



Climate Action Network - International Fair Effort Sharing Discussion Paper

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Climate Action Network (CAN) is a worldwide network of 700 Non-Governmental Organizations (NGOs) working to promote government and individual action to limit human-induced climate change to ecologically sustainable levels.

The fair effort-sharing problem is fundamental. Until and unless countries achieve at least a rough common understanding of what ‘fairness’ is and how it can be promoted through the international climate regime, it is unlikely they will be able to agree a fair, ambitious and legally binding agreement.

Countries agreed in the United Nations Framework Convention on Climate Change (UNFCCC) to prevent dangerous climate change: to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. At present they are failing in this task. One element holding them back from the necessary action is the concern that they will be asked to do more than is their fair share, and conversely that other countries will ‘free ride’ off their effort. A common understanding of fair shares – even if it is only approximate – can help overcome this trust barrier and lead to higher levels of ambition from all.

There has been a resurgence of interest in quantifiable “resource sharing” approaches to determining ‘fair shares’ to the remaining global carbon space, and (given that we have run out of carbon space) on “effort-sharing” strategies that can still successfully address the problem of developmental justice in a climate-constrained world. This resurgence is in part motivated by the widely-discussed refusal by China and India to endorse a global reduction target for 2020 or 2050 in the Copenhagen Accord, which they were being asked to do even though the developed countries’ reduction targets had not been first defined. This refusal has been justified by Chinese officials on the basis of concerns about fairness and equity.

This concern from developing countries was evident at the October 2010 meeting in Tianjin, China, when during the shared-vision negotiations a paragraph designed to address this linkage came under discussion. It explicitly stated that developing countries would not be left responsible for the global emission reductions that “remained” necessary (to meet a specified global goal) once developed country emission reduction pledges were taken into account. Given that some developed countries are insisting on an inadequate pledge and review approach to their targets and obligations, this concern is entirely understandable. An effort-sharing approach should make it clear where the costs of mitigation and adaptation belong, and remove this roadblock to increasing ambition.

In this context, the BASIC countriesⁱ are developing a joint working position on ‘equity’ and ‘atmospheric space’ issues. Other parties are tracking this effort, and may be undertaking similar efforts. In an effort to provide input into these discussions, and into the discussions that CAN believes should occur within the UNFCCC negotiations, this paper:

- Outlines the fundamental principles contained in the UNFCCC;
- Expands on these, presenting an organized set of fundamental and subsidiary principles relevant to assessing fair-share effort-sharing frameworks (Table 1 and Table 2);
- Briefly describes a set of thirteen frameworks (including both “resource-sharing” and “effort-sharing” variants); and
- Assesses these frameworks against the identified principles (Table 3).

Equity and Effort-sharing in the UNFCCC: Principles of the Convention

A meaningful solution to the climate crisis requires substantial reductions in global emissions. Such reductions will only be achieved and be politically accepted if they adhere to the principles agreed to in the UNFCCC. In order to assess such agreement, there must be clarity and common understanding of these principles, as expressed most clearly in Article 3 “Principles” of the UNFCCC, and those that build on them and clarify their meaning.

Article 3 Principles

In their actions to achieve the objective of the Convention and to implement its provisions, the Parties shall be guided, INTER ALIA, by the following:

*Article 3.1 The Parties should protect the climate system for the benefit of present and future generations of humankind, 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.*

*Article 3.2 **The specific needs and special circumstances of developing country Parties**, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, **should be given full consideration**.*

*Article 3.3 The Parties should take **precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects**. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should **take into account different socio-economic contexts**, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.*

*Article 3.4 The Parties have a **right to**, and should, promote **sustainable development**. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programs, taking into account that economic development is essential for adopting measures to address climate change.*

*Article 3.5. The Parties should cooperate to promote a supportive and open international economic system that would lead to **sustainable economic growth and development** in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.*

Equity principles that are embedded in the UNFCCC text

The overarching principle that Parties act “on the basis of equity” (Article 3.1) is not explicitly defined, but the UNFCCC does provide guidance as to differential treatment that may be required in order to achieve it. In this regard, one could say that ensuring equity means, inter alia:

- Common but differentiated responsibilities and respective capabilities (3.1)
- Developed countries should take the lead (3.1)
- Full consideration for needs and circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change (3.2)
- Precautionary approach to avoiding climate change and its adverse effects. (3.3)
- Approach is cost-effective, and comprehensive, while accounting for different socio-economic contexts (3.3)
- Approach is appropriate given Parties conditions and development needs (3.4)
- Preserves the right to sustainable development (3.4)
- Supports sustainable economic growth and development (3.5)

The core principles of the Convention

Some further elaboration of core principles is useful.

- **Common but differentiated responsibilities and respective capabilities (often shortened to “CBDR” but in this paper shortened to CBDRC)**

Neither responsibility nor capability is strictly defined in the UNFCCC, but they can be understood by clarifying the different concepts it encompasses:

- *Common responsibility*: All Parties share a common responsibility of protecting the climate system for the benefit of present and future generations of humankind (Art 3.1)
- *Differentiated responsibility*: The above-mentioned common responsibility of Parties does not oblige them all to act in the same way. Rather, they are taken having different levels of responsibility towards climate change. Responsibility is measured based on the extent to which a country has contributed to the climate problem
- *[Differentiated] Respective capability*: Parties have widely varying financial and technical wherewithal, and thus widely varying ability to contribute to solving the problem.

Differentiated responsibility and capabilities are frequently correlated, which is unsurprising as historically development, and wealth creation, has been derived by the consumption of fossil fuels. This correlation between emissions and wealth is further justification for the second sentence of Article 3.1, obliging developed countries to “take the lead in combating climate change and the adverse effects thereof”.

- **Adequacy Principle (derived from the Precautionary Principle)**

Article 3.3 of the Convention is based on the precautionary principle and requires all Countries to take measures to “anticipate, prevent and minimize the causes of climate change and its adverse effects.” This is arguably the Convention principle that most strongly supports the objective of a strong, science-based level of ambition, because a responsibility to “prevent or minimize the causes of climate change” speaks directly to the core of the issue: emission reductions. Article 3.3 specifies that efforts should take into account different socio-economic contexts, linking it to Article 3.1 and CBDRC, yet in the context of a comprehensive agreement that can “cover all relevant sources.” It also implicitly references the reality that reconciling strong ambition with CBDRC entails carrying out efforts cooperatively among Parties.

