

# Greenhouse Development Rights

An approach to the global climate regime that takes climate protection seriously while also preserving the right to human development\*

EcoEquity and Christian Aid

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*This brief paper introduces a new approach to the global climate regime, one designed to recognize the urgency of the climate crisis, while at the same time embracing the fundamental right to human development. This “Greenhouse Development Rights” approach is not primarily defended on ethical grounds. Its core justification, rather, is a realist one – our claim is that this approach, or something like it, is needed if we’re to break the global impasse over developmental equity in a climate constrained world.*

*We put forward this new approach not because we believe that it will be readily adopted as the foundation of the post-2012 regime. Rather, we intend it as a standard of comparison, a **reference framework** that marks out the steps that must be part of an effective climate regime, while refusing to prejudge which of them will or will not ultimately be deemed politically acceptable. Against this reference framework, given regime proposals can be measured to determine how realistic they are, from the standpoint of genuinely addressing the North/South impasse and having a chance of preventing a climate catastrophe.*

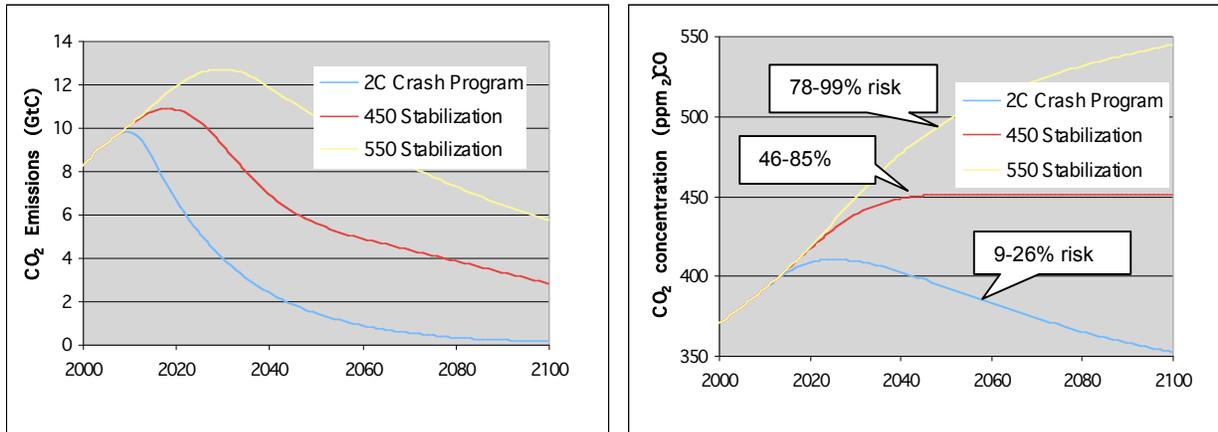
## 1) The Urgency

The climate crisis, as most everyone in the climate community knows, is upon us. Still, the pace of our response has been profoundly inadequate, so this paper will begin with the blunt truth. The science now tells us that we’re pushing beyond mere “*dangerous* anthropogenic interference with the climate system,” and are rather on the verge of committing to *catastrophic* interference.

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Given the slow progress to date, a heroic effort will now be required to have a high likelihood of averting a climate catastrophe, which the emerging consensus<sup>1</sup> takes to mean keeping overall planetary warming below 2°C. Figure 1, just below, shows three progressively more ambitious emissions trajectories and, based on current understanding of the key scientific uncertainties<sup>2</sup>, estimates of the probabilities that each trajectory would actually lead to exceeding the 2°C threshold.



**Figure 1. Emissions pathways and concentration pathways for three scenarios – the “2°C Crash Program” and typical pathways for 450 ppm or 550 ppm CO<sub>2</sub> stabilization – along with the risk of exceeding the 2°C threshold (as calculated by Baer and Mastrandrea 2006 - see note 3).**

The most stringent of these trajectories, as you can easily see, is heroic indeed. It shows emissions peaking in 2010 and dropping off at a resolute 4% per year, thus keeping atmospheric carbon concentrations below 420 ppm. Yet, even with this almost inconceivable effort, we would still be exposed to an alarming 9-26% risk of exceeding 2°C.<sup>3</sup>

Note, too, what this analysis tells us about today’s conception of political realism. After all the 450 ppm CO<sub>2</sub> trajectory is quite likely to overshoot 2°C. And the 550 ppm trajectory, which is still occasionally put forward as “precautionary,” really can no longer be taken seriously, at least not as a mitigation trajectory. It poses a 78-99% risk of exceeding 2°C and a 28-71% risk of exceeding 3°C, making it difficult to argue that 550 ppm is anything other than a reckless flirtation with catastrophe.

