

# **Curbing Climate Change?**

## **A Critical Appraisal of the Vattenfall Proposal for a Fair Climate Regime**

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## Foreword

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The climate debate is now in high gear. Al Gore's "Inconvenient Truth", the Stern Review, and the recent IPCC Reports have brought the message home: climate change is an overarching challenge that demands an immediate response. We can't afford to lose another decade. The coming months and years will play a key role in determining whether we muster the political will necessary to decisively address the climate challenge.

Corporations have too long played down this challenge in favor of short-sighted and voluntary approaches. But many appear now to be changing their views and positions. New business alliances (sometimes including civil society) abound in Europe, the US, and recently also in Brazil. And looking to the future, corporate climate activists are demanding new government policies, and in particular new incentives for corporations to invest in climate-friendly infrastructures. The situation is complex and contradictory, and defies easy generalization.

But within this crowded field, Vattenfall stands out. It is, to our knowledge, the first major corporation to present a detailed and comprehensive proposal for a global climate regime that includes binding caps on greenhouse gas emissions. This step is courageous and deserves to be commended, and this notwithstanding the major disagreements that we as a green foundation have had and continue to have with Vattenfall's investments in lignite, coal and nuclear.

Add to this the fact that Vattenfall's CEO Lars Josefsson is also advising the German Chancellor Merkel on climate change during its EU and G8 presidency, and it's clear that its positions merit closer attention. We have therefore commissioned this paper, with the goal of carefully scrutinizing the Vattenfall proposal against the criteria of adequacy and equity, key considerations for any viable climate regime.

We submit this paper as a contribution to the frank debate we now need if we're to find our way to a climate regime that takes seriously the challenges ahead. We are convinced that without taking the equity challenge honestly into account, there will be no solution to the climate crisis.

Jörg Haas  
Heinrich Böll Foundation

## Executive Summary

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In November of 2006, Vattenfall, a large, Northern European utility with substantial investments in nuclear energy and lignite based power plants, released a report called *Curbing Climate Change: an outline of a framework leading to a low carbon emitting society*.<sup>1</sup> With this report it crossed an important line, stepping beyond generalities and (a first for the business sector, at least as far as we know) making a specific, quantitative proposal for a global burden sharing framework. For these reasons alone it merits our attention.

The Vattenfall Proposal raises a number of questions, the most important being if it could actually work. This is the first question to ask about any framework proposal, but it's particularly interesting in this case because the authors of the Vattenfall Proposal take pains to be seen as fair. They do so for many reasons, though one of them, clearly, is that fairness is key to acceptability. [pp. 21-22]

What Vattenfall actually proposes is a global cap and trade system in which national permit allocations are proportional (with slight modification) to Gross Domestic Product. Is such a system fair? And would it be acceptable? The answers to these questions depend on its consequences for different types of countries, and in this case, the key consequence is that the rich countries get the bulk of the emissions permits. Furthermore, after a short period of unrestricted growth, during which their per capita emissions (and per capita incomes) remain much smaller than those of the industrialized countries, developing countries face rates of emissions reductions equal to or greater than (and in some cases much greater than) those required of industrialized countries. Such an allocation system, as we will explain below, is extremely unlikely to be seen by developing countries as fair, or even fair enough to be accepted.

Why, then, is this proposal worth discussing? There are three reasons.

First, Vattenfall appears to be serious about climate protection. Heavily criticized for its initial advocacy of a 550 ppm CO<sub>2</sub>-e concentration target, it changed its position. Given

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<sup>1</sup> *Curbing Climate Change: An outline of a framework leading to a low carbon emitting society*, the once heavily-publicized Vattenfall report that is referred to here as "the Vattenfall Proposal," was released on (or at least dated) November 1<sup>st</sup>, 2006.

this, it's possible that it will change its position again as it comes to more deeply understand the demands of the climate problem.

Second, Vattenfall seems to wield considerable influence with its climate policy proposals. It has started a business initiative called 3C – “Combat Climate Change” (see [www.combatclimatechange.org](http://www.combatclimatechange.org)) – which seeks to rally business support for a comprehensive climate protection framework. Vattenfall's CEO Josefsson has been appointed as a climate policy advisor to German Chancellor Merkel. This is especially significant as Germany is currently holding both the presidencies of the EU and the G8 at a critical stage of the international climate policy debate.

Third, Vattenfall acknowledges the importance of equity, and this too could indicate an openness to further reconsideration of the problems of climate protection. For the moment, Vattenfall's understanding of equity can be seen in its proposal's “adjustment mechanisms,” which are designed to meet two explicit design principles [p. 8]:

- “No poor country shall be denied its right to economic development – no extra cost burden on the poorest”
- “No rich country shall have to go through disruptive change”

These two principles, noted as elements in a longer list of “overriding principles,” are unfortunately easy to put into pointed contradiction with each other. And under the stringent sorts of emissions trajectories that are needed, such a contradiction is going to be difficult to avoid.

To quickly see this, look at Figure 8, on page 15 of *Curbing Climate Change* (reproduced on page 17 of this document). Here you'll see a plot of total emissions allocations (under the “early peak” variant of a 550 CO<sub>2</sub>-e scenario) for selected countries and regions. Note particularly that in 2025, just as India's total emissions reach the US level, they plummet drastically, while US emissions – by virtue of an adjustment mechanism designed to set a “maximum rate of emissions decline” for Annex I (but not non-Annex I) countries, and thus save them from any compulsion towards “disruptive change” – continue to *gradually* decline. Further, this happens while India's per capita emissions are still only about a quarter of those in the US! Moreover, this is not a contingent result, but rather an unavoidable consequence of the proposal's allocation mechanism, and it is extremely unlikely that India would ever agree to any framework designed to produce such results. And all of this takes place under the lax 550 CO<sub>2</sub>-e target. Under a more stringent target,

emissions would have to fall even more rapidly, to the point where the fatal logic of this architecture would become entirely undeniable. Either that or Vattenfall's "maximum rate of reductions" protection for Annex I countries would have to be essentially repealed.

Despite this and other related problems, Vattenfall's endorsement of "the right to economic development" as a foundational principle is extremely interesting, and its inclusion of a development threshold (below which countries are not obligated to accept mitigation commitments) is more than interesting. It is both important and commendable.

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# 1 Scope of this Appraisal

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This appraisal is based upon the original Vattenfall proposal, as embodied in the November 2006 report *Curbing Climate Change: an outline of a framework leading to a low carbon emitting society*. This report analyses Vattenfall's reported results for two variants ("early peak" and "late peak") of a 550 CO<sub>2</sub>-e scenario. Note that, in early 2007, Vattenfall, under heavy criticism, began to promote the far more precautionary concentration target of 450 CO<sub>2</sub>-e.<sup>2</sup> As of early March, however, the 550 CO<sub>2</sub>-e based analysis in *Curbing Climate Change* was still available on Vattenfall's website, and Arne Mogren, its head of climate policy, reported no immediate plans to revise the paper or redo the underlying modeling.<sup>3</sup> This was a problem for our analysis, but we did not attempt to reverse engineer the Vattenfall model to quantify its behavior for a stricter concentration target. We do however offer a qualitative estimate of the consequences of steeper emissions requirements.

