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### Liability for climate change : a decentralized approach to long-term climate policy

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**Liability for Climate Change:  
A Decentralized Approach to Long-Term Climate Policy**  
Detlef Sprinz<sup>1</sup>

**Abstract**

An international agreement on deep emission reductions is unlikely to materialize in the near future. What can be done if we wish to further an ambitious long-term climate policy goal? This article proposes a liability system that starts with at least one frontrunner and allows itself to be taken to court for the damages related to its emissions. Such a system will be fully upscalable to larger liability pools, and allows the rule of law to prevent dangerous climate change to a reasonable degree. Furthermore, I suggest strict proportionality as a distributional rule to provide powerful incentives to mitigate emissions. In order to limit the challenge of time inconsistency, we need one actor to serve as the frontrunner. The EU can credibly serve this function if it chooses to do so; alternate frontrunners are welcome to join or build their own liability fund(s). Since all four components (ambitious benchmark, liability system, distributional rule, and prevention of time inconsistency) reinforce each other, it appears to be prudent to believe that we can make substantial headway towards achieving a low greenhouse gas future by the end of the century without having to rewrite politics as we know it.

**1 The Challenge**

The Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC) mandates ratifying industrialized countries to undertake emission reductions during 2008-2012. Given recently agreed upon scientific evidence as reflected in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Intergovernmental Panel on Climate Change 2007a), it appears to be wise to halve anthropogenic emissions of greenhouse gases (GHG) until 2050 (German Advisory Council on Global Change 2008) and to go for a low greenhouse gas economy by the end of the 21<sup>st</sup> century. Among the major emitters, only the EU shows willingness to pursue such a challenge. An international agreement on deep emission reductions is unlikely to materialize in the near future. What can be done if we wish to further an ambitious long-term climate policy goal? This article proposes a liability system that starts with at least one frontrunner and allows itself to be taken to court for the damages related to its emissions. Such a system will be fully upscalable to larger liability pools, and allows the rule of law to prevent dangerous climate change to a reasonable degree. Furthermore, I suggest strict proportionality as a distributional rule to provide powerful incentives to mitigate emissions. In order to limit the challenge of time inconsistency, we need one actor to serve as the frontrunner. The EU can credibly serve this function if it chooses to do so; alternate frontrunners are welcome to join or build their own liability fund(s). Since all four components (ambitious benchmark, liability system, distributional rule, and prevention of time inconsistency) reinforce each other, it appears to be prudent to believe that we can make substantial headway towards achieving a low-GHG future by the end of the century without having to rewrite politics as we know it.

The paper is structured as follows. In the second section, I briefly show why climate change is a challenging long-term policy problem and why hopes for a “global deal” (e.g., Stern 2008) within the near future may be overly optimistic. In the third section, I introduce the fourfold architecture of what is needed, incl. a guidepost for a long-term target, the setup of a liability system, the distributional rule for liability and awards, as well as how to get it

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started by overcoming the time inconsistency problem. A response system based on this fourfold architecture will raise legitimate doubts among policy practitioners and academics alike. In response, the fourth section is geared towards proposing a range of practical fine-tuning of the liability system. The architecture proposed will never be able to solve the challenge of preventing dangerous climate change by itself, yet the concluding section will highlight the central advantages of the proposed scheme which requires comparatively little international agreement and relies on decentralized enforcement for a transition to a low-GHG future.

## **2 Why Responding to Long-term Climate Change is Difficult<sup>2</sup>**

Governing climate change is not a trivial problem. It encompasses a range of challenges, including generic ones such as intergenerational, distributional, informational, and time inconsistency issues. Superimposed on this are domestic policy problems and the challenge of international cooperation. Given that any of these challenges is not trivial to solve, we should not expect to simultaneously solve all of them as well as the interactions among them.

Adverse impacts from climate change are likely to grow over time (Intergovernmental Panel on Climate Change 2007b). Much of the atmospheric changes have been set in motion by present and past generations, but given current trends, we are unlikely to immediately switch to a low-GHG economy. The benefits of a low-GHG economy are likely to be felt by future generations, thereby not offering present generations the positive rewards of an investment into a low-GHG economy. We thus face an *intergenerational* problem. In addition, we are confronted with the distributional issue between industrialized and some industrializing countries – the latter wishing to keep open the option to substantively increase their GHG emissions as part of their development process. Furthermore, present generations may not believe that future generations will share their preferences for a low-GHG future, thereby creating an incentive not to invest now into a GHG-frugal future. It is difficult for present generations to bind future ones; and for future generations, it is difficult to bind present ones. We therefore face *time inconsistency* problems in terms of rule adherence, and the expectations mechanisms favors moral hazard among the present generation. This aspect is devoid of any aspect of lobbying for the status quo in order to pursue industrial policy, defend current markets, or favor particular groups in society.