Others have expressed these same conclusions in different words. NASA scientist James Hansen, for example, warns that “We have to stabilize emissions of carbon dioxide within a decade” or the temperature “will be warmer than it has been for half a million years, and many things could become unstoppable.”<sup>4</sup>

It will, in other words, take heroic efforts, but an honestly precautionary trajectory is still possible. Already existing technologies – if implemented and disseminated with Manhattan Project urgency – can very quickly win us huge emissions reductions, and buy us time to develop new technologies and adopt lower-consumption lifestyles. But we can’t afford delay associated with “incremental decision making” as we know it today, when each increment must be made to appear economically unthreatening and politically palatable.

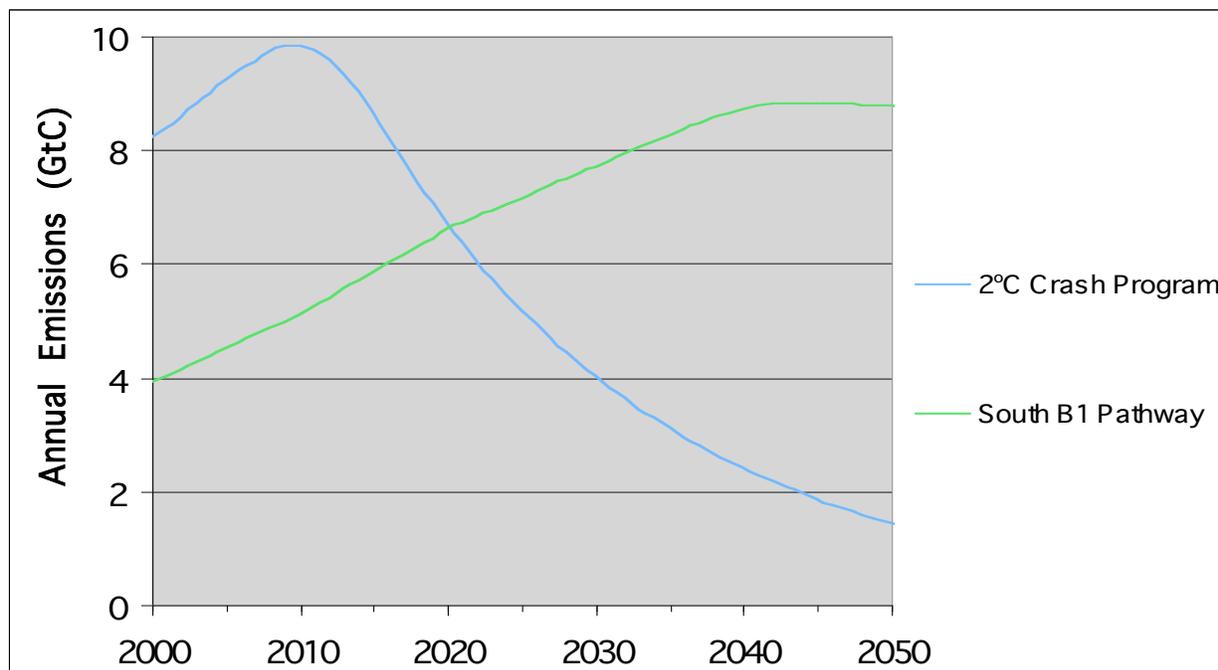
The urgency forces us to face options that – at this moment – appear “unrealistic” and “politically unacceptable.” It forces us, in particular, to honestly face the sources of the current deadlock on meaningful climate action. Chief among these sources, of course, is the impasse between developing and industrialized countries.<sup>5</sup>

## 2) Human Development and Climate Protection

Even as we grow increasingly anxious about an impending climate crisis, the South is dealing with a crisis of its own: *the crisis of poverty that still afflicts the vast majority of its citizens*. Much can be said about this crisis – scandalously high infant mortality rates, preventable or curable disease as a fact of life, the continuing onslaught of AIDS, malnutrition in a world of plenty, crushing daily physical insecurity – and much has been said that we need not repeat.

We will, rather, return immediately to the climate crisis, and to the following self-evident fact: As economies are now structured, and as development is still conventionally envisioned, ending poverty unavoidably means vastly improved access to energy services and rising carbon emissions. Herein lies the core tension between the South’s development aspirations – and even the far more minimal demands of basic human development – and the climate challenge. Any climate regime that ignores this tension is doomed to failure.