## 1.1 Introduction to the Vattenfall Proposal

When, in November of 2006, Vattenfall released *Curbing Climate Change*, it crossed an important line, stepping beyond generalities and (a first for the business sector, at least as far as we know) making a specific, quantitative proposal for a global burden sharing framework. Further, Vattenfall crossed this line quite deliberately:

"Today, the climate change issue is driven by politicians, public officials and NGOs that are trying to pull business into a low-emissions future. Looking forward, leading representatives of business and industry have to show leadership and instead of being pulled by society business leaders should be pushing and in a positive way integrate climate issues into the world of markets and trade on a global scale." [p. 2]

The Vattenfall proposal is quite ambitious. More specifically, its authors believe that their GDP-based approach "should be able to achieve wide acceptance as being fair and

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<sup>2</sup> See Vattenfall's "Global Climate Map," <http://www.vattenfall.com/climatemap/>. In speeches in March, Vattenfall CEO Lars Josefsson framed the target as "450 plus or minus 50 ppm." [http://www.vattenfall.com/www/vf\\_com/vf\\_com/Gemeinsame\\_Inhalte/DOCUMENT/360168vatt/5966164xin/620058pres/620301clim/P02.pdf](http://www.vattenfall.com/www/vf_com/vf_com/Gemeinsame_Inhalte/DOCUMENT/360168vatt/5966164xin/620058pres/620301clim/P02.pdf)

<sup>3</sup> Personal Communication, March 16, 2007. with Arne Mogren, Vattenfall's head of climate policy.



balanced” [p. 8]. They hope this because, in their view, “Richer countries pull a larger weight (emission caps do not embrace countries until they have reached a certain economic level; poorer countries with caps get higher allocations compared to richer countries).” [p. 8]

But do richer countries, in fact, “pull a larger weight?” And is that weight larger by any sort of ethically or politically justifiable measure? If “wide acceptance as being fair and balanced” is in fact the goal, these are key questions.

To answer them, note first the basics of the Vattenfall Proposal. It is cap-and-trade system based on the allocation of permits in proportion to GDP, scaled slightly (in a “progressive” direction) to account for the (on average) greater carbon intensity of developing economies. In one of the common taxonomies of climate policy discourse, it is a “multi-stage” system in which poor countries are exempted from any immediate mitigation obligation.

This appraisal will examine the Vattenfall Proposal in several different ways. Underlying all of them, however, is one simple question: “How effectively will the proposed framework protect what we call *developmental equity*?” (see Section 1.3, below.) This, we claim, is the central question behind any balanced judgment of fairness, and judging by Vattenfall’s prominent assertion (see below) that “No poor country shall be denied its right to economic development,” it agrees. But how well does the Vattenfall proposal actually do on this account? Our conclusion, alas, is that it does not do very well at all.

At the very least, the Vattenfall Proposal contains some features that are clearly “red flags” from an equity perspective, features that (we suggest) are quite sufficient to ensure that will not, in the end, be greeted warmly by either environmentalists or developing country negotiators.

## **1.2 Context of the Vattenfall Proposal**

Vattenfall, a Swedish utility, seems to be a particularly activist company. It is certainly a company alive to the political and economic cross-currents of the climate age. It has enjoyed its share of the windfall profits that the EU’s Emissions Trading System has delivered to power generators, it actively supports nuclear power and carbon-capture and storage (even as it sometime argues that wind power is too expensive), and it has run large ads in *The Economist* saying that it’s time to get beyond “empty words.”

It has also become an activist corporate citizen. In that role, it has drawn together a coalition of major energy and manufacturing firms (including not only European giants such as E.ON, Enel and Suez but also American firms like General Electric and Duke). This “Combat Climate Change” (3C) coalition has, in the words of one European environmental news service<sup>4</sup>, “joined forces to lobby for a joint vision of international climate policy based on global corporate carbon trading after 2012.”

It shouldn’t be surprising that, as the global drive for carbon regulation heats up, corporations increasingly take an active role in trying to shape the regulatory regime. What is interesting and noteworthy is that Vattenfall has taken the initiative to propose a *global* regime, not merely a national or European regime, and has made a serious effort to comply with widely held benchmarks of environmental adequacy (the 2°C target). Given this, and given Vattenfall’s explicit commitment to a regime that is able “to achieve wide acceptance as being fair and balanced,” it must be assumed that their intention and belief is that their proposal in fact meets the necessary standards of fairness, and that it can win the voluntary assent of the developing countries. It is in this context that the actual implications of Vattenfall’s burden sharing mechanisms must be evaluated.

### **1.3 Adequacy and Equity as Guiding Benchmarks**

In this analysis, our goal is to go beyond simple description, and to evaluate the Vattenfall proposal in the light of explicit, and explicitly normative, criteria of *adequacy* and *equity*. By adequacy, we broadly mean compliance with the goal of preventing dangerous climate change, which we will examine with reference to the widely endorsed threshold of no more than a 2°C mean warming (above pre-industrial), which Vattenfall also endorses. By equity, we mean both the fair distribution both of the burden of mitigation and of the associated benefits of the right to emit; elsewhere<sup>5</sup> we also consider the fair assignment of liability for adaptation to unavoided climate change and compensation for climate damages, but the Vattenfall proposal is silent on these topics.

Article 2 of the UNFCCC famously specifies that its objective is the “prevention of dangerous anthropogenic interference with the climate system,” adding three sub-conditions regarding the protection of food production, the ability of natural systems to adapt to climate change, and the need to ensure that “economic development may proceed

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<sup>4</sup> “Major firms set out post-2012 climate manifesto” (ENDS Europe Daily, 11 Jan 2007)

<sup>5</sup> *FRAMEWORKS & PROPOSALS: A Brief, Adequacy and Equity-Based Evaluation of Some Prominent Climate Frameworks and Proposals*, an EcoEquity report to the Heinrich Böll Foundation, May 2007.

in a sustainable manner.” While a discussion of these objectives is largely beyond our scope, two crucial points need to be made. First, “dangerous anthropogenic interference” is *not* the same as dangerous climate change – increases in GHGs that cause a substantial *risk* of dangerous impacts properly constitute dangerous interference, and – especially in the light of Article 3’s invocation of the precautionary principle – are thus to be avoided. Second, climate change *that is already happening or in the pipeline* clearly poses risks to food production and the adaptation of natural ecosystems in at least some regions. Thus a reasonable interpretation of the UNFCCC is that current GHG concentrations are already too high.

