

APOCALYPSE? NO!

THE STERN REPORT:
BAD ECONOMICS BASED ON BAD SCIENCE

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LIVERPOOL
MACROECONOMIC RESEARCH
LIMITED

QUARTERLY ECONOMIC BULLETIN

VOL. 27 No. 4 DECEMBER 2006



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The Stern Report — bad economics based on bad science

By Christopher Monckton

Gordon Brown and his now-departed chief economist have both described global warming as the worst “market failure” ever. That loaded sound-bite suggests the “climate-change” scare is less about saving the planet than, as Jacques Chirac chillingly said in praise of the Kyoto treaty, “creating world government”. Politicians, scientists and bureaucrats have contrived a threat of Biblical floods, droughts, plagues and extinctions worthier of St. John the Divine than of science.

Nick Stern’s report on the economics of climate change says the debate is over. It is not. There are more greenhouse gases in the air than there were, so the world should warm a bit, but that is as far as the “consensus” goes. The Royal Society agrees with Stern, saying there is a worldwide scientific consensus. It brands Apocalypse-deniers as paid lackeys of coal and oil. There have been demands for the public execution of airline executives. Margaret Beckett, the Foreign Secretary, used an otherwise paralyzing speech on climate change recently to compare thermosceptics with advocates of Islamic terror. She said both should be denied access to the media.

In the US, Senators Rockefeller and Crowe have called on ExxonMobil to stop funding scientists who doubt whether climate change will be cataclysmic. Rockefeller inherited a fossil-fuel fortune made by Standard Oil, which became Esso, which became — well, ExxonMobil.

Fortunately, the *Quarterly Economic Bulletin* is still a free-speech zone, so I am allowed to say that Stern’s report is bad economics based on bad science. First, the science — such as it is.

The Science

In the hot summer of 1988 James Hansen, a climatologist, told Congress that temperature would rise 0.2 to 0.45C by the end of the century. It rose 0.06C. Hansen said sea level would rise several feet by 2100 (the UN is about to cut its high-end forecast for sea-level rise from 3 feet to just 17 inches). The UN set up a transnational bureaucracy, the Intergovernmental Panel on Climate Change. The UK taxpayer meets the entire cost of its scientific team, which, in 2001, produced the *Third Assessment Report*, a Bible-length document presenting apocalyptic conclusions well beyond previous reports.

Next year the fourth report will come out. Though the rhetoric of the final draft is still hysterical, the facts are forcing a rethink. Carbon dioxide concentrations are rising fast, but temperature has not risen at all since the last

report. The sea has cooled in the past two years, losing a fifth of the heat it gained in the past 20 years (Lyman, 2006). The Antarctic and Greenland ice masses are growing. All the computer models on which the UN’s entire case shakily rests failed to predict either the stable temperature or the falling sea temperature, and most of them missed the growing ice-masses till after they had been observed and measured.

The scare is ingeniously constructed. First, the UN implied that carbon dioxide ended the last four ice ages. It displayed two 450,000-year graphs — a sawtooth curve of temperature and a sawtooth of airborne CO₂ scaled to look similar. Usually, similar curves are superimposed for comparison. The UN did not superimpose them. If it had, the truth would have shown: the changes in temperature *preceded* the changes in CO₂ levels, which acted as no more than a slight climate feedback boosting the rise in temperature each time it occurred (Petit *et al.*, 1999; Indermuhle *et al.*, 2000, Caillon *et al.*, 2003).

Next, the UN abolished the mediaeval warm period. In 1995, David Deming, a geoscientist at the University of Oklahoma, had written an article reconstructing 150 years of North American temperatures from borehole data. He later wrote: “With the publication of the article in *Science*, I gained significant credibility in the community of scientists working on climate change. They thought I was one of them, someone who would pervert science in the service of social and political causes. One of them let his guard down. A major person working in the area of climate change and global warming sent me an astonishing email that said, ‘We have to get rid of the Mediaeval Warm Period.’”

The UN obliged. Its second assessment report, in 1996, had displayed a 1,000-year graph showing that temperature in the Middle Ages was warmer than today’s. But the 2001 report contained a new graph showing no mediaeval warm period, and wrongly concluded that the 20th century was the warmest for 1,000 years. The graph looked like a hockey-stick. The incorrectly-flat 1000–1900AD temperature line was the shaft: the uptick from 1900 to 2000 was the blade.

The UN gave one technique for reconstructing pre-thermometer temperature 390 times more weight than any other, but did not say so. The overweighted technique was one which the UN’s 1996 report had said was unsafe: measurement of tree-rings from bristlecone pines. Tree-rings are wider in warmer years, but pine-rings are also wider when there is more carbon dioxide in the air. CO₂ is plant food. This carbon dioxide fertilization distorts the calculations.

