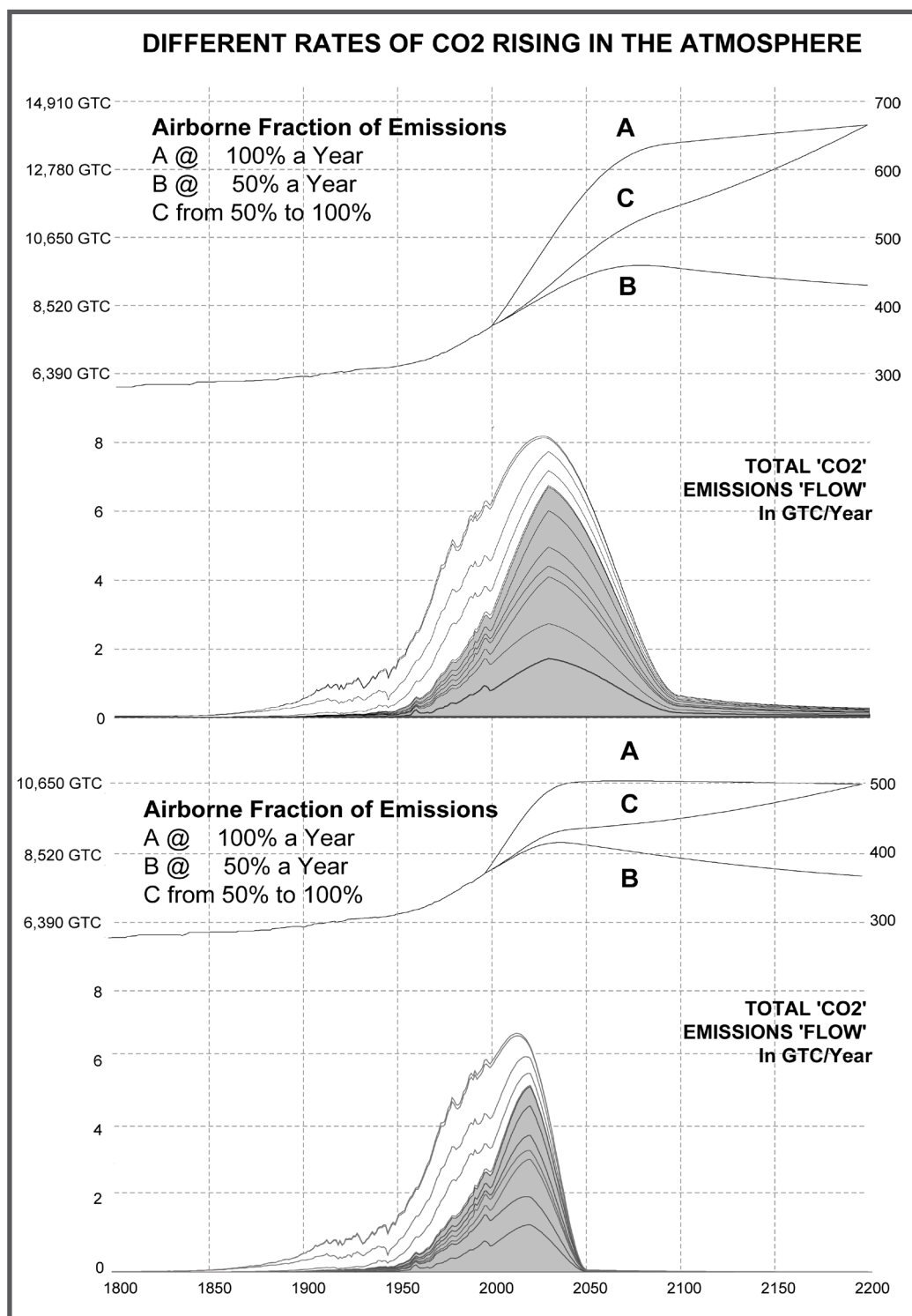


Using 'C&C' to Organise "DOING ENOUGH, SOON ENOUGH", to AVOID Dangerous Climate Change



Climate Change (Contraction and Convergence) Bill

A

B I L L

To make provision for the adoption of a policy of combating climate change in accordance with the principles of contraction and convergence; and for connected purposes.

Presented by Colin Challen.

*Ordered, by The House of Commons,
to be printed, 23rd November 2005.*

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Climate Change (Contraction and Convergence) Bill

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A
B I L L

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Make provision for the adoption of a policy of combating climate change in accordance with the principles of contraction and convergence; and for connected purposes.

BE IT ENACTED by the Queen’s most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1 Interpretation

In this Act—

“carbon emission rights” means rights to discharge greenhouse gases into the atmosphere;

“contraction and convergence” means — 5

(a) the stabilising of atmospheric concentrations of greenhouse gases at a safe and stable level, with planned progress towards that objective by an agreed date, and

(b) the equitable distribution of carbon emission rights among individual states or groups of states, in proportion to their population, with planned progress towards that objective by an agreed date, 10

as agreed in the United Nations Framework Convention on Climate Change, 1992 (“UNFCCC”);

“full-term contraction budget for global greenhouse gas emissions” and “contraction budget” mean an arrangement for the progressive reduction of atmospheric concentrations of greenhouse gases to a safe and stable level over a defined period; 15

“greenhouse gases” means —

(a) carbon dioxide, 20

(b) methane,

(c) nitrous oxide,

(d) hydrofluorocarbons,

(e) perfluorocarbons,

(f) sulphur hexafluoride, and 25

- (g) any other gas which may be prescribed in regulations made by the Secretary of State;
- “safe and stable level” means a maximum concentration of 450 million parts per volume, or such lower level as may be prescribed in regulations made by the Secretary of State.

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2 Duty of Secretary of State

It shall be the duty of the Secretary of State to pursue a policy of combating global climate change in accordance with the principles of contraction and convergence.

3 Implementation of policy

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In order to further the policy set out in section 2, the Secretary of State shall seek to secure international agreement on—

- (a) a safe and stable level of concentrations of greenhouse gases in the atmosphere;
- (b) a full-term contraction budget for global greenhouse gas emissions;
- (c) the distribution of the contraction budget among individual states or groups of states in the form of carbon emission rights in such a way that distribution in proportion to population is achieved before the end of the period to which the contraction budget applies, whether or not a population base-year has been agreed;
- (d) accelerating the rate of global convergence relative to the rate of global contraction in the contraction budget in its application to different regions of the world, whether developed or not;
- (e) the sale and purchase of carbon emission rights, both between and within individual states, in order to promote the development of, and investment in, technology which reduces carbon emissions to a minimum; and
- (f) the revision by the Conferences of Parties and Meetings of Parties to the UNFCCC of any agreed rates of contraction and convergence so as to take account of improvements in the scientific understanding of the dangers of climate change.

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4 Report to Parliament

The Secretary of State shall in the course of each year lay before Parliament a report containing—

- (a) an assessment commissioned by him of the current state of global emissions of greenhouse gases;
- (b) a statement on the progress made in the previous year in negotiations towards implementing the provisions of sections 2 and 3 of this Act;
- (c) his assessment of the efficacy of the instruments of domestic policy which are designed to give effect to the contraction budget; and
- (d) a statement on the progress made in the previous year towards the implementation of the contraction budget.

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5 Regulations

- (1) Any power of the Secretary of State to make regulations under this Act is exercisable by statutory instrument.

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- (2) Any regulations under this Act shall be laid before Parliament after being made and shall be subject to annulment in pursuance of a resolution of either House of Parliament.

6 Expenses

There shall be paid out of money provided by Parliament any expenditure incurred by a Minister of the Crown by virtue of this Act. 5

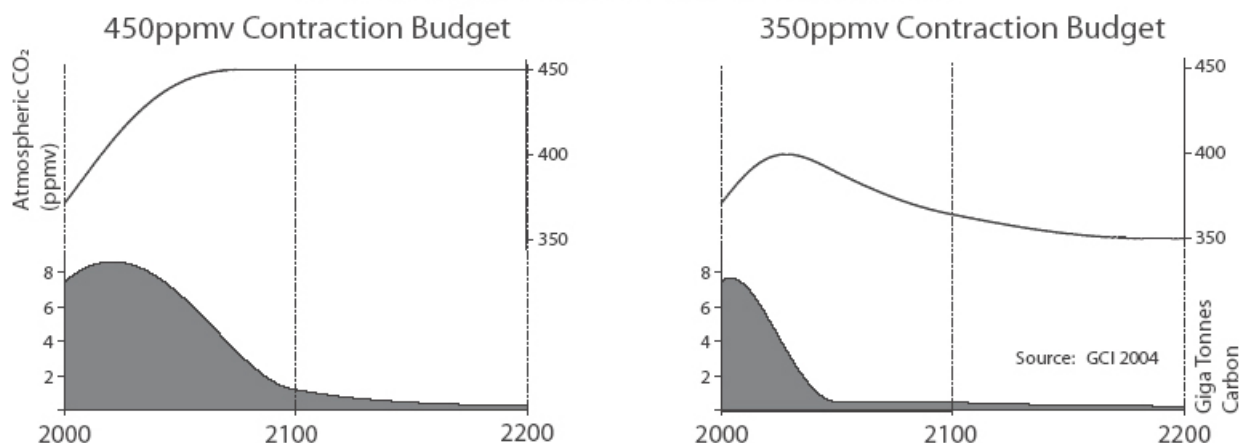
7 Short title

This Act may be cited as the Climate Change (Contraction and Convergence) Act 2006.