As a practical matter, however, GHG concentrations are going to continue to increase, and the text of the UNFCCC is not going to prevent this increase. Thus the question we’re now facing is how best to rapidly reach a peak GHG concentration level, looking ahead as necessary to the speed and character of the post-peak emissions decline. In this light, it’s useful to consider the widely endorsed 2°C threshold, not because further temperature increases below 2°C would be “safe” or because 2°C represents a physical threshold beyond which we know that risks steeply increase, but because it is fairly easy to show that, beyond the 2°C level, there is a high probability of risks that reasonable people would choose to avoid. For this reason, it’s important to attempt to estimate the likelihood that any proposed global emissions trajectory would exceed the 2°C threshold. Such estimates are not by any means straightforward, in part because many additional assumptions must be made. Nonetheless we will briefly attempt to evaluate both the stated objectives and the quantitative implications of the Vattenfall proposal with regard to adequacy. Furthermore, as we describe below, we will attempt to infer the likely behavior of the system with regard to equity as the mitigation target is made increasingly stringent.

The UNFCCC states in Article 3 that nations must pursue burden sharing “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.” This text and many other provisions of the UNFCCC and the Kyoto Protocol make it clear that there are widely shared assumptions that parties with greater emissions (responsibility) and wealth (capability, or more commonly “capacity”) should have relatively larger obligations. But beyond this generality, there is little consensus, particularly when it comes to the relevance of historical emissions, how much wealth makes you wealthy, etc. There is, in other words, little agreement as to how the principles of responsibility and capacity might be quantitatively made operational.

The problem of assessing equity is confounded by a number of additional issues. We highlight three:

1. There are two alternative framings of the climate mitigation problem. In the first, the problem is one of allocating the *costs* of reducing emissions to the desirable level. In the second, the question is one of allocating a *common resource* (the finite carbon budget, cumulated over some period of time). Neither of these framings is prima facie the “correct” one; both can inform our judgments in different ways.
2. Because there is no absolute standard of equity, countries (like people) will tend to advocate views of equity which tend to favor their (usually short term) interests. These differing views may be more or less sincerely held (or, alternatively, may be advocated more or less cynically). It is tempting in this light to say that no reasoned resolution is possible and to advocate (as per Benito Müller’s classic proposal<sup>6</sup>) a merely procedural resolution. However, we hold a stronger position, which is that there are a wide range of shared ethical premises and precedents which apply to the climate problem, and that impartial reasoning (as in a Rawlsian “veil of ignorance”) can produce a clear and “reasonable” definition of what is actually at stake in the equity debate.
3. The ethical principles by which we navigate our lives are primarily intended to apply to persons, but the agents negotiating the climate regime are nation-states. It is reasonable but by no means unproblematic to treat countries as if they had the uniform characteristics of their “average” citizen. Inequality within countries is as great as or greater than inequality between countries, and the *practices* of international relations which place domestic inequality outside the bounds of global regulation should not prevent us from discussing its implications. These, as it turns out, are considerable.

A more complete discussion of our perspective on equity, and its relationship to political “realism, will have to wait for another forum. But a brief synopsis of our working premises would include the following:

1. The global sinks for GHGs *are* a common resource, and their use effectively provides an economic subsidy to emitters by allowing them to make use of cheap fossil energy. In addition, when the right to emit is converted into a tradable

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<sup>6</sup> B Müller, *Justice in Global Warming Negotiations: How to Obtain a Procedurally Fair Compromise*, Oxford Institute for Energy Studies, 1998, [www.oxfordenergy.org/pdfs/EV26.pdf](http://www.oxfordenergy.org/pdfs/EV26.pdf)

commodity (as it is in global emissions trading systems), scarcity rents accrue to those who receive emission licenses for free<sup>7</sup>. Thus, fundamentally, equity requires that poor people and countries today not be *disadvantaged* due to the need to limit global emissions, and that there is a *prima facie* claim to an equal *cumulative* benefit from this common resource.

2. Given that there are identifiable *costs* to reducing emissions to sustainable levels, and to funding adaptation and compensation, these costs should be borne proportionally to *responsibility* and *capacity*. While there is no a priori correct way to define and quantify responsibility and capacity, the range of *reasonable* definitions is not that broad.
3. Claims that parties who would face significant costs from desirable policies (e.g., American consumers or Saudi producers) deserve protection or even compensation are not *prima facie* unreasonable. However, in a world of great inequality, claims that policies need to strictly preserve the existing distribution of wealth and income are not defensible. Where transitional protections need to be applied, these must be finite and reasonable. And where such protections come into conflict with protections for the poor and the vulnerable, then – as a matter of justice if not of realism – it is they that must yield.

Our perspective, then, is one in which inequality figures large, and the demands of justice are taken as being quite intelligible, and even plain. We speak of *developmental equity*, and by this term we believe that we make our intentions clear. The only other point that we perhaps need to stress in this brief introduction is that, under the rubric of developmental equity, we include the problem of transitional justice, as we will come to increasingly know it on a planet in which climate impacts, and environmental limits more generally, will actually undermine human progress. Developmental equity is not a problem of mitigation alone. It demands that the logic of vulnerability, the calculus of responsibility, and the demands of adaptation be taken as integral to the regime.

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<sup>7</sup> P. Barnes, *Capitalism 3.0: A guide to reclaiming the commons*. Berrett-Koehler, 2006, [www.capitalism3.com](http://www.capitalism3.com)

## 2 Basic Mechanisms

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The Vattenfall Proposal raises many questions, the most important being if it could actually work. This is the first question to ask about any climate framework proposal, but it's particularly interesting in this case because the authors of the Vattenfall Proposal, though clearly presuming to speak for at least part of the corporate sector, take pains to be seen as fair.

The notion of fairness that underlies the Vattenfall Proposal can be seen in its core allocation mechanism, in the "adjustment mechanisms" (by which the core mechanism is modified to take account of rich-world / poor-world divergences), and by the principles that, it is said, underlie these mechanisms. These principles, unfortunately, are easily put in contradiction to each other, leaving their relationship to the actual mechanisms ambiguous. And the adjustment mechanisms, in particular, do not in practice countervail the essential structure of the allocation mechanism, which allocates emissions rights proportionally to GDP. This, we argue, is fundamentally inconsistent with the equity demands of any viable global climate regime.

### 2.1 The Core Allocation and Adjustment Mechanisms

The core of the Vattenfall proposal is a global cap and trade system in which national permit allocations are based upon Gross Domestic Product. The global cap is specified to be consistent with the EU's 2°C target; Vattenfall's proposal (as published in *Curbing Climate Change*) offers two variants ("early peak" and "late peak") designed to stabilize GHG concentrations at 550 ppm CO<sub>2</sub>-equivalent, by limiting the global carbon budget from 2015 to 2100 to about 1600 MtCO<sub>2</sub>. (Note that we will not bother to criticize the 550 ppm CO<sub>2</sub>-e target itself. It is patently unacceptable and in any case Vattenfall itself seems to have moved on to more plausibly precautionary targets.)