The UN's scientists said they had included 24 datasets going back to 1400. Without saying so, they left out the set showing the mediaeval warm period, tucking it into a folder marked "**CENSORED DATA**". They used a computer model to draw the graph from the data, but McIntyre & McKittrick (2005) later found that the model almost always drew hockey-sticks even if they fed in random, electronic "red noise".

The large, full-colour "hockey-stick" was the key graph in the UN's 2001 report, and the only one to appear six times. The Canadian Government copied it to every household. Four years passed before a leading scientific journal would publish the truth about the graph. Did Kofi or Ottawa apologize? No. The UN still uses the graph in its publications.

After the graph was exposed, several scientific papers apparently confirming its abolition of the mediaeval warm period appeared. The US Congress asked independent statisticians to investigate. They found that the graph was unmeritorious, and that known associates of the scientists who had compiled it had written many of the later papers supporting its conclusion. Later the US National Academy of Sciences said the statistical method used by the UN had a "validation skill not significantly different from zero" — i.e. it was useless.

The UN, echoed by Stern, says the graph is not important, and fails to apologize for it in the draft of its forthcoming report. Yet the mediaeval warm period is key. Scores of scientific papers show that it was real, global and up to 3C warmer than now. There are usually no glaciers in the tropical Andes, except on the very highest peaks: today they are there. There were Viking farms in Greenland: now some of them are under permafrost. Data from thousands of boreholes worldwide show global temperatures were higher in the Middle Ages than now. And the snows of Kilimanjaro are vanishing not because summit temperature is rising (it is unchanged) but because post-colonial deforestation has dried the air.

In some places it was also warmer than now in the Bronze Age and in Roman times. In the interglacial, 125,000 years ago, the temperature was at least 5C warmer than now: yet CO₂ concentrations were lower than today. It was not carbon dioxide that caused those warm periods. It was the Sun. So the UN adjusted the math and all but extinguished the Sun's role in today's warming. It dated its list of "forcings" — influences on temperature — from 1750, when the Sun was almost as warm as now. But its start-date for the increase in world temperature was 1900, when the Sun was cooler.

Every "forcing" produces "climate feedbacks" making temperature rise faster. For instance, as temperature rises in response to a forcing, the air carries more water vapour, the most important greenhouse gas; and polar ice melts, reducing the Earth's albedo. Up goes the temperature again.

The UN more than doubled the base forcings from greenhouse gases to allow for climate feedbacks. Its latest report will be compelled to revise the impact of both forcings and feedbacks sharply downward: yet it still says that a doubling of atmospheric CO₂ concentrations since 1750 — which will perhaps occur between 2050 and 2100 — will cause temperature to rise by 3C. My calculations, using the latest data from the UN, suggest that "climate sensitivity" — the temperature response to a CO₂ doubling — will be about 0.6C.

Two centuries ago, the astronomer William Herschel was reading Adam Smith's *Wealth of Nations* when he noticed that quoted grain prices fell when the number of sunspots rose. Gales of laughter ensued, but he was right. At solar maxima, when the Sun was at its hottest and sunspots showed, temperature was warmer, grain grew faster and prices fell. Such observations show that even small solar changes affect climate detectably. But recent solar changes have been big.

Solanki *et al.* (2005) report that in the past half-century the Sun has been warmer, for longer, than at any time in at least the past 11,400 years, contributing up to a third of the past century's warming. The UN expresses its heat-energy forcings in watts per square metre. It estimates that the Sun caused just 0.12 watts of forcing since 1750. Begin in 1900 to match the temperature start-date, and the base solar forcing more than doubles to at least 0.3 watts. Multiply by 2.7, which Houghton (2006) suggests is the UN's current factor for climate feedbacks, and you get 0.8 watts — more than six and a half times the UN's figure. The entire 20th-century warming from all sources was 1.72 watts. The Sun could have caused almost half of it.

Next, the UN slashed the natural greenhouse effect by 40% from 33C in the climate-physics textbooks to 20C, making the man-made enhancement appear bigger (Houghton, 2006).

Then the UN chose the biggest 20th-century temperature increase it could find, and expressed surprise at how fast the world had warm. Stern wrote: "As anticipated by scientists, global mean surface temperatures have risen over the past century." As *anticipated*? Only 30 years ago, when temperature had fallen for 35 years notwithstanding the monotonic rise in CO₂, a new Ice Age was widely predicted. Books called *The Cooling* were best-sellers. Sir Crispin Charles Cervantes Tickell, an eco-diplomatist, called for State subsidy to keep people warm. Now, unblushing, he calls for State subsidy for the opposite. *Plus le climat change, plus c'est le meme Charles.*

In the US, where weather records have been more reliable than elsewhere, 20th-century temperature went up by only 0.3C. AccuWeather reckons world temperature rose by 0.45C. The US National Climate Data Center says 0.5C. The UN went for 0.6C, probably distorted by urban growth

near many of the world's fast-disappearing temperature-stations (two-thirds have been closed in recent years).