- **Right to Sustainable Development (R2SD)**

Article 3.4 notes a “right to promote sustainable development” and recognizes that “economic development is essential for adopting measures to address climate change, and Article 3.5 supports cooperation that would lead to “sustainable economic growth and development.” These principles are sometime construed as implying a right to unbounded development and unconstrained emissions, but this is clearly an unjustified misinterpretation as it expressly conflicts with fundamental objective of the Convention (to protect the climate system).

To reconcile Convention principles that support development with the fundamental objective of the Convention, we must note two key points. First, the right to development is qualified by the word “sustainable”, implying that it does not imply an unconditional right to destabilize the climate system. Second, as is true of rights generally, the right to sustainable development has implications for both *rights-holders* and *duty-bearers*. The poor have a *right* to sustainable development, and the rich have a corresponding *duty* to provide the means by which that development may be made sustainable. This perspective is reflected in the developed country Parties’ Article 4 commitments to provide financial and technological support so that developing country Parties can, in turn, meet their own commitments under the Convention.

This all means that while the Convention supports development in the developing countries, it simultaneously requires the development to be sustainable, and obliges developed countries to help enable it to be so.

Treatment of these core principles in this analysis

- CBDRC is treated as a fundamental, high-level, principle, as one of two **core equity principles** that must be satisfied by any true fair-shares effort-sharing framework. Many other equity principles that have surfaced in the course of this analysis can be, and these are treated as being **subsidiary equity principles**. Some of them (e.g. Responsibility) are specifically subsidiary to CBDRC.
- R2SD is also treated as a **core equity principle** in this analysis. Other important equity principles (e.g. Adaptation is part of the effort-sharing obligation) are treated as being subsidiary to it.
- The Adequacy Principle is the capability to support a science-based level of ambition that will meet the overall objective of the Convention – to prevent dangerous climate change. It is sometimes treated, in this analysis, as being subsidiary to R2SD. In practice this is a small distinction as a science-based level of ambition is taken as being essential to the goals of the Convention and, thus, of fair-shares effort sharing.

Other elements of equity

Other elements of equity include risk sharing and opportunity / benefit sharing. Risk, effort and opportunity sharing shape a three-prong approach to climate fairness / equity / justice. Risk sharing is included in this discussion paper as the right to survival, and in the requirement to support a science-based level of ambition to keep temperature rise below 1.5/2°C. Opportunity / benefit sharing has not received much attention in the fair-shares debate, but is essential and must be noted. This is to say that justice demands not only that burdens be fairly distributed, but also that the opportunities and benefits that the energy shift and climate transformation provide be fairly distributed as well. This implies that developing countries, especially poor developing countries, must be given the opportunity to participate in low-carbon development and not, through poverty, be locked into high carbon infrastructure, which may well have a limited lifespan. This point is expressed in this analysis as an aspect of the right to sustainable development.

Principles (and other relevant considerations) that should be considered in an effort sharing approach

A fair effort sharing approach must provide a framework for determining how obligations are allocated in a global climate regime, including both mitigation (or mitigation finance) and adaptation finance. The following tables enumerate equity principles that are directly relevant to such an approach, as well as other important considerations that are not strictly speaking equity principles (comparability, “simplicity”, etc.).

Table 1: The two core equity principles and their subsidiary principles

Principle	Elements	Measurement/metrics	Comments
Common but differentiated responsibilities and respective capabilities (CBDRC)	Core Equity Principle		
Responsibility (CBDRC – Art 3.1)	Subsidiary equity principle that supports CBDRC Historic responsibility	Emissions since an agreed start date. (1850, 1990, ...)	If obligation is based solely on Responsibility, then the historical start date should be farther back. If obligation is also based on capacity, a more recent date may be acceptable. 1990 is often used as a starting point, as it marks the first IPCC report and emissions can be more accurately accounted from that point. How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding proposed frameworks that do not adequately take historical emissions into account as a determinant of national obligations within the global regime (I.e., it would suggest excluding Contraction and Convergence and other such proposals)

Principle	Elements	Measurement/metrics	Comments
Responsibility (CBDRC – Art 3.1)	Subsidiary equity principle that supports CBDRC Current responsibility	Current annual emissions per country (As a reflection of responsibility and of mitigation potential, whether supported domestically or internationally)	<p>“Responsibility” might include all emissions, or possibly only emissions that are not necessary for meeting basic needs. This alludes to the survival emissions / luxury emissions distinction noted further below under “Luxury emissions”,</p> <p>How does this principle help us identify good effort-sharing frameworks? This depends on how it is interpreted:</p> <p>If this principle takes current emissions as a reflection of responsibility, it would suggest excluding frameworks that do not adequately take current emissions into account as a determinant of national obligations within the global regime.</p> <p>If this principle takes current emissions as a reflection of mitigation potential, it would suggest excluding proposed frameworks that do not permit reductions to happen where there is potential (independent of which countries are obliged to pay). (I.e., it would suggest excluding any framework that does not accommodate trading or some kind of fund, to facilitate transfers of finance/technology)</p>
Responsibility (CBDRC – Art 3.1)	Subsidiary equity principle that supports CBDRC Future responsibility (precautionary measures of responsibility (Art 3.2))	Projections out 30-50 years	<p>This is relevant because all countries – if they proceeded along a BAU path – will ultimately hold a high level of responsibility, and to ensure that countries avoid future carbon debt, a regime must ensure sufficient mitigation in all countries.</p> <p>How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding proposed frameworks that do not adequately curb future emissions in all countries, i.e., that do not enable a sufficiently ambitious regime. (It thus reinforces and strengthens the “precautionary action” principle.)</p>
Capacity/Respective capabilities (CBDRC – article 3.1)	Subsidiary equity principle that supports CBDRC Ability to contribute to the climate effort	Current income / wealth (GDP/GNI) Other indicators of overall level of development? (MDGs, HDI, etc.)	<p>“Capacity” might include all national income. Or it might just include income above a specified threshold related to basic needs. Or it could be explicitly progressive across a range of incomes. Or it could be defined in terms of wealth instead of income. Or in terms of Human Development Index (HDI).</p> <p>How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding proposed frameworks that do not adequately take capacity into account as a determinant of national obligations. (I.e., it may suggest excluding equal per capita and its variants, although cumulative per capita might be considered to have a high enough correlation with capacity (see above chart) that it implicitly accounts for capacity.)</p>

