Warming as usual – Radical change to international political economy required to address climate change *

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Abstract

Dangerous climate change is the greatest threat humanity has ever faced. Our international and national environmental governance systems have so far failed to effectively deal with it. Global warming is now reaching dangerous levels. At the International Climate Change Summit in Copenhagen in December 2009, we need to conclude an effective international agreement that will rapidly stabilise then reduce substantially global greenhouse gas emissions. The Greenhouse Development Rights Framework provides a model for the type of international agreement urgently needed to reduce the risk of dangerous climate change. It provides an emergency climate protection pathway that imposes the financial cost of mitigating climate change and adapting to its impacts on those mainly responsible, the rich minority world, including Australia, and the wealthier citizens of the poorer majority world. These costs include financing a development path for the global poor that has low greenhouse gas emissions.

Key words: climate change, international environmental governance

1 Introduction

The paper firstly summarises the most recent evidence which indicates the global climate crisis is even more severe than that outlined by the Intergovernmental Panel on Climate Change (IPCC) Reports in 2007. It then provides a short review of the failure of our International Environmental Governance systems to effectively address the climate change problem. It then outlines the Greenhouse Development Rights (GDR) Framework (P Baer, Athanasiou & Kartha, 2007), as representing the type of radical approach needed to address the extremely complex, multifaceted, wicked problem of climate change. It illustrates the potential economic impact of the GDR on groups of countries and particular countries, including Australia. It then briefly compares the GDR approach with some other proposed international approaches or

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frameworks. It concludes with a short discussion of the problems of getting an approach such as GDR internationally adopted.

2 Dangerous climate change

> If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO2 will need to be reduced from its current 385 ppm to at most 350 ppm (Hansen et al., 2008: 1).

The European Union, the IPCC and the International Climate Change Taskforce propose a temperature cap of 2°C to avoid dangerous anthropogenic interference with the climate system (Spratt, 2007a, p13). These "current proposals to establish caps of 2°C or 3°C as reasonable for avoiding dangerous climate change are not being informed by the likely impacts and the most recent scientific research, but have been shaped by the world of diplomacy, political tradeoffs and compromises driven by narrow, short-term and national needs (Spratt, 2007a, p8)." There is little doubt that an average warming of 3°C would be disastrous and it is clear to minimize the risk of dangerous climate change that the further below an average warming of 2°C that we stabilise the climate the better (P Baer & Athanasiou, 2004; Spratt, 2007a).

A recent report that reviews the most recent scientific evidence on setting targets for greenhouse gas reductions reaches the following conclusion.

> The only conclusion to be drawn is that the loss of the Arctic sea ice, in all likelihood at an increase of less than 1ºC in global average temperature compared to pre-industrial levels, unambiguously represents dangerous human interference with the climate; and therefore we already have too much greenhouse gas in the air, and we need to find the means to engineer a rapid massive drawdown of current greenhouse gases to a safe level. It is now not so much a question of "how much more greenhouse gas can we add to the atmosphere?" but "by what means, at what speed and to what extent can we draw down the current levels of greenhouse gases to a safe level? (Spratt 2007a: 7).

Open ocean waters absorb almost ten times more solar radiation than sea ice, a phenomenon know as the ice-albedo feedback (Newton 2007). Scientists have warned for years of the potential negative feedback loop from global warming where melting ice and snow expose more land and ocean, which then absorb more heat from the sun, triggering further warming and snow and ice, melt. There is little doubt, that this occurred in the Artic in the northern hemisphere summer of 2007 (Spratt 2007b) and again in 2008.

Scientists have demonstrated that we can power our current and future global economy from renewable energy sources with minimal greenhouse gas emissions, albeit at a higher cost (Sorensen 2004). In view of danger now posed by global warming, the building of another coal fired power station or even a fossil fuel powered plane or automobile, could therefore be viewed as a crime against humanity.

We are now forced to accept some degree of danger, as totally avoiding the risk of dangerous climate completely is no longer feasible. The focus needs to be on decarbonising the global economy as quickly as possible while continuing to meet or exceed the Millennium Development Goals (UN 2005).

> We'd all vote to stop climate change immediately, if we only believed that doing so would be so cheap that no country or bloc of countries could effectively object. But we do not so believe. Thus we're forced to start trading away lives and species in order to advocate a "reasonable" definition of "dangerous" (Baer and Athanasiou 2004).

There is, however, a major danger that a weaker precautionary approach than that which is required to minimise the risk of dangerous climate change is being taken by politicians in various countries. They see the huge emission reductions necessary added to the global financial crisis as endangering business-as-usual and market driven economic growth in their country, which they are likely to see as threatening their re-election prospects. Parts of the fossil fuel industry, through various Business NGOs and "independent" think tanks are still keen to foster this perception despite the planetary emergency caused by their products (Exxonsecrets.org, 2007; Hansen, 2007; Union of Concerned Scientists, 2007).