Figure 2 expresses this tension by way of a simple comparison of two emissions trajectories. The “2°C Crash Program” trajectory is the same global 420 ppm “peak and decline” trajectory shown above in Figure 1. The “South’s B1 Pathway” is a rather conservative reference projection (the IPCC’s SRES B1) of the South’s future emissions<sup>6</sup>. What is striking about the simple exercise of comparing these two paths is that it unambiguously demonstrates that *a truly precautionary trajectory is radically inconsistent with even this optimistic reference projection of Southern emissions*. To avoid bursting through the precautionary envelope, emissions in the South<sup>7</sup> would have to leave their projected path quite soon, and be dropping precipitously by 2020. But even with the B1 scenario’s optimistic assumptions about both equity and economic growth<sup>8</sup>, the South would still be struggling against poverty when its emissions began this steep decline. The question then is, what manner of climate regime can enable such a rapid emissions decline *at the same time* as the South continues, and even steps up, its fight against poverty?



**Figure 2: Available Southern emissions budget under the 2°C Crash Program, plotted against the South’s SRES B1 pathway emissions. Note that Northern emissions are assumed to magically drop to zero in 2020 – the South’s budget reflects the *entire* global emissions budget.**

In this context, we submit that a global climate regime with any promise of success must explicitly, *structurally*, embrace the fundamental right to human development, and must actively preserve that right

for all, despite the dire pressures of the climate crisis. We support this claim with two arguments.

First, there is a *political* imperative to embrace human development. For even as we globally pursue a massive greenhouse transition, the South will insist – with strong ethical justification – on focusing its energies on development rather than climate mitigation. More particularly, the South will refuse to pay the additional costs of low-carbon energy technology until its most pressing human development needs have been met and its ongoing poverty crisis brought under control. The problem of human development, in other words, is intrinsic to the problem of negotiating a global climate regime. Indeed, we will go so far as to argue that the climate protection regime will only succeed in engaging the South if actually it helps the South to focus its energies on human development.

Of course, conventional macroeconomic development does not always lead to poverty alleviation or, more generally, egalitarian social outcomes. But this is a large matter that extends far beyond the proper ambit of the climate regime. Nonetheless, “development” is still widely regarded as the best path forward for the poor, and no climate regime with pretensions to realism can impose obligations on the South that would siphon off resources that could otherwise be devoted to economic growth and, if only indirectly, poverty alleviation.

Second, there is a *structural and practical* imperative to engage the problem of human development – the North can only hope to successfully engage the climate problem in cooperation with a Southern partner that is progressing healthily toward human development. This is so because of the many intrinsic connections between the climate and human development challenges.

These connections, though manifold and complex, can be briefly outlined with respect to both mitigation and adaptation. In the former case, climate protection will require dramatic technological transformation, one amounting to a wholesale reinvention of the global energy infrastructure based on low-emission fuels and technologies. In the developing world, this will require large-scale investment in training and education, and creating the institutional capacity to adopt, develop, and implement revolutionary solutions, all while meeting the growing needs of expanding populations and economies. Mitigation will also require far-reaching changes in agricultural and land-use practices, which currently account for as much as one-third of Southern greenhouse-gas emissions. Fortunately, all these things are possible, given the real commitment to grassroots empowerment that is essential if we’re to open any truly positive future for the poor communities that are currently dependent on land-clearing for subsistence farming, fuel wood harvesting, grazing, timber extraction and other land-use activities. The point is that, in both the case of energy infrastructure and land-use practices, investment in human development is fundamental to the necessary transition. Ultimately, mitigation calls for next-generation energy technologies as well as female literacy, not-yet-developed agronomic practices as well as universal neonatal healthcare.

With respect to adaptation, it clearly requires a level of resilience far beyond the grasp of the two billion people currently living on less than two dollars a day. It requires improved access to financial resources, but just as importantly it requires social capital and the opportunity to adopt new or altered livelihoods. It also requires enfranchisement, and the ability to influence decisions and hold governments accountable.

Though these two arguments – the political and the practical – resonate deeply with an intuitive sense of ethical propriety, the Greenhouse Development Rights approach is not fundamentally an appeal to morality. Its justification is, rather, a realist one. It, or something like it, will be necessary if we are to break the global impasse and rise to the demands of the climate crisis.