Principle	Elements	Measurement/metrics	Comments
Luxury emissions / Overconsumption	<p>Subsidiary equity principle that allows proper conception and calculation of capacity</p> <p>Place special obligations on countries in relation to the extent of their luxury emissions</p>	<p>Emissions above a specified threshold</p> <p>(The challenge lies in defining luxury emissions in a robust way that would work around the world.)</p>	<p>Doing this properly would address an issue first noted when Agarwal and Narainⁱⁱ distinguished between luxury emissions and survival emissions, and often raised since by developing countries.</p> <p>How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding frameworks that fail to distinguish the emissions associated with luxury consumption from survival and other emissions. (This distinction applies to emissions within countries – other principles implicitly address this between countries)</p>
National inequality	<p>Subsidiary equity principle that allows proper conception and calculation of capacity</p>	<p>Gini coefficients, income and emissions distributions (rather than per capita averages)</p>	<p>Include information about distribution of responsibility and capacity within a country in the determination of national obligations.</p> <p>How does this principle help us identify good effort-sharing frameworks? This principle suggests excluding any frameworks that do not account for national inequality in its assessment of national obligations (or, modifying such frameworks so that they do account for national inequality). E.g., if a framework bases national obligations on income as a measure of capacity to pay, it should do so in a manner that recognizes the unequal distribution of income.</p>
Equal treatment for all people	<p>Subsidiary equity principle that supports CBDRC</p> <p>Responsibility and capability indicators</p>	<p>Equivalent metrics should be used for all people across the world</p>	<p>This is necessary for a truly global system</p> <p>How does this principle help us identify good effort-sharing frameworks? This means, for example, that an affluent citizen of the South that lives in an emerging economy like China should be treated the same as an equally affluent citizen of the North, or an equally affluent citizen of an LDC.</p>

Principle	Elements	Measurement/metrics	Comments
<p>Developed countries lead Developed countries must “take the lead in combating climate change and the adverse effects thereof.”</p>	<p>Subsidiary equity principle that supports CBDRC</p> <p>Annex 1 must not be able to shift the burden onto nA1. (Note: this would include shifting burden to the nA1 by failing to take sufficiently stringent targets and thus imposing climate damages on the South)</p> <p>Developing countries to act as well (in accordance with principles and provisions of UNFCCC, including CBDRC, R2SD).</p> <p>Avoiding / mitigating climate impacts or disproportionate burden (Art 3.2)</p> <p>Policies & measures should take into account different socio-economic contexts (Art 3.3) and should be appropriate for the specific conditions of each Party (Art 3.4)</p>	<p>Magnitude and distribution of obligation (i.e., stringency of allocations or extent of costs) and form of commitment imposed by effort-sharing framework, especially on developing countries.</p>	<p>Can the burden-sharing proposal serve as a basis for a regime that evolves through a phase during which developed countries “take the lead”, ambition is “ratcheted up”, and trust is built?</p> <p>How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding frameworks that do not support developed countries “taking the lead”, including both domestic reductions as well as finance and technology to enable significantly more reductions in developing countries (as would be consistent with the overall global climate protection goal).</p> <p>Note that, while A1 countries would have to take the lead in terms of action and finance, this principle in no way implies that nA1 countries that wished to act quickly (E.g. to share in early-mover advantages) should be discouraged from doing so.</p>

Principle	Elements	Measurement/metrics	Comments
A1/nA1 version possible?	<p>Subsidiary equity principle that supports CBDRC</p> <p>Is there a framework variant that can be applied right away, as per the Bali Roadmap and the structure of the UNFCCC negotiations based on A1/nA1 and KP/LCA distinctions.</p>	<p>Magnitude and distribution of obligation (i.e., stringency of allocations or extent of costs) and form of commitment imposed by burden-sharing framework, especially on developing countries.</p>	<p>How does this principle help us identify good effort-sharing frameworks?</p> <p>It would suggest that an acceptable framework must support an immediate phase during which developed (A1) countries “take the lead”, serving an immediate positive function within the structure implied by the AWG-KP track of the Bali Roadmap, and where developing countries take action in line with their responsibility, capability and to support sustainable development.</p>
A1/nA1-free version possible?	<p>Subsidiary equity principle that supports CBDRC</p> <p>Is there a framework variant that would be applicable in a future phase after the developed countries have taken the lead, whereby all countries are engaged on the basis of a fair-shares analysis that equitably applies to all countries.</p>	<p>Magnitude and distribution of obligation (i.e., stringency of allocations or extent of costs) and form of commitment imposed by effort-sharing framework, especially on developing countries.</p>	<p>How does this principle help us identify good effort-sharing frameworks?</p> <p>It would suggest that an acceptable framework must support a subsequent phase, once developed countries have “taken the lead”, whereby all countries are engaged on the basis of a fair-shares analysis that equitably applies to all countries.</p>

Principle	Elements	Measurement/metrics	Comments
<p>Right to sustainable development (R2SD)</p> <p>(Article 3.4)</p>	<p>Core Equity Principle</p>	<p>Use established indicators for development:</p> <ul style="list-style-type: none"> - fulfilment of MDGs? - access to energy services? - HDI? - development threshold? 	<p>The climate regime must enable countries to develop sustainably, and allow all countries to share in the opportunities created in the move to a low carbon economy.</p> <p>This principle demands an effort-sharing framework ensuring that equitable levels of ambition for developed and developing countries are explicitly identified – making it clear that developing countries will not be left to pick up the <i>remainder</i> of global effort once developed country effort is taken into account.</p> <p>How does this principle help us identify good effort-sharing frameworks?</p> <p>This principle would suggest excluding proposed frameworks that preempt or undermine a right to sustainable development. I.e., it would suggest excluding any framework that, given the limited carbon space available, provides insufficient financial and technological resources for meeting the legitimate development needs of developing countries (represented, for example, by the MDGs or a specified threshold of income or HDI). It would also suggest excluding any framework that imposes obligations that are so costly as to preempt or undermine prospects for developing countries to meet their legitimate development needs.</p>