Partially cutting across this set of challenges are the domestic politics and international cooperation issues. Put briefly, even the best internationally agreed plan can be pulled apart by the push-and-pull of everyday politics and the eagerness of most leaders to appeal to particular constituencies in return for their vote. As climate changes may often not be as high a priority item as food security for the near future (although it may very well be the case for long-term food security), requests for improving social security for particular constituents, or dealing with the next budgetary crisis, we should expect an imperfect domestic climate policy in most countries – especially if we are interested in long-term climate policy. Furthermore, the transition to a low-GHG world economy requires open or tacit collusion among the top 10 to 20 emitting countries and to a lesser degree collusion by countries embarking on adaptation (Sprinz 2001, 272-276). Based on past observations, including the Kyoto Protocol, we are unlikely to see the replication of the relative success of the efforts to reduce stratospheric ozone-depleting substances under the Montreal Protocol as well as successor agreements. It would indeed be a rare feat to see the world manage a couple of percents of world GDP collectively and harmoniously over a century for the sake of protecting planet Earth. Even the World Trade Organization is characterized by sufficient

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<sup>2</sup> Hovi et al. (forthcoming) provide an in-depth treatment of time inconsistency, domestic politics, and international anarchy in the context of global climate change policy.

difficulty to promulgate a world of perfect international trading. Not even common markets, such as the EU, would claim this privilege. We should not expect global climate policy to easily beat well-oiled regulatory institutions such as the EU or the GATT/WTO system. The negotiations about a post-2012 climate order appear to have arrived at some stage of uncertainty or crisis. But crisis also implies opportunities, and this article sketches the outline of a strategy that circumvents a range of the problems mentioned above.

### 3 A Fourfold Architecture

The architecture proposed consists of four components. First, we need an ultimate goal that gives some operational meaning to the ultimate objective of the UNFCCC (United Nations 1992, Article 2). Second, I propose a liability system that compensates for damages caused by anthropogenic climate change. Third, awards through the liability system necessitate a distributional structure. I propose that strict proportionality of shares in the causing agents should guide proportionality in awards. And fourth, such a system has to come into existence by overcoming aspects of time inconsistency. I suggest that a leading actor, such as the EU or others, could set a liability system in motion that might evolve and mature over time.

First, a benchmark is needed to establish liability. At a minimum, a positive price for GHG emissions should prevail. The Kyoto Protocol succeeded in creating the difficult-to-revert belief that there will be a positive price for carbon now as well as in the foreseeable future. The governance structure of the Kyoto Protocol essentially displays all the problems described briefly in Section 2. Therefore, it is difficult to imagine that the present Kyoto architecture by itself – rather than different factors – will serve as a self-propelling and energetic incubator for a transition to a low-GHG future. A positive price for carbon or GHG emissions is, however, not sufficient. Only an ambitious long-term target can serve as a benchmark, and only the impacts caused by *deviations* from the (counterfactual) benchmark can serve as grounds for liability for “residual damage,” (Verheyen 2005), i.e., damages not prevented by mitigation or adaptation.

In effect, the UNFCCC stipulates such a benchmark:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient 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 (United Nations 1992, Article 2).

Interpreting this objective is a non-trivial undertaking (Ott et al. 2004). In practical terms, there is no universal agreement what this goal means and whether countries can be held accountable to fully contribute to achieving it. A voluntarily erected liability system actually does not necessitate universal agreement on Article 2, but it needs an ambitious benchmark to establish that residual damages should be avoided and otherwise be compensated. An ambitious goal such as a 2 degrees Celsius temperature change as compared to pre-industrial periods<sup>3</sup> or a 450ppm carbon equivalent goal may serve this purpose. There is *no* need for universal support for such a goal in legal form, just a broadly held belief that such an ambitious goal would be in line with Article 2 of the UNFCCC. It is the climate impacts associated with an operationalization of Article 2 UNFCCC which would

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<sup>3</sup> [http://europa.eu/press\\_room/presspacks/energy/comm2007\\_02\\_en.pdf](http://europa.eu/press_room/presspacks/energy/comm2007_02_en.pdf) (accessed 01 July 2008).

constitute a zero liability benchmark, and any excess damages relative to this benchmark would be considered for compensation. The damages themselves need to be caused by anthropogenic climate change, not by normal fluctuations in climate.