3 Failure of international environmental governance

In 1988, the Toronto Conference on the Global Atmosphere, hosted by the Canadian Government and attended by many eminent climate scientists and government officials from many countries concluded "humanity is conducting an unintended, uncontrolled and globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war" (Bodansky, 1994, p49). The Conference recommended a 20% reduction in global CO2 emissions from 1988 levels by the year 2005. As this was a global goal and the Conference Statement states that as developing countries will need to increase their energy use "significantly" then industrialised countries would need to reduce their emissions by more than 20% to offset these increased emissions (Bodansky, 1994).

In 1990, the IPCC published its First Assessment Report which "predicted that if states continue to pursue "business as usual," the global average surface temperature will rise by 0.3C per decade...a rate of change unprecedented in human history" (Bodansky, 1994, p57) This was despite successful attempts at the final IPCC plenary session by the US, Saudi and Soviet delegations, encouraged by the fossil fuel industry, at "watering down the sense of the alarm in the wording, beefing up the aura of uncertainty" (Leggett, 2001, p15).

Despite these and many subsequent warnings, our current International Environmental Governance has failed to provide an effective response to global warming. By 2007, global greenhouse gas emissions are more than 30% above 1990 levels (IPCC, 2007) and since 2000, CO2 emissions have been increasing at a faster rate (Raupach et al., 2007) and global average temperatures continue to rise (IPCC, 2007).

Given this failure, is there reason to hope that the current negotiations based on the Bali Mandate to be agreed at the Conference of the Parties on the UN Framework Convention on Climate Change (UNFCCC) in December 2007 will be successful? In the lead up to the Conference, Yvo de Boer, Head of the UNFCCC said "Politicians have to act on the information provided by the science" (Willkinson & Skehan, 2007). Politicians have, however, failed to act effectively on the science for almost 20 years.

The early indications are that the proposed Bali Mandate will not deliver sufficient emission reductions to ensure that we avoid more than 2°C of average global warming over pre-industrial levels. The Bali Mandate proposal is for 25-40% reductions by developed

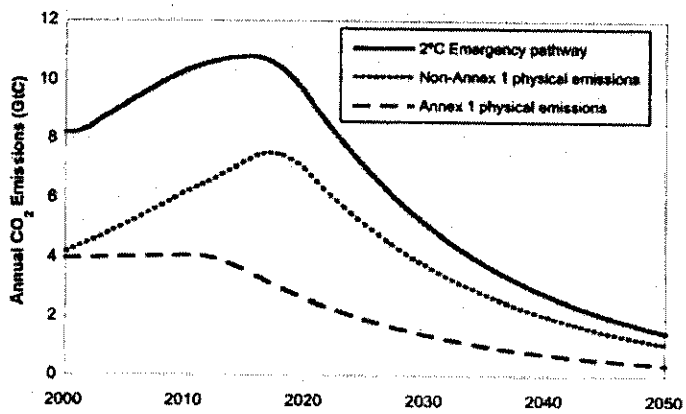
countries by 2020. Given that now 50% of global emissions are not from developed countries and these emissions are growing (IPCC, 2007; Raupach et al, 2007), this proposal looks unlikely to get global emissions to begin reducing by 2015, which is the minimum that is required to put the earth on a pathway to avoid dangerous climate change (Paul Baer & Mastrandrea, 2006; Spratt, 2007a).

4 What is needed?

The science is quite clear, the more quickly we reduce greenhouse gas emissions the more likely we are to avoid more serious dangerous climate change. As discussed previously we already have dangerous human interference with the climate. The key issue is how we minimize the risk of more severe dangerous climate change. Our current economy is currently emitting over 100 million tonnes of global warming pollution into the atmosphere every day. The ideal therefore would be to stop all human activities that result in greenhouse gas emissions tomorrow; that would, however, result in social and economic chaos so it is not a feasible option. Given that science shows that we should cut greenhouse gas emissions as much and as quickly as possible, the critical question is how quickly can we cut greenhouse gas emissions without causing social and economic chaos and how do we get international agreement to do this?

Human ingenuity, creativity and problem solving abilities are immense given the opportunity to address a challenge, such as landing a man on the Moon or a robotic vehicle on Mars. To address the climate emergency, we need to create a framework that encourages all nations to cooperate to address the emergency while ensuring that those on the planet who are struggling to find food, clothing and shelter are not adversely affected by the global redirection of the world economy towards rapid decarbonisation. As is shown in Figure 1 it will require substantial reductions in greenhouse gas emissions by both Annex 1 (developed countries) and developing countries (non-Annex 1) in order to stabilise atmospheric concentrations of greenhouse gases at a level likely to avoid 2°C of warming.

Figure 1: Non-Annex 1 emissions also have to reduce substantially



Source: Based on Baer, Athanasiou and Kartha (2008: 2)

Under the 1992 UN Framework Convention on Climate Change, the developed (Annex 1) countries aim to return emissions of greenhouse gases to their 1990 levels. Very few of the Annex 1 countries have achieved this and in the case of the largest emitter among Annex 1 countries, the US, its greenhouse gas emissions were by 2005 16% above 1990 levels. The Annex 1 countries have yet to show a serious commitment to making the required reductions in greenhouse gas emissions, particularly the US which has not committed to meeting even the modest Kyoto Protocol reduction targets. This is making it harder to get an effective international agreement on reducing greenhouse gas emissions.