Principle	Elements	Measurement/metrics	Comments
<p>Must be able to support a science-based level of ambition</p> <p>(Precaution – Art 3.3)</p>	<p>Subsidiary equity principle (adequacy principle) that supports R2SD</p> <p>Specification of level of global ambition that must be supported by the framework.</p>	<p>Overall global emission trajectory and GHG budget consistent with keeping 1.5°C within reach, and a high probability of keeping warming well below 2°C.</p>	<p>Science-based level of ambition refers to a sufficiently precautionary target defined in a manner consistent with the science. A science-based level of ambition is an equity principle because an insufficiently ambitious climate agreement will cause devastating impacts to poor communities, potentially threatening their right to survival.</p> <p>CAN believes that warming should be kept within a 1.5°C increase compared to pre industrial temperatures, whereas at Cancun countries agreed to keep warming below 2°C. The framework must be applicable to both these levels of ambition. This would allow a comparison between the different levels of mitigation and adaptation effort required for each temperature objective, which would complement the 1.5°C review planned by parties to be completed by 2015. (It should be noted that there is nothing to keep a framework that can support a high level of ambition from being applied to assess fair shares at a lower level of ambition. This could be informative, and even politically useful, for example when comparing across various countries’ Copenhagen/Cancun pledges, which are well-known to be weak in aggregate.)</p> <p>Generally, any given effort-sharing frameworks can be applied to any desired level of ambition. However, not all fair-shares frameworks are capable of supporting a high level of ambition in a manner that does not excessively burden poor countries, and compromise their right to sustainable development. Such proposals must be rejected.</p> <p>How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding proposed frameworks that can only support weak levels of ambition. (I.e., would suggest excluding any framework that does not require/enable major mitigation in developing countries within several years.)</p>
<p>Adaptation should be part of the effort-sharing obligation</p>	<p>Subsidiary equity principle that supports R2SD</p> <p>Need for support to adapt and build adaptive capacity.</p> <p>Vulnerability (exposure to climate impact)</p>	<p>Estimated costs of adaptationⁱⁱⁱ (e.g. UNDP)</p>	<p>How does this principle help us identify good effort-sharing frameworks? This principle would suggest excluding frameworks that do not provide any guidance in effort-sharing relating to funding adaptation. (Or, perhaps, it just suggests that such frameworks should be considered incomplete and in need of a complementary framework for adaptation.) I.e., it would suggest excluding (or considering incomplete) any of the resource sharing frameworks below. It would also suggest the effort-sharing frameworks below should be used to also allocate adaptation costs.</p>

Principle	Elements	Measurement/metrics	Comments
<p>Must be able to support the right to survive</p>	<p>Subsidiary equity principle that supports R2SD</p> <p>Applicable especially to AOSIS, LDCs, and any other countries or communities that face an existential threat from climate change.</p>	<p>Measures of overall ambition, such that survival is ensured.</p>	<p>Because it is arguable that mitigation is the best form of adaptation, mitigating emissions should be prioritised without neglecting current, near term adaptation needs. What is certain is that the obligations implied by an equity framework must be such that the right to development and other national goals and aspirations (this can include survival for small island states, avoiding impacts etc) is not undermined.</p> <p>How does this principle help us identify good effort-sharing frameworks?</p> <p>This principle would suggest excluding any frameworks that are not able to support a regime that would ensure (with high probability) the survival of those countries for whom climate change is an existential threat. (It thus strongly reinforces and strengthens the “precautionary action” principle above.)</p>

Table 2. Additional subsidiary principles

Principle	Elements	Measurement/metrics	Comments
<p>Economic Costs and cost effectiveness</p>	<p>Subsidiary equity principle</p> <p>How should differential (marginal) costs factor into an effort sharing system?</p> <p>As a reflection of cost-effectiveness, many (for example, the EU) seek to reach equal marginal abatement costs across regions.</p> <p>“Fair shares” of a global effort should be comparable based on economic impact, accounting for the fact that costs vary among countries.</p>	<p>Total cost to a nation of meeting climate obligations should take into account:</p> <ul style="list-style-type: none"> - mitigation required in a developed country - mitigation required in developing countries (unsupported) - mitigation potential in developing countries that can only be achieved with international finance and support - adaptation costs - technology needs (for both mitigation and adaptation) 	<p>There are lots of institutional design issues hidden here, which might well be separable from the effort sharing framework per se. For example, there are market-based and non-market based ways of “sharing” low cost mitigation options and ensuring a cost-effective regime.</p> <p>Some effort-sharing approaches seek explicitly to set targets for <i>domestic</i> reductions (though not necessarily overall effort-sharing obligations) based on equalizing marginal abatement costs. These analyses, as derived by (for example) McKinsey, Stern, and International Energy Agency, calculate sector by sector the cost of mitigation in each country, and generally identify domestic mitigation action in each country up until a common marginal cost of abatement (e.g. \$50 per ton of CO₂). These approaches tend to be complex, and rely on modeling to generate domestic emission reduction targets. “Incremental costs” can be very difficult to define.</p> <p>How does this principle help us identify good effort-sharing frameworks?</p> <p>This principle would suggest excluding any frameworks that do not allow the global effort to be undertaken in a cost-effective manner. (One definition of “cost-effective” is that marginal abatement costs are equalized for all regions.) (I.e., it would suggest excluding any framework that does not accommodate trading or some kind of fund, to facilitate transfers of finance/technology.)</p>
<p>Simplicity</p>	<p>Subsidiary equity principle</p> <p>Can be easily communicated</p> <p>The overall approach, if not all its internals, must be easy to explain.</p> <p>Can be externally verified, for example, by civil society.</p>		<p>A system may involve technically complex analysis internally, but still lend itself to simple public presentation.</p> <p>How does this principle help us identify good effort-sharing frameworks?</p> <p>This principle would suggest excluding any framework that is too complex to implement. (I.e., too complex to explain and justify, too easily gamed, impossible to verify, etc.)</p>

Principle	Elements	Measurement/metrics	Comments
Comparability	<p>Subsidiary equity principle</p> <p>It should be possible to compare a country's effort to its fair share of the total global effort, and to the efforts being made by other countries.</p> <p>This should be possible for countries across various stages of development.</p>	<p>Common base years</p> <p>Frequency of review</p> <p>Financial contributions of different forms</p> <p>(i.e., this implies an MRV system that is comprehensive and fair across different types of effort.)</p>	<p>Any meaningful effort sharing approach must be capable of being compared across countries, even (especially?) in a "pledge and review" regimes. This is necessary if we are to ratchet up effort in a world where countries are anxious about going "to far out in front" of other countries.</p> <p>How does this principle help us identify good effort-sharing frameworks?</p> <p>This would suggest excluding any framework that relies on metrics or establishes obligations that are not comparable across countries, and hence that cannot serve as a basis for determining whether countries' actions are in accordance with equitable effort-sharing.</p>
LULUCF related efforts must be treated as core	<p>Subsidiary equity principle</p> <p>Effort sharing approach should account for efforts related to LULUCF emissions</p>	LULUCF emissions	<p>High-ambition pathways are not within reach unless land-use emissions are part of the picture.</p> <p>How does this principle help us identify good effort-sharing frameworks?</p> <p>This principle would suggest excluding any framework that does not require/enable mitigation in the LULUCF domain.</p>

How to understand this enumeration of principles

First of all, a few of these are “guiding” or “core” principles, while the others are subsidiary. And all of them must be understood in the context of the broader package that principles of any sort must inevitably be embedded in.