### **3) Greenhouse Development Rights**

The Greenhouse Development Rights approach aims to follow the above arguments through to their logical conclusions and to elaborate a framework for a global climate regime that is consistent with those

conclusions. While the details are described below, here's a brief summary of the approach:

- The GDRs approach takes climate protection to mean a *scientifically-grounded* precautionary approach. It recognizes the uncertainties, and aims to preserve a high probability of avoiding catastrophic climate disruption. This implies an extraordinarily stringent global emission path.
- The GDRs approach explicitly preserves the right to human development for all. What this means in practice is that it is structured to allow – even facilitate – the advance of human development in poor countries. It explicitly relieves developing countries of the pressure to focus their resources on mitigation, and ensures them of resources to help adapt to the changing climate.
- Conversely, the GDRs approach calls upon the wealthy countries to provide the resources necessary to allow society, collectively, to transition to clean, efficient, low-carbon economies, and to meet a precautionary global emission trajectory. The cost of meeting this obligation would, to be sure, be significant (though as the Stern Review<sup>9</sup> has shown, it would be far from crippling, and further delay would likely make the cost vastly higher), but this only means that it's critical to share the obligation fairly, and that the process by which this is done can't be left to horse-trading and political arm-twisting. To this end, the GDRs approach allocates obligations to nations according to their responsibility (their historic contribution to the climate problem) and capacity (their ability to dedicate resources to the problem).
- The GDRs approach, crucially, would impose parallel obligations on developing countries. Recognizing that there are vast intra-national disparities in wealth and circumstances – the proverbial “Germany inside India” – the GDRs approach calculates national obligations in a manner sensitive to intra-national income disparities. It then obligates developing countries to (1) work toward the “no-regrets” mitigations options that are available to them, and (2) invest in human development to enhance mitigative and adaptive capacity within their poor populations.

In both its historical evolution and its conclusions, the GDRs approach is a descendent of other proposals that recognize both the human right to the environmental commons and national responsibilities for consuming that commons. It has been informed by earlier proposals, including Contraction and Convergence<sup>10</sup>, The Brazilian Proposal<sup>11</sup>, multi-stage proposals such as the Climate Action Network's “Viable Framework<sup>12</sup>” and “South North Dialog<sup>13</sup>”, and the AOSIS Climate Change Insurance Fund<sup>14</sup>.

By design, the GDRs approach is intended to be compatible with the institutions already emerging within the climate regime. It could, in particular, be implemented as a global cap-and-trade system where allocations are based on “national no regrets trajectories”. And by the way such trajectories, which can be used as crediting baselines, would vastly improve upon today's project-based CDM.

## **4) The Structure of the GDRs System**

This is not a detailed exposition of the GDRs system, though one is under development. It is, rather, a quick review of its key building blocks.

### **4.1) A precautionary global emissions trajectory**

The GDRs approach begins with an explicit, scientifically honest precautionary trajectory. At present, climate science suggests a precautionary trajectory is something like the 420 ppm peak-and-decline trajectory discussed above, but this will be revised as the science evolves. The key point is that global emissions have to peak soon, and if the proposals herein seem unrealistic, this is the reason. The ramifications of the GDRs approach would be less stark under a less stringent path. However, to be blunt, significantly less constraining global emissions trajectories should at this point be taken as merely academic exercises. To the extent that they dominate the more visible, “politically acceptable” proposals