Second, Immanuel Kant's categorical imperative serves as a point of departure for liability for damage. As Kant stipulated:

Act only according to that maxim whereby you can at the same time will that it should become a universal law (Kant 1993 [1785], 30).

Kant suggests that a concerned party should act in accordance with a collective goal in mind and no fallacy of aggregation exists (Sprinz 2000). If everyone behaved accordingly, there would be no need for a liability fund as everyone would be satisfied. This is unlikely to be the case for the foreseeable future as a transition to a low-GHG world economy is expected to take 25 to a hundred years. The charm of the liability fund is to entice parties to join the liability fund such that the emissions of major emitters become more broadly aligned with Article 2 UNFCCC – akin to compliance with an intertemporal Kantian categorical imperative on unwanted climate change.

Attribution of cause and effects ought to be in the hands of a neutral judicial body that has no interest whether and which amount to award. For simplicity, let us define it as the climate court. It should simply apply judicial rules and procedures to see whether there is sufficient evidence that links anthropogenic emissions to climate-induced damages.<sup>4</sup> If this link can be credibly established based on judicial best practice, the climate court would make an award. The effective award to be made from the liability fund would be proportional to the percentage of emission covered by the members of the liability fund. In terms of establishing cause and effect, climate change resembles liability for smoking-induced health care damages. While early warnings were issued already by the midst of the 20<sup>th</sup> century (Doll and Hill 1950), it took court cases several decades to reasonably establish cause and effect relationships and make financial awards to relevant parties<sup>5</sup> and to arrive at the WHO Framework Convention on Tobacco Control of 2003.<sup>6</sup> The rule of law and independent adjudication are at the core of a liability system for anthropogenic climate change. Awards would only go to members of the liability fund.

Third, the distributional rule used is strict proportionality. This applies to the damages covered, compensation received, and the contributions to be made. While there are many alternatives to strict proportionality considered in the climate negotiations, including work by this author (Schröder et al. 2002, 140-141), it appears that simplicity and transparency afford the greatest advantage. Proportionality over time adjusts who is liable to which degree. Until now, most industrialized countries would be disproportionately liable due to their high share of emissions. If current projections regarding an increasing share by rapidly developing countries such as Brazil, China, and India are correct, then their share of emissions will increase over time.

This would increase the percentage of contributions which these countries make to the fund. Such a system has one undisputable advantage: It rewards any country for outright mitigation, as GHGs not created cannot cause liability, necessitate no contributions to the liability fund (in the extreme case of no emissions). This rule applies to past emissions since

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<sup>4</sup> See also Jaeger et al. (2008).

<sup>5</sup> [http://www.naag.org/backpages/naag/tobacco/msa/msa-pdf/1109185724\\_1032468605\\_cigmsa.pdf](http://www.naag.org/backpages/naag/tobacco/msa/msa-pdf/1109185724_1032468605_cigmsa.pdf) (accessed 02 April 2009).

<sup>6</sup> [http://www.ftc.org/index.php?option=com\\_content&view=article&id=22&Itemid=28](http://www.ftc.org/index.php?option=com_content&view=article&id=22&Itemid=28) (accessed 02 April 2009).

the reference year, and also provides incentives to curb future emissions regardless of current aspirations for economic development.