USING C&C TO ORGANISE "DOING ENOUGH, SOON ENOUGH", TO AVOID DANGEROUS CLIMATE CHANGE

1. "Contraction and Convergence" (C&C) is the science-based, global climate-policy framework, proposed to the United Nations since 1990 by the Global Commons Institute. This definition below is the basis of a 'C&C Bill' now before the UK Parliament.
2. The objective of safe and stable greenhouse gas concentrations in the atmosphere and the principles of precaution and equity, as agreed in the "United Nations Framework Convention of Climate Change" (UNFCCC), provide the formal calculating basis of the C&C framework that proposes:

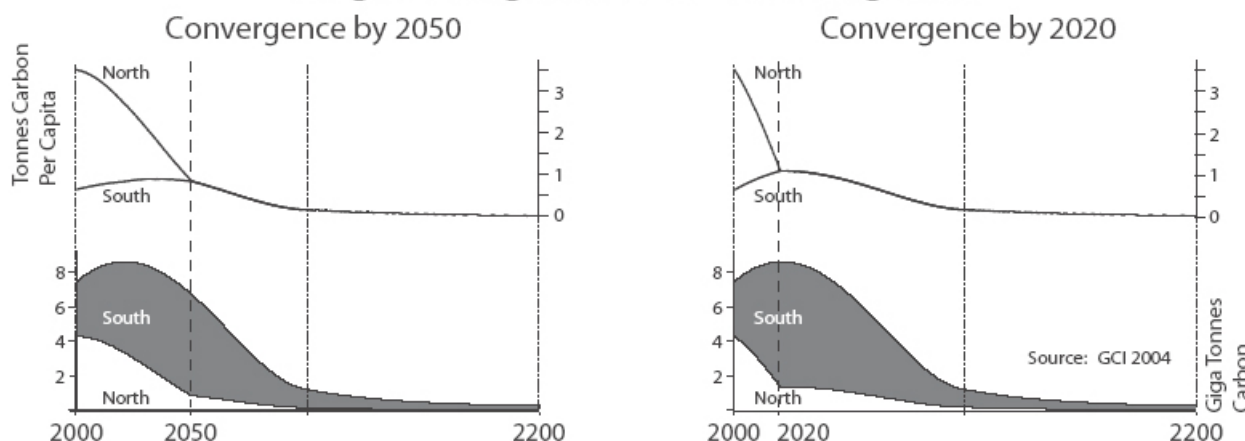
Negotiating Rates of Contraction



Annual Carbon Emissions contract over time to a sustainable level. This is the "Contraction Event".
The Choice of a "safe" CO₂ stabilisation level determines the total tonnage of carbon to be burnt during the contraction event.
Two examples of CO₂ stabilisation levels are shown above, with their corresponding contraction budgets.

- A full-term contraction budget for global emissions consistent with stabilising atmospheric concentrations of greenhouse gases (GHGs) at a pre-agreed concentration maximum deemed to be safe, following IPCC WG1 carbon cycle modelling. (See Image Two on page two – GCI sees higher than 450 parts per million by volume [ppmv] CO₂ equivalent as 'not-safe').

Negotiating Rates of Convergence



Per capita emissions around the World converge on equality by a negotiated "Convergence Date".
Two examples of convergence are shown here, each within a 450ppmv contraction budget.

- The international sharing of this budget as 'entitlements' results from a negotiable rate of linear convergence to equal shares per person globally by an agreed date within the timeline of the full-term contraction/concentration agreement. (GCI suggests [a] between the years 2020 and 2050, or around a third of the way into a

100 year budget, for example, for convergence to complete (see Image Three on page two) and [b] that a population base-year in the C&C schedule is agreed).

- Negotiations for this at the UNFCCC should occur principally between regions of the world, leaving negotiations between countries primarily within their respective regions, such as the European Union, the Africa Union, the US, etc.
- The inter-regional, inter-national and intranational tradability of these entitlements in an appropriate currency such as International Energy Backed Currency Units [EBCUs - 5] should be encouraged.
- Scientific understanding of the relationship between an emissions-free economy and concentrations develops, so rates of C&C can evolve under periodic revision.

3. Presently, the global community continues to generate dangerous climate change faster than it organises to avoid it. The international diplomatic challenge is to reverse this. The purpose of C&C is to make this possible. It enables scenarios for safe climate to be calculated and shared by negotiation so that policies and measures can be internationally organised at rates that avoid dangerous global climate change.

4. GHG emissions have so far been closely correlated with economic performance (See Image Four Page Three). To date, this growth of economies and emissions has been mostly in the industrialised countries, creating recently a global pattern of increasingly uneconomic expansion and divergence [E&D], environmental imbalance and international insecurity (See Image).

5. The C&C answer to this is full-term and constitutional, rather than short-term and stochastic. It addresses inertial argument about 'historic responsibilities' for rising concentrations recognising this as a development opportunity cost to newly industrialising countries. C&C enables an international predistribution of these tradable and therefore valuable future entitlements to emit GHGs to result from a rate of convergence that is deliberately accelerated relative to the global rate of contraction agreed..

6. The UK's Royal Commission on Environmental Pollution [6] and the German Advisory Council on Global Change [7] both recommend C&C to governments. Many individual and institutional statements supporting C&C are now on record. [8, 9] The Africa Group of Nations formally proposed it to the UNFCCC in 1997. [10] It was agreed in principle at COP-3 Kyoto 1997. [11] C&C conforms to the requirements of the Byrd Hagel Resolution of the US Senate of that year [12] the European Parliament passed a resolution in favour of C&C in 1998 [13] and this definition statement is now the basis of a Bill [The "Contraction and Convergence" Act] before the UK Parliament.

7. This synthesis of C&C can redress the increasingly dangerous trend imbalances of global climate change. Built on global rights, resource conservation and sustainable systems, a stable C&C system is now needed to guide the economy to a safe and equitable future for all. It builds on the gains and promises of the UN Convention and is an approach compelling enough to galvanise urgent international support and action.

[1] <http://www.gci.org.uk>

[2] <http://www.gci.org.uk/model/dl.html>

[3] [http://www.gci.org.uk/images/CC_Demo\(pc\).exe](http://www.gci.org.uk/images/CC_Demo(pc).exe)

[4] http://www.gci.org.uk/images/C&C_Bubbles.pdf

[5] <http://www.feasta.org/events/debtconf/sleepwalking.pdf>

[6] <http://www.rcep.org.uk/pdf/chp4.pdf>

[7] http://www.wbgu.de/wbgu_sn2003_engl.pdf

[8] http://www.gci.org.uk/Archive/1989_2004

[9] <http://www.gci.org.uk/consolidation/Sasakawa.pdf>

[10] <http://www.gci.org.uk/papers/zew.pdf> [appendix C, page 16]

[11] http://www.gci.org.uk/temp/COP3_Transcript.pdf

[12] <http://www.gci.org.uk/briefings/C&C&ByrdHagel.pdf>

[13] http://www.gci.org.uk/consolidation/UNFCCC&C_A_Brief_History_to1998.pdf

A global CO₂ problem declared in 1990

The First Assessment Report (FAR) of the Intergovernmental Panel on Climate Change (IPCC) – Climate Change; the Scientific Assessment - was published in 1990. Even then its main findings were confident and stark. Climate Scientists agreed that: -

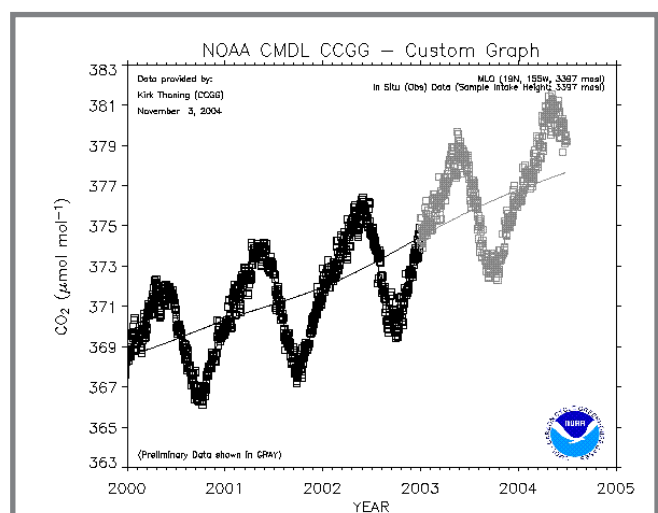
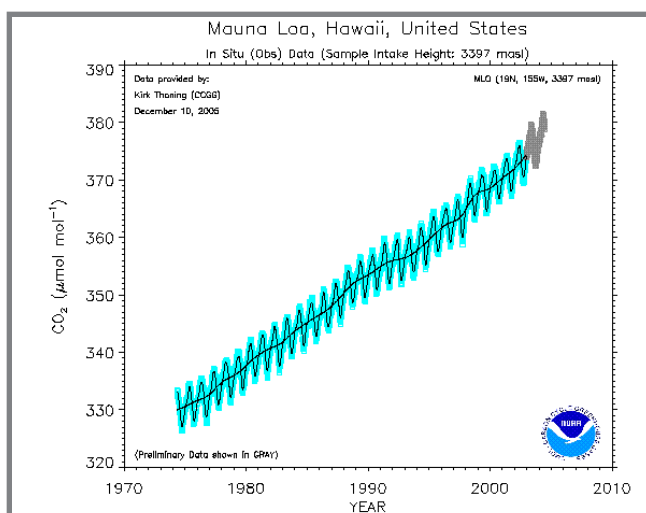
- greenhouse gas concentration in the atmosphere had risen 25% above the pre-industrial level;
- this was due to an accumulation of emissions from human activities such as fossil fuel burning and land-use change;
- global mean temperature had increased by more than one third of a degree over the previous 100 years;
- calling it “inadvertent”, this combination of trends was potentially changing the global climate in a manner that was damaging and dangerous;
- to stabilise the rising concentration of carbon dioxide (CO₂), the main greenhouse gas from human sources, in the atmosphere at the then current value of 353 parts per million by volume (ppmv), an immediate deep cut [between 60% and 80%] of the emissions of CO₂ would be required;
- concentrations would continue rising if the cuts were not immediately implemented and if such cuts were delayed, a greater the extent of cuts would be required to achieve a given level of concentration in the atmosphere.

Inconstancy in the ‘Constant Airborne Fraction’ [CAF] of CO₂

Until recently, the ratio of rising emissions and concentrations [or sources minus sinks] has been assumed to be constant. The ratio of what has been accumulation in the atmosphere has remained constant at the net 50% of the flow of emissions for the last two hundred years. The CDIAC data record shows these things clearly;

1. Emissions of CO₂ from fossil fuel burning rose from about ten million tonnes of carbon a year in 1800 to around six and a half billion tonnes at the present rising at an average rate of between 2 and 3% per annum, [See Chart on page 6],
2. Concentrations of CO₂ in the global atmosphere rose during this period 100 parts per million by volume (ppmv) from 280 ppmv in 1800 to 380 ppmv at the present time, [See left hand side Charts overleaf - “Different Rates of CO₂ Rising”].