All countries which are covered – all Annex I countries from the beginning of the regime, and other countries after their per capita income exceeds a specified threshold<sup>8</sup> – receive a uniform allocation of permits per unit of GDP, with slight modifications, described in detail below. The first modification gives a slightly higher allocation per unit of GDP to

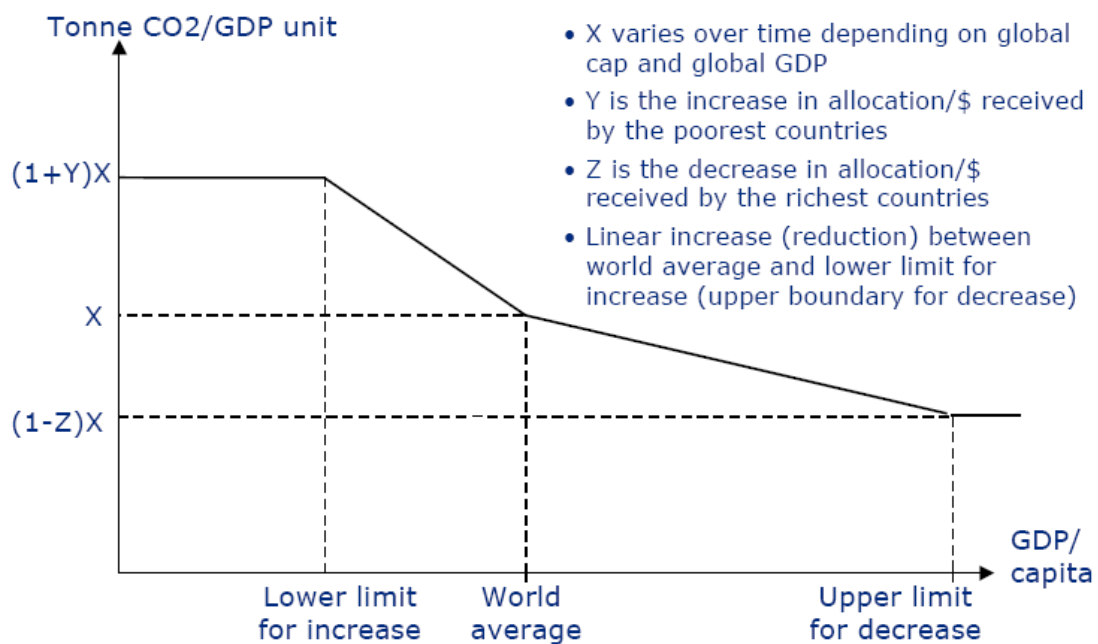
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<sup>8</sup> The proposed threshold is 50% of 2002 average per capita GDP for Annex I countries, which is about \$11,000 (PPP adjusted).

poor countries and a slightly lower one to rich countries; the second establishes minimum and (more importantly) maximum rates of reductions on Annex I (but not non-Annex I) countries. The system as described covers only CO<sub>2</sub> emissions from fossil fuels, but this seems to be largely a consequence of simplifying the exposition, rather than any explicit choice about regime design.

The exemption of countries below an income threshold is obviously a critical component of the proposal, and can be said to ensure to some extent that the proposal meets the stated principle that “No poor country shall be denied its right to economic development – no extra cost burden on the poorest.” However, countries are still poor when they cross the threshold, so the fairness of the system to countries once they have “graduated” is also paramount. And in this regard, the idea of allocation according to GDP *prima facie* fails a minimal test of fairness; it represents a form of grandfathering, and we will argue that Vattenfall’s adjustment mechanisms do not effectively countervail the inequity of grandfathering. But before we discuss further the consequences of per GDP allocations, it is important to consider these adjustment mechanisms themselves.

The proposal authors recognize that, on average, poorer countries have higher carbon intensity than wealthier countries – that is, they use more carbon per unit of GDP produced. (Note that the real issue is *energy intensity*, or energy per unit GDP; on average the carbon per unit of energy is roughly comparable between developing and industrialized countries.) Accordingly, countries facing restrictions but with per capita GDP less than the world average are allocated up to 1.25 times extra emission allowances *per unit of GDP* compared to a country at the average level. The extra allocation increases linearly below the average GDP per capita and the maximum extra allocation is reached if the country has a GDP per capita that is equal or less than 0.5 times the world average. In a similar manner, countries that are richer than the world average receive less allocation per unit GDP. For countries with GDP per capita twice, or higher, than the world average, the allocation/GDP unit is 0.9 times the allocation for a country at the average level. The mechanism is described graphically (with the actual numbers replaced by variables X, Y and Z) in Figure 2 from page 10 of *Curbing Climate Change*.



**Vattenfall’s GDP-based allocation mechanism (Figure 2 from p. 10 of *Curbing Climate Change*)**

The second adjustment mechanism establishes minimum and maximum rates of reductions for Annex I countries in the period through 2045. In the 550 ppm CO<sub>2</sub>-e scenario analyzed in *Curbing Climate Change*, the minimum rate of reduction is set to a 5 percent reduction below 2002 emissions in 2015, increasing to not less than a 15 percent reduction below 2002 levels in 2035. The maximum level is set to yield reductions of no more than 15% below 2002 levels in 2015, increasing at 10% per decade, so that emissions reach 55% below 2002 levels in 2045.

The minimum rate of reduction seems to serve two purposes. First, given that the global budget may (at least under the 550 ppm scenario) be rising for the first 10 to 25 years, it means that all Annex I countries will nonetheless be required to reduce their emissions. This provides room for additional growth for developing countries which have no restrictions. Second, it ensures that no Annex I countries get “hot air” – that is, allocations in excess of their current emissions – which could otherwise happen. However, no explicit justification for the minimum rate of reduction is given.

The maximum rate is expressly designed to meet the criteria that “no rich country shall have to go through disruptive change,” and more specifically “to allow existing capital to



serve its lifetime.” [p. 10] Of course, what constitutes “disruptive change” is a subjective question; and, interestingly, no cost estimates of any kind are included in the study.<sup>9</sup> Ultimately, if one seeks to increase the stringency of a mitigation regime (and thus the costs), there must be some distribution of those costs between poor and rich countries. *Under the Vattenfall proposal, the maximum rate of reduction and the “development threshold” at which countries face restrictions appear to be (given the basic allocation method) the primary determinants of the division of costs.* The existing thresholds can be said to “work” for the modeled 550 ppm CO<sub>2</sub>-e trajectories (although, as we show below, it’s questionable whether they “work” for developing countries like China and India). Under the significantly more rapid reductions required by, say, a 450 ppm CO<sub>2</sub>-e trajectory, both the development threshold and the maximum rate of reductions would almost certainly have to be adjusted. This is important, because it would make the tradeoff between “preserving the right to development” and “preventing disruptive change to rich countries” quite explicit.