Even a 0.6C temperature rise was not enough. So the UN repealed a fundamental physical law. Buried in a sub-chapter in its 2001 report is a short but revealing section discussing "lambda" — the crucial factor converting radiant-energy forcings to temperature. The UN devoted several pages of its 2001 report to commenting on what it called the "remarkable" near-invariance of lambda at 0.5C per watt per square metre of direct forcing.

However, for the climatically-relevant range of temperatures, it is easy to verify that the Stefan-Boltzmann equation, which converts radiant energy to temperature, yields a near-linear temperature response to changes in radiant energy.

This law is as central to the thermodynamics of climate as Einstein's later equation is to astrophysics. Like Einstein's, it relates energy to the square of the speed of light, but by reference to temperature rather than mass. The UN plainly did not understand it.

The bigger the value of lambda, the bigger the temperature increase the UN could predict. Using the Stefan-Boltzmann law, the base value is just 0.22-0.3C per watt per square metre. In 1995 and again in 2001, the UN doubled lambda to 0.5C per watt, saying that feedbacks consequent on temperature increases were responsible for the extra. A bidding war began, involving the UN, its former climate-change chairman Sir John Houghton, and James Hansen, the scientist who had started the scare in 1988. Stern joined in. Table 1 shows just how little consensus there is about this key variable.

The IPCC (1995, 2001, 2007) has proposed three values, each higher than the last, but has corrected its definition of "lambda" for its next report. Hansen has also proposed three values, in a single paper (Hansen, 2006). Sir John Houghton (2002, 2006) has proposed two values. Stern (2006), here as elsewhere, is at the extreme high end of the table. Using his suggested 1.89C per watt means that 85% of the warming he thinks ought to have taken place in the 20th century has disappeared into the oceans.

Even if Stern's excitable estimate were right, the worst consequence would be the disappearance of the ice-cap at the North Pole during the summer. Polar bears would have to spend the summer in Greenland. The UN is about to concede that the ice-sheets in Greenland and Antarctica, which have been growing rapidly in the past 30 years (Greenland by an average of 2 inches a year) are not going to melt significantly, and that sea levels are not likely to rise all that much faster in the next century than in the past century.

TABLE 1
Estimates of temperature response to forcings and feedbacks

| Source | $\delta T / \delta F$ |
|--|-----------------------|
| Stefan-Boltzmann law (emissivity 1.000): | 0.223 |
| Stefan-Boltzmann law (emissivity 0.614): | 0.303 |
| IPCC 1996 (implicit) | 0.480 |
| IPCC 2001: | 0.500 |
| Calculated using IPCC 2007 methods: | 0.525 |
| Implicit in Houghton, 2002: | 0.545 |
| Forcings x2 (IPCC 2001): | 0.606 |
| Hansen, 2006 ₁ : | 0.670 |
| Hansen, 2006 ₂ : | 0.750 |
| Implicit in Houghton, 2006: | 0.809 |
| Implicit in IPCC, 2007: | 0.817 |
| Hansen, 2006 ₃ : | 1.000 |
| Implicit in Stern, 2006: | 1.890 |

The central problem with the UN's calculations is that the computer models on which it heavily relies have consistently over-projected temperature, which has not risen as fast as the models had forecast. In 2000, the UK's Hadley Centre solved the problem of over-projection by dividing its modelled output by three to "predict" 20th-century temperature correctly.

Hansen (2006) now says the oceanic "flywheel effect" gives us extra time to act (always supposing that action is necessary). Therefore Stern's alarmism is already outdated. However, provisional calculations — not yet verified or peer-reviewed — using the data and methods described in the UN's forthcoming report suggest that the difference between the transient and equilibrium climate response to temperature is very small, and is probably intra-annual rather than supra-centennial — Table 2.

All of the principal processes and data relevant to projection of the temperature effects of radiative forcings are presented in a single table for the first time. The IPCC's model-derived data and methodologies have been used to project temperature response to radiative forcings and consequent climate feedbacks between 1906 and 2006, and between 1906 and the point at which atmospheric CO₂ concentrations double. 1906 was selected as the base year because, unlike the IPCC's base year 1750, it falls within the instrumental record. Also, it is the point at which both temperature and CO₂ concentrations began to rise appreciably (IPCC, 2007).

In addition to all of the anthropogenic and solar forcings tabulated in IPCC (2007), for each of which the IPCC's central estimate is taken, Table 2 enumerates all climatic feedbacks except the CO₂ feedback, which is most simply understood as bringing forward the moment when atmospheric CO₂ concentration will reach 556 ppmv, twice the pre-industrial 278 ppmv. The climate sensitivity event is likely to occur in 2100 at the latest.