So far on average, a constant half of each year’s emissions has been retained in the atmosphere and half has been returned to the natural sinks. It is this so-called ‘constant airborne fraction’ [CAF] that now appears to be increasing. The biosphere ‘sinks’ appear no longer to be expanding in proportion to the growth rate of emissions. The fraction of each year’s emissions retained in the atmosphere is increasing.



These two images are from Mauna Loa Observatory [MLO] in Hawaii [NOAA]. They show the rise in CO₂ in the global atmosphere as an average of measurements taken from many points around the globe since the early 1970's. The one on the right enlarges the detail from 2000 until mid 2004. The significant feature is the accelerated rise recorded between 2002 and 2004. This recent average of increase is 1.5 parts per million by volume (ppmv) a year. The last two years appear to have doubled the rate to nearer 3 ppmv. Each atmospheric ppmv CO₂ weighs 2.13 billion tonnes of carbon [GtC] so 1.5 ppm weighs 3.2 GtC. A rise per annum of 3 ppmv is a weight-gain of 6.4 GtC.

This is roughly equal to the entirety of human emissions from fossil fuel burning in that single year. Why? The global economy didn't grow 100% in that year. It grew at under 3%. So up to the net equivalent of 100% of emissions appears to have been retained in 2003/4.

This breaks sharply with the average pattern of the past. Ralph Keeling of MLO, said informally if one wanted to know what positive feedback would look like, it would look like this. This is not reassuring. Positive feedback within the system as a whole increases the potential for rates of global climate change to become 'runaway', rates over which we will lose any control we might have had through emission control. If this trend persists, the odds for achieving the objective of the UNFCCC worsen. It means that the contraction and convergence of emissions required for stable concentrations must be even faster than was outlined in the IPCC 2nd and 3rd Reports.

CO₂ Emissions and Concentrations A 'Bath-Tap' Analogy

The dominant greenhouse gas from human sources is carbon dioxide or CO₂. The relationship between atmospheric CO₂ concentrations and the emissions of CO₂ from human sources is a 'stock-flow' relationship and can be thought of as a 'bath-tap' analogy. Just as the bath accumulates the flow of water to it from the tap, the atmosphere accumulates the flow of emissions to it from sources such as the burning of fossil fuels. Emissions are the short-term flow to the atmosphere which slowly accumulates a fraction of these as long-term stock.

On the flow side, the bath-tap analogy extends further introducing the 'plug-hole' through which water is drained away, where the tap represents the 'sources' of emissions, the plug-hole represents their natural 'sinks'. Sinks are for example oceans and forests and where some of the extra CO₂ emissions are 're-absorbed'.

If the plug hole is open while the tap is on, the level of water in the bath [the stock] slowly rises. In other words that level of the bath is the net balance of the rates of flow in to it through the tap [the source] and out of it through the plug-hole [the sink]. If the tap runs in at twice the rate the plug-hole drains away, the net rate of water accumulating in the bath is 50%, or half the rate, of the flow from the tap into the bath.

If the bath approaches the point of over-flowing, the tap needs to be turned off completely to avoid over-flow. The bath level however, continues to rise even while the tap is being turned off and at least until it is turned off.

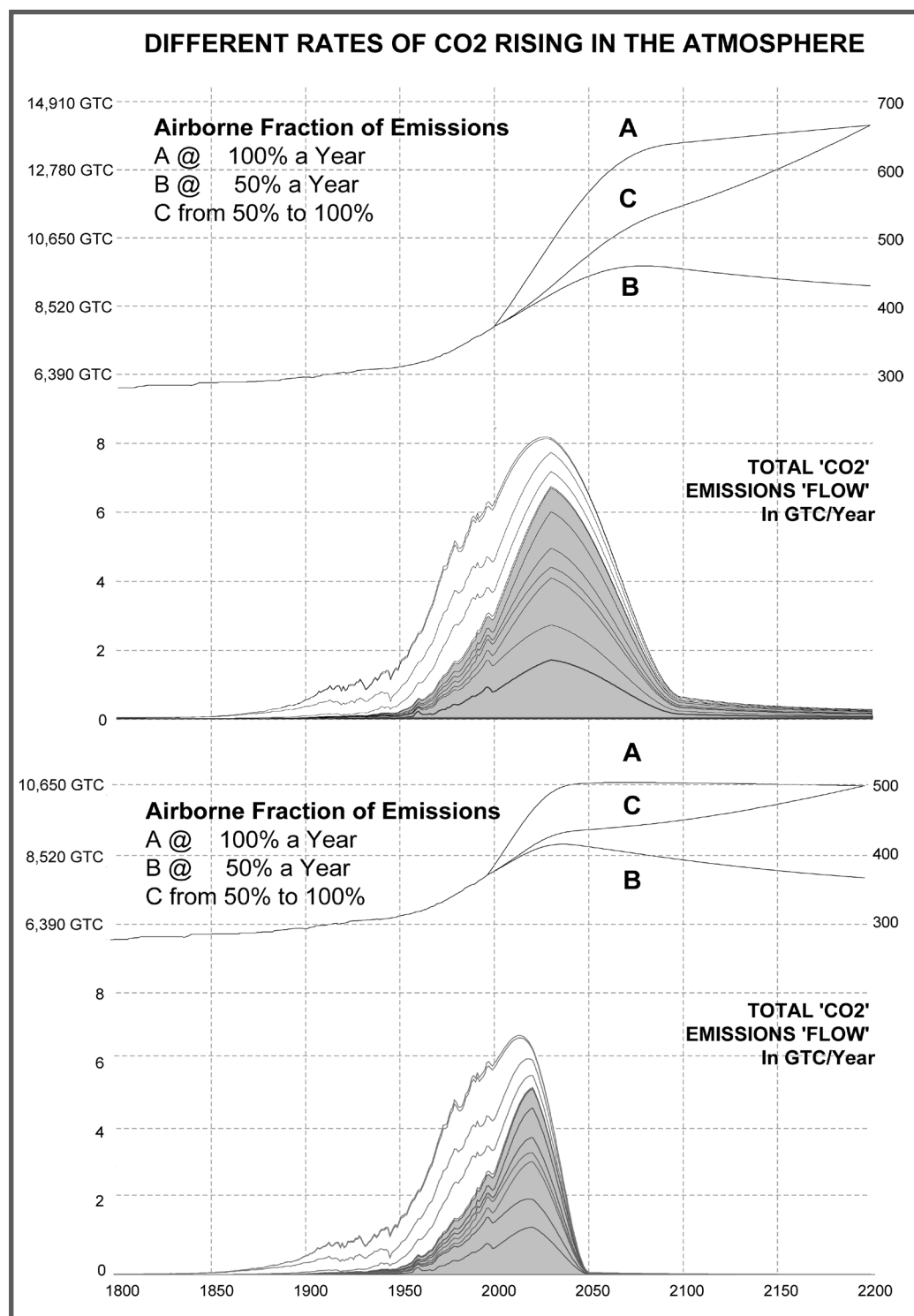
The danger of the over-flow is increasing not decreasing. Rates of the flow from the tap into the bath and from the bath out through the plug-hole - are accelerating - as is the rate of retention. In the real world this is manifest and there is real cause for concern. Emissions are increasing driven by efforts to correct 'Asymmetric global development' and sinks are failing due to increased forest combustion, warming and acidification of the oceans consequently the airborne fraction of emissions is increasing too.

In the analogy, the tap is opening wider, the pressure behind it is increasing, the plug-hole is blocking up, the rate at which the bath is filling is accelerating and there are more and more people in the bath wanting to fill it; - the likelihood of the bath overflowing is itself, rapidly growing.

The delaying consequences of vague and aspirational climate politics come at a price. Here is a graphic visualization of future CO2 emissions and their possible effects on future atmospheric concentrations. This is based on two 100 year totals [600 GtC Chart in A and 300 GtC in Chart B] of emissions from the IPCC. In both scenarios, atmospheric retention of CO2 is projected over 200 years at three rates:

C – Airborne Fraction Constant [CAF] at 50%, as per the original modelling;
A – Airborne Fraction Constant at 100%, constantly projecting the recent rate;
B – Airborne Fraction Constantly increasing from 50% to 100% as the mean case.

If CAF is no longer constant at 50%, even if it is increasing only gradually, this needs to be explained. The projections show clearly that the deep cuts in CO2 globally we are contemplating may prove ineffectual unless they are systematically structured and pursued as a top priority, immediately. The case for urgent contraction is clear. If the overall rate of rate of contraction is kept to not exceeding 400ppmv, the risk of accelerating atmospheric accumulation into the curvature of the C path is reduced.



As soon as we look at futures that were previously quantified in IPCC 2nd and 3rd Assessments as raising concentrations no higher than 450 ppmv, the accelerating increase in the airborne fraction means that even with the global contraction of emissions the concentrations can and probably will continue to rise; this means that temperature and damages will continue to accelerate as well.

With countries identified, these two scenarios are compared at the end of this paper with different rates of convergence to demonstrate the methodology of 'convergence-accelerated-relative-to-the-overall-rate-of-contraction'. This is C&C's way of resolving the argument between the North and the South about 'historic responsibility' for emissions.

The Emerging Political Economy of Climate Change since 1990

John Knaess, the Head of the US Delegation to the Second World Climate Conference in November that year, was asked at a press conference whether the US accepted the report's findings on increased concentrations and the implied increase in global warming. His reply was memorable and blunt; *"this is simple sophomore physics; the only uncertainties now are to do with how much warming and how soon."* Heat-trapping or 'greenhouse' gases, by definition, trap heat. What John Knaess was affirming was fundamental and obvious; if greenhouse gas traps heat, more greenhouse gas traps more heat. In no sense was his response a US denial of the problem.