Some of the exact details of the allocation calculations are difficult to interpret from the text, but it appears to be that, given that some countries receive higher allocations than they would otherwise due to one or the other of the adjustment mechanisms, that the difference is not taken out of anyone else’s budget in that year. Indeed, it appears from *Curbing Climate Change’s* Figure 11 [p. 17] that the actual allocation may exceed the budget by perhaps 10% or more annually over the period 2030-2045, during which time the global budget is dropping most steeply but some countries are protected by the maximum rate of reduction. Eventually either the global budget will need to be reduced or the experienced CO<sub>2</sub> concentrations will be higher; but the proposal acknowledges the need to potentially renegotiate the cap periodically given new information and the actual path of global emissions.

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<sup>9</sup> It will be interesting to see whether, now that Vattenfall’s “Climate Map” has given marginal abatement cost estimates, if they produce an *economic* model of the distribution of costs of their proposal to different countries.

### 3 Grandfathering and its Discontents

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#### 3.1 Grandfathering and the Logic of “Comparable Burdens”

The key feature of the Vattenfall proposal is that each country’s allocation primarily depends on its share of global production, as represented by its share of global GDP. To a first approximation – ignoring the extent to which countries’ carbon intensities are *not* correlated with their per capita GDP – this amounts to grandfathering; countries get more or less the same amount of permits as their emissions. And, notwithstanding the minimum and maximum reduction rates, all countries not exempted due to their low per capita incomes will be required to reduce their emissions at essentially the same rate at which the global emissions budget is dropping.

From the perspective which considers emissions rights as a global common resource, this, on its face, is patently unfair, for the same reason that all forms of “grandfathering” tend to be unfair – they give over to those who already, informally or implicitly, have use of a resource the formal right to that resource. In this case the unfairness is compounded by the fact that *the wealthy get a greater share of the common resource simply by virtue of being wealthy*.

Yet grandfathering is not without its justifications. For one thing, grandfathering as a *transitional* allocation (as in Contraction and Convergence) provides a buffer against the “economic shock” that might be associated with (for example) a rapid transition to equal per capita allocations. Furthermore, grandfathering is one way to create a “comparable burden” of reductions; if all countries are required to make the same percentage reduction in their emissions, and if emissions are roughly proportional to income, then everyone will face roughly the same costs relative to their income. This is defensibly fair if one considers the relative wealth of different countries to be “close enough” that, say, a one percent reduction in GDP (a typical cost estimate for reductions consistent with stabilization at 550 ppm) would be of equal moral impact for different countries.

Clearly, for the poorest countries, this would not be the case. And indeed, as noted above, Vattenfall addresses the problem here by modifying its GDP-based allocation principle,

introducing a “development exemption” (our term) in which poor countries face emissions restrictions only once they have reached “a certain predetermined gross domestic product (GDP) threshold,” equal to about \$11,000.

By doing so, Vattenfall effectively claims that all countries *above* that threshold should face the same rate of emissions reductions, regardless of their per capita emissions, cumulative per capita emissions, or per capita income. (We will return momentarily to the fact that Vattenfall’s “maximum rate of reductions” adjustment mechanism for Annex I countries, and the “graduation discontinuity” that developing countries encounter when they become wealthy enough to lose their development exemption, actually imply that some poorer countries face *more rapid reductions*” than many wealthier countries.)

Defending this sort of allocation requires one to argue that the “comparable burden” argument trumps the “equal rights” argument. The authors of the Vattenfall proposal do not do so explicitly; rather, when they compare equity principles (need, equal entitlements, responsibility/polluter pays, capacity, opportunity of effort, and comparability of effort), they conclude:

“The proposal outlined here can clearly not satisfy all the, partly conflicting, views on fairness. But no other proposal can do so either. What is important is that the proposal has the potential of allocating the burdens in a way that is acceptable to most, or hopefully, all parties. For a given level of global emissions, it will not force the industrialized countries to commit to unreasonably fast reductions, but at the same time it will give all countries similar opportunities to grow – especially since poor countries do not face restrictions at the start.” [P. 23]

There are several points to note here. First, “unreasonably fast reductions” has two possible meanings: “unreasonable” compared to the reductions that other (developing) countries have to make, and “unreasonable” compared to what the industrialized countries are prepared to pay. To determine whether a given allocation requires unreasonably fast reductions in the first sense requires that one actually evaluate the ethical arguments for, and consequences of, different allocational principles, which, as noted, the authors do not do; thus it is not unreasonable to assume that “unreasonable” is being used in the second sense here, to mean “unacceptable” or “unrealistic.”

Second, the quoted text asserts that the proposal gives all countries “similar opportunities to grow.” The cited exemption of poor countries from restrictions does go some distance in that direction – although, as we note below, the fact of a “graduation discontinuity” renders this somewhat problematic. But is it actually fair that countries that have just barely crossed the development threshold should face the same rates of emissions reductions, and thus the same proportional costs for reductions, as much wealthier countries?

What Vattenfall is, in effect, claiming is that *the right to economic growth – even for already wealthy countries* – is prior to the *right to fair (equal) shares of a global common resource*. Even though the industrialized countries have accumulated their capital stocks on the basis of decades (if not centuries) of unrestricted emissions, newly graduated countries with about a third of the per capita income and emissions of the already wealthy countries are expected to accept a reduction in their growth rates in order that the rich might have faster growth. We suggest that this is *inconsistent with the demands of developmental equity*, and that middle income countries today, and low income countries that would “graduate” in the near future, would be justified in rejecting such a proposal.

Ironically, one of the justifications that Vattenfall’s authors give for their allocation mechanism is that, as per capita incomes converge over the course of the century, the allocation of emissions rights will also converge towards equal per capita. Yet one of the conditions that contributes to the rapid growth of poorer countries – their access to cheap energy – would be directly, and adversely, affected by the Vattenfall’s proportional emissions reduction mechanism. Thus the system would have the practical consequence of *slowing* the convergence of per capita incomes.

### **3.2 What about the Adjustment Mechanisms?**

Vattenfall’s adjustment mechanisms are clearly intended to make its proposal widely acceptable, by meeting criteria that various countries are presumed to see as either fair or in their interests, or both. Thus, the main question: given our criticism of per GDP allocations, what can we conclude about the extent to which the adjustment mechanisms increase or decrease the developmental equity of Vattenfall’s core allocation?

Consider first the adjustment of the basic per GDP unit of allocation, an adjustment keyed to per capita income, and recall that it gives countries that are poorer than the global average up to 25% more permits per unit of GDP, and countries that are wealthier than the global average up to 10% fewer permits per unit of GDP. This plainly shifts costs from the

wealthier to the poorer countries, and in that regard moves towards developmental equity. Yet (recalling that we're discussing countries that have "graduated") two things must be noted. First, the variation of national carbon intensities is much larger than the range of proposed adjustments. Among the countries with between half the world average and the world average per capita GDP in 2003 (\$7,894 PPP adjusted), carbon intensities ranged from under 50% of the global average (e.g., Peru, Philippines, Brazil) to well over 150% of the global average (e.g., Iran, Venezuela, Belarus). Among countries with two or more times the global average per capita income, carbon intensities similarly ranged from under 50% of the global average (Norway, Sweden, Switzerland, France) to between 100% and 120% of that average (US, Canada, Australia, South Korea) to more than 200% of the global average for some OPEC countries.