The liability fund would make awards using strict proportionality.<sup>7</sup> As we presently consider countries (rather than consumers or individuals) to be liable for climate change, they would be held liable for the percentage of damages caused by climate change in proportion to their emission share since a specific reference year. For example, if the EU were responsible for 17% of worldwide CO<sub>2</sub> emissions since 1990 (reference year for emissions in the UNFCCC), then the EU were liable for 17% of the anthropogenically induced climate damages occurring after 1990 (see Figures 1 and 2 for illustration). The same rule applies to all other countries. Alternative reference years could be 1992 (the opening for signature of the UNFCCC). The parties to the UNFCCC, which enjoys close to universal support, have explicitly endorsed both reference years, and it is the integral of emissions since the reference year (minus potential depreciation of GHGs due to atmospheric processes) that creates the basis for counting cumulative emissions. In order to become a plaintiff, the country of the plaintiff has to join the liability fund, and make payments to it in proportion to its intertemporal integral of emissions since the base year. The liability fund thus takes care of the disparity of shares in emissions and shares in damages and provides an overall incentive for emission reductions. Those actively expecting a net transfer in their favor will likely join such a fund, others are more likely to abstain in the beginning. In order to have some funds at its outset, a major emitter needs to join the liability fund. Proportionality of coverage of cumulative emissions translates into identical proportions available for compensation. If this fund covers 40% of worldwide emissions since the reference year, it would only make awards equivalent to 40% of the damages and self-indemnify from the remaining 60% of damages by pointing plaintiffs to the actors responsible for the uncovered damages. This procedure limits the threat of immediate insolvency and a run on the fund, besides the length of time needed for the adjudication of the case. If the damages from smoking are any guidance, it will take several decades for court decisions to award compensation. In the meantime, the fund could be build up to relevant size.

Fourth, the time inconsistency problem has to be restrained. In their Nobel-prize winning work on time inconsistency, Kydland and Prescott (1977) demonstrate that optimal choices at one point in time may be at odds with optimal choices at future points in time. Policies may be designed such that one policy rule is administered in the first period, e.g., encouraging low emissions. However, at a later point in time, it may be the best policy to actually permit high emissions. More generally, governments are tempted to renege on earlier promises given changes in circumstances. “The suboptimality arises because there is no mechanism to induce future policymakers to take into consideration the effect of their policy, via the expectations mechanisms, upon *current* decisions of agents” (Kydland and Prescott 1977, 481). Naturally, the challenge of time inconsistency applies to long-term climate policy.

A prominent way to escape this challenge is to essentially tie one’s hands irrevocably to an ambitious goal and have an institutional setup that does not allow for easy departure from the path chosen earlier. Thus, the need for a credible frontrunner arises who irrevocably wishes to lead in terms of aiming at a low-GHG future while contributing the kernel of a liability fund of credible size to demonstrate its sincerity. At this point in time, the EU may be the only group of countries of substantial size that has a long-term ambition (2 degrees Celsius goal),<sup>8</sup> prepares for unconditional emission reductions (20% by 2020 as compared to

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<sup>7</sup> The valuation of economic damages is worth a separate treatment. Due to space limitations, this cannot be accomplished in an architectural sketch.

<sup>8</sup> [http://europa.eu/press\\_room/presspacks/energy/comm2007\\_02\\_en.pdf](http://europa.eu/press_room/presspacks/energy/comm2007_02_en.pdf) (accessed 01 July 2008).

1990), and aims at halving its emission by the middle of this century.<sup>9</sup> In addition, the EU has created a carbon market for roughly half its industrial emissions and the income generated from auctioning all permits could serve as the contribution to the liability fund. Any other country is encouraged to join, but there may be little competition to be the first mover. As awards are only given to plaintiffs whose countries are members of the liability club, plaintiffs will induce their countries to join.<sup>10</sup> Countries abstaining from joining a mutual liability fund would remain politically vulnerable to being sued directly through their own court system (e.g., the USA) or in other international fora of the UN system (Sprinz 2005; Ochs and Sprinz 2008).

What should the liability fund actually fund? Since mitigation is the central action variable to reduce one's contributions to the liability fund, only adaptation and compensation for residual damage remain as potential purposes. In effect, adaptation and compensation for damages not avoided are essentially two different forms of compensation related to damages. Funding for adaptation is transferred in anticipation of damages, compensation (in the narrow sense) is awarded ex post. The plaintiffs are entitled to compensation for damages proportional to the aggregate emission share of countries covered by the liability fund, and they could use it for adaptation measures or outright compensation. This, however, assumes that we have infinite time to spare when making awards. Given reasonable anticipation, funds sent by countries covered by the liability fund to potential plaintiffs, e.g., for adaptation measures, should be considered prepayments under a potential settlement. To make sure that resources are left for ex post compensation for climate impacts not avoided, at least 50% of the liability fund should be held back for ex post adjudication to avoid that plaintiffs do not sue a fund that already exhausted its resources. This rule also limits the temptation to buy political allegiance under the guise of climate adaptation.