Developing countries, especially those with large national emissions, particularly China and India, are also critical for an effective international agreement. Both India and China, however, have per capita emissions that are less than one-quarter of US levels and are therefore unlikely to be willing to commit to emission reductions until it is clear that the Annex 1 countries are clearly committed to and have begun to take serious measures to reduce greenhouse gas emissions. Different approaches to the negotiations are also likely to be taken by the non-Annex 1 countries.

What is needed is a climate regime that will allow for global emissions to come rapidly under control, even while the developing world vastly scales up energy services in its ongoing fight against endemic poverty and to enable human development. Developing countries will, quite reasonably, refuse to pay the additional costs of low-carbon energy technology until their most pressing human development needs have been met and the ongoing global poverty crisis brought under control. An effective agreement therefore has to have a mechanism whereby those with the capacity to pay and the responsibility for emissions already in the atmosphere provide the financial and technological assistance necessary to safeguard the right to development.

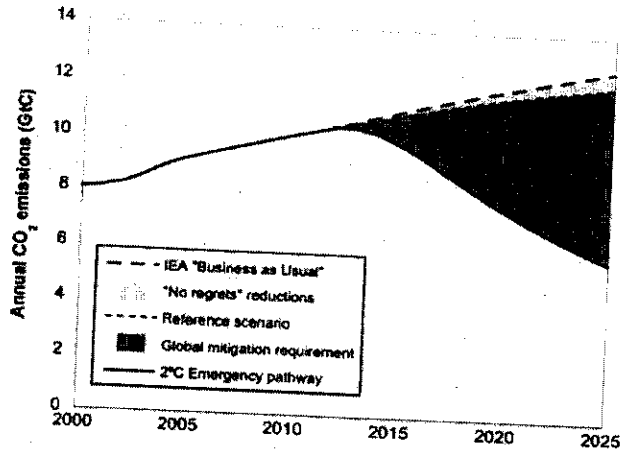
5 Precautionary approach – Greenhouse development rights

One framework that may be effective in helping to engender the international cooperation needed to address the climate emergency is the Greenhouse Development Rights (GDR) framework, as it aims to overcome the inherent critical impasse between the global climate crisis and the global development crisis. Given the most recent scientific reports, its initial target of holding global warming below 2°C will need to be strengthened, resulting in an emergency climate protection pathway that reduces emissions even more steeply than the 2°C emergency pathway shown in Figure 2. This pathway still has a 17-36% risk of breaching the critical 2°C limit. It will not stabilise the climate at well below 2°C; it does, however, still require substantial global emission reductions of up to 6% pa starting in 2015 (Baer, Athanasiou and Kartha, 2007).

In Figure 2, the top line is a 'Business-as-Usual' trajectory, which extrapolates the historical approach to energy conservation, renewables, fossil fuel subsidies, pollution controls etc and is based on the International Energy Agency (IEA) projections. The second top line is a 'No-Regrets' trajectory, a projection of the global emissions pathway as it would be if all negative and zero-cost emissions reduction options were successfully captured, this is based on the IPCC SRES B1 Scenario. These represent free and profitable emission reductions, which

are large, though far from large enough to bring emissions all the way down to the 2°C emergency pathway, the bottom line.

Figure 2: The 'mitigation gap' (middle wedge) between a 'No-Regrets' baseline (line at bottom of top wedge) and the 2ºC emergency pathway' (bottom of middle wedge)



Source: Adapted form Baer, Athanasiou and Kartha (2007: 37)

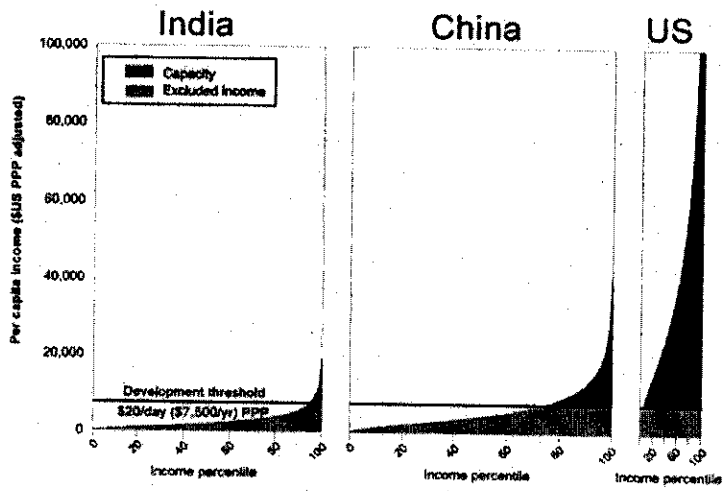
As discussed previously, the most recent scientific evidence is increasingly showing that we need to adopt even more stringent emission reductions than the 2°C emergency pathway shown, in order to avoid significant risk of dangerous climate change. An emergency stabilization pathway of a 50% reduction of global greenhouse gas emissions by 2025 and a transition to a decarbonised economy by 2050 are targets consistent with setting stretch goals to harness and direct humanity's expertise, knowledge and resources to achieve this task. It can also be viewed as a backcasting approach which enables policy-makers to consider how to get to a desired end-point (Mander et al 2007; Robinson 2003).