This was easy to understand but not easy to act on, and the policy difficulty was very easy to understand. CO₂ emissions, especially those from fossil fuel burning, have been a close proxy for income or Gross Domestic Product since industrialisation at the beginning of the 19th Century. Deep cuts in these emissions to stabilise their atmospheric concentration implied curtailing economic growth. Indeed Economic Scientists working on emissions stabilisation scenarios in the 'Response Strategies Working Group' of the IPCC, stated that *"economic growth levels were assumed to decrease in the second half of the [21st] century."*

Real life intervened hard at that moment in the direction of damaging growth. In pursuit of more oil production, the Kuwaitis had been 'slant-drilling' under their North West border with Iraq. Seeing this as theft of Iraqi oil, Saddam Hussein objected and responded by invading Kuwait. Mrs Thatcher, then UK Prime Minister, used the 2nd World Climate Conference as a platform to denounce this and fearing this was the Iraqi preamble to seizing the nearby Saudi oil-fields, the then US President George Bush Senior formed and led a coalition of military forces to drive him out.

In retaliation, Hussein detonated the heads of the oil-wells and the emissions of CO₂ from that two month conflagration resulted in pointless emissions of CO₂ to the global atmosphere for some months while the fires were extinguished. With no economic benefit to anyone, the emissions impact of this on the global climate system was equal to the all emissions from the UK for one year [180 Megatonnes Caron]. During the rest of the year, soot particles were found in snows around the planet.

As that war began in January 1991 so did the negotiations to create what became the United Nations Framework Convention on Climate Change (UNFCCC). Formally agreed eighteen months later in June 1992 at the Earth Summit in Rio, the 'ultimate objective' of this treaty was to stabilise the rising concentrations of greenhouse gases in the atmosphere at a level that did not trigger dangerous rates of climate change. From that moment to this, the meaning of the word 'ultimate' has veered between 'eventual' and 'fundamental' and argument along this axis of interpretation remains contentious and confrontational. Some, who see evidence of global climate change as speculative, see the objective as an outcome to which end efforts are merely 'aspirational'. Others see evidence of global climate potentially changing so dangerously that species survival is called into question. Their thesis is "Equity and Survival" and to them being less than totally committed to the objective of the UNFCCC in a fundamental and organised way is foolishly playing the odds on an extinction event. Drawing the prickly inference that 'everything will come right in the end', fundamentalists see eventualists as mere evolutionists who recklessly seek refuge in the economics of Doctor Pangloss where mere aspiration secures the best of all possible worlds.

When really pressed on the reality of the problem, some eventualists switch to being fatalists saying there is no solution to the problem of climate change as it is too vast and humanity too disorganised to avert it.

United Nations Framework Convention on Climate Change

Agreed in June 1992 and ratified into force by March 1995

The Convention's Key Clauses

After two years of negotiation the UNFCCC draft text was tabled at the Earth Summit in 1992, signed and subsequently ratified. It defines the global problem and states that its global objective has to be guided by the principles of precaution and equity with a need for efficiency. Some of its key clauses are reprinted below:

The necessity for the Convention.

Parties to the UNFCCC, *'acknowledge that change in the Earth's climate and its adverse effects are a common concern of humankind.'* They are, *'concerned that human activities have been substantially increasing the atmospheric concentrations of greenhouse gases, that these increases enhance the natural greenhouse effect, and that this will result on average in an additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind'* (Preamble).

The Convention's Objective

'The ultimate objective of this Convention is to achieve.. stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.' (Article 2) In other words, greenhouse emissions have to contract.

The Principle of Global Equity

The Parties *'should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity.'* (Article 3.1). They note that, *'the largest share of historical and current global emissions of greenhouse gases has originated in developed countries and that per capita emissions in developing countries are still relatively low'* (Preamble). They therefore conclude *'that in accordance with their common but differentiated responsibilities and respective capabilities the developed country Parties must take the lead in combating climate change and the adverse effects thereof'* (Article 3.1), while, *'the share of global emissions originating in developing countries will grow to meet their social and development needs,'* (Article 3.3). In short, the Convention covers Convergence and a system of emissions allocation.

The Precautionary Principle

The Parties, *'should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures . . .'* (Article 3.3) . .

Achieving global efficiency

' . . taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at lowest possible cost.' (Article 3.3). This clause points to the global trading of emissions rights. More generally, the point to note here is that the idea of a framework based on precaution and equity had been established, with efficiency introduced in a subsidiary role purely to assist it.

Equity and Survival

From the outset however the US government took the position that global warming was a global problem and required a global solution. Their recognition of the need for globality was not just reasonable, it was inevitable. It said that to be effective at avoiding dangerous rates of climate change, all countries had to be involved in controlling emissions now, as the atmosphere was fluid, global and with no vertical boundaries, a perfect mixer of greenhouse gases.

In other words - perhaps like the US Government itself - the atmosphere was indifferent to the history and geographical source of emissions. Emissions from anywhere and anytime and for whatever reason are retained in the atmosphere. Consequently the US Government was calling for politics based on the generally obvious point that emission control in only some countries with no control of emissions in others was partial and therefore ineffectual. Following scenarios from the 'science-policy' group in the first IPCC report, initial talk was of global emissions reductions pro rata at 2% annually, either immediately or from perhaps 2010 onwards.

But as the United Nations Framework Convention on Climate Change (UNFCCC) was negotiated two global principles emerged in support of attainment of the objective: - precaution and equity. Precaution meant that taking steps to avoid climate change was necessary, even if uncertainties remained as to measuring the extent of the dangers faced. And equity recognized differentials; that national responsibilities for the accumulation of greenhouse gases in the atmosphere thus far were actually very different when added up over time. In essence the industrial countries of the North with 20% of global population were responsible for 80% of the rise in concentrations, and the newly industrialising countries of the South with 80% of global population were responsible for the other 20% of the rise in concentrations. This asymmetry obviously could not be ignored.

Because of the link between emissions and income, another way of measuring this was the significant differences in per capita emissions [or impact] and purchasing power [or income] between the two groups: it was on average between ten and fifteen to one. These differences were generically recognized in the text of the UNFCCC. The North, while not necessarily saints, recognized they had had a prosperous past and the South, while not necessarily sinners, felt they still deserved a future no less prosperous. The difficulty for everyone was that for the developing countries this development issue was paramount, even if it meant burning fossil fuels and damaging the global environment to achieve it.

'Expansion and Divergence' Growth, Efficiency and No-Regrets

After 1992, the UNFCCC underwent a three-year period of gathering the volume of signatures that eventually ratified it into force in 1995. At the same time the IPCC underwent a three-year period of preparing its "Second Assessment Report".

It was during this period that two strands of economic argument were woven onto the fundamental framework of the UNFCCC objective and principles and the US Government requirement for 'globality'.

The fundamental thesis of the UNFCCC was 'precaution, equity and stabilisation'. The evolutionist counter-thesis was 'no-regrets, efficiency-gains and aspiration' and well-resourced economists arrived in force to champion this antithesis from 1993 onwards. Preferring 'evolutionism' and 'eventualism' to fundamentals, the economist's arguments led to diplomatic confrontation, political dissipation and lost opportunity.

'No-regrets' was the school of economic reasoning which traded off both sides of the scientific uncertainty around global warming. For example it said that where a local policy measure adopted to lower energy consumption and fuel bills avoided

emissions as well, there should be no-regrets about the avoided environmental costs to the climate system. As it was an avoided production cost that enhanced net income, it therefore made sense anyway. This was sceptic reasoning and its effect was to entrench delay.

'Efficiency-gains' raised the local no-regrets argument to a standard for the global good. This economic reasoning traded growth off damage, or global income off global impact. As long as units of economic growth per unit of damage to the climate system - or the ratio of dollars global GDP to tonnes of global greenhouse gas emissions - increased in favour of income, this 'global-cost-benefit-comparison' claimed to show that the economy could 'safely' absorb damages from climate change while it continued to grow.

What this really said however, was that the aspiration towards growth out-ranked the aspiration towards the objective of the climate treaty, whatever the eventual outcome. It promoted evolutionist economics to out-rank the fundamentally goal-specific framework for globality required to achieve the objective of the UNFCCC. This raised delay to a whole new level and argument between evolutionism and intelligent design found a whole new arena.

Climate change was correctly seen by evolutionist economists as a threat to continued economic growth. So they asserted the conceptual framework of 'global cost-benefit-analysis' of climate change, claiming it would help determine the levels of carbon tax that should be introduced to discourage emissions. Distinct from stabilising their atmospheric concentrations, this 'social cost' of carbon, would be how much tax people were willing to pay to avoid a unit of emissions causing climate change and damages.

This approach was flawed and inadequate. It contained fundamental errors that led to diplomatic furore. Repudiating the scenarios in the IPCC First Assessment that anticipated decreasing economic growth, the economists restated that the incontestable purpose of the economy was to grow at three or more percent per annum ad infinitum.

The first error was their valuation of the planet's resources as a whole as threatened with increasing and potentially catastrophic damages. While insurance industry data showed these damages to have been growing steadily at twice the rate of economic growth for the previous 30 years, the economists ignored this and any projections of such trends, and spot priced their damage estimates - many external to the markets altogether - at the margins and persistently well below the value of the economy as a whole. It was only some years later some of them acknowledged the possibility of climate change delivering "nasty surprises".

The second error was their failure to recognise the enormity of global economic apartheid. For the Second Assessment Report, the IPCC asked GCI to undertake a trend study of the unequal use of the global commons. We did this and it was published by IPCC in 1995. It demonstrated that the economies of the world have been jointly and severally growing in a persistent pattern of 'expansion and divergence' since at least since the Second World War. By 1990 this pattern showed on average the persistent global distribution of US Dollar equivalent purchasing power and emissions between people as follows: -

[1] one third of population had consistently emitted more than 40% of the annual per capita average of fossil fuel emissions giving a total of 90% gross of annual emissions and 94% of annual global purchasing power, and the other . . .

[2] two thirds of population had consistently emitted less than 40% of the annual per capita average of fossil fuel emissions giving a total of 10% gross of annual emissions and 6% of annual global purchasing power.

Population, pollution and purchasing power had been increasing throughout the period. This asymmetric 'expansion and divergence' are trends of worsening global economic apartheid now also aggravated by the rising damages of climate change.