The model produces outputs at the lower end of the range, partly because the effects of the CO₂ feedback are taken into account not as a temperature effect but as a time effect.

The projected temperature response to all climatic forcings and feedbacks in 2006 compared with the climatic state in 1906 is 0.8C, a little below the observed temperature increase of 0.84C (NCDC, 2006). At the climate-sensitivity event the temperature is projected to be 1.45C higher than in 1906, or ~ 0.6C warmer than the present.

These results from the simple model presented in Table 2 give no ground for supposing that any warming attributable to past forcings has not yet manifested itself fully in the temperature response, suggesting that both the duration and the amplitude of the difference between the transient and equilibrium climate responses may be small, and confirming the results of numerous climate-sensitivity studies following the eruption of Mount Pinatubo,

Philippines, in June 1991.

Hansen *et al.* (1992) had proposed that the climate forcings and feedbacks following the Pinatubo eruption, though they were transient, would provide a benchmark for testing the AOGCMs' ability to evaluate forcings and feedbacks correctly.

Sassen (1992) reported that cirrus clouds were produced during the eruption. Lindzen *et al.* (2001) proposed that cirrus clouds might provide a negative feedback partially counteracting the positive feedbacks, which the IPCC has now quantified (IPCC, 2007, ch.8), and further work continues on confirmation and quantification of this negative feedback. However, no allowance for this additional negative feedback has been made here.

Douglass and Knox (2005) "determined the volcano climate sensitivity and response time for the Mount

TABLE 2
Temperature response to anthropogenic and natural radiative forcings
Based on IPCC methodologies, data and central estimates, 2007

| V. Source or calculation | Climatic process | 1750-2006 | 1906-2006 | 1906-2xCO ₂ |
|---|---|--|---------------------------------------|---------------------------------------|
| 1. NCDC (2006) | Mean temperature in 1906: | | 13.71 C | 13.71 C |
| 2. [(0.69 TSI / 4) + forc.+ fdbk.] | Total radiant energy in 1906: | | 235.88 Wm ⁻² | 235.88 Wm ⁻² |
| 3. $\varepsilon = v_2 / [(v_1 + 273.15)^4 \sigma]$ | Earth/troposphere emissivity ε : | | 0.6144 | 0.6144 |
| 4. IPCC | CO ₂ concentration (C / C ₀): | 381/278 ppmv | 381/300 ppmv | 556/300 ppmv |
| 5. [5.3 ln(C / C ₀)] (IPCC, 2001) | CO ₂ forcing: | 1.66 Wm ⁻² | 1.27 Wm ⁻² | 3.27 Wm ⁻² |
| 6. IPCC (2006) | <i>Other</i> Methane forcing: | 0.48 Wm ⁻² | | |
| | <i>greenhouse-gas forcings:</i> Nitrous oxide: | 0.16 Wm ⁻² | | |
| | Halocarbons: | 0.34 Wm ⁻² | | |
| | Total: | 0.98 Wm ⁻² | 0.75 Wm ⁻² | 0.82 Wm ⁻² |
| 7. (v ₅ + v ₆) | All greenhouse-gas forcings: | 2.64 Wm ⁻² | 2.02 Wm ⁻² | 4.09 Wm ⁻² |
| 8. IPCC (2006) | <i>Other</i> Ozone forcing: | 0.30 Wm ⁻² | | |
| | <i>anthropo- CH₄ water vapor:</i> | 0.07 Wm ⁻² | | |
| | <i>genic</i> Contrail cirrus: | 0.01 Wm ⁻² | | |
| | <i>forcings:</i> Surface albedo: | -0.10 Wm ⁻² | | |
| | Direct aerosol: | -0.50 Wm ⁻² | | |
| | Cloud albedo: | -0.70 Wm ⁻² | | |
| | Total: | -0.92 Wm ⁻² | -0.71 Wm ⁻² | -1.00 Wm ⁻² |
| 9. (v ₇ + v ₈) | All anthropogenic forcings: | 1.72 Wm ⁻² | 1.31 Wm ⁻² | 3.09 Wm ⁻² |
| 10. (1.6v ₉ / 1.72) | Adjusted total anthropogenic forcings: | | 1.23 Wm ⁻² | 2.87 Wm ⁻² |
| 11. Author's estimates | Solar forcing compared with 1906: | | 0.30 Wm ⁻² | -0.12 Wm ⁻² |
| 12. (v ₂ + v ₁₀ + v ₁₁) | Total radiant energy including all forcings: | | 237.41 Wm ⁻² | 238.63 Wm ⁻² |
| 13. [v ₁₂ / (εσ)] ^{1/4} — 273.15 — v ₁ | Temperature response since 1906 to forcings only: | | 0.46 C | 0.83 C |
| 14. λ ₁ (IPCC, 2007) | <i>Climate</i> Water vapour: | 1.80 Wm ⁻² K ⁻¹ | | |
| λ ₂ (IPCC, 2007) | <i>feedbacks:</i> - lapse rate: | -0.84 Wm ⁻² K ⁻¹ | | |
| λ ₃ (IPCC, 2007) | Surface albedo: | 0.26 Wm ⁻² K ⁻¹ | | |
| λ ₄ (IPCC, 2007) | Cloud effect: | 0.69 Wm ⁻² K ⁻¹ | 1.91 Wm ⁻² K ⁻¹ | 1.91 Wm ⁻² K ⁻¹ |
| 15. 1 / [1 + (λ ₁ +λ ₂ +λ ₃ +λ ₄) / — 3.2] | Feedbacks mutually amplified: | | 2.48 Wm ⁻² K ⁻¹ | 2.48 Wm ⁻² K ⁻¹ |
| 16. (v ₁₃ · v ₁₅) | Feedback forcing compared with 1906: | | 1.14 Wm ⁻² | 2.06 Wm ⁻² |
| 17. (v ₁₂ + v ₁₆) | Radiant energy including forcings & feedbacks: | | 238.55 Wm ⁻² | 240.69 Wm ⁻² |
| 18. [v ₁₇ / (εσ)] ^{1/4} — 273.15 — v ₁ | Projected temperature in 2006: | | 14.51 C | 15.16 C |
| 19. (v ₁₈ — v ₁) | Response to forcings+feedbacks (NCDC 0.84 C): | | 0.80 C | 1.45 C |
| 20. Checksum: [v ₁₉ / (v ₁₀ + v ₁₁)] | λ = δT / δF [in IPCC (2001) chapter 6, λ ~ 0.50]: | | 0.52 | 0.53 |