The GDR provides a framework for implementing an internationally agreed emergency stabilisation pathway of emission reductions while safeguarding the right of all people to reach of dignified level of sustainable human development. This standard of living, which could be described as that of a 'global middle class,' is significantly higher than the global poverty line, but lower than the northern middle-class standard (Baer, Athanasiou and Kartha, 2008: 3). It does this by recognising the right to development and the corresponding right to be exempt from global emission reductions as belonging to poor people, not to poor countries. Having defined the emergency stabilisation pathway, it then quantifies national responsibility and capacity to act and uses this to calculate national obligations to pay both the costs of an emergency mitigation program to reduce emissions and to fund strenuous adaptation efforts. This is done for all countries in a manner that takes income disparities within countries into explicit account. By so doing, it seeks to secure for the world's poor the environmental space and resources needed for low-carbon development (Baer, Athanasiou and Kartha 2008: 4).

6 Capacity to contribute to addressing climate emergency

The GDR framework allocates to the wealthy and high emitting consumers in the developed and developing world, the costs required to rapidly reduce greenhouse gas emissions and to fund adaptation costs. It does this by identifying the proportion of the country's population that is above the specified development threshold (US$7500 per capita income PPP) and therefore has the capacity to contribute to the measures necessary for the climate emergency. This is illustrated below for three countries, India, China and USA. The US$7500 level of the development threshold is just below the global average per capita income in 2005 (Baer, Athanasiou and Kartha 2007: 29).

Figure 3: Capacity/Development need chart for India, China and the US in 2005, with $7500 income per capita (PPP) development threshold



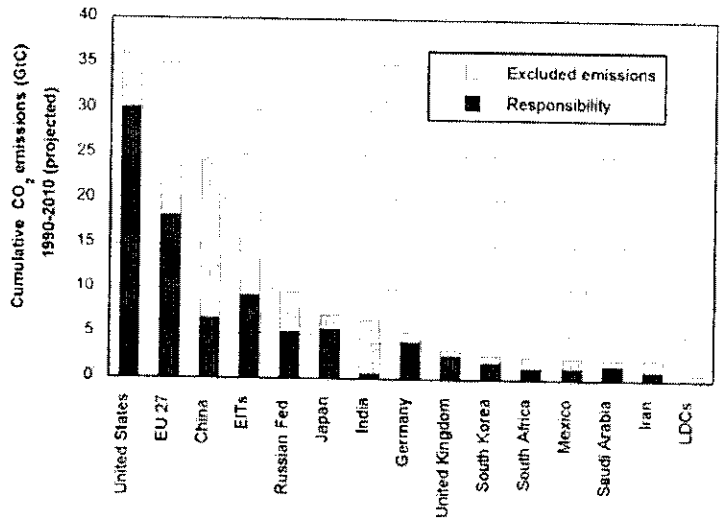
Source: Based on Baer, Athanasiou and Kartha (2008: 4)

In Figure 3, the length of the x-axis is proportional to the population. At each point on the x-axis, this curve shows the income of the corresponding percentile (one percent) of the population, measured in US dollars per capita (PPP - Purchasing Power Parity adjusted). The top section representing capacity to fund mitigation and adaptation can therefore be directly compared. It shows that almost all of the US population have the capacity to contribute and also that China also has a significant population with the capacity to contribute. Australia shows a similar pattern to the US, with over 90% of the population above the threshold. 27% of the world's population in 2005 were above this development threshold with almost 15% of these living in high-income countries and 11.5% in medium-income countries. Less than 1% were from the low-income countries where 37% of the world's population live (Baer, Athanasiou and Kartha 2007: 31).

Historic Responsibility

The GDR framework proposes that cumulative per capita CO_2 emissions from fossil fuel consumption since 1990 is a reasonable measure of historic responsibility, largely because emissions made prior to this date were usually made in ignorance rather than by deliberate policy. Figure 4 shows this measure of responsibility for selected countries and regions; the left bar is the total national per capita figure (from 1990 to 2005), while the right bar adjusts to account for the exclusion of emissions below the development threshold. The adjustment is straightforward, based on the assumption that (within any given country) emissions are proportional to consumption, which is in turn proportional to income (Worldwatch Institute, 2007).

Figure 4: Cumulative per capita CO_2 emissions from fossil fuel combustion, 1990-2005; 'responsibility' adjusted to account for the exclusion of emissions below the development threshold



Source: Baer, Athanasiou and Kartha (2007)

This then raises the question of how capacity and responsibility should be combined into a single obligation indicator, which can then drive the allocation of the global responsibility to each country.

