

An Overdue Letter to President Bush from Albert Einstein

Dear Mr. President,

In August 1939 I wrote to your predecessor Franklin D Roosevelt to warn him of the dangerous military potential of nuclear fission. Using an equation similar to that by which I have become quite well known, I see it as my duty to warn you that adoption by you and your fellow heads of government of the target proposed at your conference last month for reduction of carbon dioxide emissions by up to 60 per cent of the 2000 level by 2050 has the capacity to institute a new Ice Age. The ensuing mass starvation and deaths will be on a scale beyond that achieved by the atom bombs foreshadowed in my last letter.

Please allow me to explain. There is a real risk that if the sort of target adopted at your conference is implemented, the resulting carbon dioxide emissions, at perhaps only 40 per cent of the 2000 level, would go far beyond the stated purpose of the target, which is stabilizing the atmospheric concentration of carbon dioxide at 450 parts per million (ppm) by 2050. Instead, achieving and maintaining the target could easily, by as early as 2050 — and possibly even sooner — reduce the concentration to levels (below 280 ppm) not seen since the eighteenth century, at the height of the Little Ice Age.

The problem with the target is that its proponents implicitly believe that greenhouse gas emissions are the only factor affecting the atmospheric level of carbon dioxide. They usually, like the report commissioned last year by Mr Gordon Brown (the *Stern Review*) discount the other known major influence on the atmospheric level of greenhouse gases, which is the uptake of carbon dioxide by both terrestrial and oceanic sinks. The assumption appears to be that these sinks will absorb less carbon dioxide exactly in proportion as less of that gas is emitted..

There is no basis for that assumption, least of all in the main citation in the *Stern Review*. Its 'unanimous agreement' of 'eleven coupled climate-carbon cycle models' is that 'future climate change will reduce the efficiency of the earth system to absorb the anthropogenic perturbation', so that 'a larger fraction of anthropogenic CO₂ will stay airborne if climate change is accounted for' (2006:3337).

Unfortunately none of these models can be shown to have predicted the observed ability of the earth system to absorb most of mankind's emissions of CO₂ over the last 100 years, which must cast doubt on their claimed predictive ability for the next 100 years. Interestingly, none of the models was based on statistical evaluation of observations. Perhaps that is why the models disagreed on the relative importance of terrestrial and oceanic uptake of atmospheric CO₂: eight favoured the land, three favoured the oceans. Moreover the models achieved no consensus as to whether the terrestrial uptake depended more on net primary productivity (i.e. photosynthesis) than on changes in respiration. I must say such uncertainty contrasts with the rigour of my equation $E = MC^2$.

The real evidence on observed uptakes by the earth system is to the contrary, namely that the terrestrial and oceanic sinks will continue to increase their uptakes in the future as they have over the last 25 years, i.e. the period for which comprehensive data on CO₂ emissions, atmospheric concentration, and global uptakes are available. This means that the reduction of carbon dioxide emissions arising from the burning of fossil fuels to just 40 per cent of the 2000 level (i.e. 9.65 billion tonnes of CO₂ as against the 2005 level of over 27 billion tonnes) will lead to a much more than proportionate reduction in the atmospheric concentration of carbon dioxide. That in turn implies that instead of stabilizing at 450 ppm, the atmospheric concentration will fall rapidly to the pre-industrial age level of 280 ppm or even less, resulting in catastrophic global cooling and the concomitant collapse of world food production.

My new equation is very simple, but just as precise as my better-known theorem.

$$xC = aE - bM$$

where x , a , and b are year on year rates of growth from previous year-end values of C , E , and M , E is emissions from burning of all fossil fuels, which grew from 1980 to 2003 at 2.2% p.a. but since 2003 at a rate of $a=5\%$ p.a., M is the atmospheric concentration of carbon dioxide which now stands at 382 ppm, and increasing currently at a rate of $b=0.51\%$ p.a., and C is the inferred uptake of carbon by oceanic and terrestrial sinks through solution and photosynthesis respectively, growing at the combined rate x yielded by the equation.

Entering the known values of C , E , and M in 1994, and the known compounded annual growth in M (0.5% p.a.) and E (2.2% p.a.) from 1994 to 2005, we derive the

annual growth in C over that period at 3.4% p.a. This figure has not previously been calculated, and certainly not by Friedlingstein *et al.*, (2006).

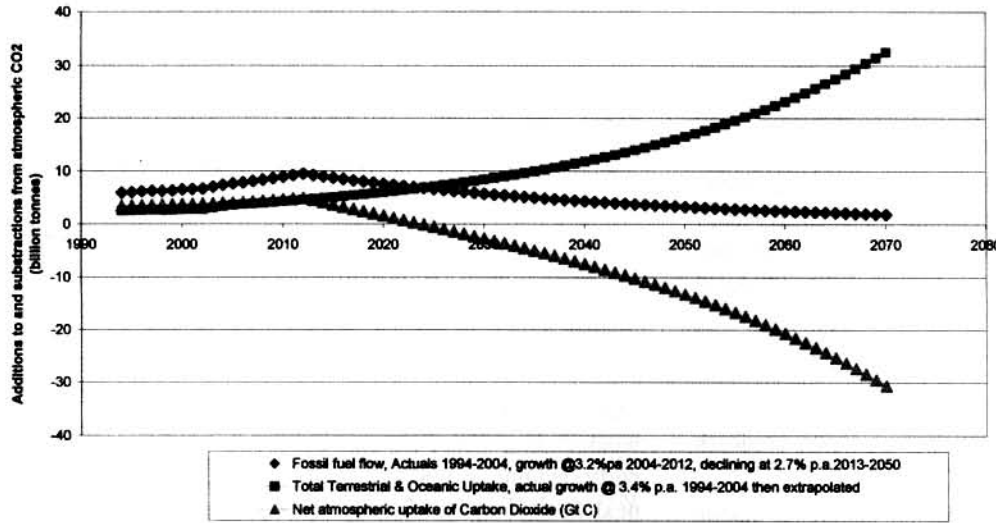
This means that by the 2050s, the atmospheric concentration of carbon dioxide may well be less than 280 ppm, i.e. lower than the level before the industrial age

began in about 1750 (see Fig.2). However as the concentration approaches that level, there is very likely to be a reversal in agricultural productivity, because of a veritable shortage of atmospheric carbon dioxide, leading to global food stress on an unprecedented scale.