The level of scientific understanding of processes below the line is low.

Pinatubo eruption, using observational measurements of the temperature anomalies of the lower troposphere, measurements of the long-wave outgoing radiation, and the aerosol optical density.” They reported “a short atmospheric response time, of the order of several months, leaving no volcano effect in the pipeline, and a negative feedback to its forcing.”

Douglass and Knox also reported that the short intrinsic climate response time that they had derived (6.8 ± 1.5 months) “confirms suggestions of Lindzen and Giannitsis (1998, 2002) that a low sensitivity and small lifetime are more appropriate” than the “long response times and positive feedback” assumed in the AOGCMs. They concluded that “Hansen *et al.*’s hope that the dramatic Pinatubo climate event would provide an ‘acid test’ of climate models has been fulfilled, although with an unexpected result.”

The present calculations strongly support the contention that the time-difference between the transient and equilibrium responses to radiative forcings and climate feedbacks is intra-decadal and perhaps intra-annual, and is very unlikely to be supra-centennial. If the difference is indeed of months rather than of years, then the magnitude of the equilibrium response has fully manifested itself in the observed temperature record.

However, it is possible that in the past half-century the Sun has been more active than at any time in the previous 11,400 years. Solanki *et al.* (2005) report that “during the past 11,400 years the Sun spent only of the order of 10% of the time at a similarly high level of magnetic activity and almost all of the earlier high-activity periods were shorter than the present episode.” They say, “The rarity of the current episode of high average sunspot numbers may indicate that the Sun has contributed to the unusual climate change during the twentieth century.” But they point out that solar variability is unlikely to have been the dominant cause of the strong warming during the past three decades.

If Solanki *et al.* are right, the solar forcing assumed here, already a little higher than that assumed by the IPCC, might be greater still, either lengthening the duration of the period between transient and equilibrium response or suggesting that the forcings and climate feedbacks — many of which the IPCC acknowledges are little-understood — may be overstated in the UN’s models.

We are attempting to model an object — the climate — that is chaotic in the mathematical sense and is hence unpredictable by definition unless not only all relevant climatic processes and interactions but also the initial state of the climate at any chosen instant are known in detail to a very high degree of precision.

Lorenz (1963) founded chaos theory by demonstrating that, in a heuristic climate model containing only five variables, and following rules that were predetermined and hence

fully known, even a small perturbation in one of the variables could induce phase transitions in a later state of the climate that would not otherwise occur. It is the exiguity of the phase-transition trigger in the initial state of the climate, when compared with the magnitude of the subsequent effects of that small change, which mandates a level of detail and precision in our knowledge of the initial state of the climate that is not at present attainable.