The Responsibility and Capacity Indicator (RCI)

The GDR framework's RCI is developed in order that among countries with the same capacities but different responsibilities, the country with greater responsibility has the greater obligation. It also ensures that among countries with the same responsibility but different capacities, the one with the greater capacity must have the greater obligation. There are many formulae, which have this property. The preferred approach uses one that multiplies responsibility and capacity, in a way that allows different weights to be given to each:

$$RCI = R^a \bullet C^b$$

It specifies that the weights a and b sum to 1, which confers the property that, as the paired weights go from a=1 and b=0 towards a=0 and b=1, the RCI goes from being exactly equal to responsibility (*R*) to being exactly equal to capacity (*C*). Perhaps more importantly, the sum of the RCIs calculated for parts (say nations within a region) is equal to the RCI of the whole, which means that RCI calculations behave appropriately whether you're looking at countries, fractions of countries, or multi-country regions(P Baer, Athanasiou & Kartha, 2007, p41).

In the reference case shown in Table 1, the GDR Framework uses a = 0.5 and b = 0.5, which weights capacity and responsibility equally. This is just one of many possible choices of possible weightings for capacity and responsibility.

Table 1: Global percentage shares of population, income, and capacity, cumulative emissions, responsibility, and RCI for selected countries and groups of countries

GDR results for selected countries and groups of countries							
	2010					2020	2030
	Population (%)	GDR (per cap(ta) $PPP	Capacity (%)	Responsibility (%)	RCI (%)	RCI (%)	RCI (%)
EU 27	7.3	30,472	28.8	22.6	25.7	22.9	19.6
EU 15	5.8	33,754	26.1	19.8	22.9	19.9	16.7
EU +12	1.49	17,708	2.7	2.8	2.7	3.0	3.0
United States	4.5	45,640	29.7	36.4	33.1	29.1	25.5
Japan	1.9	33,422	8.3	7.3	7.8	6.6	5.5
Russia	2.0	15,031	2.7	4.9	3.8	4.3	4.6
Australia	0.3	33,880	1.4	2.0	1.7	1.5	1.4
China	19.7	5,899	9.8	5.2	5.5	10.4	15.2
India	17.2	2,818	0.7	0.3	0.5	1.2	2.3
Brazil	2.9	9,442	2.3	1.1	1.7	1.7	1.7
South Africa	0.7	10,117	0.6	1.3	1.0	1.1	1.2
Mexico	1.6	12,408	1.8	1.4	1.6	1.5	1.5
LDCs	11.7	1,274	0.1	0.0	0.1	0.1	0.1
Annex I	18.7	30,924	76	78	77	69	61
Non-Annex I	81.3	5,096	24	22	23	31	39
High Income	15.5	36,488	77	78	77	69	61
Middle Income	63.3	6,226	23	22	22	30	38
Low Income	21.2	1,599	0.2	0.2	0.2	0.3	0.5
World	100	9,929	100%	100 %	100 %	100 %	100 %

One notable feature of these results is that the US has the largest share of global capacity, the largest share of global responsibility, and the largest share of combined RCI.

However, this result is extremely important that by any reasonable standard of common but differentiated responsibilities (as agreed under the UNFCCC), the United States would have to pay the largest share of the global climate 'bill.' But, despite the fact that the American people have come to accept the need for concerted action to stabilize the climate, that action is still conceived in almost entirely domestic terms. Indeed, when it comes to preparing the ground for US international obligations, the American climate movement has largely failed, having barely begun to even explain the necessities of emergency global action to its people (P Baer, Athanasiou & Kartha, 2007). Australia has relatively high capacity (due to its high per capita income) and high responsibility due to high level of emissions since 1990 giving it an RCI for 2010 of 1.7%. This would require Australia to fund 1.7% of the global cost of mitigation and adaptation for climate change.

Calculating national bills for climate change mitigation and adaptation

The overall global cost of mitigation and adaptation is hard to estimate, however, the following table gives an estimated cost per 1% of GWP (Gross World Product) that is required to fund the combined cost of mitigation of and adaptation to climate change. If 2% of GWP is required the cost would be double this, 3% of GWP triple this etc.

Table 2: GDP, capacity, and obligation, projected to 2012.