History is replete with unintended consequences of well-meaning but poorly designed policies. The false premise behind the emission reduction targets is that fossil fuel emissions are the only force determining the atmospheric concentration of carbon dioxide. In

reality terrestrial and oceanic uptake of carbon dioxide will continue at least at the current rate, so that ongoing emission reductions after 2050 will result in a rapid *decline* — not stabilization — in the atmospheric concentration of carbon dioxide, as a result of falls of 5 ppm a year as early as 2035. This means that within the lifespan of many alive now, the atmospheric

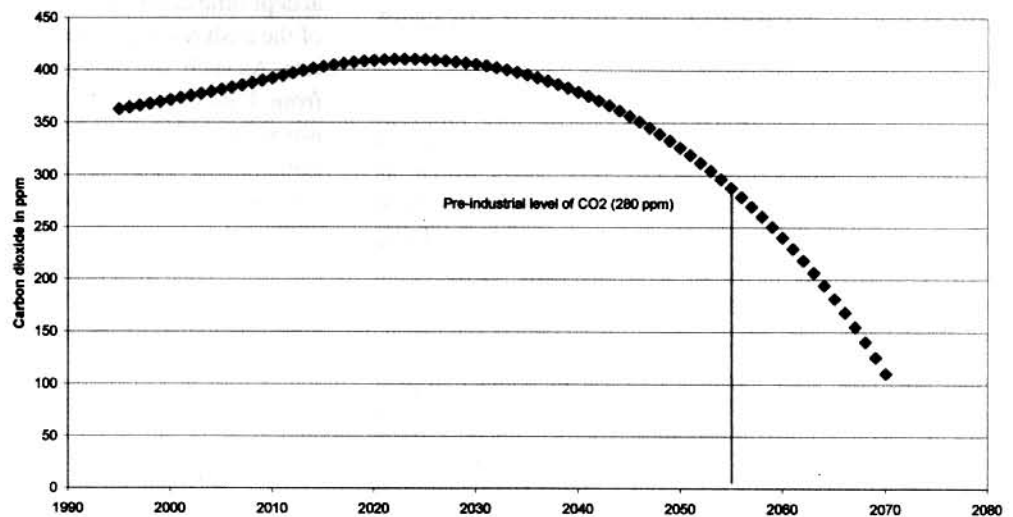
Fig.1 Carbon dioxide emissions and uptakes with resulting net change in atmospheric CO2



There is no reason why the targeted reductions in carbon dioxide emissions of the EU if adopted globally would reduce the rate of uptake of atmospheric carbon dioxide by terrestrial and oceanic forces. For example, Mr Gore's switch from a Hummer to a hybrid is unlikely to have had any impact on his or your rose gardens' uptakes of carbon dioxide through photosynthesis.

Far more significant is the impact of the rapid growth of agricultural yields and output since 1980, faster than ever before in world history. In countries as far apart as Egypt, South Africa, and Australia, wheat yields have more than doubled since 1980, and yields and production of other grains like corn and rice not to mention palm oil and sugar have also grown explosively. World food production has increased by over 50 per cent since 1980, with a parallel increase in the uptake of carbon dioxide. As a result, the target reduction in carbon dioxide emissions to 40 per cent of the 2000 level will be substantially augmented by the continuing growth in uptake of carbon dioxide by oceanic and land-based photosynthesis (see Fig.1).

Fig.2 Atmospheric Carbon Dioxide in parts per million after global emissions reduction to 40% of level in 2000 by 2050



concentration of carbon dioxide may fall below the pre-industrial level of 280 ppm as soon as 2055 (see Fig.2).

Thus a major challenge for policy makers will, long before 2050, be to find ways of reversing the emission

reduction programs imposed on them by today's governments, with the support of your own Democrat opponents. Will they be able to reverse the carbon taxes these all propose, given the vested interest of the beneficiaries — corn farmers, windmill operators, and the like — in maintaining them? If not, many alive now and our grandchildren can look forward to a cold and hungry future unless you once again stand firm.

Sincerely,

Albert Einstein

(with the aid of a spirit medium and amanuensis: Timothy R Curtin, sometime lecturer in economics at Universities of Zimbabwe and York, 1964-1970, and economic adviser, for Ford Foundation, EU and World Bank programs, inter alia, 1970-1999).

Notes:

1. P. Friedlingstein *et al*, 'Climate-Carbon Cycle Feedback Analysis', *Journal of Climate* 19, 15 July 2006.

2. For example, as Friedlingstein *et al* admit, 'none of the models prescribed actual land cover changes as boundary conditions of the vegetation model' (2006:3338).

3. The base year values in 1994 were: for atmospheric carbon dioxide, 361.47 ppm; for carbon dioxide emissions from burning of fossil fuels, 21.651 billion tonnes of carbon dioxide (i.e. 5.9 billion tonnes of carbon); and for terrestrial and oceanic uptake, 2.5 billion tonnes of carbon (one tonne of carbon is equal to 3.67 tonnes of carbon dioxide) (the latter figure is the central estimate from Houghton, *Global Warming*, (Cambridge: CUP, 2004) p.30 and subject to wide margins of error).