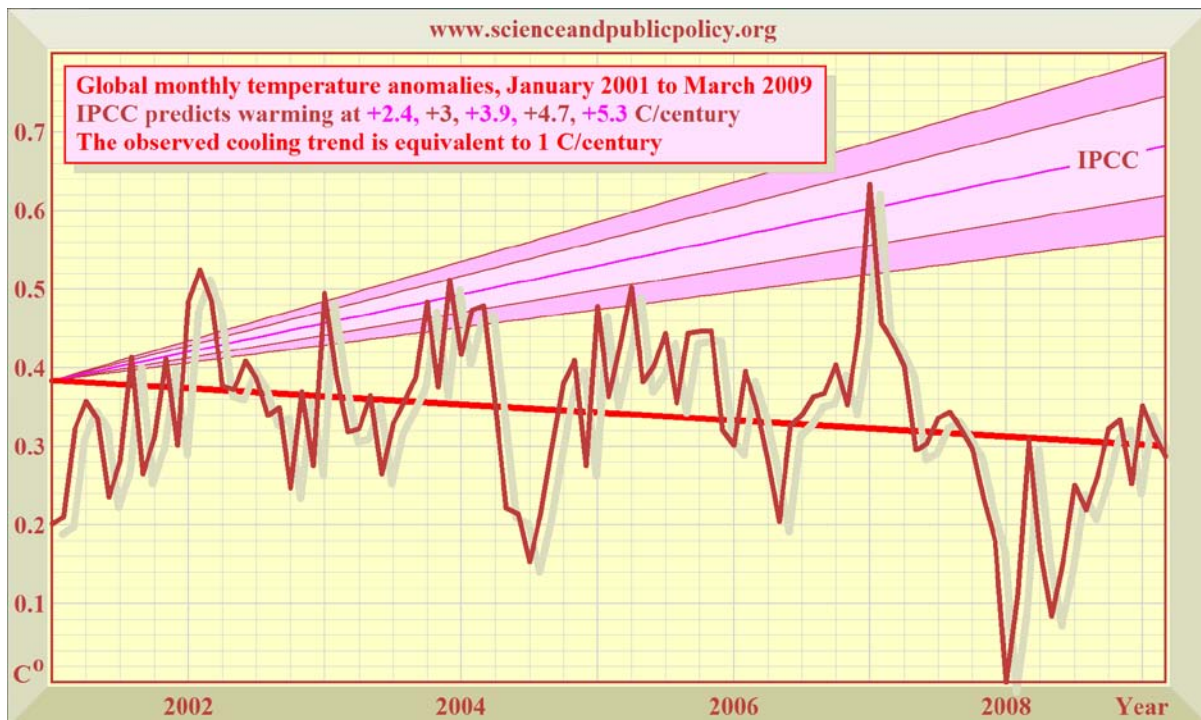
The failure of CO<sub>2</sub> concentration to rise even half as fast as predicted, notwithstanding global emissions that are at the higher end of the IPCC’s projected range, requires, on its own, that all of the IPCC’s projections for anthropogenic warming in the current century be halved, ending the “climate crisis”.

**Secondly**, therefore, we should wait and see. Since the turn of the millennium on 1 January 2001 there has been no statistically-significant

“global warming”: indeed, there has been eight and a half years’ global cooling trend, as Figure 4 shows –

Figure 4

## Eight and a half years' global cooling at 1 K/century



For eight and a half years, global temperatures have trended downward. The IPCC's predicted equilibrium warming path (pink region) bears no relation to the global cooling that has been observed in the 21<sup>st</sup> century to date. *Source: SPPI global temperature index (arithmetic mean of HadCRU, NCDC, RSS, and UAH datasets).*

Therefore, there is certainly no scientific basis for the frequent statements by Vice-President Al Gore and the Prince of Wales to the effect that we only have  $(1 \leq x \leq 10)$  years to Save The Planet. Merely restoring temperatures to where they were in 2000 is likely to take the best part of a decade – if temperatures recover at all.

At Copenhagen, the states parties to the Convention would be acting reasonably if they were to agree to take no further action to mitigate imagined “global warming” if and when it resumes, and to spend no more taxpayers' money on it, unless and until mean global surface temperature had risen by at least 1 K above the observed value for the year 2000. On current trends, that will not happen for at least a century, if then. Meanwhile, real environmental problems can be addressed instead.

***While the attractiveness to politicians, bureaucrats, and other rent-seekers of taxing carbon emissions as a means of raising very large government revenues is self-evident, on this analysis it is equally self-evident that the costs of such needless over-taxation substantially outweigh the benefits – if, indeed, there are any benefits at all.***

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