#### **4 Challenges to the Architecture**

Readers may consider this architecture to be insufficient to assure that the world will avoid dangerous climate change. This may indeed be the case, yet many alternative architectures share this fate (Aldy and Stavins 2007). Rather than consider complex schemes, I propose Shaker architecture. The proposed liability fund does not rely on elaborate interstate negotiations, yet is fully upscalable to universal membership. The liability architecture requires at least one frontrunner who is willing to expose itself to limited liability, but the architecture is indifferent about the identity of the frontrunner. Under ideal circumstances, such as perfect anticipation and procedures, the architecture proposed achieves full compliance with an ambitious interpretation of Article 2 and need not make awards: Countries would make appropriate emission reductions and avoid liability. If the outcomes are less benign, damaged parties are left with a good chance for actual compensation.

The architecture proposed so far should be augmented by a range of finer points to understand its basic working and make it robust against some likely challenges. These points are addressed in a question and answer format.

#### ***Who Will Serve as The Plaintiff?***

The law normally operates either by (i) perfect adherence by parties covered under the law or (ii) the courts dealing with infringements on the law. Since there is little expectation that countries are currently on the way to universal implementation of an ambitious interpretation of Article 2 UNFCCC, it is not far-fetched to expect that some actor will seek redress for climate-induced damages. But who shall be entitled to claim damages?

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<sup>9</sup> <http://register.consilium.europa.eu/pdf/en/07/st07/st07224-re01.en07.pdf> (accessed 02 April 2009).

<sup>10</sup> If nobody sues the liability fund, the contributions could be repaid.

I suggest that any person should be able to make a case for compensation, provided some minimum criteria are met for the sincerity of the case. A pre-screening procedure of the climate court should weed out frivolous cases in order to avoid clogging the judicial system. While anyone or groups of persons or entities (incl. countries and groups of countries) can sue and potentially win cases, awards should be reserved for persons or entities in member countries of the liability fund. Persons or entities in the frontrunner country are equally entitled to sue and receive awards.

This procedure allows the climate courts to start considering questions of cause and effects – which are likely to take more than a decade. The requirement for plaintiff’s country being a club member of the liability fund provides incentives for plaintiffs to induce their country or countries to join the liability fund system.<sup>11</sup> As a result, the liability fund system is likely to grow beyond a committed frontrunner.

### ***What Happens If There are Different Interpretations of Article 2 UNFCCC?***

Assume a world without universal agreement on the meaning of Article 2 UNFCCC with respect to a zero liability benchmark. Would there be scope for multiple liability funds?

Given our current understanding of the climate system and our future preferences, we are unlikely to arrive at a universally agreed upon interpretation of Article 2 UNFCCC now or in the foreseeable future. But this does not have to be harmful. Our world has different product standards, lives with different laws, and has different economic, political, or social ambitions. Thus, we should expect that more than one liability fund emerges. Let them compete! Some countries may prefer a 350 ppm equivalent goal (Hansen et al. 2008) whereas others may prefer a 450 or 550 ppm equivalent goal. Member countries would self-select into liability funds with different ambitions, may become members of multiple funding systems, and can engage in merger and acquisition agreements between liability funds. Will the “law of the least ambitious program” - the survival of the fund with the least ambitious interpretation of Article 2 UNFCCC - become observed reality (Underdal 1980, 1998; Hovi and Sprinz 2006)?

The outcome depends on the position of the *most* ambitious party that creates a specific liability fund. If it is of sufficient size, it may attract particularly climate-vulnerable parties to join it. Domestic budgetary oversight or competing claims for funds by domestic constituents will quickly limit costly membership in too many liability clubs. But what happens if the most ambitious fund opts for a very unenthusiastic goal, such as 1,000 ppm carbon equivalent goal? If the most climate-friendly country is very unambitious, then there may be no need to care for long-term climate-related damages. To instill more optimism, a liability fund could also be created by interested private persons or private entities (such as charitable foundations), and countries could join private frontrunners. Given the current realities in world politics, it is very likely that at least some financial, societal, or sovereign actor is willing to pursue a somewhat ambitious interpretation of Article 2 UNFCCC.