Now, since all countries that are currently below the global average income are also below the "development threshold," they wouldn't be assigned an emissions cap until years or even decades into the future. But carbon intensities don't change all that rapidly, and thus the range of emissions intensities in the low-income countries is likely to remain large at the time that most of them have graduated.

Two things matter here. First, inasmuch as this adjustment is supposed to make things "more fair" to poor countries, it's problematic that it undercompensates some countries and overcompensates others. Poor (but graduated) countries who need the adjustment because of their higher carbon intensities will find that it does not in fact compensate for the historical "inertia" of their economies, and that they are still relatively disadvantaged in terms of their requirements to make or purchase reductions. Second, efficient Annex I economies would, under the "base" allocation, receive *more* permits than they need. Straightforwardly, a country like Sweden with a carbon intensity of about 40% of the world average, if it receives a permit allocation of 90% of the world average, would receive a permit allowance that was more than twice the size of its actual emissions.

This is a rationale for the *minimum rate of reduction* adjustment that Annex I countries face. Which is not necessarily a bad solution to the "problem" of what would otherwise be an allocation of "hot air" to many of the world's wealthiest economies. The suggested minimum rate (not less than 5% below 2002 levels in 2015 and not less than 15% below 2002 levels in 2035) comes to an annual reduction rate of around 0.5% annually. Now, admittedly, this minimum rate could be altered through negotiations, but it still seems pretty unlikely that any newly graduated country which found itself, before 2035, required

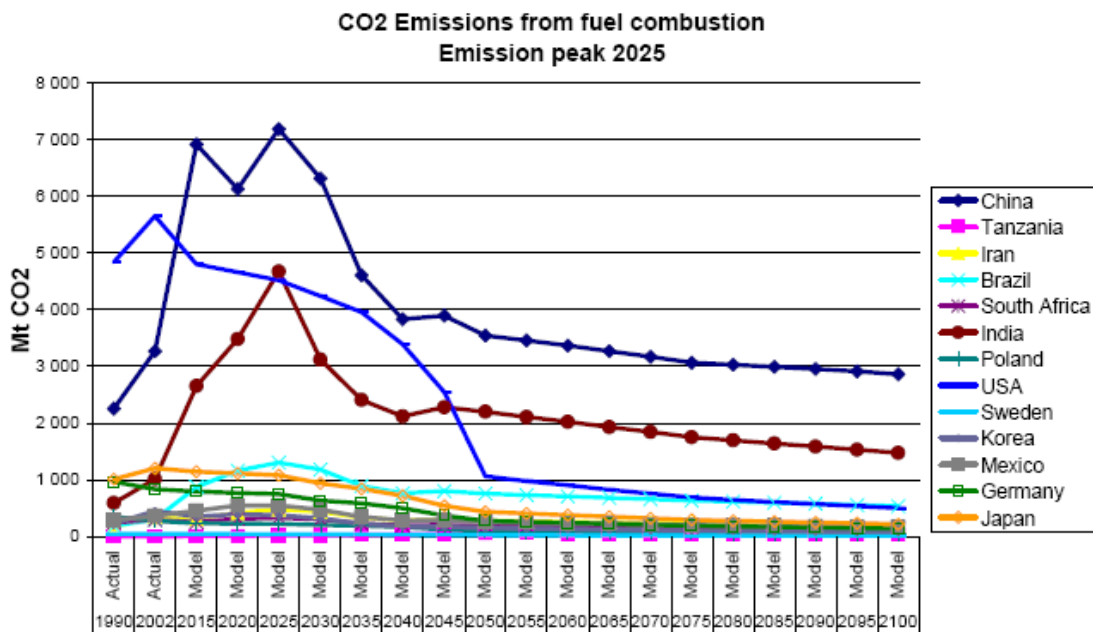
to reduce its emissions at a rate *faster* than a country which was many times wealthier, would consider the allocation system to be fair.

Which brings us to the last points, the *maximum rate of reduction* adjustment and the problem of *graduation discontinuities*.

The maximum rate of reduction applies to Annex I countries only, and while it's nominally designed "to allow existing capital to serve its lifetime" [P. 10], this is somewhat of a red herring. Countries would always have the option to make or purchase reductions elsewhere (domestically or internationally) and to subsidize the continued use of inefficient capital stock; thus the real effect of this maximum reduction rate is simply to reduce the overall costs of compliance. Nonetheless, some Annex I countries have very high carbon intensities (e.g., Russia, with 2.4 times the world average carbon intensity in 2003), and this would protect them from immediate shocks when the system takes effect. Which is, no doubt, its real rationale.

The United States of course is one of the most interesting cases. The US's carbon intensity in 2003 was 1.05 times the world average; thus, if it was to be given the "standard" 90% rich-country allocation, it would immediately have a 15% shortfall. However, given expected US income and emissions growth 2002 through 2015, its permit allocation in 2015 would probably be larger than that implied by, the "maximum rate of reduction." However, when the global emissions trajectory began to curve sharply downward, as it must even for a 550 ppm CO<sub>2</sub>-e pathway (in the "early-peak" scenario, global reductions are 2.5% to 5.5% annually between 2035 and 2045) the maximum rate of reduction would protect the US from steeper cuts, while –as we will show – poor graduated countries would face much more rapid cuts, in spite of their much lower per capita emissions and per capita incomes.

To quickly see this, take a look at Vattenfall's Figure 8, from page 15 of *Curbing Climate Change*, which is reproduced here:



This is a plot of total emissions allocations (the “early peak” variant of a 550 CO<sub>2</sub>-e scenario) for selected countries and regions. We can’t easily account for the “two-peaks” shape of the allocation curve for China, but note that in 2025, for both China and India, emissions begin to *plummet drastically*, while US emissions, protected by the “maximum rate of reduction adjustment,” continue to *gradually decline*. Yet at this point India’s per capita emissions would still only be about a quarter, and China’s about a third, of US levels. Frankly, it’s extremely unlikely that either country would ever agree to a framework designed to produce such results. And, once again, this takes place under a lax 550 CO<sub>2</sub>-e target. Under a 450 ppm CO<sub>2</sub>-e target, the global drop in reductions would be greater and come sooner. Unless the maximum rate of reduction for Annex I countries was greatly increased, an even more unfair result would be likely.

