

Greenhouse Development Rights

The right to development in a climate constrained world

Tom Athanasiou, Sivan Kartha, Paul Baer, Eric Kemp-Benedict

The Greenhouse Development Rights Framework

The climate crisis does not come to us alone, but rather amidst worsening social and economy turbulence. Some of this turbulence – the »financial crisis« in particular – is sharp and episodic, but, always, there is the crisis of inequality and poverty – the ongoing development crisis. Given this, any potentially viable global climate accord must address the crisis of poverty and development. In particular, it must acknowledge and explicitly preserve a right to development or, more precisely, a right to sustainable human development. The bottom line in this very complicated tale is that the South is neither willing nor able to prioritize emissions reductions above the social and economic advancement of its people. And that, therefore, the key to climate protection is the establishment of a international effort-sharing regime in which it is not required to do so.

The *Greenhouse Development Rights* framework is, accordingly, designed to protect the right to sustainable human development, even as it drives extremely rapid global emissions reductions. To do this, it proceeds in the only possible way, by concretely interpreting the official principles of the UN's *Framework Convention on Climate Change*, according to which Parties commit themselves to »protect the climate system ... on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.«

As explained more fully below, the Greenhouse Development Rights framework anticipates a future when all countries are taking on a share of the burdens under a global climate regime. In the meantime, as specified in the UNFCCC, it is time for the industrialized world (the countries identified in Annex 1 of the UNFCCC) to »take the lead in combating climate change and the adverse effects thereof«. Through aggressive and sweeping mitigation initiatives at home, and through good-faith support to non-Annex 1 countries seeking financial and technological resources to mitigate and to adapt, it can still launch the transition to a post-carbon world.

As a first step, the GDRs framework codifies the right to development as a »development threshold« – a level of welfare below which people are not expected to share the costs of the climate transition. People below this threshold have survival and development as their proper priorities. As they struggle for better lives, they are not obligated to expend their limited resources to keep society as a whole within its sharply limited global carbon budget. They have, in any case, little responsibility for the climate problem and little capacity to invest in solving it.

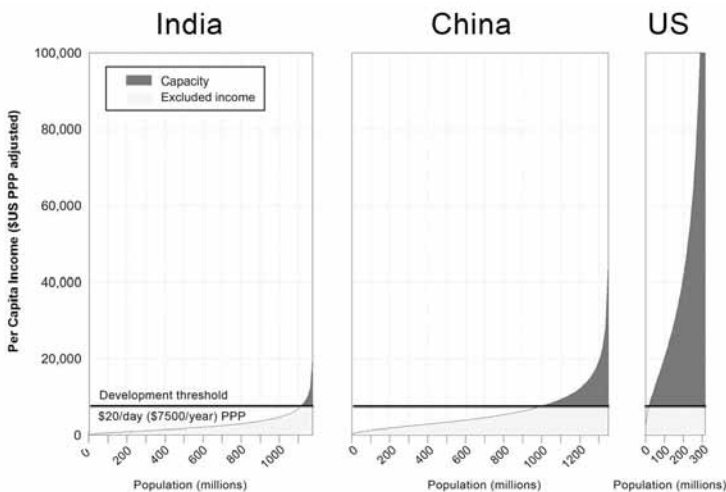
People with incomes that exceed the development threshold, on the other hand, are taken as being wealthy enough to begin bearing the burdens of the climate transition – as having realized their right to development and as bearing some fraction of our common responsibility to preserve that right for others. They must, as their

incomes rise, assume a steadily rising share of the costs of curbing the emissions associated with their own consumption, as well as the costs of ensuring that, as those below the threshold rise toward and then cross it, they are able to do so along sustainable, low-emission paths. These obligations, critically, are taken to belong to *all* people with incomes above the development threshold, whether they live in the Annex 1 or Non-Annex 1, in the North or in the South.

The level and method by which a development threshold would best be set is clearly a matter for debate. One matter, though, must be stipulated – the development threshold is emphatically not an »extreme poverty« line, one which is typically defined to be so low (\$1 or \$2 a day) as to be more properly called a »destitution line.« For a threshold to reasonably capture the principle of a right to development, it should be set to be at least modestly higher than a global poverty line; it must reflect a level of welfare that is beyond basic needs, though well short of today's levels of »affluent« consumption.