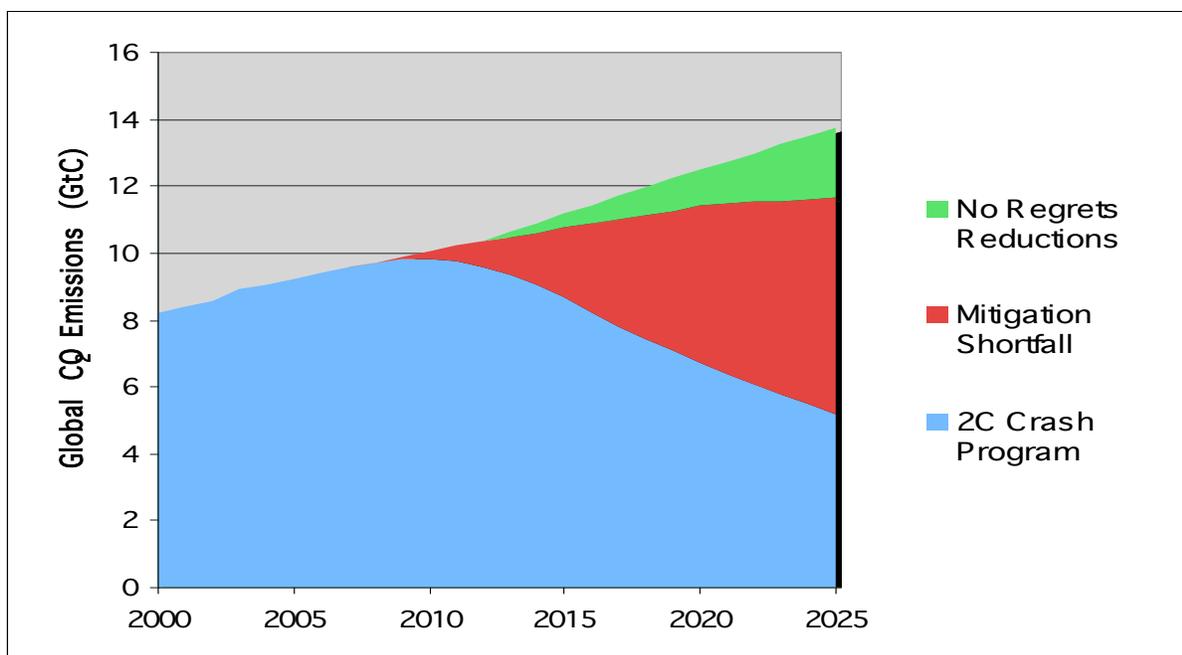
they are distracting and, frankly, dangerous. Any conclusions based on them are of little relevance to the problem of preventing catastrophic global climate change.

#### 4.2) The global mitigation shortfall

The GDRs calculations begin, in each commitment period, by determining the global mitigation shortfall. This is defined as the amount of mitigation that is needed in order to adequately decarbonize the global economy and keep us within the precautionary global emissions budget, above and beyond the mitigation that nations can be expected to accomplish by means of no-regrets activities.

No-regrets activities are those that reduce emissions relative to conventional business-as-usual development, but which garner financial or other benefits that make them worthwhile even without accounting for their climate benefits. Admittedly, no-regrets activities will be a challenge to rigorously define; they evolve over time as technology and market conditions shift, they face non-market barriers that make them harder to exploit, and they yield co-benefits that are difficult to financially value. But the principle is clear: the GDRs approach distinguishes mitigation activities that incur positive costs from those that nations should be promoting anyway because they make sense even in the absence of climate constraints.

Given this distinction, it should be possible to negotiate a transparent, internationally standardized, and fair process for the construction and maintenance of national no-regrets trajectories. These, in turn, could be aggregated into a global no-regrets trajectory, as shown in Figure 2, just below:



**Figure 3. Business As Usual, No Regrets and precautionary 2°C Crash Program trajectories. The yellow wedge represents no-regrets reductions. The red wedge represents the mitigation shortfall.**

Note that the business-as-usual trajectory (the top of the green wedge) is represented here by the IPCC's SRES A2 trajectory, while the global no-regrets trajectory (the top of the red wedge) is represented by SRES B1. The difference between the global no-regrets trajectory and the 2°C Crash Program trajectory is, by definition, the global mitigation shortfall.

#### 4.3) The global adaptation shortfall

Similarly, we need an estimate of the global adaptation shortfall, one which also needs to be calculated in a bottom-up fashion, one nation at a time. As with national no-regrets trajectories, this bottom-up

calculation would have to be done transparently, and in conformance with agreed international guidelines. No doubt, the global adaptation shortfall will be even more challenging to calculate than a global mitigation shortfall, and much remains to be worked out in this area. But this challenge is by no means unique to the GDRs approach; any approach that takes the notion of “polluter pays” seriously requires a cost assessment. To a first order, this assessment can be envisioned as an evolution and generalization of the process that is already underway to develop National Adaptation Plans of Action<sup>15</sup>.

The adaptation shortfall includes not only the “urgent and immediate adaptation activities” cataloged in the NAPAs, but also longer-term physical infrastructure requirements like drinking water systems and sea walls, as well as institutional infrastructure like comprehensive disaster responses systems and insurance schemes accessible to the poor. Perhaps most importantly, though, the adaptation shortfall must reflect the need to create broad-based adaptive capacity in poor communities. It must, in other words, account for the considerable investments<sup>16</sup> in basic human development needed to build resilience in vulnerable communities.