Phase transitions — abrupt changes from an ordered to an apparently disordered state — occur in all chaotic objects, such as climate. We do not know enough to predict them. The models failed to predict the timing, duration or magnitude of the exceptional El Nino Southern Oscillation in 1998. They failed to predict the sudden and substantial cooling of the climate-relevant surface or mixed layer of the ocean over the past two years (Lyman *et al.*, 2006). Such coolings seem to occur periodically, but we do not yet know why.

Unlike Lorenz’s heuristic, the Earth’s climate is not defined by us in advance. We do not make the rules, and we do not have a thorough understanding either of the rules themselves or of the consequences of their application. It is only recently that the AOGCMs have been developed to the point where “flux adjustments” many times larger than the comparatively small effects under study can be dispensed with. As Table 2 shows, it is at a rather early point in the algorithm that our level of scientific understanding of the processes we are using becomes low.

Furthermore, we have not been making detailed climatic measurements for long enough to establish the causes of events that now surprise us. Many of the climatic processes are being measured for the first time. We do not know how much hotter the Sun is in 2006 than it was in 1906. IPCC has substantially reduced its already-low estimate of the solar influence on climate since its 2001 report: but it still marks our understanding of the solar influence on climate as “low”. If the Sun has played a greater role in the past century’s warming than the IPCC considers likely, one possibility is that the contribution of greenhouse gases and other anthropogenic effects to the past century’s warming has been commensurately less even than that shown in Table 2.

Finally, the UN’s predictions are founded not only on an underestimate of the solar effect on climate that leaves pre-industrial climate change unexplained, but also on an excessive rate of increase in airborne carbon dioxide. The true rate is 0.38% year on year since records began in 1958. The rate has risen recently, but is still under 0.5%. The models assume 1% pa, more than two and a half times too high. In 2007 the UN will use these and other adjustments to predict a 21st-century temperature increase of 2 to 6C. Stern suggests up to 11C.

The Economics

So to the economics. Stern's report says the world must spend 1% of GDP from now on to avert disaster. The UN's 2007 report was going to mention up to 5%, but Sir Nick's team tell me, "We are confident that the UN will publish a range for costs next year in which ours will be centrally placed." Some quiet, high-level co-ordination is going on. The oddest thing about Stern's curious report was its timing. Publication of the UN's next major science assessment is only months ahead. Why not wait and base the economics on that?

The UN needed Stern more than Stern needed the UN. Its 2001 report had numbers more extreme than anyone else's, so sceptics abounded. This time, an international spinfest is shutting off dissent in advance. First, the damage done by the defective graph had to be repaired, so a series of papers supporting its conclusions quickly appeared, many written by associates of its authors.

Next, the failure of observed temperature to rise as the UN projected had to be explained. Hence another flurry of learned papers, this time about the ocean notion — the maritime heat-sink into which the missing temperature might be vanishing.

Above all, it was vital that this time the UN's report should not be seen to print the biggest exaggerations around. Enter Stern.

At whom was the spin aimed? At the Chinese, the Indians, the Indonesians and the Brazilians. China has 30,000 coal mines. It is opening a new power station every five days till 2012. The Third World is growing. It will not be told it cannot enjoy the growth we have enjoyed. It would not sign Kyoto till it was exempted, so, under Clinton and Gore, the US Senate voted unanimously to reject Kyoto. Whatever the West does to Save The Planet is mere gesture unless the developing world agrees to give up its right to grow as we have grown. It remains to be seen whether the US Senate, now under Democrat control, moves to ratify Kyoto.

Sir Nick says if we spend 1% of GDP now and forever we can reduce "the chances of temperature rises of 4–5C and above — at which levels some of the worst impacts occur". The crucial number when evaluating tomorrow's income-stream from today's investments is the discount rate — the annual percentage by which any forecast of tomorrow's revenue is cut to allow for the risks inherent in not getting it today. Stern discusses the rate at length, and even has a technical annex on it, but — astonishingly — not once in 700 pages does he put a figure on it.

I gave his team 24 hours' notice of the question: What discount rate or rates and why? Six hours after my deadline, as the Treasury was closing, they said they might answer "next week". The following morning, I rang and

asked again. "There's nobody in who worked on that part of the report," they said. Eventually, and only after I had threatened to put down questions in the House of Lords, Stern's team replied. Their answer is as follows:

"The annual discount rate can, under standard economic assumptions on diminishing marginal utility from consumption, be shown to approximate to the annual consumption growth rate multiplied by the elasticity of the marginal utility of consumption plus the pure rate of time preference. The elasticity is taken in the Review to be one, and the pure rate of time preference is assumed in the Review to be 0.1%. Therefore, for paths with different growth rates there are different discount rates.

"For GDP or consumption, we assume global average growth of 2% this century, 1.8% next century and 1.3% in 2200 and beyond, depending on time and region (so that, for instance, growth rates in developing countries are higher than those in developed countries).