For the purposes of our indicative quantification here, we draw upon recent empirical analyses of the individual income levels and their correlation with indicators of poverty. As it turns out, an income of approximately \$16 per day (PPP adjusted) sets the point at which the classic plagues of poverty – malnutrition, high infant mortality, low educational attainment, high relative food expenditures – begin to disappear, or at least become exceptions to the rule. Taking a figure 25% above this global poverty line (development by any measure must reflect more than a mere escape from poverty) we illustrate the implications of the Greenhouse Development Rights approach based on calculations relative to a development threshold of \$20 per person per day (\$7,500 per person per year). Not coincidentally, this income correlates well with the level at which the southern »middle class« begins to emerge.

Figure 1: The development threshold



These curves approximate income distributions within India, China and the US. Thus, the dark gray areas represent national incomes above the (\$20 per person per day, PPP) development threshold, our definition of national capacity. (Chart widths are scaled to population, so these capacity areas are correctly sized in relation to each other).

Once a development threshold has been defined, logical and usefully precise definitions of *capacity* and *responsibility* naturally follow, and these can be built upon to specify and calculate national obligations for shouldering the climate challenge. Capacity, which we take to mean income that is not demanded by the basic necessities of everyday life, is income that is at least hypothetically available to be »taxed« to support a global climate mobilization; such a tax would not *compromise a fundamental level of welfare*. Honoring a right to development thus means that an individual's capacity must be defined not as *all* of his or her income (as for example in a GDP/capita metric) but rather as their income *excluding income below the development threshold*. And that, in turn, a nation's aggregate capacity should be defined as the sum of all individual income above the development threshold. Responsibility, by which we mean

Table 1: Percentage shares of total global population GDP, capacity, responsibility, and RCI for selected countries and groups of countries

GDRs results for representative countries and groups (percent shares)							
	2010					2020	2030
	Population (percent of global)	GDP per capita	Capacity (percent of global)	Responsibility (percent of global)	RCI	RCI	RCI
EU 27	7.3	30,472	28.8	22.6	25.7	22.9	19.6
EU 15	5.8	33,754	26.1	19.8	22.9	19.9	16.7
EU +12	1.49	17,708	2.7	2.8	2.7	3.0	3.0
Austria	0.1	38,040	0.5	0.3	0.37	0.34	0.30
Germany	1.2	34,812	4.2	3.7	3.9	3.5	3.1
United states	4.5	45,640	29.7	36.4	33.1	29.1	25.5
Japan	1.9	33,422	8.3	7.3	7.8	6.6	5.5
Russia	2.0	15,031	2.7	4.9	3.8	4.3	4.6
China	19.7	5,899	5.8	5.2	5.5	10.4	15.2
India	17.2	2,818	0.7	0.3	0.5	1.2	2.3
Brazil	2.9	9,442	2.3	1.1	1.7	1.7	1.7
South Africa	0.7	10,117	0.6	1.3	1.0	1.1	1.2
Mexico	1.6	12,408	1.8	1.4	1.6	1.5	1.5
LDCs	11.7	1,274	0.1	0.0	0.1	0.1	0.1
Annex 1	18.7	30,924	76	78	77	69	61
Non-Annex 1	81.3	5,096	24	22	23	31	39
High Income	15.5	36,488	77	78	77	69	61
Middle Income	63.3	6,226	23	22	22	30	38
Low Income	21.2	1,599	0.2	0.2	0.2	0.3	0.5
World	100%	9,929	100%	100%	100%	100%	100%

Table 1. Percentage shares of total global population, GDP, capacity, responsibility, and RCI for selected countries and groups of countries, based on projected emissions and income for 2010, 2020, and 2030. (High, Middle and Low Income

Based on projected emissions and income for 2010, 2020, and 2030. (High, Middle and Low Income Country categories are based on World Bank definitions. Projections based on International Energy Agency *World Energy Outlook 2007*.)

contribution to the climate problem, can similarly be defined as cumulative emissions (since some agreed starting year) excluding emissions that correspond to consumption below the development threshold. »Development emissions,« like »development income,« do not contribute to a country's obligation to act to address the climate problem.

Thus, in the GDRs framework, both capacity and responsibility are defined in individual terms, and in a manner that takes explicit account of the unequal distribution of income within countries. This is a critical and long-overdue move, because the usual practice of relying on national per-capita averages fails to capture either the true depth of a country's development urgency or the actual extent of its wealth. Indeed, if one looks only as far as a national average, then the richer, higher-emitting minority lies hidden behind the poorer, lower-emitting majority.