The intention here is as follows:

- The climate agreement must be sufficiently ambitious to prevent dangerous climate change, and enable all human beings the right to survive and the right to a decent life. This means striving very hard to keep temperature rise below 1.5°C.
- The science-based ambition level and the right to survive are directly linked to the ambition of the overall package and in principle the level of ambition should not change the way that effort is divided.
- The right to sustainable development should be the guiding principle for the global package. Ensuring this right means ensuring a high level of ambition and thus the provision of financial resources. The obligation of developed countries to lead in providing these resources arises from their historic responsibility and capacity to act, and must be understood in that context (CBDRC). Similarly overconsumption should be reflected as an aspect of responsibility. Higher consumption must mean higher responsibility.
- There must be binding mitigation and finance commitments for all countries, based on strong ambition and fair effort-sharing. Fairness implies not only the fair sharing of mitigation actions but also a fair distribution of the costs of climate change. Adaptation is fundamental and cannot be treated as a second thought.
- The overarching importance of equity must not be taken to compromise the overall practicality of the system. The high-ambition that we need can only be achieved in the context of a cost effective architecture.
- Effort-sharing must incorporate, or be supplemented by, opportunity-sharing. The question is not (only) how to share the burden, but who is to be part of the modernisation and transformation towards climate-friendly energy systems and societies.

Various approaches to effort sharing (resource sharing and effort sharing)

This discussion paper is a first step in developing a recommended approach to effort sharing, one that will take into account the principles identified above. This will draw on the experience of the last 20 years, in which time a number of effort sharing approaches have been developed, some of which are summarised below.

Resource sharing approaches

- **Equal Per Capita Emission Rights** is a straightforward approach premised on the equal rights to the atmospheric commons. All countries would be awarded emission allowances in proportion to their population, and would be free to trade them. The total number of allowances granted globally would steadily decrease along a path consistent with an agreed climate stabilization goal.^{iv}
- **Contraction and Convergence (C&C)** is a hybrid framework combining grandfathered emission rights with per capita emission rights, with a gradual transition from the former to the latter over a specified number of years. Countries whose emissions start above the global average would receive allowances that gradually trend down to the global average, while countries whose emissions start below the global average would receive allowances that gradually trend up to the global average.^v
- **Common but Differentiated Convergence (CDC)** is a descendent of C&C in which Annex-I countries’ per-capita emission allowances converge within a convergence period to a low level. Individual non-Annex-I countries’ allowances converge to the same level also within the same period (‘common convergence’), but starting when their per-capita emissions are a certain percentage above global average (‘differentiated’). Until then they may voluntarily take on ‘positively binding’ targets.^{vi}

- **One Billion High Emitters** (also known as the Princeton Proposal) is notable for treating the entire human population as one pool of emitters and “capping” emissions (allowances) at a level below that of the world’s top emitters. It has not to this point had much of an impact on the negotiations, but the key idea has been picked up and discussed as a potentially promising approach.”^{vii}
- **The “Indian Prime Minister’s approach”**: asserts that India’s per capita emissions will not exceed developed country emissions, and that, up to that point, its emissions allocation will be taken as being equal to its unmitigated requirements. As average per capita emissions in developed countries decline, they serve as a cap for India’s per capita emissions. This framework can be generalized and quantified by interpreting “developed country” to signify Annex 1 countries, and applying the same allocation rule as India has proposed for itself to all non-Annex 1 countries. Indian writers have also distinguished between survival and luxury emissions.^{viii}

The above five proposals are all fundamentally based on equal per capita emission rights, and are thus closely related to each other. Generally speaking, it is possible to order them with respect to how demanding they are for developing countries as follows (in increasing order of stringency, and depending on choices of particular framework-specific parameters):

Common But Differentiated Convergence → Equal Per Capita → “Indian Prime Minister’s Approach” → One Billion High Emitters → Contraction and Convergence

- **Equal Cumulative Per Capita Emission Rights approaches** (three variants) extends the concept of equal per capita rights to cover the entire historical and future carbon budget since (for example) the beginning of the industrial revolution, rather than just the portion of the budget remaining for the future. This approach, which has grown in influence over the last few years, particularly in China, India, and parts of civil society, takes into account the fact that some countries (generally, higher income countries that industrialized earlier) have consumed more than an equal per capita share of the total budget, resulting in a “carbon debt” that may be expressed as a negative allocation for the future. **India** and the **German WBGU** have come out with versions of this approach, both of which are limited variants of the strict equal cumulative per capita approach.^{ix} In their standard presentation, they make different assumptions about the year at which accounting of historical emissions is to begin, and the overall global budget to be shared. Otherwise, they are virtually identical in structure.