Also, a good part of India’s sudden decline can be attributed to what we call a “graduation discontinuity.” Put simply, emissions are allowed to grow unrestricted until India crosses the “development threshold” of about \$11,000, at which point its allocation would immediately be capped. True, that cap would be 1.25 times great than it would be if it was a rich country, but if its actual carbon intensity was significantly higher than 1.25 times the global average, it would immediately need to reduce emissions, or purchase emissions reductions elsewhere, or default on its commitments under the framework. So while the Vattenfall proposal specifically excludes poor countries from the “maximum rate of reductions” adjustment (in order, it is said, to prevent a “perverse incentive” to invest in

high-emitting technologies<sup>10</sup>) the practical consequence is that poor countries face very steep reductions when they graduate. Unless they substantially reduce the carbon intensity of their economies prior to graduation, an effort for which they get no explicit financial support.

The strength of this effect will depend, as noted above, on the exact parameters by which the system is calibrated, and it's impossible to say how strong it will be without actually modeling its behavior. But it's not necessary to do such modeling to observe that the architecture here is a problematic one, in which the interests of the graduated poor are opposed to those of the rich, and that this opposition could well become a critical problem if the overall stringency of the global emissions caps is high, as for example happens when the target is tightened from 550 CO<sub>2</sub>-e to 450 CO<sub>2</sub>-e.

### **3.3 Initial Conclusions**

The Vattenfall proposal is presented as an even-handed attempt to respect the interests of both the poor and the rich, but it seems to us that its structure is actually dictated by a set of political judgments. The maximum the rate of reduction, in particular, functions as a “safety valve” that limits the demands of the framework on the rich and thus makes the proposal more acceptable to them, a move that realism dictates because the rich, after all, will only pay so much. But the final effect is to reduce the developmental space available to the poor, a space that will already, of necessity, be far smaller than that which the rich enjoyed during their age of development, and to make the proposal unattractive to the developing countries. But developing country negotiators would never agree. Therefore the proposal is dead on arrival.

An odd sort of realism, this one. And, unfortunately, an all too common one.

In this context, it's worth stepping back and noting that grandfathering has little appeal as a fundamental principle for distributing a scarce common resource. There are always “realist” voices to defend it, of course, and it's worth noting that (when they bother to frame their defense in equity terms) they generally appeal to the “comparability” (or “equal sacrifice”) principle: Since everyone has to make an equal percentage reduction, the cost burden as a percentage of income is approximately the same. Or so, at least, it is said. In point of fact, grandfathering favors historical high-emitters, who tend to be rich, and to

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<sup>10</sup> Although countries which will graduate by or soon after 2015 might be thought to have exactly the same “early retirement of capital” considerations of that the current Annex I nations have.



live in more efficient economies. Historical low emitters (including most developing economies) would generally prefer a different equity principle: equal per capita emissions, or equal cumulative per capita emissions, or some other more sophisticated measure of capacity, responsibility, and level of development.

What sense can be made of all this? Conventional academic wisdom doesn't help, for it suggests that all these equity principles are equally valid and appropriate, and that there's no objective way to distinguish between them.<sup>11</sup> But this is patently untrue. One obvious way is in terms of their overall "fit" with the larger global situation, in which efforts to design, or even conceive, of viable approaches to global climate policy are hamstrung by global economic inequality and developmental injustice. We suggest that grandfathering proposals, like Vattenfall's, do not pass the test.

At the end of the day, the problem is stringency. If there was enough remaining atmospheric space, a great variety of framework proposals could be plausibly claimed as fair. Unfortunately, this is not the case, and the goal of any proposal must be to divide a severely limited carbon budget. In this context, equity matters a great deal, because if rich countries cannot be required to make reductions at home or pay for them abroad at more than a limited rate, then only two alternatives remain. The extra cost burden can be placed upon the poor, or the stringency of the emissions-reduction goal can be reduced. If the former option isn't on the table there will be pretty firm limits on the rate of overall emissions reductions that a system can generate.

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<sup>11</sup> Note that this "equity neutrality" is largely among climate policy specialists; among philosophers (e.g., Henry Shue, Dale Jamieson, Peter Singer, Steve Gardiner) there is rather more consensus that responsibility, capacity, and equality are appropriate principles and "sovereignty" (the term used to justify grandfathering) is not.

## 4 Update to Vattenfall's 450 ppm Target

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Vattenfall, when it published *Curbing Climate Change* less than a year ago, promoted as “acceptable” an extremely dangerous target:

”Studies show that an acceptable temperature increase and long-term temperature stability could be achieved at a concentration of 550 ppm of carbon dioxide equivalents in the atmosphere.” [p. 5]

Such a target, however, has even odds of a 3°C increase<sup>12</sup>, and prima facie accepts very high impacts and a high risk of catastrophic impacts. It is no longer possible, even after Stern, to promote it as “acceptable.” Vattenfall, not surprisingly, was heavily criticized for supporting 550 CO<sub>2</sub>-e. Indeed, the legitimacy of the criticism was so obvious that few analysts even bothered to look beyond Vattenfall's target to the structural details of its overall proposal.

In the intervening months, the situation has evolved, and 450 CO<sub>2</sub>-e now seems to be Vattenfall's official or semi-official target. Certainly it's new “carbon map” is written in terms of this new, stricter target, which is explained in the following terms:

“... we have assumed that the concentration of greenhouse gases in the atmosphere need to be stabilized at 450 ppm CO<sub>2</sub>e compared to the pre-industrial level of about 280 ppm CO<sub>2</sub>e. This implies that a maximum of 31 Gigatonne (Gt) of CO<sub>2</sub>e emissions can be ‘allowed’ in 2030, and a range of ±7 Gt around this level would cover the majority of scientific estimates.”<sup>13</sup>

This is, clearly, a major step forward. Still, as we write this the situation is still a bit unclear<sup>14</sup>, and 450 CO<sub>2</sub>-e is in any case not an unimpeachable target. The real goal is to

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<sup>12</sup> See for example Meinshausen, M. (2006). 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>13</sup> See <http://www.vattenfall.com/www/ccc/ccc/569512nextx/573662mappi/index.jsp>

<sup>14</sup> See Note 2 *supra*.

avoid “dangerous climate change,” and our position, like the position of most scientists and of course the European Community, is that this means holding the maximum warming to 2°C degrees. The conventional wisdom is that stabilization at 450 ppm CO<sub>2</sub>-e offers only even odds of keeping the warming to this level, but whether this is a reasonable risk estimate depends on what is counted as CO<sub>2</sub>-equivalent.<sup>15</sup>

Nonetheless, the plain consequence of the now settled science is that framework proposals must now be evaluated in terms of their prospects under extremely stringent emissions budgets, for these are exactly the sorts that we are going to face.

Further, it’s worth repeating that the environmental adequacy of a proposal, any proposal, is a key *equity* benchmark of that proposal, and that this remains true no matter how challenging the evolving science forces the adequacy target to become. This for the very simple reason that the impacts of climate change are themselves a huge equity issue. The logic here has long been evident, and has only been made more inescapable by the recent release of the IPCC’s new Working Group II report on impacts: aside from the extinctions and the threats of catastrophe there is also the ugly fact that the impacts of climate change will fall first and heaviest on those who are both most vulnerable and least responsible.