The economists ignored these in their 'global cost-benefit-analysis' and demonstrated that the loss of life was – all things considered – a benefit and not a cost. The effect of this was inflammatory. Considerable mortality due to climate change related events was already apparent at that stage and the economists forecast a considerable rise in this especially in the poorer countries. Mortality is inevitably part of the story, but it was the economist's monetarily abnormative valuation of this that proved to be one of the academic blunders of all time. The deaths were valued 'statistically' as functions of the disparate incomes of the people who were forecast to perish due to climate change. The crude global results were poor and rich valued at fifteen to one; in other words on average fifteen dead Indians had the same economic value as one dead European. So though most deaths were forecast to occur in the poorer countries, these had a smaller cash value than the relatively smaller number of deaths forecast to occur in the richer countries. The two thirds of the global population in our study were mostly people in the poor countries of the South who rightly said they had not triggered this global crisis. The whole things suggested the poor were "too poor to worry and too poor to worry about". Normal to the economists perhaps, this method caused outrage and several Governments from Developing Countries denounced this as the 'economics of genocide' and a policy promoting economic growth than preventing climate damages and deaths. It was formally repudiated in the 'policy-makers summaries' when the Second Assessment Report (SAR) of the IPCC was published in 1995 [as quoted below].

Anticipating this inflammatory outcome, GCI attempted to persuade the economists that at least equal life evaluation might be seen as a less contentious method. We were rebuked by Professor William Nordhaus of Yale University who took the view that we were merely "objecting to the US Dollar as the unit of measurement". He advised us to seek the dollar's replacement with "spotted-owl-equivalents if we preferred" and present our ideas "in the political and economic market place." We did this asking why, if a spotted owl equalled a spotted owl, a human didn't equal a human.

We never got an answer from him or his colleagues. However, when the negotiations resumed in 1996, the programme of "Contraction and Convergence" (C&C) we had begun devising in 1990 was worked out for negotiations about the full term. Based on the fundamentals of concentration limits, globality and equal emissions rights that are internationally tradable, C&C established a constitutional bench-mark in the political and economic market place that no economist has displaced to this day.

'Contraction & Convergence' - the whole truth and reconciliation

We returned to the UN climate negotiations in 1996 with the first two examples of fully worked "Contraction and Convergence" (C&C) scenarios and imagery. With data from the US Energy Department for past emissions, the images showed these for all countries in a pattern of 'Expansion and Divergence' and the "Contraction and Convergence" (C&C) of these in projections of the future where rising atmospheric CO₂ concentrations were held to no more than 350 ppmv (parts per million per volume) in one, and 450 in the other. Total rates, weights and shapes of the contraction budgets were taken from the IPCC.

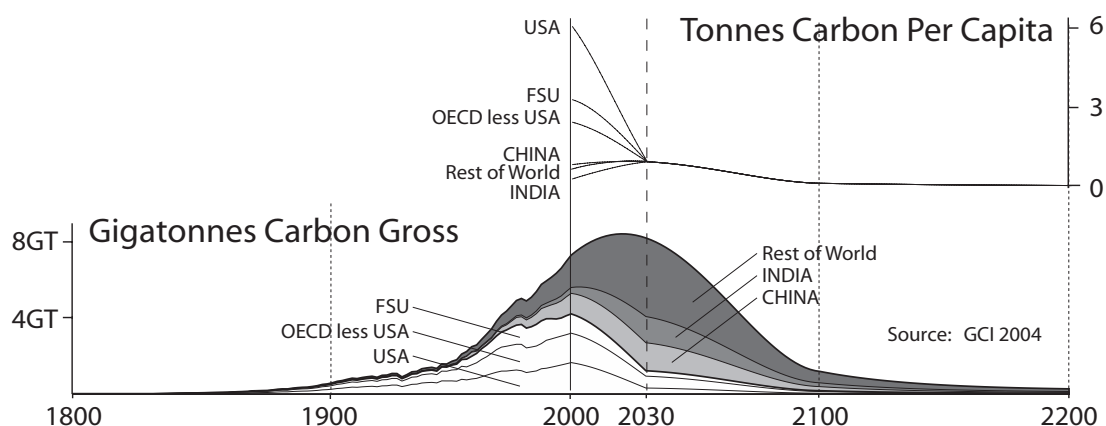
In 1994/5 the IPCC published for the first time emissions scenarios that directly juxtaposed runs from the so-called "Bern" Carbon-Cycle Model for stabilising CO₂ concentrations with the six evolutionary emissions scenarios from the IPCC Response Strategies Working Group published in 1992 [IS92].

Taking the fundamental view that stabilising greenhouse gas concentrations in the atmosphere outranked the predictions of economists, which did anything but, we used the Bern carbon-cycle model runs to create the C&C calculus or 'planning model'. We regarded the economic models as dangerous.

At the core of the argument, C&C does two interlocked things. Taking the fundamental objective of the UNFCCC - safe and stable greenhouse concentrations in the atmosphere - as the primary feature governing the process, the model is a software programme that: -

1. takes any stable greenhouse gas concentration result from the carbon-cycle models and computes the global emissions profile - or "contraction budget" as reported by IPCC as achieving the stable concentration level - specified by the user, and
2. sub-divides this global emissions contraction budget on the basis of starting with the international emissions shares as actually reported in the starting year, and then progressively pre-distributes these as tradable emissions permits over a time-frame specified by the user, so that international shares converge to become equal to international population shares by the date chosen.

Here is an example for 450 ppmv with world as 6 regions converging by 2030: -



GCI regarded C&C as 100% of two inseparable aspects of a single proposition. C&C was the primary calculation necessary to demonstrate stable concentration of greenhouse gas in the atmosphere with first-order intent by intelligent design; it was "globality with equity".

We started in 1990 with the conceptual framework "equity and survival". In developing the calculating framework of global C&C, we came to recognize that it was reflexive not only across space [all countries] but also across time [full-term].

The spatial aspect of this was that while there could be "no globality without equity", there could be "no equity without globality" either. Globality meant 100%, or all countries, great and small, involved simultaneously.

The temporal aspect of this was even more subtle. It related to the word 'ultimate' in the 'ultimate objective' of the UNFCCC. The word 'ultimate' means 'fundamental' as in perennial, as much as it means 'eventual' as in outcome. The time left to achieve the objective of the UNFCCC - probably no more than decades - is finite and the clock to its successful attainment is ticking. Globality is therefore across time as well as across space; 100% in the sense of full-term with all countries consciously involved in the overall contraction event from the word go.

If this was only broadly seen at the outset, the focus for it sharpens all the time. A global full-term emissions contraction budget is required in its 'entirety' to achieve stabilisation especially as concentrations, temperature and damages rise throughout,

and convergence, in some manner and at some rate, is an inevitable part of the achievement. C&C immediately connects the means of all parties to these ends in a single full-term calculus. This, the "whole-truth of entitlements" under contraction, is distinct from the "the half-truth of commitments" under business-as-usual, as in the Kyoto Protocol.

The basic C&C proposition is irreducible and by 2003, the secretariat of the UNFCCC affirmed publicly that, *"stabilisation inevitably requires contraction and convergence."* This is not equity for its own sake, but for survival and the US demand for globality tacitly acknowledged all of this from the outset. From 1990, the issue of warming and rising damage had been clearly recognised as, "how much and how soon". From that moment onwards, being governed by this "100% full-term understanding" became - and remains - the lesson we all most urgently needed to take. It is urgent, as nursing false dichotomies and the chaotic politics of blame that has taken root in the UN climate negotiations, cause delay make us forgetful that concentrations, temperature and damages are rising..

The Kyoto Protocol: half-truths and no reconciliation

These had resumed in April 1995 in Berlin. The required degree of support for the ratification of the UNFCCC into force had been achieved and the First Conference of the Parties (COP1) to the UNFCCC got underway with two major rows breaking out.

The first was the Developing Countries led by India. Taking up the row about economic valuation of human life in the IPCC, the Environment Minister Kamal Nath formally wrote to all the delegations saying: -

"We unequivocally reject the theory that the monetary value of people's lives around the world is different because the value imputed should be proportional to the disparate income levels of the potential victims concerned. Developing countries have no - indeed negative - responsibility for causing global climate change. Yet they are being blamed for possible future impacts, although historical impacts by industrialised economies are being regarded as water-under-the-bridge or "sunk costs" in the jargon of these biased economists."

This was when the value-of-life row became conspicuously public. It seethed on and by the end of the year the IPCC published their "Summaries for Policy Makers" written by delegates to, rather than economic experts within, the IPCC who observed: -

"The literature on the subject in this section is controversial and mainly based on research done on developed countries, often extrapolated to developing countries. There is no consensus about how to value statistical lives or how to aggregate statistical lives across countries. Monetary valuation should not obscure the human consequences of anthropogenic climate change damages, because the value of life has meaning beyond monetary value. It should be noted that the Rio Declaration and Agenda 21 call for human beings to remain at the centre of sustainable development. The approach taken to this valuation might affect the scale of damage reduction strategies. It may be noted that in virtually all of the literature discussed in this section 1). The developing country statistical lives have not been valued equally at the developed country value 2). Other damages in developing countries are also not equally valued at the developing country value."

As if the first row wasn't bad enough, the Second row about 'globality' was worse. The Ministerial comment from the Indian delegation summed things up thus: -

"We face the actuality of scarce resources and the increasing potential for conflict with each other over these scarce resources. The social, financial and ecological inter-relationships of equity should guide the route to global ecological recovery. Policy instruments such as tradable emissions quotas, carbon taxes and joint implementation may well serve to make matters worse unless they are properly referenced to targets and time-tables for equitable emissions reductions overall. This means devising and implementing a programme for convergence at equitable and sustainable per values for consumption on a per capita basis globally."

There was a certain irony in this. The US Government maintained their demand for all countries to be included in the control of emissions, yet they didn't respond at this time to this call for globality with equity from what was seen as a 'key developing country'. The problem, then as now, was a lack of clarity and candour about the dilemma. No side trusted another and equity was a battle-ground. The lesson was that if we don't want chaos, we will have to choose against it and this means choosing order in a form that is straightforward enough to win everyone to the globality with equity that avoids the chaos.