### ***What Happens If a Country Leaves The Liability Fund?***

Some countries may be willing to join the fund early on in the expectation that high damages and small premiums will benefit it in the early phase of the fund’s life, but that GHG-intensive development plans provide incentives to leave the liability fund after the first awards. These expectations may indeed be realistic. What can be done to keep countries from exploiting the liability fund by way of the timing of membership?

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<sup>11</sup> For regions without universally accepted sovereignty or a permanent population (such as Antarctica) a trustee solution will be created.

Membership in a law-abiding system that takes decades to grant awards can be expected to have norm-establishing and socializing functions. But even if it does not, there is no need to make awards in the form of one-time payments. Ex post compensation can be awarded similar to an infinite interest payment for bonds, thereby lengthening the horizon of a party that may otherwise cancel its membership. But even if a party leaves liability fund A to join fund B or to leave the liability system completely, there is scope to limit the gaming of membership: Cancel all undisbursed payments to the party leaving the liability fund, reduce the coverage of the overall fund by using the proportionality rule, and make renewed membership conditional upon immediately paying up for previously uncompensated obligations for emissions. The latter mechanism serves as a membership fee that is not charged on permanent members. During periods of non-membership or membership in less ambitious liability funds, countries would become politically vulnerable. Conversely, if they abandon less demanding liability funds in favor of more demanding liability funds, they become less politically exposed.

### ***What is The Role of International Agreement?***

No international agreement is needed. The liability system relies on a frontrunner to come into existence. The only guidance needed is Article 2 UNFCCC, i.e., prevention of dangerous climate change, and nearly all countries have already subscribed to this norm. Potential merger and acquisition (M & A) among rival liability systems may necessitate standard commercial negotiations among M & A partners – besides due diligence. While unified international standards may solve coordination problems, a variety of liability funds may help solve the participation problem.

### ***What is The Role of Science?***

There is considerable scope for the role of science, and a liability system actually serves as a test of the credibility of science. In this context, science is understood to be all knowledge generating systems that links causes (emissions) and effects (climate damages), quantifies the effects, and parcels the effects out to relevant causal mechanisms. Without these three aspects of knowledge, the liability system cannot work. Fundamentally, the judicial system will adjudicate climate cases similar to the case of smoking and health- related research, i.e.,

- whether GHG emissions will lead to adverse effects,
- how and in which measurement units damages will be calculated, and
- which part of the assessed damages in a particular case (e.g., storm-related destruction of a large forest) can be attributed to anthropogenic climate change and which part shall be attributed to other causes (see Jaeger et al. 2008).

Those parts of damages which cannot credibly be linked to anthropogenic GHG emissions should be settled through means other than the climate liability fund.

The fact that science often does not speak with one voice should not pose a special problem. There are competing theories of why individuals undertake crimes, and the courts were and remain able to adjudicate cases of murder despite changes in science and its fashions. There is no reason for climate change to pose a new challenge to lawyers. The complexity involved may suggest that climate courts should be able to draw on specialized expertise, but the same is true for any other novel category of court cases.

In many respects, a liability system is a vote of the confidence by lawyers on the science of climate change. Two aspects matter in this context: means and variance. If confidence is below the threshold needed for the award of compensation through the climate courts, then the mean award should be zero. Beyond the threshold of confidence, the awards should be positive. The more exact the knowledge provided by the scientific sector, the lower the variance to be considered in the awards. At the upper end of confidence, we could

have awards with zero variance. Zero variance is unlikely to be accomplished in the foreseeable future, but advances of science should allow the variance to be narrowed over time.

### ***Why is a Frontrunner Needed?***

A frontrunner of non-trivial size is needed to establish the liability fund. Ideally, the largest cumulative emitter should serve as the founder of the liability fund as it assures potential plaintiffs a sizeable enough award to be worth its country's membership as well as the pursuit of a court case. For practical reasons, the founder or founding group should ideally cover 10% or more of cumulative emissions. The USA, China, and the EU qualify for such a role. The EU appears to be the most suitable candidate at this point in time, but any other coalition with an ambitious interpretation of Article 2 UNFCCC is welcome.<sup>12</sup>

### ***How Can The Credibility of The Liability System be Assured?***

There is no guarantee that the liability system will come into effect, and there is no guarantee that the system – once erected – will remain credible. To limit the first challenge, a credible frontrunner has to be found who pursues the project as a private good even while creating global public benefits. The second challenge can be addressed by a Political Climate Exchange.