	National Income (Billion $)	National Capacity (Billion $)	National Capacity % GDP	National Obligation (Billion $)	National Obligation % GDP
EU 27	$16,049	$12,323	76.8%	$ 184	1.14%
EU 15	$14,086	$11,098	78.8%	$ 163	1.15%
EU +12	$ 1,963	$ 1,225	62.4%	$ 21	1.05%
United States	$14,956	$12,661	84.3%	$ 235	1.57%
China	$ 8,980	$ 2,925	32.6%	$ 47	0.52%
India	$ 3,736	$ 353	9.5%	$ 4	0.11%
Annex I	$41724	$32343	80.4%	$ 549	1.32%
Non-Annex I	$31247	$11216	42.4%	$ 180	0.58%
High Income	$40728	$32759	83.2%	$ 553	1.36%
Middle Income	$29690	$10,700	36.0%	$ 175	0.66%
Low Income	$ 2553	$100	3.9%	$ 1	0.06%
World	$72971	$43,559	59.7%	$ 729	1.00%

Note: These figures assume that the total cost of the global climate change program is 1% of GWP or about $730 billion in 2012

Source: Based on Baer, Athanasiou and Kartha (2007: 43)

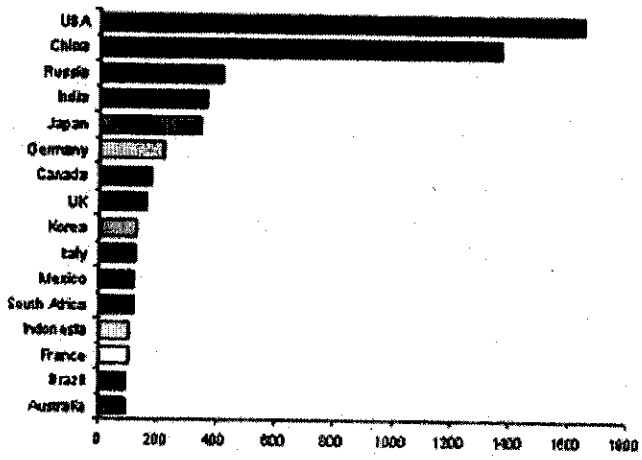
The wide range of these national obligations reflects the widely different degrees of responsibility and capacity in different countries. Based on its RCI, Australia would have an obligation as a % of GDP just below the US. These figures make no assumptions about the fraction of any national obligation that could reasonably be discharged domestically, as opposed to internationally. A range of institutional, political and governance mechanisms would be necessary were such obligations to be codified in international law, collected, and actually channeled toward mitigation and adaptation activities.

Military budgets of the world's major economies represent 2% of GWP and global consumer expenditure on "luxuries" as opposed to necessities is even higher. A spending of a similar or even higher level is justified to defend the world against the danger of climate change. The GDR framework gives an approach on how the global costs of mitigation and adaptation could be reasonably fairly shared.

7 National greenhouse gas emission targets

As is shown in Figure 4, which is based only on fossil fuel emissions, USA and China are clearly critical to any effective international agreement that substantially reduces global greenhouse gas emissions.

Figure 4: Fossil Fuel Carbon Emissions in 2004 (in million tonnes – Carbon)

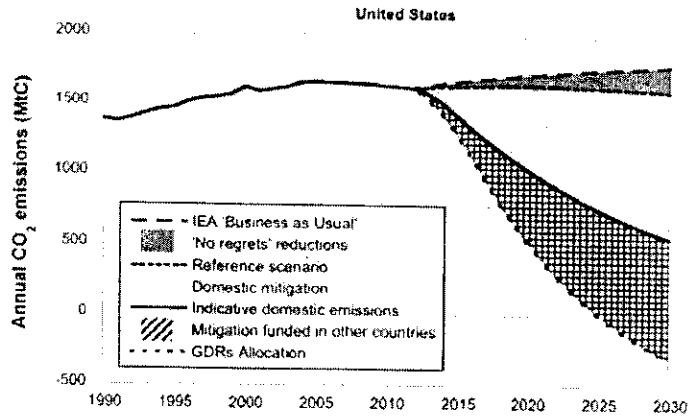


The rankings of some countries change when emissions associated with land-use change, particularly deforestation, are included: by this measure, Indonesia and Brazil would join the USA and China in the top ten emitters (Baer, Athanasiou and Kartha, 2007: 43).

The example of the United States

Figure 5 shows a similar calculation for the US to the global reductions projection shown earlier. But instead of showing a reduction wedge that thickens to 6% per year (reflecting the global rate in the climate emergency trajectory), it shows an even more ambitious USA domestic reduction trajectory that reduces national emissions to 90% below 1990 levels in 2050. Even this ambitious '90% by 2050' trajectory would only satisfy a portion of the USA's total obligation, the rest of which would have to be satisfied by funding international reductions (Baer, Athanasiou and Kartha, 2008).

Figure 5: The US business-as-usual trajectory, reference trajectory, mitigation obligation, and emission allocation



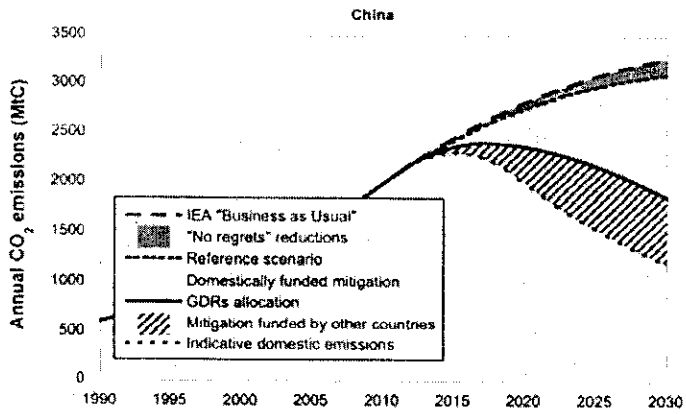
Source: Based on Baer, Athanasiou and Kartha 2008: 7

Beyond its no-regrets reductions (top dark shaded wedge), US mitigation obligation includes domestic reductions (lightly shaded wedge - 2nd from top), showing reductions that will bring emissions to 90% below 1990 levels by 2050) and international reductions funded by the US (cross-hatched wedge), which together fulfill the US mitigation obligation.