These measures of capacity and responsibility can be straightforwardly combined into a single indicator of obligation: a »Responsibility Capacity Index« (RCI). This calculation is done for all Parties to the UNFCCC, based on country-specific income, income distribution, and emissions data. The precise numerical results depend on the particular values chosen for key parameters, such as the year in which national emissions begin to count towards responsibility (we use 1990 as our indicative »responsibility start date,« but a different dates can be defended and, especially, the development threshold.

Crucially, the GDRs framework lays out a straightforward and transparent operationalization of the UN's official differentiation principles, and that, again, is designed to protect the poor from the burdens of global climate mobilization. Beyond that, the values of specific parameters can be easily adjusted and should certainly be debated; all of them, of course, would have to be negotiated.

Still, for all that, our indicative calculations are well chosen and interesting. Looking at just the 2010 numbers, for example, they show that the United States, with its exceptionally large share of the global population of people with incomes above the \$20 per day development threshold (capacity), as well as the world's largest share of cumulative emissions since 1990 (responsibility), is the nation with the largest share (33.1 percent) of the global RCI. And that the EU follows with a 25.7 percent share. And that China, despite being relatively poor, is large enough to have a rather significant 5.5 percent share, which is still less than that of the much smaller but much richer country of Japan (7.8%). And that India, also large but much poorer, falls far behind China with a mere 0.5 percent share of the global obligation to act.

As Table 2 shows, the global balance of climate obligation changes over time, as differing rates of projected national growth change the global income structure. The projections here predate the global financial crisis, and would have been uncertain even in its absence, but they reflect business-as-usual as modeled by the International Energy Agency, and are thus among the most widely vetted BAU projections available. In any case, the results of these differing rates of national growth are most evident in the projected change in China's share of the total RCI, which nearly triples between 2010 and 2030 (from 5.5% to 15.2%), reflecting China's rapid economic growth, its increase in emissions, and the large number of its citizens whose incomes are projected to rise above the development threshold in the coming two decades.¹

These figures, again, illustrate the application of the GDRs framework by way of a particular choice of key parameters. Note that for this indicative calculation, the RCI

is defined such that all income (and all emissions) above the development threshold count equally. This amounts to a »flat tax« on capacity and responsibility. However, it might well be more consistent with widely shared notions of fairness if the RCI were defined in a more progressive manner. Which is to say that a strong case can be made for a capacity calculation in which an individual's millionth dollar of income contributed far more to their RCI than his or her ten-thousandth dollar of income. A more progressive formulation of RCI would also be more consistent with the »tax schedules« by which the income tax codes of most countries are structured.

Still, and regardless of the particulars of any example quantification, the GDRs framework, or any approach to differentiating national obligations that is similarly designed to ensure a meaningful right to development, could potentially reframe the entire differentiation and effort-sharing debate. For one thing, it would allow us to objectively and quantitatively estimate national obligations to bear the burdens of climate protection (obligations to support adaptation as well as obligations to mitigate) and to meaningfully compare efforts and obligations even between wealthy and developing countries. Using the terminology of the Bali Roadmap, it would allow us to flexibly gauge the »comparability of effort« across countries. Another way of putting this is that it would give us tools we need to escape the Annex 1 / Non-Annex 1 divide, which has become a critical obstacle to the progress of the negotiations.

After all, in a GDRs style system, debates about whether Saudi Arabia or Singapore should »graduate to Annex 1« would be entirely unnecessary; both would simply be countries with obligations of an appropriate scale, as specified by their RCIs.

That said, however, the real value of the GDRs approach is a deeper one – GDRs defines and quantifies national obligations in a way that explicitly safeguards a meaningful right to sustainable development. By so doing, it takes at face value the developing country negotiators' claim that they can only accept a regime that protects development, and just as importantly it tests the willingness of the industrialized countries to step forward and offer such a regime.

Operationalizing a GDRs effort-sharing framework

How might such obligations be operationalized? Consider two complementary examples, each a stylized version of the more complex mechanisms that would emerge in real negotiations. The first is a single grand international fund through which all mitigation and adaptation would be financed – such as, say, a greatly expanded version of the Multinational Climate Change Fund proposed by Mexico or the »Financial Mechanism for Meeting Financial Commitments under the Convention« proposed by the G77 and China. Here, the RCI could serve as the basis for determining each nation's obligatory financial contribution to the fund.