#### **4.4) National indicators of responsibility and capacity**

The heart of the GDRs approach is the premise that national obligation within a climate regime should be commensurate with responsibility and capacity. “Responsibility” of course refers to a country’s contribution to the climate problem, thus embodying the polluter pays principle. “Capacity” refers to a country’s resources to cope with the climate challenge and invest in solving it. The GDRs approach takes these as fundamental quantities that, though contentious, must be officially raised and openly discussed in the climate negotiations. Specifically, the negotiations will have to evolve from today’s general acknowledgement of principles (“Common but differentiated responsibilities and respective capabilities”, UNFCCC preamble) to specific definitions and quantifications, so as to allow responsibility and capacity to be explicitly and transparently related to legally binding obligations and commitments.

In general terms, the GDRs approach would establish an indicator of responsibility that reflects a nation’s contribution to the climate problem – its carbon debt. The precise structure of this indicator should be discussed and negotiated, but a reasonable starting point is cumulative emissions since some starting date (say, 1992, when the UNFCCC was agreed). Similarly, some indicator of capacity would have to be adopted. These indicators, crucially, must account for intra-national inequity, by calculating them in a disaggregated way (for example, by summing over decile income classes, rather than taking national per capita averages). The point is that a nation’s wealthy minority must be properly accounted in the calculation of its responsibility and capacity, even if the majority of its people are quite poor or even utterly impoverished.

#### **4.5) Obligations and burden sharing in the GDR framework**

Finally, and most importantly, the GDRs approach asserts a set of obligations, in accord with its underlying principles: precautionary protection of the climate, preservation of the right to human development, and obligations to invest globally in both mitigation and adaptation commensurate with responsibility and capacity.

To start with, all nations are obligated to reduce their emissions to the level reflected in their no-regrets trajectory. GDRs, after all, is a climate protection framework, and this is the first step towards driving all development, everywhere, into efficient, low-carbon pathways.

Beyond that, industrialized countries have qualitatively different obligations than developing countries. The GDRs approach, as controversial as this step may be, proposes to discard the conventional Annex-I, Annex-II, non-Annex I categories. These categories are static and political, and have limited usefulness when it comes to assigning commitments that truly reflect national responsibility and capacity.

Instead, the GDRs approach would proceed by establishing a “development threshold” that reflects a level of socio-economic development to which all countries are entitled. This threshold would be measured by a “capacity indicator” that would include but not necessarily be limited to per-capita

income.<sup>17</sup> Those countries whose capacity indicator exceeds the development threshold (let's call these "Annex North" countries) would collectively be obligated to pay for the low-carbon development needed to meet the global mitigation shortfall. The allocation of this burden within Annex North would, in turn, be based on national responsibility and capacity indicators – countries with greater responsibility and capacity would be obligated to pay to mitigate a correspondingly larger proportion of the global mitigation shortfall. Analytically, responsibility and capacity indicators would be combined into a composite "*obligation indicator*", and the global mitigation shortfall (expressed in tons of CO<sub>2</sub>eq) would be allocated to Annex North countries in proportion to their obligation indicator.

This scheme could be implemented as a global cap-and-trade system, providing only that each country is given allowances in an amount corresponding to its no-regrets trajectory minus the portion of the global mitigation shortfall that it is obligated to reduce. Countries with emissions in excess of their allowances would be required to either mitigate them domestically or, alternatively, to buy additional allowances on the global market, at a price that might indeed be quite high, reflecting as it does the stringency of the global adequacy trajectory.<sup>18</sup>

Those countries whose capacity indicator falls below the development threshold ("Annex South") would not be required to contribute to meeting the global mitigation shortfall. Instead, they would be required, in proportion to their obligation indicator, to allocate resources directly to human development. Recall, in this regard, that responsibility and capacity indicators are calculated in a disaggregated manner that accounts for intra-national disparities. Thus a country like, say, China – which is poor in aggregate but home to a wealthy (and responsible) sub-population – would have a non-zero obligation. But as long as China as a whole remained below the development threshold, it would be obligated not to mitigation activities, but rather to activities designed to promote the human development of its own people.

Once an Annex South country reaches the development threshold and "graduates" into Annex North, it will, by definition, have enough capacity to start paying for the global mitigation shortfall, though its initial mitigation obligations would be small. Until that time, development is its proper priority, and it is obligated only to invest in human development.

Finally, all countries are obligated, in proportion to their obligation indicator, to pay to meet the adaptation funding shortfall.