The example of China

The complement to the situation illustrated above for the USA is China, the world's second largest national emitter of greenhouse gases. Due to the much lower RCI calculated for China (shown in Table 1) its national mitigation obligations are smaller than the 6% per annum reductions required globally by the emergency 2ºC trajectory.

Figure 6: China's emissions including mitigation funded by other countries



Source: Based on Baer, Athanasiou and Kartha 2008: 7

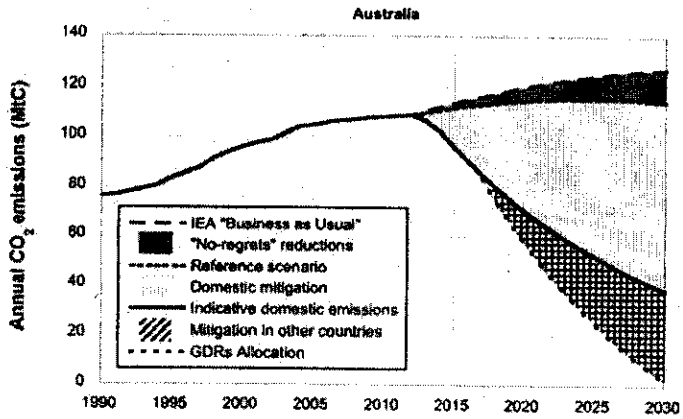
Here, again, the top dark shaded wedge represents no-regrets reductions. The 'Business-as-Usual' trajectory (the top of this dark wedge) is taken as an extrapolation of China's historical emissions growth, a choice that seems appropriate given its atypical rate and recent momentum, though the bottom of China's no-regrets wedge, and thus its area, is still based upon the B1 emissions trajectory. But note that China's domestic mitigation obligation, calculated as it is on the basis of China's RCI, is not particularly large, despite the projected continuation of China's unusually rapid economic growth. The bottom striped wedge represents mitigation in excess of China's obligations that are required to reduce China's emissions in a manner consistent with the global 2ºC emergency pathway.

In Figure 6, we also see what GDRs seek to achieve – a hypothetical instance in which a large amount of additional emissions reductions (the bottom striped wedge) are made within China, but financed by wealthy developed countries in need of offsets. These reductions are absolutely necessary, for China's emissions are large, and making full use of its mitigation potential is essential if we are to keep within the climate emergency trajectory. Fortunately, under the GDRs framework, there is a strong incentive for China to reduce beyond its national obligation by, in effect, selling mitigation potential to wealthy and middle-income countries such as those in the EU and the USA that need it to fulfill their mitigation obligations. Or, to put it another way, in a cap and allocate system, China would, in principle, be able to sell reductions at an international price that is greater than its marginal cost, and, by so doing, earn the revenue needed to finance its own required reductions, at least partially and perhaps wholly.

The example of Australia

The pattern for Australia under a GDR regime looks very similar to the US, with Australia having to achieve substantial domestic reductions of greenhouse gas emissions and fund reductions in other countries to meet its obligations.

Figure 7: The Australian business-as-usual trajectory, reference trajectory, mitigation obligation and emission allocation.



Beyond its no-regrets reductions (top dark shaded wedge), Australia's mitigation obligation includes domestic reductions (light shaded wedge - 2nd from top, showing

reductions that will bring emissions to 90% below 1990 levels by 2050) and international reductions (cross-hatched wedge), which together fulfill Austalia's mitigation obligation.

The domestic mitigation in this scenario (26.5% below 2000 by 2025) is only slightly more than the 25% reduction by 2020 from 2000 levels, the most stringent scenario outlined by Garnaut (2008) and Treasury (2008) in their recent reports. Treasury (2008, pV) confirmed in its report that given an effective international agreement a 25% reduction by 2020 could be achieved with "limited impact on national and global economic growth".

The GDRs framework is, regrettably, outside the spectrum of proposals now being negotiated for a post-2012 regime. But at the same time, it is clear to put in place an effective international climate change regime that will reduce greenhouse gas emissions as quickly as is needed to minimise the risk of dangerous climate change will require honesty, boldness and a radical approach. In this context, the GDR framework can serve as a useful standard of comparison – a 'reference framework' that clearly marks out a set of essential core elements, elements that must be a critical part of any even potentially successful international post-2012 climate regime.