Whatever the operationalization, cost would of course be a major issue. And when it comes to estimating the total scale of global mitigation and adaptation costs, there is, of course, tremendous uncertainty. This is not the place to discuss cost estimates in any depth, except to note that they span a fairly wide range. The Stern Review, for example, surveyed a range of modeling analyses and found mitigation costs rising up to the order of 1% of Gross World Product by 2050. Stern has subsequently revised this estimate upward as he has come to advocate more stringent targets.² The analysis backing up the EC Communication provided two alternative results. Its macroeconomic analysis (using the GEM-E3 model) concluded that the mitigation

scenario would suffer in 2020 a 1.0% GWP cost relative to the baseline. Its more techno-economic analysis (using POLES) found mitigation costs of € 175 billion, or about ¼ % of the EC's projected 2020 Gross World Product.

In the face of such variance situation, we find it useful to admit that one cannot know the cost of stabilizing the global climate, and to instead conduct a thought experiment in which we take the 2020 global funding requirement as being exactly 1% of the projected Gross World Product. It is a useful figure to start with, as it is well within the range of published estimates of the cost of a global climate transition, though it is four times larger than the size of the EC's technoeconomic estimate, equal to the EC's macroeconomic estimate, and half as large as Stern's revised estimates.

Given an assumed total global climate transition costs of 1% of GWP, (or \$ 944 billion in 2020 in our projection), one can ask how a GDR allocation would allocate those costs. The US, with 29.1% of the global RCI, would be obligated to pay about \$ 275 billion. Similarly, the EU's share would be about \$ 216 billion (22.8% of the global RCI). China's share would be \$ 98 billion (10.4%), India's about \$ 11 billion (1.2%), and so on, as shown in Table 3, below.

These figures are, again, based on the assumption of a total annual global cost, for both mitigation and adaptation, of 1% of GWP. It they turned out, instead, to be

Table 2: GDP, capacity, and obligation, projected to 2020

	National Income (Billion \$)	National Capacity (Billion \$)	National Capacity % GDP	National Obligation (Billion \$)	National Obligation % GDP
EU 27	\$19,327	\$15,563	80.5%	\$ 216	1.12%
EU 15	\$16,752	\$13,723	81.9%	\$ 188	1.12%
EU +12	\$ 2,574	\$ 1,840	71.5%	\$ 28	1.09%
Austria	\$ 399	\$ 335	84.0%	\$ 4	1.09%
Germany	\$ 3,568	\$ 2,961	83.0%	\$ 45	1.25%
United States	\$18,177	\$15,661	86.2%	\$ 273	1.50%
Japan	\$ 5,071	\$ 4,139	81.6%	\$ 62	1.23%
Russia	\$ 2,905	\$ 1,927	66.3%	\$ 41	1.40%
China	\$13,439	\$ 5,932	44.1%	\$ 98	0.73%
India	\$ 5,814	\$ 972	16.7%	\$ 11	0.19%
Brazil	\$ 2,535	\$ 1,376	54.3%	\$ 16	0.64%
South Africa	\$ 706	\$ 422	59.8%	\$ 10	1.42%
Mexico	\$ 1,744	\$ 1,009	57.9%	\$ 15	0.84%
LDCs	\$ 1,549	\$ 82	5.3%	\$ 1	0.06%
Annex 1	\$50,368	\$40,722	80.8%	\$ 652	1.29%
Non-Annex 1	\$44,037	\$18,667	42.4%	\$ 292	0.66%
High Income	\$49,279	\$40,993	83.2%	\$ 655	1.33%
Middle Income	\$41,546	\$18,190	43.8%	\$ 286	0.69%
Low Income	\$ 3,579	\$ 206	5.8%	\$ 3	0.08%
World	\$94,405	\$59,388	62.9%	\$ 944	1.00%

These figures assume that the total cost of the global climate program is 1% of GWP, projected as \$ 944 in 2020.

0.5% of projected 2020 GWP rather than a full 1%, national obligations would come to only half of these figures.

What does this tell us? Well, consider that the Greenhouse Development Rights framework could be operationalized in many ways – as a global cap and trade system, as an auction-based system, as a fund-based system, or even as a system of internationally harmonized taxes. All approaches would have their advantages and their disadvantages. And it does seem that, in ruminating about costs, and trying to understand what they mean in concrete terms, thinking in terms of a global tax is particularly useful. In this case, the RCI, in effect, would serve as the basis of a modestly progressive global »climate tax« – not a carbon tax, but a capacity and responsibility tax. And the size of this tax could be expressed in individual terms, by simply assuming that it is passed down to taxpayers at various levels of (2020) income, according to their individual RCIs, *thus ensuring that effort sharing within nations exactly parallels effort sharing among nations.*