Effort sharing approaches

- **Equity in the Greenhouse, South-North dialogue** is a global “multi-stage approach,” based on principles of: responsibility; capability; mitigation potential; right to development. It is of enduring interest as the most well elaborated multi-stage proposal (though several of its principle authors consider that it has been superseded by approaches – e.g. Greenhouse Development Rights – based on responsibility and capacity measures that are directly applied at the country level.) It clusters countries into six groups, which have commitments to mitigate based on indicators of the above principles and contingent on payment of mitigation costs (where these diverge). Countries graduate between groups as they develop, and are permitted to meet some of their obligations by trading. Emissions reduction obligations at home are distinct from obligations to pay for mitigation actions abroad, which depend on responsibility and capability indicators and so falls mostly on rich countries, though some newly industrialised countries also take on some of this burden.
- **Brazilian Historic Responsibility** is based primarily on historic responsibility for emissions: developed countries are each allocated emissions cuts based on the total contribution of their historic emissions (going back to 1800s) to the current global temperature increase. In the A1/nA1 version, capacity is reflected in the distinction between developed countries and developing country parties, and responsibility is used to quantitatively determine the level of obligation.
- **Greenhouse Development Rights** is a framework wherein the burdens for supporting both mitigation and adaptation are shared among countries in proportion to their capacity and responsibility, as expressed by way of an responsibility and capacity index that is defined with respect to a “development threshold” – an income level modestly above a global poverty line.^x Like most frameworks, GDRs could be implemented with an emissions

trading system only, with a global fund only, or with a combination of the two. GDRs is a flexible framework, and can be implemented in a manner that includes a “luxury threshold” as well as a development threshold, and, if desired, in a manner that takes “embodied emissions” into account in the calculation of national responsibilities. Note also that several Chinese variants of GDRs have also been articulated.^{xi}

- **Oxfam** has proposed an approach^{xii}, subsequently supported by various other NGOs, that uses a calculated responsibility and capability index to allocate an overall developed country target of 40%, and allows for a climate finance budget of \$150bn to be allocated using the same method. Developing countries individual need for financing is assessed in line with available economic capability, taking into account intra-national inequality, and hence climate finance is provided on a sliding scale (below a minimum ‘available capability threshold’).
- **The EU** has (e.g. EU Commission Proposal of 2009) suggested a method for distributing targets amongst Annex 1 countries that includes starting with an overall target for Annex 1 countries of 30% below 1990 levels by 2020 and allocating this target on the following basis: GDP per capita, addressing the capacity to pay for emission reduction within a country and through the global carbon market [capacity]; GHG per GDP, addressing the opportunities to reduce GHG emissions within one economy [capacity/mitigation potential]; Change of GHG emissions between 1990 and 2005, rewarding early action by developed countries to reduce emissions [reward early action/recognize latent mitigation potential]; Population trends over the period 1990 – 2005, recognizing different population trends between countries and as such different pressures on the projected emission evolution [equal rights to pollute]. In other words, the EU approach is highly parameterized and its effort-sharing implications depends upon the exact functions and values that are assigned to distinct parameters. These are typically not well explained or justified in EU proposals. In general, these proposals can be better understood as negotiating frameworks than as effort-sharing proposals.

Table 3. Comparison of fair-share equity frameworks relative to each of the principles

	Resource-sharing (sharing the global atmospheric resource)								Effort-sharing (sharing the global mitigation & adaptation effort)				
	Equal per capita and variants					Equal cumulative per capita and variants			Multi stage	Indicator-based (R and C Index)		Other	
	Common but Differentiated Convergence	Equal per capita	“One billion high emitters”	“Indian Prime Minister’s Approach”	Contraction & Convergence	historical responsibility / carbon debt	Indian carbon budget approach	WBGU carbon budget approach	South/North dialogue (Equity in the Greenhouse)	Brazilian approach	GDRs	Oxfam approach	European Commission proposal (2009)
Common but differentiated R&C	-	-	-	-	-	-	-	-	-	-	-	-	-
Historical responsibility	n	N	N	n	n	y	y	y	y	y	y	y	n
Current responsibility	y	Y	Y	y	y	y	y	y	y	y	y	y	y
Future responsibility	y	Y	Y	y	y	y	y	y	y	y	y	y	y
Capacity/capability	n	N	N	n	n	n	n	n	y	n	y	y	y
Lux emissions / Overconsumption	n	N	N	n	n	n	n	n	n	n	n	n	n
National inequality	n	N	Y	n	n	n	n	n	n	n	y	y	n
Equal treatment for all	n	N	N	n	n	y	y	y	?	n	y	y	?
Developed countries lead	?	?	?	?	?	?	?	?	?	?	?	?	?
A1/nA1 version possible	y	Y	Y	y	y	y	y	y	y	y	y	y	y
A1/nA1-free version possible	y	Y	Y	y	y	y	y	y	y	y	y	y	y
Right to sustainable development	-	-	-	-	-	-	-	-	-	-	-	-	-
Supports science-based ambition & right to survival ...	y	Y	Y	y	y	y	y	y	y	y	y	y	y

	Resource-sharing (sharing the global atmospheric resource)								Effort-sharing (sharing the global mitigation & adaptation effort)				
	Equal per capita and variants					Equal cumulative per capita and variants			Multi stage	Indicator-based (R and C Index)			Other
	Common but Differentiated Convergence	Equal per capita	“One billion high emitters”	“Indian Prime Minister’s Approach”	Contraction & Convergence	historical responsibility / carbon debt	Indian carbon budget approach	WBGU carbon budget approach	South/North dialogue (Equity in the Greenhouse)	Brazilian approach	GDRs	Oxfam approach	European Commission proposal (2009)
... while providing sufficient space for finance for sustainable dev	n *	n	N	n	n	y *	y *	y *	?	n	y	y	?
Must treat adaptation as core	n	n	N	n	n	n	n	n	y	y	y	y	y
Subsidiary principles													
Economic cost-effectiveness	y	y	Y	y	y	y	y	y	y	y	y	y	y
Simplicity	-	-	-	-	-	-	-	-	-	-	-	-	-
... of calculation	n	y	N	Y	y	n	n	n	n	n	n	n	n
... of public presentation	y	y	Y	Y	y	y	y	y	y	y	y	y	y
Comparability	y	y	Y	Y	y	y	y	y	y	y	y	y	y
Can include land-use changes	y	y	Y	Y	y	y	y	y	y	y	y	y	y

Notation:

- The value of this cell is dependent on the value of subsidiary cells
- * A preliminary judgement that must be validated by further quantitative analysis
- ? The value of this cell is radically undefined, either because political context would rule or because framework parameterization could vary wildly

Some notes on the fair-shares framework comparison matrix

The rows: what they mean and how the cells were filled in with Y (yes) or N (no)

The rows match the principles in the above principles table. In each row, the Y or N entries indicate whether the corresponding principle is intrinsically reflected in the specified effort-sharing framework. In most cases, the developers of a proposal use a standard reference case when presenting it. This case might, for example, define a level of ambition, or use Annex 1 as a definition of “developed countries,” or take it that “one billion people” make up the planet’s “high emitting” population. However, in deciding if a proposal should be scored with a YES (y) or a NO (n) with regard to a particular principle, we have assumed this standard reference case is not engraved in stone. The matrix asks, rather, if the proposed framework can be extended / updated / generalized fairly straightforwardly to deal with the case at hand, preserving the structure and the overall intent of the framework. If so, it gets a YES. If **all** proposal score Y with respect to some indicator – and this is sometimes the case – it means that the principle is satisfied by all the frameworks, at least in principle. Which means that, whilst it may be an important principle, it is not particularly useful as a means of distinguishing between framework proposals.