8 Could it work?

As outlined previously, we need rapid reductions in greenhouse gas emissions to begin as soon as possible if we are to minimise the risk of dangerous climate change. Given that the problem has mainly been caused by the fossil fuel emissions of the developed world, it is reasonable that the developed countries cover most of the costs of moving the world to a decarbonised economy and of funding adaptation to the global warming already caused.

Given that this will require massive investment in energy efficiency, renewable energy technologies and other technologies in all countries of the world, the challenge will be to get the political leaders of the developed countries to accept the responsibility to fund the transition not only domestically but also in the developing world. Appropriate governance mechanisms will also be required to ensure that the funds are effectively spent on reducing greenhouse gas emissions and appropriate adaptation. Many problems have already occurred with the projects funded under the Clean Development Mechanism(CDM) of the Kyoto Protocol (Carbon Trade Watch, 2005).

We also are likely to have to finally acknowledge that there are limits to economic growth and re-direct the global economy from GWP to global happiness and quality of life in order to achieve Ecologically Sustainable Development. These will therefore represent the type of radical changes to our current system of international political economy required to avoid dangerous climate change.

9 How does GDR compare with other approaches?

There are a number of other proposed approaches to gaining an effective international agreement to reduce greenhouse gas emissions. These include:

- Contraction and Convergence

- The Climate Action Network (CAN) - Viable Framework for Preventing Dangerous Climate Change
- The South-North Dialogue - Equity in the Greenhouse Proposal
- The Vattenfall Proposal
- The Global Climate Certificate System (P Baer & Athanasiou, 2007).

It is not clear whether some or all of these have been proposed as a basis for a negotiated international agreement or to illustrate the problem. Contraction and Convergence, although appealing in its simplicity, with a rapidly contracting global per capita limit on emissions does not recognise the much higher capacity of the developed world to fund solutions or the developed world's historic responsibility for the problem. It is therefore unlikely to be supported in the international negotiations by the poor developing countries with relatively low emissions.

CAN's framework takes a strong normative approach as it commits to defining obligations in terms of both responsibility and capacity) and additionally because it treats adaptation as integral to the required climate regime. Both the "South-North" and GDR proposals are broadly consistent with the CAN approach, and both are being developed by people who are directly or indirectly associated with CAN. The South-North proposal is a multi-stage framework that divides countries into six classes, each with differentiated mitigation commitments, based on capacity, responsibility, and potential to mitigate. It has some difficulties in addressing the issues of whether the commitments within the classes are the same and if not how are they differentiated and also on what basis does a country move to the next class with a higher level of mitigation commitments (P Baer & Athanasiou, 2007).

The two key features of Vattenfall Proposal are its allocation of permits in proportion to GDP, and its exemption of countries below a threshold level of per capita income. The exemption threshold Vattenfall suggests is one half of average Annex 1 per capita income in 2002, which is roughly $11,500 PPP adjusted (or about $10,500 in unadjusted terms) (P Baer & Athanasiou, 2007). Its allocation of permits on the basis of GDP makes it unlikely that poorer countries would accept it as 'fair', even with the adjustments it includes. As it is based on GDP, it also benefits the more developed countries, which also have the greater responsibility.

The Global Climate Certificate System (GCCS) is a very detailed proposal by German economist Lutz Wicke for a global cap-and-trade system, one that combines a nominal equal per-capita allocation with an administered and (critically) price-controlled transfer of "surplus" permits between low-emitting and high-emitting countries. This amounts to partial grandfathering of permits, which again benefits the more developed countries that have the greater capacity and responsibility for global warming (P Baer & Athanasiou, 2007). The GCCS does not fully address the needs for development and the levels of transfer payments needed from the developed countries to fund the low emission development path among the global poor.

The GDR approach is particularly useful in highlighting the 'equity' dimension of the climate change problem and in providing a reference framework against which other proposals developed in the international negotiations can be assessed. Without an unprecedented level of global cooperation, the 2°C emergency pathway, or anything like it, will quickly recede out of range. To effectively address climate change will require an unprecedented level of cooperation by developed and developing countries.

10 Conclusion

The effective international agreement that is urgently required to avoid dangerous climate change will require a much greater willingness to cooperate and more radical policies than those adopted so far in the international climate change agreements. The agreement needs to provide an effective mechanism, such as the GDR framework, whereby those with the capacity and responsibility fund decarbonised development for the global poor. The developed countries need to make a clear commitment to do this as well as committing to dramatically reduce their own emissions.

The GDRs framework represents the type of ambitious approach that is necessary to gaining international agreement to implement the emergency climate program necessary to avoid dangerous climate. It compares favourably with other frameworks proposed for the post-2012 period, particularly in terms of environmental justice issues for the global poor and it therefore provides a viable framework for substantially reducing the risk of dangerous climate change. The problems with having it adopted are more political and governance issues rather than technical feasibility. This or a similar radical approach to changing the international political economy is also required to move humanity towards Ecologically Sustainable Development.

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