Table 3: »Climate tax« for various income levels

Country	income	Total costs: 0.5% of GWP			Total costs: 1.0% of GWP			Total costs: 2.0% of GWP		
		marginal tax rate	average tax rate	annual tax	marginal tax rate	average tax rate	annual tax	marginal tax rate	average tax rate	annual tax
Austria	\$7,500	0.00%	0.00%	\$0	0.00%	0.00%	\$0	0.00%	0.00%	\$0
Austria	\$15,000	0.65%	0.33%	\$49	1.30%	0.65%	\$98	2.61%	1.30%	\$195
Austria	\$30,000	0.65%	0.49%	\$147	1.30%	0.98%	\$294	2.61%	1.96%	\$588
Austria	\$60,000	0.65%	0.57%	\$342	1.30%	1.14%	\$684	2.61%	2.28%	\$1,368
Austria	\$120,000	0.65%	0.61%	\$732	1.30%	1.22%	\$1,464	2.61%	2.44%	\$2,928
Germany	\$7,500	0.00%	0.00%	\$0	0.00%	0.00%	\$0	0.00%	0.00%	\$0
Germany	\$15,000	0.75%	0.38%	\$56	1.50%	0.75%	\$113	3.01%	1.50%	\$225
Germany	\$30,000	0.75%	0.57%	\$170	1.50%	1.13%	\$339	3.01%	2.26%	\$678
Germany	\$60,000	0.75%	0.66%	\$396	1.50%	1.32%	\$792	3.01%	2.64%	\$1,584
Germany	\$120,000	0.75%	0.71%	\$846	1.50%	1.41%	\$1,692	3.01%	2.82%	\$3,384
United States	\$7,500	0.00%	0.00%	\$0	0.00%	0.00%	\$0	0.00%	0.00%	\$0
United States	\$15,000	0.87%	0.44%	\$65	1.74%	0.87%	\$131	3.48%	1.74%	\$261
United States	\$30,000	0.87%	0.66%	\$197	1.74%	1.31%	\$393	3.48%	2.62%	\$786
United States	\$60,000	0.87%	0.76%	\$456	1.74%	1.52%	\$912	3.48%	3.04%	\$1,824
United States	\$120,000	0.87%	0.82%	\$978	1.74%	1.63%	\$1,956	3.48%	3.26%	\$3,912

The marginal tax rate, average tax rate, and total annual bill are shown, under three different assumptions about the total costs of the emergency climate mitigation and adaption costs (0.5%, 1.0%, and 2.0% of Gross World Product, projected to 2020).

Under such circumstances, individuals below the development threshold, who contribute nothing to their nation's obligation, would similarly pay nothing toward fulfilling that obligation. In effect, their »climate tax« would be zero. Which is to say that, in 2020, the roughly two-thirds of the world's population that falls below the development threshold (assuming for simplicity that intranational income distributions remain as they are today, though of course they will change) would be exempt from paying any climate tax, enabling them to prioritize the attainment of a basic level of welfare. The remaining population (the top third of the global population),

which is projected to control 85% of the world's income in 2020, would cover the total global mitigation and adaptation cost.

Here we show three representative cases: Austria (a country with low responsibility relative to its capacity, Germany (with moderate responsibility relative to its capacity), and the United States (with high responsibility relative to its capacity). (The details: Austria's cumulative per capita emissions, 1990 to 2020, are projected to be 65 tons of carbon³, while Germany's are projected to be 85 tons and the United States' are projected to be 136 tons.)

Note that, although each incremental dollar of income or ton of emissions is taxed at the same rate (as in a »flat tax«), income and emissions below the development threshold are explicitly excluded, and therefore the whole system is modestly progressive. And note especially that when you compare individuals with the same level of income, across countries with different levels of responsibility, their overall »tax« is not the same. The tax for individuals at the same income level varies (being highest for the US and lowest for Austria), reflecting the fact that this is a capacity- and responsibility-based *climate tax*, not simply an income tax, nor a carbon tax.

The size of this tax is not onerous. Consider the medium case above, in which we estimate the total costs of stabilizing the climate as being 1% of GWP in 2020. As you can see, a German citizen earning \$ 60,000 a year would pay a climate tax of \$ 792 a year, or about \$ 2 a day. This is not a large sum, and, again, keep in mind that this is based on a global cost estimate that is quite high when compared to that used by the European Commission. *If you instead use the EC's 2020 cost estimate of € 175 billion (220 billion US dollars), this same citizen would pay a climate tax of about \$ 185 a year, about half a dollar a day.* If we are instead extremely pessimistic, and we assume that even Stern's revised estimate is low by a factor of two, and that total global costs will be an unthinkable 4% of GWP, then this individual would be asked to contribute somewhat about \$ 8/day. Still a small price to pay to save the planet.