Comments on specific principles and how they were used:

- Right to sustainable development:

In order to try to decide which frameworks preempt or undermine a right to sustainable development, (i.e., given the limited carbon space available, provides insufficient financial and technological resources for meeting the legitimate development needs of developing countries), it would be necessary to run the numbers and see how it plays out (an exercise that has not yet been done). The Y/N responses in the above table are tentative assessments, based on looking at whether developing countries would have to start radically reducing their emissions, in the near future, even in the absence of financial and technological support.

Note, this is ultimately a matter that cannot be judged a priori, but would rely on some quantitative analysis of the frameworks to determine how much carbon space and/or finance and technology would be provided to developing countries.

- Science based level of ambition; Right to survival:

These principles from the above table were combined because they both referred to the requirement that a framework must ensure a level of overall climate protection that is appropriately ambitious. The frameworks were assessed in terms of whether they could, in principle, be applied to an overall global goal that is appropriately ambitious. CAN believes that developed countries need to reduce their emissions by more than 40% below 1990 levels by 2020, and that developed countries need to substantially reduce their emissions below a business as usual trajectory.

- Equal treatment for all

Note that different standards are applied on the resource sharing and effort sharing sides. In the former case, the question is if an individual’s emissions rights are independent of their country of residence. In the later, the question is if the obligations carried by an individual with the same responsibility and capacity would, similarly, be independent of their country of residence.

- Developed countries lead; A1/nA1 version possible; A1/nA1-free version possible:

The principle “Developed countries must lead” is followed, in this matrix, by its two related rows: “A1/nA1 version possible” and “A1/nA1-free version possible.” The motivation is that the UNFCCC principles state that ‘developed countries must take the lead’, and the Bali Roadmap has set out a negotiating course reflecting this. The question then is whether a given effort-sharing can serve as an equitable basis for an evolution from a phase during which developed countries lead, thereby providing a positive function within the structure implied by the AWG-KP track of the Bali Roadmap, during which ambition is ratcheted up, to a

subsequent phase where obligations are more broadly allocated. Specifically, can the proposal support an immediate-term variant during which developed (A1) countries “take the lead” (“A1/nA1 variant possible”), and then a subsequent phase in which all countries are engaged on the basis of an fair-shares analysis that equitably applies to all countries (“A1/nA1-free variant possible”).

- Economic cost-effectiveness:

This is interpreted as asking whether the effort sharing approach could be implemented in a manner that allowed mitigation to take place cost-effectively, that is, for mitigation opportunities everywhere (i.e., all sectors in all countries) to be used, either in compliance with domestic reduction obligations or international funding obligations. Some people interpret this to mean that marginal abatement costs are equalized globally, perhaps through trading or perhaps through a global climate fund. All effort-sharing frameworks were assessed as being amenable, in principle, to either mechanism.

- Comparability:

It is important to be clear about the uses to which we imagine putting a principle-based framework that calculates comparable fair-shares, relative to a given emission-reduction goal.

- What share of a country’s fair share is it doing, relative to either a global consensus target or a target that its political leaders themselves claim to support?
- What share of a country’s fair share is it doing, relative to another country, which may even be a country at a different level of development?
- How do the total demands that a framework make upon a country compare to the total demands made on another country?

- Simplicity:

It must be said that “simplicity” is not a simple concept. In particular, complex proposals may be, and generally are, amenable to simple explanations. Indeed, from the point of view of some public messaging strategies, all of these frameworks, and indeed the very idea that equity has something to do with the climate crisis, is too complex to be effectively communicated.

This is not a trivial point, since this analysis indicates that the simplest of the original proposals fail to satisfy the key “Right to Sustainable Development” when they are analyzed within the context of high-ambition carbon budgets. The rule, in other words, some complexity is necessary, and simplicity cannot be taken to trump fundamental matters.

That said, unnecessary complexity is clearly a problem. The clearest example here is the EU approach, which is designed to be highly parameterizable and is, thus, extremely complex (as well as capable of generating wildly varying outcomes, depending on obscure changes in parameterization). Such an approach may make sense in some contexts – e.g. negotiations within the EU – but it is unlikely to lead to widespread global understanding and consensus.

Also, approaches that match existing approaches and models are generally more easily understood and, thus, “simpler.” For instance, one of the key obligations asserted here is that of developed countries to not only act first but to also support climate action in developing countries. This obligation can be articulated as a single mitigation target, that could be met domestically or via international trading, and hence in developing countries via the purchase of offsets. Or it can be articulated as a mitigation target that is primarily designed to be met at home, teamed with a level of climate finance designed to support mitigation and adaptation in developing countries. The latter approach is more consistent with the conventional understandings of international life, and indeed with the existing international climate paradigm/regime; hence it is often considered ‘simpler’.

Framework specific notes

- **Equal per capita, Contraction & Convergence, the Indian Proposal and “One billion high emitters”**

Equal per capita approaches are judged not to preserve a right to sustainable development *under a stringent target*. Under a highly constrained atmospheric space, a per capita share (whether used directly, or traded for financial/technological “support”) is not self-evidently sufficient for meeting basic energy services. Frameworks that provide less than a per capita share (C&C, Indian Prime Minister’s proposal, “One billion”) provide less than a per capita share, and are considered not to preserve a right to sustainable development under a stringent target.

Per capita approaches are also judged not to support a A1/nA1 version, because exempting nA1 countries from the system would simply imply that they are not eligible for their per capita share of emissions allowances, and thus the ability to trade their surplus allowances. One could imagine a variant in which developing countries with surpluses are allowed to sell them, and countries without surpluses are exempted from mitigation obligations, but this variant essentially becomes common but differentiated convergence (below).

- **Common but Differentiated Convergence (CDC)**

The most important thing to say about CDC is that is an improvement on C&C from the point of view of opening developmental space to the South. However, assessments indicate that its additional flexibility is inadequate, with respect to the support of sustainable development.