## **5) Climate Realism**

Many will see the GDRs approach as "unrealistic." After all, it asks that nations, and in particular the nations of the North, make commitments that, as of now, they show no inclination to accept. In this is it quite different from most other proposed frameworks, which generally put forward incremental steps that build marginally on existing progress, and which downscale expectations to match commitments that are already seen, or almost already seen, as politically acceptable.

The GDRs approach takes a different tack. It starts from the science and asks "what will be necessary if we're to have a good chance of preventing a climate catastrophe?" The science unforgivingly responds that global emissions must peak within a decade and then start racing downward.

If the climate crisis were not quite so desperately urgent, if we were not facing catastrophe even while millions of people were still impoverished and vulnerable, then a slow, measured, incremental approach might work. *But we don't have time for incremental approaches.* Any strategy that drags through the next decade with measured unthreatening steps has a high likelihood of failing.

We put forward the GDRs approach not because we believe it will be readily adopted as the foundation of the second commitment period regime. Rather, we inject it into the debate as a standard of comparison –

a *reference framework* – which bluntly marks the steps that will be needed to prevent a climate catastrophe, but does not prejudge what would or would not be politically acceptable. Against this reference framework, one can measure the degree to which any given regime proposal is either realistically precautionary and seriously addresses the North/South impasse, or merely an insufficient, dangerous, time-wasting distraction.

If this approach seem reckless, that's only because it's already too late for realism as usual, too late for a honestly precautionary way forward that does not involve a radical redefinition of what is realistic.

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<sup>1</sup> The 2°C level marks a threshold beyond which climate impacts are expected to escalate sharply, cause immense human suffering, and threaten irreversible ecological disruption. This threshold has been broadly adopted (e.g., by the European Union, the United Kingdom, and the Climate Action Network), and has become the de facto definition of the maximum acceptable warming. It is, however, notable that some climate scientists, driven by the fear of the disintegration of the major ice sheets and a disastrous rise in sea levels, have argued for maximum thresholds even lower than 2°C, (Hansen 2005; O'Neill and Oppenheimer 2002). And because recent droughts, heat waves and storm patterns are consistent with the anticipated impacts of a warming climate, and particularly with new evidence of drastic impacts in the Arctic, it is quite clear that some regions are *already* experiencing dangerous, and locally catastrophic, climate change. Still, despite all this, we unenthusiastically adopt 2°C as a modest definition of “acceptable warming”.

<sup>2</sup> The calculations shown in this paper are from Baer, Paul and Michael. Mastrandrea, 2006. *High Stakes: How large and how fast will cuts in greenhouse gas emissions need to be to have a high chance of avoiding dangerous climate change?* Institute for Public Policy Research, London, Available at [www.ippr.org](http://www.ippr.org).

This study takes account of and seeks to combine the best existing uncertainty estimates for climate sensitivity, ocean heat uptake, land-use emissions, the carbon sink, and aerosol cooling. Similar results have also been demonstrated by Malthe Meinshausen in his “On the Risk of Overshooting 2°C,” in [Avoiding Dangerous Climate Change](#). H. J. Schellnhuber, W. Cramer, N. Nakicenovic, T. Wigley and G. Yohe, eds. Cambridge, UK, Cambridge University Press.

<sup>3</sup> These calculations (cited in Note 2) are made with rigorous probabilistic techniques that require as an input subjective expert opinion about the uncertainty of various parameters. Because there are a range of reasonable assumptions that can be made about key parameters, the calculated risk must be reported as a range.

<sup>4</sup> Hansen, James., 2006. “Climate Change: On the Edge.” (*The Independent*, 17 February) The details of Hansen’s analysis can be found in James Hansen, Makiko Sato, Reto Ruedy, Ken Lo, David W. Lea, and Martin Medina-Elizade, “Global Temperature Change,” Proceedings of the National Academy of Sciences of the United States of America, contributed July 31, 2006 and published online on September 31, 2006.

<sup>5</sup> We discuss this impasse at much greater length in Kartha, S., T Athanasiou, P. Baer and D. Cornland, 2005. *Cutting the Knot: Climate Protection, Political Realism and Equity as Requirements of a Post-Kyoto Regime*. EcoEquity. This paper, available at [www.ecoequity.doc/GDRs](http://www.ecoequity.doc/GDRs), was the first version of the Greenhouse Development Rights framework.

<sup>6</sup> The SRES B1 scenario – the IPCC’s “green” scenario, is characterized by relatively low population growth, “reductions in material intensity, and the introduction of clean and resource-efficient technologies” (IPCC, 2000) at aggressive rates that exceed historic precedent. And like all the SRES reference scenarios, it includes by definition no explicit climate policy.