This analysis has two clear implications, that fair effort sharing is of great pragmatic significance, and, by definition, any fair effort-sharing system must take intra-national income distribution into proper account. Even if the costs of a rapid climate transition are assumed to be quite high, and *even* if these costs are deemed to be solely the obligation of the minority of people with incomes above a \$ 7,500/year development threshold (less than one third of the global population today) they would still be quite bearable. The rich and the relatively well-off can easily afford to shield the poor from the costs of combating climate change. They can, in other words, afford to honor a meaningful right to development.

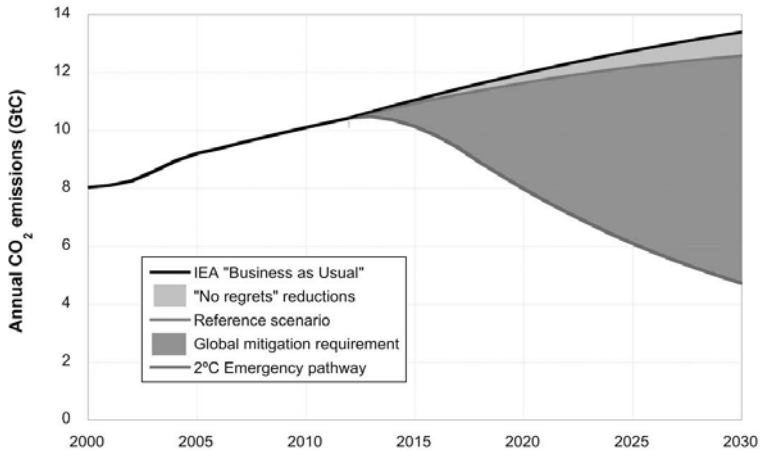
The GDRs framework & national reduction targets

Another perspective on effort sharing, one that is central to the ongoing negotiations, expresses post-2012 obligations in terms of emission reduction obligations and Kyoto-style national targets. To illustrate it, we start by comparing a global »business-as-usual« trajectory to the rapidly dropping 2°C emergency pathway, a comparison that allows us to straight-forwardly calculate the total amount of mitigation needed globally in any given year.

Figure 2 shows this rapidly growing gap divided between »no regrets« reductions (green), which have zero or net negative costs, and the much larger »global mitiga-

tion requirement« (blue).⁴ As shown, the global mitigation requirement, excluding the no-regrets opportunities, grows to approximately 3.7 GtC in 2020.

Figure 2: Total global mitigation requirement



The BAU scenario, minus no-regrets mitigation options, yields the global reference scenario

In the GDRs framework, national emission reduction obligations are defined as shares of the global mitigation requirement, as allocated among countries in proportion to their RCI. This is illustrated in Figure 3, which shows this allocation into national obligations with, to give a few prominent examples, the US's share (29.1%) of the total mitigation requirement appearing as the large red wedge, the EU's share (22.8%) as the large purple wedge, and China's share (10.4%) appearing as the smaller but still significant blue wedge. Thus, for example, the EU's mitigation obligation is (22.8% of the 3.7 GtC global mitigation requirement in 2020) is about 850 GtC.

If this mitigation obligation were interpreted literally and achieved entirely through domestic reductions, it would imply reductions of nearly 140% below 1990 levels – minus 500 MtC – by 2030. Obviously, this is impossible. In fact, for mitigation obligations of this magnitude to make sense, countries must not be expected to meet them entirely through domestic reductions. Thus, whatever is not accomplished domestically would need to fulfill internationally, by way of reductions in other countries that are »supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.«⁵

On its left side, Figure 3 shows the total EU mitigation obligation with an indicative division into a domestic (light blue) mitigation obligation and an (dark blue hatched) international mitigation obligation. The domestic mitigation effort is here defined so as to match the rapid decline needed to put the EU on course toward 90% domestic reductions relative to 1990 levels by 2050.