While 'deep simplicity' is the norm, complexity was the fashion and economists and other lobbyists found endless ways to fashion it. Some even pressed the view that there wasn't a climate problem at all, and others claimed that the US Government believed this too. This was hard to believe as why would the US ask for a global solution to a problem that didn't exist? However, the environmentalist non-government-organisations [NGOs] claimed the US was not 'sincere' and lobbied for real 'leadership'. So, initiated by some environmental lawyers and the policy directorate of Greenpeace, the Protocol from AOSIS or the "Association of Small Island States" was tabled. Plucking numbers from fresh air, this said developed countries only would have 'mandatory' emission targets that were legally binding to levels 20% less than 1990 levels by 2005 with penalties for 'non-compliance'.

In other words, it lobbied for an arbitrary, punitive and inadequate solution to the fundamental and full-term challenge of global climate change. It was pressed into COP1's "Berlin Mandate" for what would later become the "Kyoto Protocol". The accompanying rhetoric was emotive in more ways than intended. It foretold of climate chaos without it, while saying nothing about the political acrimony and chaos this half-truth would engender. The requirement for stabilising concentrations was simply disallowed. And while the environmental NGOs scolded the US for daring to – let-alone rightly – raise the globality point, the US Government, like everyone else in the process, did indeed find it difficult to deal with 'differentiation' in the global equity point. This would change.

Certainly, as argued by many in Developing Countries, 'equity' encouraged the idea that differentiation meant rights to use of the global commons of the global atmosphere were, in the new real-politik of global climate inter-dependence, equal to people rather than [as in the status quo] merely proportional to their income. If this was so, it certainly took global equity outside the box, which perhaps explained the hesitation. It was not without irony when this moment was lost; it was just as 'globality with equity' for stable concentrations was the over-riding requirement to keep everyone together in it.

The challenge was to avoid the reverse, 'no globality without equity'. It was one to which all parties to the Berlin Mandate did not rise at that time and so a course was proposed for the industrial countries to accept legally-binding emissions control 'first'

as an admission of having, albeit in ignorance, caused the climate problem and the rest, albeit with special development pleadings, to accept a blank cheque to make it worse, as a doubtful form of reparations. This was 'equity without globality and, like all of the politics of blame, a fight for half-truths and no reconciliation. It offered no environmental security to anyone and pushed the thorn of discord into the flesh of the politics from that day to this.

At the beginning of 1996, the IPCC published their "Second Assessment Report" and the row over the value-of-life aside, the memorable feature of this was from the science working group. They collectively agreed the wording that, "*the balance of evidence suggests a discernible human influence on the climate system*". Parties to the UNFCCC negotiations reconvened for the Second Conference in June 1996.

They had to reconcile the strengthened IPCC judgement with the already fractious proceedings under the Berlin Mandate, while the US tore up the AOSIS Protocol as "*unrealistic and unachievable*".

In this atmosphere, the first projections of GCI's C&C imagery shown at COP-2 were clarifying and candid. Because the model could calculate full-term inclusive projections and the results of this could be charted, the basis of the negotiation for globality with equity for stable concentrations could actually be seen. Full colour posters of "Contraction and Convergence" (C&C) were exhibited, bill-board size. The principal all-country image showed convergence to equal per capita shares globally by 2040 under an overall emission contraction that brought emissions down to 40% of 1990 values by 2100; this was a scenario for CO₂ concentration at 70% above the pre-industrial level, or 450 ppmv. The effect was salutary. It was a 'Who's Who' in the pollution league tables. Questions were asked. Suggestions were made. Reactions were marked as everybody - great and small - could for the first time 'see' their emissions full-term in relation to those of everyone else.

Some environmental NGOs attacked C&C because it didn't object to emissions trading. But at the end of COP-2, a man appeared at C&C billboard who turned out to be Tom Spencer MEP, soon to become chairman of the Conservative MEPs and subsequently chairman of the European Parliament's Foreign Affairs Committee. But he introduced himself as the president of GLOBE, the Global Legislators' Organization for a Balanced Environment. Within a year under his leadership, GLOBE had convinced parliamentarians on four continents, including the US, to pass resolutions backing C&C as the only way to make the Framework Convention meaningful.

'C&C' Kyoto and the 'Byrd Hagel Resolution'

In March 1997, three months before the US Senate did unanimously passed the Byrd Hagel Resolution, the US Government presented the resolution's precursor to what was then the sixth UNFCCC session on the Berlin Mandate. I read an advance copy of the document and it was clear that conflict lay round the corner; the US proposal required all countries to have 'commitments' by 2005. At the same time it was easily consistent with Contraction and Convergence for the simple reason that the proposal had deliberately omitted to quantify any of the commitments countries were to make.

The US delegation asked for support for their proposal with C&C argument at their press conference. At the end of this standing-room-only event and waves of rage and abuse against the US proposal from government and non-government participants from all over the world, GCI put on record that we supported it as it was consistent with C&C. There was even more uproar. Environmental NGOs denounced this as 'treachery'.

In fact the position was a rational exposition of globality with equity. As such it was a full exposure of the divisive half-truths of the arguments leading to the Kyoto Protocol that have flawed the debate throughout. In response to the challenges of 'globality and equity' and 'can we do enough, soon enough' C&C structures the options. But already in the 'Kyoto Track', the rhetoric required one half of the world to do what it regarded as too much too soon, while the other half were given permission to do what was clearly too little too late.

Just as the US, Chinese, Indian and many African Governments showed real interest in C&C, the NGOs who had merged to become the Climate Action Network under the direction of Greenpeace, stepped up their attack on the US Government. Within three months they would denounce to US Senate en bloc for its Byrd Hagel Resolution which required all countries to be involved in emission control.

Still at the March session, the head of the Chinese delegation said the C&C images could be read as 'blaming us.' If the Chinese were to take a positive view of this approach, his officials needed to be understood that these were projections of future emissions rights. We put a note on the board to that effect and his officials invited me to Beijing for June.

Immediately before the visit to China, I went to Washington and gave a series of briefings on C&C to bodies such as the Department of Energy, the Environmental Protection Agency, the State Department and the AFLCIO. The views expressed said the C&C model was "*a beautiful piece of work*", and "*an ingenious way to try and solve a very difficult problem*". In the Energy Department I was told there was only one man to reach in China, Song Jian, the State Counsellor for Climate Change and Population. He was known to the US Government officials as the 'seven megaton gorilla' because he had his finger poised over the start button of a coal-fired development project with annual emissions to match. If the Chinese could be persuaded to play C&C, the view was the US would play too as it would become the only game in town.

In China I didn't see Dr. Song Jian, but I saw many of his officials and that October he himself made the following statement at the closing ceremony of the China Council for International Co-operation on Environment and Development.

"When we ask the opinions of people from all circles, many people, in particular the scientists think that the emissions control standard should be formulated on a per capita basis. According to the UN Charter, everybody is born equal, and has inalienable rights to enjoy modern technological civilization. Today the per capita consumption is just one tenth of that of the developed countries, one eighth of that of medium developed countries. It is estimated 30-40 years would be needed for China to catch up with the level of medium developed countries."

Any date of convergence on equal per capita emissions can be portrayed in the C&C model. I was therefore able to adjust it to show the US reaching convergence by 2100 in one scenario and the Chinese by 2010 in another. I showed both countries this and told them that negotiating the date (and hence the rate) of convergence was their problem not the model's. A faster rate of convergence simply meant that high population, low-per-capita emissions countries like China got a larger share of emissions permits sooner. If these permits were tradable, any high-emissions country such as the US which found itself unable to reduce its emissions quickly enough, could always buy the permits it would have got itself if the convergence period had been longer.

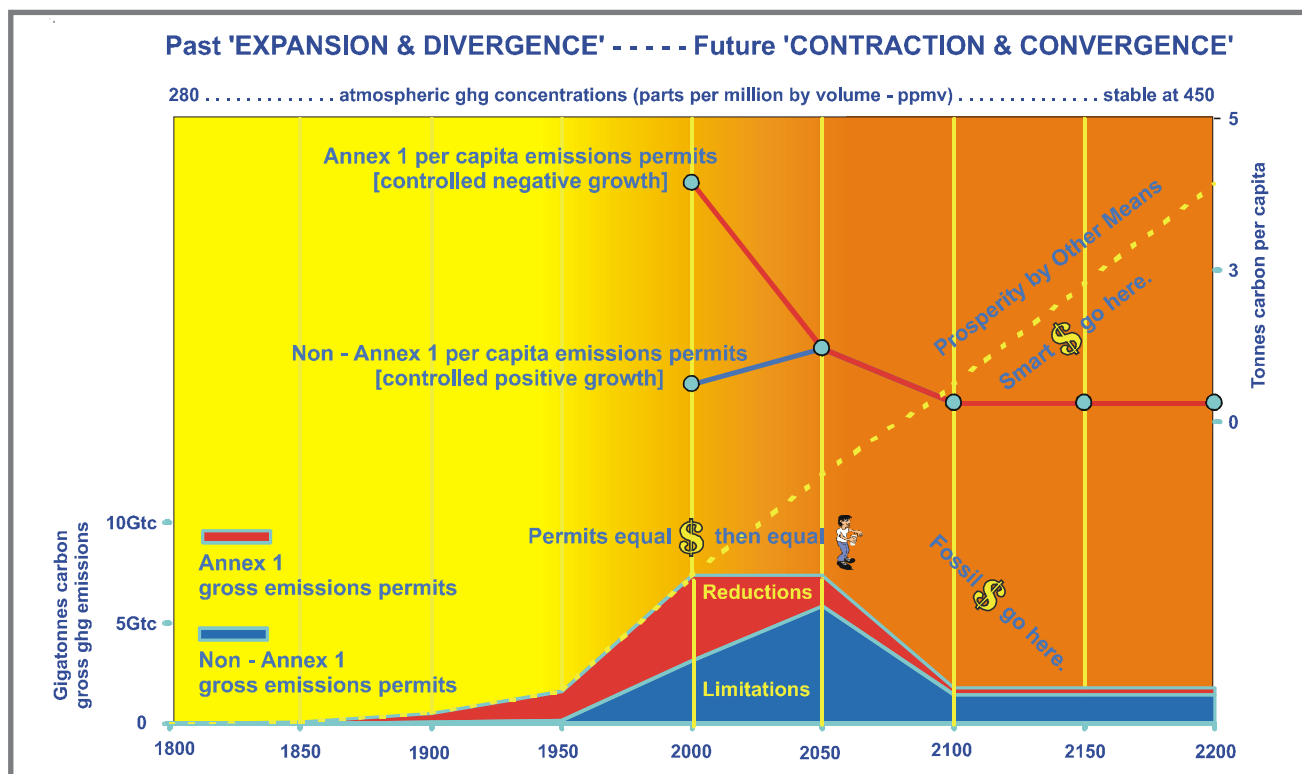
In other words, under C&C, negotiations about the date by which all nations should converge on the same per capita entitlement are about money and resources sharing under limits. Politicians determine the convergence rate. It will be a compromise. Economists would simply advise how best to handle the consequences after the fact.