<sup>7</sup> The reader may notice that this way of presenting the problem is actually quite optimistic, in that it posits that Northern emissions magically and entirely disappear by 2020, making the entire precautionary emissions budget available to the South. Without this assumption, Southern emissions would have to start their precipitous decline even earlier – well before 2020.

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<sup>8</sup> The SRES B1 scenario has Southern per-capita income rising at a rate of 3% per year. Using this rate, per-capita income in the South would thus have risen from today's average of a little over \$4000 (PPP adjusted) to around \$7000 in 2020. Compare this to *today's* average for Annex I nations of about \$24,000.

<sup>9</sup> The Stern Review (available for download at [www.sternreview.org.uk](http://www.sternreview.org.uk)) is of course the UK government report on climate change economics that, we may all hope, marks the end of the pretense that economic analysis justifies further delay before launching serious attempts at mitigation. Having said this, we regret that The Stern Review, despite its concern to keep total warming below the 2°C, threshold, didn't seriously examine "peak-and-decline" scenarios, and has little if anything to say about burden sharing.

<sup>10</sup> Contraction and Convergence, of course, is the famous attempt to construct an equitable and adequate global climate regime, with equity defined in terms of equal per-capita emissions rights. Many of the authors of this essay were once partisans of C&C, and all of us are still friendly to it and its core concerns. That said, we now believe that it cannot work, and would not be fair, in a world where the developed countries have already consumed the bulk of the total global carbon budget. Simply put, Contraction and Convergence would not allow adequate developmental space for the South. Moreover, it cannot be extended to account for national circumstances, and it has nothing to say about the developed world's responsibilities in terms of adaptation. It is important, however, to note that the outcome of the GDRs approach would be a world in which global emissions contracted while rich- and poor-world per-capita emissions moved towards convergence. Of course this is true for the trivial reason that this sort of contraction and convergence is an inherent property of any system that could actually work.

<sup>11</sup> The "Brazilian proposal" would have allocated the *share of a global reduction target* on the basis of historical contribution to global temperature increase. It was designed to allocate reduction targets to Annex I countries; it never answered the question "when do countries graduate" and cannot be taken as a serious post-Kyoto proposal without such an addition.

<sup>12</sup> "A Viable Global Framework for Preventing Dangerous Climate Change" was adopted as a Climate Action Network discussion paper at the 9<sup>th</sup> Conference of Parties in Milan, Italy in December 2003. It can be downloaded at [http://www.climatenetwork.org/docs/CAN-DP\\_Framework.pdf](http://www.climatenetwork.org/docs/CAN-DP_Framework.pdf).

<sup>13</sup> The final proposal of the "South-North Dialogue on Equity in the Greenhouse: a proposal for an adequate and equitable global climate agreement" was published in May of 2004. It is particularly notable for its serious attempt to construct a composite responsibility and capacity based indicator of national obligation to mitigate. It can be downloaded at [http://www.wupperinst.org/download/1085\\_proposal.pdf](http://www.wupperinst.org/download/1085_proposal.pdf).

<sup>14</sup> The AOSIS proposal for a Climate Change Insurance Fund would cover the costs associated with climate change in part through a levy on fossil fuel sales in Annex I. (See "Seminar of Government Experts: Draft Future Actions Strategy – Tuvalu." Presentation made at the Seminar of Government Experts, 16-17 May 2005, Bonn, Germany.)

<sup>15</sup> Muller (2006) has used the NAPAs to very roughly estimate the scale of funding needed to meet "urgent and immediate adaptation actions" within developing countries, estimating the range to be roughly \$5 billion to \$17 billion. (Benito Muller and Cameron Hepburn, "IATAL — an outline proposal for an International Air Travel Adaptation Levy" (Oxford Institute for Energy Studies #EV 36, October 2006)

<sup>16</sup> Any attempt to categorically distinguish investments in "human development" from "adaptation activities" is likely to be fraught with difficulties. There are not only practical but also conceptual problems with trying to determine the "additionality" of adaptation activities, or with trying quantify the "incremental costs" of adaptation over the "baseline costs" of development.

<sup>17</sup> Economic indicators are of course not adequate indicators of development. Some people in the GDRs coalition are thus arguing for an indicative definition of the development threshold that is based entirely on the Human Development Index or other more directly qualitative indicators. The operationalization of such a threshold would, of course, require a negotiated definition of the development threshold.

<sup>18</sup> At least in comparison with, say, the current price of allowances.