"A scenario with higher GDP or consumption growth rates would be expected to generate greater emissions, but also have a reduced discount rate. The balance of these effects depends on how fast damages rise with emissions, and how the discounting factor changes rate over time (shaped by the growth rate and the elasticity of the marginal utility of consumption)."

Why the coyness? Because, despite the entire chapter devoted to the discount rate in the Stern Report, the procedure for setting the discount rate, and the rates themselves, are identical to those described on a single page in the Treasury's Green Book. No commercial organization would use a discount rate so low: this rate is what the Treasury has been using to provide specious justification for the rapid, costly and wasteful expansion of the State sector under the present Government.

Stern's team were also coy about what value our \$500 billion a year would buy us. They said that if the world stabilized atmospheric CO₂ at around 485 parts per million we should have spent 1% of GDP to get a 1.1% fall in consumption. If we stabilized at 400ppm, consumption would fall by only 0.6%. But that is a pipedream: we are at 380ppm already, and, on Stern's figures, we shall reach 400 in just eight years.

By 2035, says Sir Nick, temperature will have risen by "over 2C". Sounds alarming. What he means, though, is over 2C since 1750, when we do not know what temperature was. Stern's 485 parts per million by 2035 is based on the UN's worst case. Even then, the increase compared with today would be just 0.7C. On the UN's lower projection, implying 425ppm by 2035, only 0.3C.

The UK accounts for just 2% of global emissions, and falling. Even if Britain stopped using energy altogether,

global temperature by 2035 would be six thousandths of a degree Celsius less than if we carried on as usual. If we shut down once a week on Planet Day, make that less than one thousandth. Even if every Western country complied with Kyoto (and most won't), Senator Inhofe of Oklahoma, outgoing chairman of the Senate Environment Committee, says temperature a century from now would be a twenty-fifth of a degree lower than without Kyoto.

In that context, the few femtowatts you'll save by turning off the standby LED on your TV don't rate. It is not that energy efficiency, renewables and recycling will not make enough difference. They will hardly make any.

We are addressing the wrong problem. In the UK, energy is about to run out. In ten years, a third of our power stations will be worn out or against EU pollution laws. By 2035 oil prices could be ten times today's. Our children would be immeasurably better off if we sequestered North Sea oil by leaving it in the ground than if we sequestered carbon dioxide at Peterhead.

While the Government quixotically tilts at wind-power the Danes, who did it first, have stopped building bird-slicers. You need a wind-farm the size of Greater Manchester to match the output of one nuclear power station, and not a watt if the wind isn't blowing. As for hydro, if you want to build a plant above a megawatt in Scotland, you can't, because for the last year two bureaucracies have been arguing about which of them should grant planning permission.

The UK needs to start building (not designing, or having ten-year planning enquiries about) 12 nuclear power stations at once. Nuclear power does not emit CO₂. The French, 80% nuclear, have half the UK's carbon footprint. And what is Stern's policy on nuclear power? "We argue that a portfolio of technologies will be needed." The Government's? "Er..." The Tories'? "Um, a last resort. Let's all cycle to work and have the chauffeur follow us with our clean shirts."

Sci-fi panics like climate change are dangerous because they distract politicians from what really needs doing. Y2K bug: correct solution, laugh; actual solution, Y2K Office; result, zilch at great cost. BSE/CJD: correct solution, eat British beef; actual solution, massive research and widespread hysteria; result, nada. Bird flu: correct solution, do nothing; actual solution, jobs for virologists and, weirdly, purchase of 200,000 body-bags; result, surplus of body-bags. Climate change: correct solution, go nuclear and reverse 20th-century deforestation; actual solution, chauffeured shirts, rampant deforestation, EU paying farmers not to plant trees or anything else; result, energy crisis, species loss and no fall in CO₂.

Shouldn't we take precautions, just in case? No. The "precautionary principle" kills. Example — DDT: correct solution, limit it in agriculture but allow indoor spraying

against malaria; actual solution, give the inventor a Nobel Prize, then say it's cancerous (it's safe enough to eat) and ban it, especially for indoor spraying; result, only this year, after 30 million dead of malaria and counting, has the WHO agreed to recommend indoor spraying.

Carbon taxes? Bizarrely, the UK's climate-change levy taxes all forms of generation even if they don't emit CO₂. David Miliband, the Environment Secretary, told the BBC this week how good it was. The BBC didn't argue.

Emissions trading? The EU's daft scheme allows more emissions to be traded than are being emitted — except in the UK, whose business-unaware Government sets us at a disadvantage by imposing a lower limit and not even exempting the NHS. Result: poor hospitals have to buy emission rights from rich oil companies. Miliband told the BBC how good it was. The BBC didn't argue. One of the better jokes going the rounds at Westminster is that the unit of cant is the Miliband.