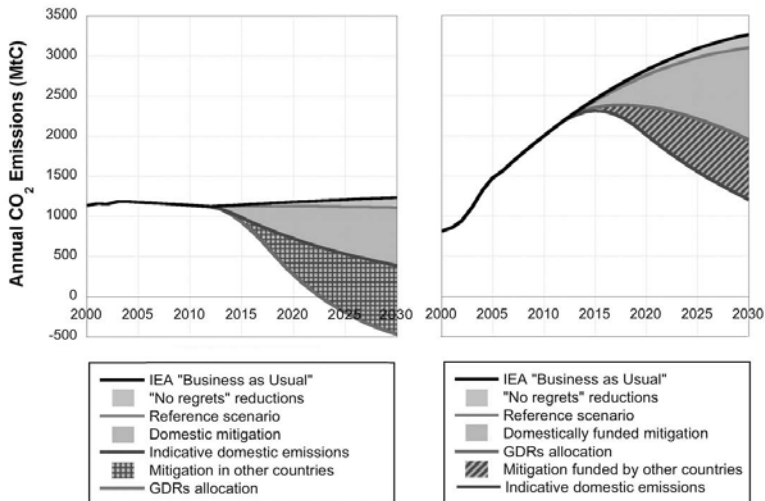
This makes for a stringent, and thus illustrative, example, one in which the EU achieves physical domestic reductions by 2030 of more than 60% below 1990 levels. Even this ambitious rate of domestic reductions satisfies well less than half of the

EU's total mitigation obligation. The remainder, amounting to nearly 900 MtC of reductions in 2030, must be discharged in other countries. In total, assuming domestic reductions of more than 60%, the EU would still be obligated to make international reductions greater than 70% of its 1990 emissions.

Moreover, this very demanding result is by no means an anomaly or methodological quirk, but rather a direct outcome of the principles underlying the GDRs framework. Like any country with high capacity and responsibility, the EU is assigned a very large obligation – large enough to necessitate extremely ambitious reductions both domestically and internationally.

China, in contrast, would be obligated to reductions of about 1100 MtC in 2030 (light blue shading), all of which could be made domestically. At the same time, another substantial quantity of reductions within China, about 750 MtC in 2030 is our estimate, (blue striped shading), would be enabled and supported by other countries with higher capacity and responsibility.

Figure 2: GDRs EU obligations. a GDRs China pathway



The EU's obligations are calculated in a way that would put its domestic emissions on a path toward 90% reductions by 2050, while its remaining mitigation obligation is fulfilled by an international obligation (represented here by the dark gray hatched area in the left panel). Conversely, some of the mitigation taking place in China is enabled by other countries through technology and financial support (the dark gray striped area in the right panel). Note that the sizes of these various areas are merely indicative; the GDRs framework does not, in itself, specify what fraction of a country's mitigation obligation should be met domestically, and what fraction internationally.

These examples illustrate a robust and striking conclusion. The national mitigation obligations of the countries with high capacity and responsibility greatly exceed the reductions they could conceivably make at home. In fact, their mitigation obligations will typically come to exceed even their total domestic emissions. Which is to say that, under a GDRs effort-sharing framework, countries with high capacity and responsibility ultimately receive »negative allocations«⁶.

Obligations of this scale may seem simply implausible by today's standards of political realism, even for countries with high capacity and responsibility. Nevertheless, they are, in the final analysis, quite unavoidable. It is only through explicit obligations of this magnitude that a climate regime can effectively bring about its two essential outcomes. First, by driving ambitious domestic reductions, these obligations ensure that the wealthier countries free up sufficient environmental space for the poorer countries to develop. Second, by driving equally ambitious international reductions, enabled by technological and financial support from the wealthier countries, they ensure this development occurs along a decarbonized path.

It is only by accepting their *two-fold obligation* that the wealthy countries can enable a climate regime that is genuinely consistent with the right to development.

Recap: differentiation and sequencing

We have argued that the climate challenge requires a simple, transparent, and compelling effort-sharing framework, one that's robust enough to be universally applicable, and to make sense even when comparing wealthy, middle income, and poor countries, each with skewed, and often highly skewed, income distributions. Such a framework must be built upon the principles of »common but differentiated responsibilities and respective capabilities,« and, crucially, it will have to explicitly preserve a coherently defined right to sustainable development. These are the qualities that a differentiation scheme must have if it is to be more than a mere policy abstraction, if it is to serve as the backbone of a viable climate protection architecture. Without such a framework, the emergency climate mobilization we so urgently need will remain stalled amidst endless disagreement over who should do what, and when, and how.

We have further argued that the GDR framework embodies the necessary characteristics, although we would not presume that our particular quantitative results – relying as they do on the datasets now available, and our particular choice of various parameters – are the final word. But we do argue that differentiation is ultimately unavoidable, and that – once it is fully deliberated and vetted – a scheme that is structurally akin to the one outlined here will be needed if we're to break the impasse that prevents a global emergency mobilization.