While I was on my way to China, the US Senate adopted the Byrd Hagel Resolution. It rehearsed again the fatal flaws in Berlin Mandate and the document then being drafted for COP-3 that became the Kyoto Protocol. Alive to the reality of climate change, the intervention tried to reposition the debate around "globality with equity". After eight years of no surrender on global equity, the US Senate conceded differentiation and this was no small shift. Though emissions control commitments would be for all countries on the same schedule, they would quantitatively be of two kinds: - reductions and limitations. 'Reduction' commitments would be controlled and negative growth of emissions or permits for some countries. 'Limitation' commitments would be controlled but positive growth of emissions or permits for the rest. As with the US Government position in March, no single target amount for any country was specified.

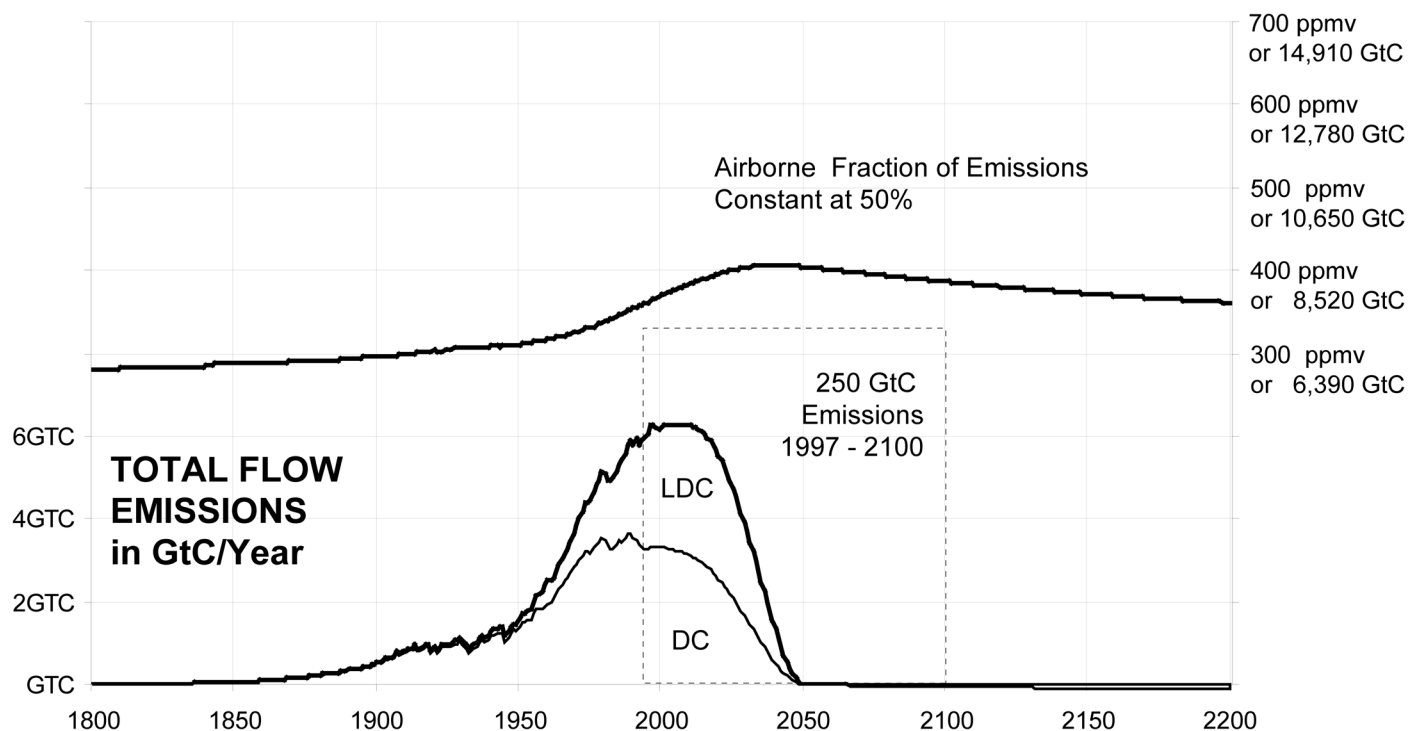
'Now, therefore, be it Resolved that: - (1) The United States should not be a signatory to any protocol to, or other agreement regarding, the United Nations Framework Convention on Climate Change of 1992, at negotiations in Kyoto in December 1997, or thereafter, which would mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period.'

The resolution was adopted by 95 votes with none against. The two key distinctions are; between the Annex 1 Parties and the Developing Country Parties and secondly between a commitment to 'limit' ghg emissions and one to 'reduce' them. In this context, limiting ghg emissions means controlling the rate at which they increase while reducing them means controlling the rate at which they are actually cut back. This created a potent dynamic with C&C. When these distinctions are put together, they translate into the permit sharing of C&C. Annex 1 Parties immediately reduce (or contract) their emissions as Developing Country Parties, in the short term, limit their emissions (converging with the Annex One Parties) and then contract. Technically a 'convergence factor' is required. This won't appear by accident but it can by design. Real life complexity will be a function of and not a rebuttal of the deep-simplicity C&C.

How C&C conforms to the Byrd-Hagel Resolution



TOTAL 'CO2 STOCK ATMOSPHERE in ppmv & GtC



A CRITIQUE of the GREENPEACE ATTACK on the BYRD HAGEL RESOLUTION

In 1997, during the Clinton Administration, Greenpeace denounced the US Senate's "Byrd Hagel Resolution". The global numbers show that Greenpeace was well to the right of the US Senate.

Between 1997 and 2050 on the x axis, shows a future contraction budget of emissions totalling 350 GTC with a constant rate of of 50% retention in the atmosphere rising to 400 and back to 360 ppmv.

This 250 GTC is just under the maximum permitted emssions budget Greenpeace used to confront the US Senate in June 1997. The Senate had just unanimously passed the "Byrd Hagel Resolution" [BHR] which required "all" countries to be on the books and in the emissions permit schedule with either Limitation or Reduction commitments.

The maximum Greenpeace permitted was 270 and the minimum 150 GTC. They called this "The Carbon Logic". Using this they denounced the BHR as "Byrd-brained", dumping tonnes of coal on Capitol Hill.

The global effect of combining the: -

- [1] Logic of the Byrd Hagel Resolution for globality with,
- [2] Kyoto Protocol's 'fatally-flawed' logic of the Developed Countries only targets of the time,
- [3] Greenpeace "Carbon Logic", the maximum emissions budget as above,

is shown by the line dividing DC [Developed Country] from LDC [Less Developed Country].

This budget means that there isn't much left globally and, combining all of the above, this is a roughly 50/50 split on permits between the 20% of people in the Developed Countries and the 80% of people living in Developing Countries.

The feature of C&C that deals with this 'distributional justice' in a logical manner is 'convergence-that-can-and-obviously-should-be-accelerated-relative-to-the-contraction'. The Senate's proposal accepted that. In fact when the US requirement for globality is combined with the globe's demands for adequacy and equity, it means that C&C is "inevitably required". This point was effectively agreed at the climax of the COP-3 negotiations in Kyoto in December 1997.

Greenpeace leads the environmental movement's 'climate-action-network' whose motto is, 'justice for developing countries'. But as these words are repeatedly contradicted by their numbers, they take steps to obstruct demonstration of this with C&C, merely asserting that "C&C doesn't deal with 'historic resonsibilities'" for past emissions. As the argument is illogical, Greenpeace are increasingly isolated.

Over the years, the US has affirmed that: -

1. A global solution to the global problem of climate change is needed.
2. The objective of the UNFCCC, the stabilisation of ghg concentration in the global atmosphere, inescapably requires ghg emissions to contract. [The graph shows them doing so between 2000 and 2100].
3. All countries must be involved in emissions control [2000 - 2200 in the graph].
4. A 'central organising principle' must be applied to determine which countries limit, and which countries cut, their emissions and by how much. (Initially the US said 'all countries will reduce ghg emissions by x% pro rata' [2050 - 2200 in the graph] This was later modified by the Byrd Hagel Resolution to combine 'Reductions' [controlled negative growth] with 'Limitations' [controlled positive growth] giving 'convergence' [2000 - 2050 in the graph].)
5. The 'commitments/entitlements' arising from this controlled contraction and convergence must be 100% tradable.

None of these requirements conflicts in any way with the basic C&C solution, namely achieving equal per capita tradable entitlements for everyone on the planet by an agreed date under a predefined global cap. Can any other formula be developed that fits the US specification as well?

In June 1997, Greenpeace dumped several tonnes of coal on the steps of the US Senate in protest against the Byrd Hagel Resolution calling it "Byrd-Brained". They argued their global *"Carbon Logic"* saying, *"To limit ecological damage, the carbon budget calculated by Greenpeace demonstrates that only 150-270 billion tonnes of carbon may be emitted. If no action is taken to stop deforestation then only around 150 billion tonnes can be emitted."* The Resolution set emissions limitations alongside their reductions with adequacy [amounts] to be determined by something.

The attack on this and C&C by Greenpeace is not so much rational as 'aspirational' as it comes from a position that picked a few numbers out of fresh air with no numerical reference to their carbon logic whatsoever. This lack of a rationale renders any claim for adequacy, equity and globality impossible to validate.