Vattenfall, interestingly, anticipated the criticism of their 550 CO<sub>2</sub>-e proposal. So, for example, *Curbing Climate Change* includes a footnote about lower targets.

“First, a global target cap is set to reach a specific carbon dioxide concentration level by year 2100. The calculations presented in this report are based on a 550 ppm CO<sub>2</sub>-equivalent target. Whether this target is too lax, or too harsh, is beyond the scope of this work, but the same principles can be used for other target levels.” [p. 8]

But this is not necessarily so! An architecture which adequately protects the right to development of poor countries under a lax target may no longer do so under more stringent targets, not if it attempts to squeeze the additional reductions equally out of rich and poor

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<sup>15</sup> Stabilization at 450 ppm CO<sub>2</sub> equivalent would be expected to lead to equilibrium warming of 2.1°C if the climate sensitivity (the response to an equivalent doubling of CO<sub>2</sub>) were just 3°C, a median estimate in the IPCC’s Fourth Assessment Report (Working Group 1). However, this is true if what is counted is the sum of *all* warming and offsetting cooling effects; the Stern Review among other sources has taken to referring to the CO<sub>2</sub>-equivalent level as only the sum of the Kyoto-basket of greenhouse gases, ignoring both offsetting cooling effects from aerosols, as well as warming from ground level ozone, black soot and other effects. Using this definition, the net radiative forcing seen by the atmosphere could be very different from the CO<sub>2</sub>-equivalent level, either higher or lower.

countries (or worse, disproportionately from poor countries). And this point is so key, and of such wide applicability – it also applies, for example, to the extremely well known “Contraction and Convergence” proposal – that we must stress it here.

In the end, total costs are largely determined by the stringency of the target, and for any given target, costs to the poor are determined by the share paid by the rich. Proposals which are based on *balancing* the costs between poor and rich – or, like the Vattenfall proposal, putting *maximum limits* on the cost to the rich – will necessarily burden the poor further as the cap is made more stringent.

Presumably, to behave even tolerably well under a stringent emissions budget, the Vattenfall proposal would have to be changed to increase the maximum rate of reductions for rich countries. And indeed we argued above that the existing structure *already* treats poor countries unfairly, because it effectively requires them to fund their own emissions reductions even while they are below the threshold, and to face rates of reductions equal to or greater than the global reduction rate immediately on graduation, and this regardless of their level of per capita emissions.

In other words, as the global emissions budget shrinks, the importance of the historical overuse of the commons by the wealthy countries looms larger, and the importance of focusing on the equal right to benefit from the commons increases relative to stressing the comparable cost burdens.

We have in any case concluded that the Vattenfall Proposal, though it nods to the “right to economic development,” seems in practice to give only weak protection to that right. This was a conclusion that we reached when Vattenfall’s official target was 550 CO<sub>2</sub>-e, and Vattenfall’s subsequent adoption of an even stricter target has done nothing to convince us that we were wrong. Indeed, our sense is that, under a 450 CO<sub>2</sub>-e target, Vattenfall’s burden sharing system would only become more unfair and unworkable. However, the point of this analysis is not simply to identify the weaknesses of the Vattenfall proposal, but to suggest that, were its framers more alive, from the inception, to the challenges of the extremely stringent emissions budgets that lie in our common future, they would not have made the mistakes that we’ve been forced to point out.

## 5 The Framework Challenge

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When setting out to design a climate framework that's intended to be as fair, two kinds of clarity are essential. First, you must be clear about what you mean by fairness. Second, you must be deliberate in fire-walling judgments about justice off from judgments about political realism. A workable and acceptable solution must succeed on both accounts, but this isn't likely to result from a process in which the two are mixed promiscuously together.

Vattenfall can be forgiven a bit of confusion on fairness. Certainly it's a confusion that is shared, and promulgated, by the academic and policy literature on climate equity, which almost uniformly features a table of conflicting, overlapping equity principles, and a comment noting that you can't satisfy everyone.<sup>16</sup> Vattenfall, following the tradition, does just the same, arguing first that "The proposal outlined here can clearly not satisfy all the, partly conflicting, views on fairness," but no other proposal can do so either," and then going on to claim that:

"What is important is that the proposal has the potential of allocating the burdens in a way that is acceptable to most, or hopefully, all parties. For a given level of global emissions, it will not force the industrialized countries to commit to unreasonably fast reductions, but at the same time it will give all countries similar opportunities to grow – especially since poor countries do not face restrictions at the start. In the long run, it is also necessary that it will be more attractive to be a part of the system than to stay outside." [p. 23]

The journey to fairness barely begins before it passes into political calculation. And note the pivot of that calculation, that "it will give all countries similar opportunities to grow."

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<sup>16</sup> The exceptions tend to be the work of philosophers including Henry Shue, Dale Jamieson, Peter Singer and Steve Gardiner.

It's a recurring theme. For example, in this bit about "Contraction and Convergence," another framework proposal that is widely seen (because of its assertion of equal per-capita emissions rights) to be fair:

"This also means that if the GDP/capita quota converges, then the allocation of CO<sub>2</sub> allowances per capita will also converge, thus giving equal entitlements to everyone." [p. 22]

"Equal entitlement to everyone." And, of course, capacity and responsibility, which are now widely recognized as being key to the matter of common but differentiated commitments:

"A fourth approach could be labeled *the ability to pay approach*, which naturally is designed to deal with the capacity principle, but will also to a considerable extent take care of the need and comparability aspects. This approach implies that the responsibilities are allocated according to per capita GDP and the developed countries would thus carry the majority of the costs." [p. 22]

It's a neat circle, one in which GDP/capita solves all problem. Just as long as everyone has "similar opportunities to grow." Which, finally, is what Vattenfall means by "the right to economic development."

Does it, finally, matter that we all agree what equity really means? Perhaps not, but what definitely does matter is that the real core of the framework problem – finding a way to structure a global accord that, even in this bitterly divided world, can support a global program of emergency decarbonization – must be somehow addressed. Which is why the right to development – developmental equity – is the real key, and why circular arguments that define such equity in terms of GDP/capita convergence are unlikely to be particularly convincing in poor countries that, to be frank, do not see the global economy as a level playing field. Vattenfall, near the conclusion of its proposal, tells us that:

"What we need here is a reasonable and generous compromise between the developing countries' demand for fair development conditions and the industrialized countries' demand that competition throughout the world must not be distorted," [p. 37]

and here, finally, is a clear view of the problem. Because if there's anything that can be guaranteed as we move deeper into the greenhouse century, it's that "competition throughout the world" will be distorted. And that any attempt to prevent such distortion and at the same time claim justice is, frankly, doomed to failure. Particularly if it is taken, from the very beginning, to mean a system in which emissions allowances are based on per capita GDP.