However, the world follows a complex and varied course. It cannot be fully captured by any top-down, principle-based scheme such as GDRs, which is ultimately and inevitably ahistorical. Given this, it's no surprise that the analysis above minimizes the politics that got us to this impasse, and the political accommodations that will be required to get us beyond it. It neglects, in particular, a global lack of political will and a North-South trust deficit that effectively rule out the simplest way forward, in which the nations of the North and the South each legally commits to carry its »fair share« of the climate burden.

To be sure, the main problem is simply that the scale of the required action appears overwhelming. Looking at either the United States or the China trajectories above, or that of any other country, the implied effort is barely imaginable given today's meager political willingness to solve the climate problem. This is not a result of the particular effort-sharing approach in question, but rather a simple consequence of the stringency of the emergency transition now upon us. Were we to run the same analysis with a much weaker temperature target, the results would be rather less daunting. That is to say, the scale and urgency of the action required now

is largely a consequence of our lethargic response to the climate challenge thus far. In particular, with the Annex 1 countries having entirely neglected their Rio promise to stabilize emissions at 1990 levels by the year 2000, and after the past decade of half-efforts to meet their Kyoto commitments), the climate challenge has grown much more severe than it might have.

But even if the scale of the required action were more modest, the South would still be unlikely to accept legally binding commitments. Indeed, it would be so even if those commitments were defined in a principle-based way that safeguards its right to development, such as way presented here. It is not simply that the South is stubbornly waiting for the North to fulfill its formal UNFCCC responsibility to »take the lead« in combating climate change. It is that the South sees any agreement that would curtail its emissions as simply too big a risk to take at this point. Fossil fuels have driven development up to now, and the countries of the South are not about to sign away their right to follow along this proven pathway, not without the North's demonstrated willingness to help chart out, and indeed pave, an alternative course. The South's distrust of legally binding commitments is directly linked, therefore, to the North's inattention to its own emission constraints, and equally to the North's repeated failure to meet its UNFCCC and Kyoto commitments to provide technological and financial support for mitigation and adaptation in the South.

None of this, however, excuses the South any longer from the obligation to earnestly engage. This is the case not only in the more affluent of the southern countries, such as Singapore and South Korea, but also in China, which though suffering a relatively low average per-capita income, nevertheless has a significant capacity to act. Such countries must act, and unless they do, progress on a global climate response will be stymied. The question is how they must act, and here we are compelled to emphasize one word above all others: *voluntarily*.

And we say this despite even the results of our own analysis, which suggest that a GDR-based reckoning of the South's obligation is sizable, amounting already to somewhat more than one-fifth of the global total. We do so for the obvious reason that a legitimate Copenhagen phase simply cannot push legally-binding mitigation commitments onto the non-Annex 1 countries. The course of the negotiations thus far, and the failure of the North to demonstrably »take the lead,« has made this the simple political reality.

Endnotes

- 1 The projected figures here are by no means definitive. For example, the share of the RCI that is here being attributed to China is not yet adjusted to include the carbon that is »embodied« in Chinese exports. Some significant fraction of this carbon would be better posted against the accounts of the nations that import and consume these exports, and soon they will be. And, as noted in the text above, a more »progressive« definition of the RCI would similarly shift the distribution of obligations further toward the relatively wealthier countries.
- 2 See the Stern Review (2006) and, for Stern's 2008 revisions, his *Key Elements of a Global Deal on Climate Change*. London: The London School of Economics and Political Science.
- 3 To convert to tons of carbon dioxide rather than carbon, multiply by 3.7. This figure accounts for CO₂ from fossil fuel combustion and cement manufacturing only; all-GHG figures would be somewhat higher.
- 4 The business-as-usual scenario in this analysis is taken from the International Energy Agency (IEA, 2007); the size of the no-regrets reductions potential is derived from McKinsey Com-

pany analysis (Enkvist et al., 2007), and the emergency pathway is the same as that which was presented far above in Figure 3.

- 5 The Bali Action Plan, Decision 1/CP.13 para 1(b) ii.
- 6 Incidentally, this kind of negative allocation can never arise under per-capita convergence systems, wherein high-emitting countries are only required to transition from their high grandfathered allocations down toward the global per-capita average. Greenhouse Development Rights, it should be said, arose from an effort to adapt the per capita approach (the most well-known of them being Contraction and Convergence), to the realities of a largely depleted global emission budget and an ongoing development crisis.



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