This problem is persistent at the expense of any credible progress. Between 1997 and 2005, the global fossil fuel economy has emitted around 50– 60 billion tonnes of carbon to the atmosphere in a growth pattern. At the time of writing this critique, Montreal COP-11 [December 2005], has just concluded. The Montreal agreement results in the future global emissions path of 6 plus billion tonnes per annum and rising. This means that by around 2020, continuing at something near the present rate of annual global growth [2% p/a] something approaching 200 gigatonnes is likely to have been emitted globally.

According to "The Carbon Logic" this means either we are doomed or emissions will then just cease overnight. However unpalatable, the former proposition cannot be waived aside but the sudden cessation of emissions is entirely improbable. So this approach of 'pick-a-number' is not really helpful. The argument – which is basically between the US and China – needs to be mediated by BH/C&C. There will be stalemate without this and 'blackmail-emissions' will continue to grow and we'll be lucky not to become stuck in these trends for decades triggering dangerous and even chaotic rates of climate change.

The Montreal outcome of COP-11 was negotiated by people who alarmingly know this, many of whom are actively warning of the Armageddon to come. The verdict of Montreal was to keep on talking against these trends as the backdrop. To regards this as 'progress', is completely irresponsible.

'C&C' and the 'Africa Group.'

Back at the negotiations in Bonn in August 1997, the Africa Group of Nations took a clear initiative in favour of Contraction and Convergence at the final plenary session.

"As we negotiate the reduction of greenhouse gases, the countries of Africa believe that there should be certain principles that need to be clearly defined. There must be limits on all greenhouse gases if the danger to our climate is to be averted. The IPCC scientific assessment report provides us with the basis for global consensus on such limits. A globally agreed ceiling of greenhouse gas emissions can only be achieved by adopting the principle of per capita emissions rights that fully take into account the reality of population growth and the principle of differentiation. Achievement of a safe limit to global greenhouse gas emissions can be achieved by reducing the emissions of Annex One while at the same time ensuring that there is controlled growth of future emissions from Non-Annex One countries, reflecting our legitimate right to sustainable economic growth. We strongly believe that this will take us along a path to responsible climate management that allows us to reach our goal of defining a mutually agreed point of convergence and sustainable development. Such a convergence must ensure that we maintain a global ceiling on emissions to prevent dangerous interference with the climate system.

When we look at time frames, we believe that insufficient commitment by Annex One countries will only result in delaying our influence on the climate system. If this course is maintained, then we will all suffer and the burden will be even greater for humanity in general. The burden for any future mitigation efforts on those of who have not been historically and currently responsible for creating the problem will be greater.

Mr. Chairman, we must focus our attention on the most appropriate, reasonable and acceptable time frame for action. There is an over-riding pre-requisite. The time frame cannot be too far away into the future if we are to avoid at all costs the dangers that global climate change poses. The current scientific evidence indicates that Africa faces decline in water resources, agricultural production and economic performance. It is therefore for this reason that we wish to register the seriousness with which we view the effective implementation of the Convention and future agreements emanating from it."

The Africa Group carried this position through to the end of COP3 in December.

'C&C' at COP-3 in Kyoto.

By the time this conference began to discuss the international tradability of ghg emissions entitlements, an increasing number of countries began to see the logic behind the Africa Group's advocacy of Contraction and Convergence.

By definition, emissions trading cannot occur until the principle of property rights has been agreed and entitlements to the property have been assigned. Very late on the last day, the paragraph in the draft Kyoto Protocol relating to emissions trading came up for acceptance. The US re-iterated its insistence on everyone's acceptance of emissions trading. The governments of China and India, contrary to widespread expectations, did not reject the idea. Instead they responded by saying that they would agree to emissions trading if 'equitable allocations' of emissions entitlements were made to all countries on a per capita basis. The Africa Group restated the C&C structure for this and the US responded, *"It does seem to us that the proposals by for example India and perhaps by others who speak to Contraction and Convergence are elements for the future, elements perhaps for a next agreement that we may ultimately all seek to engage in"*

Kyoto - Politics of Incompleteness: C&C - Intelligent Design

The intellectual battle that has been fought at the UNFCCC has never seriously been about whether there was a climate problem or not. It has always really been about how best to organize and deal with the *"how much, how soon"* of global climate change. To be effective, globality with equity on emissions control or C&C is inevitably required. Even if political fashion suggests otherwise, the accelerated rise in atmospheric concentrations shows the globalisation of this as collective committed action is urgently required.

The UNFCCC was a broad global proposition to this end at the start in 1992. However, various axes of sub-global argument were reactively introduced thereafter that have divided and disabled the debate about adequacy from then until now. These are the marginal 'arguments of incompleteness' such as, *"costs versus benefits"*, *"ability to pay versus willingness to pay"*, *"voluntary measures versus mandatory"*, *"adaptation to climate change versus its mitigation"*, *"technology versus targets"* and so on.

All of the traffic on these axes has maintained at best a tenuous linkage with the objective of the UNFCCC. Since 1992, when Michael Howard the UK Environment Minister introduced the word '**aim**' into the commitments section of the UNFCCC text, the objective of the Convention became ultimate only in the sense of 'aspirational'. Mr Howard says he did it to enable George Bush senior to sign the Convention in Rio. The cost of this however, was to disable the debate about collective adequacy and so delay urgent action.

The Kyoto Protocol is Darwinian and its incompleteness potentially equates with our being collectively unfit to survive. It is the 'evolutionist's' view of climate change and it holds that increments at the margins and 'development' that is merely the unpredictable result of this mostly random process, is good enough. It is the evolutionist's climate-adjusted summary of business as usual. It either doesn't recognize we are already in a struggle to survive or, seeing this as unspeakable, prefers silence and impotence.

There is no-one in this process now who credibly defends the idea that it is 'too much too soon'. Its supporters [for example European Governments] and its detractors [like statistician Bjorn Lomborg and other sceptics like Myron Ebell of CEI] all agree that the effect of Kyoto on the atmospheric concentration of CO₂ and avoiding climate change is marginal to the point of being undetectable; while the atmosphere accumulates carbon gases measured in billions of tonnes of carbon, Kyoto avoids emissions of these measured in mere million of tonnes. So when Kyoto's detractors say 'why bother', defenders say, 'we will do better!' Some detractors then become fatalists and assert the inadequacy point harder by saying, 'why bother, it is all too little too late.' In doing this, some of the sceptics then go without a blush from a previous attitude of 'no-problem' to one for the future called 'no-solution'.

But, their criticism of Kyoto's inadequacy cannot just be swept aside in favour of fatalism. The situation is developing and a 'second phase' of Kyoto ["five more years", with a third phase and so on beyond that] is proposed. This is what Kyoto's defenders now assert is the adequate answer and the only answer. Yet the adequacy of this evolutionary model is not demonstrated, calculated or even really contemplated. Though it is incomplete, it is from this position that its defenders position C&C as a slogan or an 'outcome' and stable concentrations as an aspiration. All this Panglossian thinking is no less dangerous than climate change itself because it rests on the illusion that infinite growth is achievable.

The laws of physics that govern and change global climate are immutable and irresistible. If we continue to accumulate heat-trapping gases in the atmosphere, even at no

more than the rate we have been since industrialisation, the extra heat trapped will increase climate instability and turbulent weather towards and sharply into, not away from danger. Avoiding this depends on reading the worsening trends as the reason to chart a course away from danger by intent and design. Any political economy of future development on planet earth that is viable has to avoid dangerous rates of global climate change by actually achieving the objective of the UNFCCC. Seeing this goal as merely 'long-term' and 'aspirational' and the result of natural selection, amounts to 'hoping to' achieve it and is absurdly relaxed about the prospects of failure. If we are committed to the goal, achieving it will be consciously embraced by the goal-specific gravity of C&C and fundamentally organised to this purpose now, whatever rates are required for success. Seeing C&C merely as the outcome of an aspiration to avoid dangerous climate change allows for what will become for our children the agony of failure and chaos.

The "*how much, how soon*" questions posed at the outset by US Delegate to SWCC in November 1990, John Knaess were spot on. They led straight to the key axis of completeness which is, "*too much too soon versus too little too late.*" This challenge led to the intelligent design of the UNFCCC, and the politics of inclusion and globality as defined in the US Senate's Byrd Hagel Resolution. It also led to "Contraction and Convergence" (C&C) that structures globality, equity and adequacy to the key issue, "*can we do enough soon enough?*" Can we win what is a race against time? Damages from climate change are growing at an average of 6% a year [see box], at least twice the rate of fossil-fuel burning economic growth. This means the odds steadily worsen as we continue to make the problem more rapidly than we act to control and avoid it. With Kyoto's axes of incompleteness, we entrench almost apartheid-like politics of separate rather than sustainable development. This undermines our collective response to avoid dangerous climate change and answer the question, "*can we do enough, soon enough?*".

C&C is fundamental to answering this question. Its global logic is irreducible. Whatever rates we agree, and then almost certainly revise, the basic aim and structure of the argument remains constant. In that sense it embodies a prerequisite of any intelligent design – stability through internal consistency. This is what the policy community has to focus on. 'Telos' or goal-focus, intelligent design and intent are fundamental and now urgent.

"Doing Enough, Soon Enough"

This means avoiding being globally tone foolish and adopting locally tone wise. The latter is the personal rationing of DTQ. The former is being clear about these choices:-

Last two images compare C&C budgets for 350 and 450 ppmv, as per the original carbon-cycle modelling of the Bern Carbon Cycle model runs.

In each image: -

[a] three rates of atmospheric accumulation and

[b] two rates of convergence

are projected.

If the Accumulation curves are regarded as proxy for damages, and if the mean case is regarded as the more likely the more contraction is delayed, aiming to be nearest the 350 case appears to be the only option left to avoid a future where the rise in concentrations becomes uncontrollable.

In these circumstances, convergence accelerated-relative-to-the-rate-of-contraction is the only option left for persuading the majority world to join in with emissions control, the alleged cost of doing this is a necessary part of the net-benefit of avoiding chaos.