- **Indian carbon budget approach**

This is a variant of historical responsibility / carbon debt, with a default case that sets a relatively recent limit on historical responsibility (1970), and that has a global trajectory less stringent than a 1.5C/2C trajectory. These assumptions are not intrinsic to the proposal and could therefore be modified.

- **WBGU carbon budget approach**

This is a variant of historical responsibility / carbon debt, with a default case that sets a relatively recent limit on historical responsibility (2010), and that has a global trajectory less stringent than a 1.5C/2C trajectory. These assumptions are not intrinsic to the proposal.

- **Equity in the Greenhouse**

This framework was scored N for simplicity, primarily because it involves a proliferation of Annexes, each requiring its own graduation criteria, and each requiring its particular specification of mitigation and/or financing obligations.

- **Brazilian approach**

The Brazilian approach does not take into account capability to take action at all, and therefore puts at an, arguably unfair, disadvantage countries who have high historic responsibility but who may have relatively low capacity to act. For example The ex-Soviet Union countries whose economies collapsed have high historic responsibility but relatively low economic capacity when compared to other countries with similar historic responsibility.

- **GDRs**

The Greenhouse Development Rights approach is, by design, able to meet all of the criteria specified in the above matrix. Save of course for “simplicity,” where it suffers the fate of all other effort-sharing (as opposed to resource sharing) approaches. These later are inherently much simpler, for they seek, one way or another, to directly allocate rights to the global atmospheric resource, rather than to define an allocate the more abstract notion of “effort” or “obligation” – which must, by its nature, be calculated relative to a baseline of some kind.

That said, resource sharing approaches tend to fail for the simple but significant reason that they are too simple. They must either ignore or write off the past (impossible choices for any framework that seeks political legitimacy) or lean on a cumulative model of responsibility, a choice they brings with it its own set of (serious) problems.

The GDRs approach, of course, features some particular complexities that are not shared by other effort sharing approaches. In particular, it takes explicit account of income distribution within countries, which it leverages to calculate both responsibility and capacity in manners designed to increase the fairness of the over allocation. This, clearly, increases complexity, though it does so in a manner that the GDRs authors believe is both justified and transparent.

- **Oxfam approach**

The Oxfam approach meets all of the identified principles, except for luxury emissions/over consumption.

The Oxfam approach has the advantage of being closely related to the current negotiating paradigm – it shares out developed country emissions from a 40% total reduction (which could be adjusted based on new science) and calculates developed country obligations to pay for mitigation and adaptation finance in developing countries. The Oxfam approach foresees this support being channeled through a body similar to the Green Carbon Fund, which is in the process of being established under the UNFCCC, and funding being allocated to developing countries based on their level of development, or need for support.

The Oxfam approach could be adjusted to accommodate a non Annex approach, however it was explicitly developed to meet current political circumstances of the Annexes, and hence would require substantial rework to treat all countries on the same footing. At which point it would begin to closely resemble GDRs.

- **EU proposal**

The EU has at various time proposed a number of related approaches. These approaches are heavily parameterized, and thus highly – but not entirely – tunable. There is for example no provision for historical responsibility. And the overall system is extremely obscure – it entirely fails from the perspective of simplicity.

This approach has evident advantages when negotiating within the EU, where trust and a sense of common political destiny can be assumed, but neither of these conditions apply at the level of the global climate negotiations. All told, the EU approach can be better characterized as a negotiating framework than as a effort-sharing regime. In any case, it cannot be effectively evaluated (particularly in terms of its implications for the R2SD) unless it is precisely specified, as a parameterized global proposal, and this, to our knowledge, has never been done.

Other considerations

There are various other elements that are important in the design of an effort sharing approach, that may not be finally reducible to principles, in the usual sense of the term. Many of them have be captured in this document and embodied, one way or another, in the above principles. Many of them – for example the refusal of any accounting system that allows double-counting – are operational considerations that apply to all possible viable architectures, whether principle-based or not.

In the end, however, one “other consideration” remains in a class by itself: Political Judgement. Any effort sharing approach and its strategic and tactical uses, will have to take into account the pragmatic logic – or lack of logic – that characterizes the negotiations.

ⁱ Brazil, South Africa, India, China

ⁱⁱ Anil Agarwal, Sunita Narain, (1991) *Global Warming in an Unequal World: A Case of Environmental Colonialism*, New Delhi: Centre for Science and Environment.

ⁱⁱⁱ UNDP's 2007 report estimated the costs of adaptation in developing countries in 2015 to be between \$US86 and \$109 billion.

^{iv} Anil Agarwal, Sunita Narain, (1991) *Global Warming in an Unequal World: A Case of Environmental Colonialism*, New Delhi: Centre for Science and Environment . Later, similar schemes were put forward by other organizations . For example, in 2000, just before COP6, the World Council of Churches proposed a Global Atmospheric Commons Fund based on equal per capita emissions under a sustainable level of emissions. Countries using in excess of the permitted emission level would pay a use penalty from which developing countries should be assisted in moving towards a carbon-free or—poor economy.

^v GCI (The Global Commons Institute) (2008) *The Carbon Countdown - The Campaign for Contraction and Convergence*, London: Global Commons Institute. http://www.gci.org.uk/Documents/Carbon_Countdown.pdf

^{vi} Common but differentiated convergence (CDC): a new conceptual approach to long-term climate policy, Niklas Höhne, Michel den Elzen, Martin Weiss.

^{vii} Sharing global CO₂ emission reductions among one billion high emitters, Shoibal Chakravarty, Ananth Chikkatur, Heleen de Coninck, Stephen Pacalaa, Robert Socolow, Massimo Tavonia.

<http://www.pnas.org/content/early/2009/07/02/0905232106.abstract>

^{viii} http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/3-2-india_presentation_workshop_on_annex_i_targets.pdf

^{ix} http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/3-2-india_presentation_workshop_on_annex_i_targets.pdf

^x Paul Baer, Tom Athanasiou, Sivan Kartha, Eric Kemp-Benedict (2008) *The Greenhouse Development Rights Framework - The right to development in a climate constrained world*, in: Publication Series on Ecology, Berlin: Heinrich Böll Foundation, Christian Aid, EcoEquity and the Stockholm Environment Institute.

^{xi} Fan, Gang, Cao Jing, Su Ming, 2010. Also Yue Chao, 2010. "The National Development Rights Framework: Bridging the gap between developed and developing countries"

^{xii} <http://www.oxfam.org/policy/fair-climate-deal-copenhagen>