Emissions trading and all such interventions advocated by the climate-change "consensus" will be expensively futile without the consent of the Third World's fast-growing nations. That consent will rightly be withheld until the UN produces soundly-based, scientifically-honest, fair and realistic projections. Meanwhile, cut out and keep this article. If Margaret Beckett has her way, you won't ever see one like it again.

References

- CAILLON, N., Severinghaus, J.P., Jouzel, J., Barnola, J.-M., Kang, J. and Lipenkov, V.Y. **2003**. *Timing of atmospheric CO₂ and Antarctic temperature changes across Termination III*. *Science* **299**: 1728–1731.
- DOUGLASS, D.H. and Knox, R.S. **2005**. *Climate forcing by the volcanic eruption of Mount Pinatubo*. *Geophysical Research Letters* **32**: 10.1029/2004GL022119.
- HANSEN, J., Lacis, A., Ruedy, R. and Sato, M. **1992**. *Potential climate impact of Mount Pinatubo eruption*. *Geophysical Research Letters* **19**: 215–218.
- HANSEN, J., Nazarenko, L., Ruedy, R., Sato, M., Willis, J., Del Genio, A., Koch, D., Lacis, A., Lo, K., Menon, S., Novakov, T., Perlwitz, J., Russell, G., Schmidt, G., and Tausnev, N. **2006**. *Earth's energy imbalance: confirmation and implications*. *Science* **308**: 1431–1434.
- HOUGHTON, Sir John. **2002**. *Overview of the climate change issue*. Presentation to “Forum 2002” at St. Anne’s College, Oxford. www.jri.org.uk/resource/climatechangeoverview.htm.
- HOUGHTON, Sir John. **2006**. *Replies to questions from the author*, Royal Society, 27 October.
- INDERMUHLE, A., Monnin, E., Stauffer, B. and Stocker, T.F. **2000**. *Atmospheric CO₂ concentration from 60 to 20 kyr BP from the Taylor Dome ice core, Antarctica*. *Geophysical Research Letters* **27**: 735–738.
- IPCC. **1996**. *The Science of Climate Change: Contribution of Working Group I to the Second Assessment Report of the IPCC* (eds. J. T. Houghton et al.), Cambridge University Press, London, 1996.
- IPCC. **2001**. *Climate Change, The Scientific Basis*, Cambridge University Press, London, 2001.
- IPCC. **2007**. [in press]. *Fourth Assessment Report*. Cambridge University Press.
- LINDZEN, R.S. and Giannitsis, C. **1998**. *On the climatic implications of volcanic cooling*. *Journal of Geophysical Research* **103**: 5929–5941.
- LINDZEN, R.S., Chou, M.-D. and Hou, A.Y. **2001**. *Does the earth have an adaptive infrared iris?* *Bulletin of the American Meteorological Society* **82**: 417–432.
- LINDZEN, R.S. and Giannitsis, C. **2002**. *Reconciling observations of global temperature change*. *Geophysical Research Letters* **29**: 10.1029/2001GL014074.
- LORENZ, Edward N. **1963**. *Deterministic nonperiodic flow*. *Journal of the Atmospheric Sciences*, **20**: 130–141.
- LYMAN, John M., Willis, J.K., and Johnson, G.C. **2006**. *Recent cooling of the upper ocean*. *Geophysical Research Letters*, **33**: L18604, doi:10.1029/2006GL027033.
- McINTYRE, Stephen and McKittrick, Ross. **2005**. *Hockey sticks, principal components, and spurious significance*. *Geophysical Research Letters*, **32**: L03710, doi: 10.1029/2004GL021750.
- PETIT, J.R., Jouzel, J., Raynaud, D., Barkov, N.I., Barnola, J.-M., Basile, I., Bender, M., Chappellaz, J., Davis, M., Delaygue, G., Delmotte, M., Kotlyakov, V.M., Legrand, M., Lipenkov, V.Y., Lorius, C., Pepin, L., Ritz, C., Saltzman, E., and Stievenard, M. **1999**. *Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica*. *Nature* **399**: 429–436.
- SASSEN, K. **1992**. *Evidence for liquid-phase cirrus cloud formation from volcanic aerosols: Climate indications*. *Science* **257**: 516–519.
- SOLANKI, S.K., Usoskin, I.G., Kromer, B., Schüssler, M. and Beer, J. **2005**. *Unusual activity of the Sun during recent decades compared to the previous 11,000 years*. *Nature* **436**: 174 (14 July 2005) | doi: 10.1038/436174b

STERN, Sir Nicholas. **2006.** *The Economics of Climate Change*. Internet publication by HM Treasury: Downloadable from http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.