The Council of the EU has decided in March 2007 to pursue an unconditional emission reduction of 20% of GHGs by 2020 as compared to 1990, irrespective of the ambition of other countries.<sup>13</sup> Current efforts at creating a climate and renewable energy program are meant to add credibility to this political goal. Why the EU is willing to advance an ambitious goal until 2020 and pursue halving its emissions by the middle of this century remains somewhat clouded. The EU may test its authority as an aggregate vis-à-vis its member states, may be willing to show world leadership on an issue it cares for while having a reasonable chance to implement its past promises under the Kyoto Protocol (European Environment Agency 2007), or may have other reasons for pursuing its ambitions. To make the degree of credibility of the frontrunner's resolve transparent and to assess the credibility of the liability system over time, it would be desirable to create a Political Climate Exchange (PCX).

The PCX would trade assets similar to those found on the Iowa Electronic Markets.<sup>14</sup> Rather than offering bets on who the next US president will be or which monetary policy decision the US Federal Reserve Board will take in the near future, the PCX could offer future trades with different maturities whether the frontrunner will comply with its announced goal. Prices of 100 units would signal 100% trustworthiness, a price of 0 units would signal complete untrustworthiness. As long as sufficient liquidity is guaranteed via market makers, strategic interventions by influential actors curbed, and insider trading avoided, the PCX could signal the resolve of the frontrunner. In addition, this system could later be applied to the liability system at large. The point is to make transparent to all interested parties whether a liability system and the policies of frontrunners are credible and when crises of trust ensue. Ratings of sovereign bonds by rating agencies fulfill the same function – with all the known imperfections. In essence, information markets would substitute for political access to

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<sup>12</sup> Scholars of international relations will think of hegemonic stability theory and the provision of global public goods (see (see Keohane 1984; Kindleberger 1986; Olson 1971). The good provided here is potentially global in scope but in fact a club good: Only members of the liability fund are eligible for awards. The phasing of disbursement of awards makes the execution of the exit option less likely as compared to a situation with a cost-free exit option.

<sup>13</sup> <http://register.consilium.europa.eu/pdf/en/07/st07/st07224-re01.en07.pdf> (accessed 02 April 2009).

<sup>14</sup> <http://www.biz.uiowa.edu/iem> (accessed 02 April 2009).

decision-makers by the few. The liability fund should be audited by at least three accounting firms to limit conflicts of interest, with rotation of auditors after 5 or 10 years. The audits should be made available to the public as well as the responses by the PCX's management.

### ***How Can The Architecture be Made Universal?***

The architecture is universal and fully upscalable. The liability fund, once erected, can grow with the help of new members. Plaintiff's countries have to become club members before awards can be disbursed, thereby inducing growth in membership. The fund is upscalable to complete membership of the UN membership system, and in this case, the awards would cover nearly all anthropogenic emissions. As membership grows, a governance system has to be created. It should resemble those of stock exchanges, not that of the UN system. In effect, the credibility of the management of the liability fund would be reflected in the PCX quotes. As there is no necessity to have just one liability system, I would expect competing systems to emerge, with some of them offering gold standards and others only silver or bronze standards for management and their ambitions to curb climate change. Their respective price quotes should reflect the differences in products offered.

### ***How Can We Deal with Parties Claiming Repeat Damages?***

Climate change is an enduring challenge, not a one-time problem. The liability fund is created with a perspective towards long-term operation. It is funded on the basis of cumulative emissions over time, and it shall make awards for cumulative anthropogenic climate damages. Assume in a thought experiment that the same cumulative emissions trigger damage X at time  $t_0$  and a different damage at  $t_1$ . An insurance would normally be entitled to cancel an insurance plan after settling a claim for  $t_0$ . Given that we know considerably little about cumulative climate damages and substantial inertia in the climate system (even if we reduced GHG emissions to zero overnight), liability should cover damages. Given that the liability fund cannot exclude cumulative damages by design, it should be allowed to make deductibles to limit damages at  $t_0$  and at  $t_1$  at the latest. In effect, the climate courts could stipulate that some part of the award at  $t_0$  has to go to adaptation measures to limit the damages at  $t_1$ . Insurance for earthquakes, such as the California Earthquake Authority, mandates deductibles to align the interest of the insured with that of the earthquake fund and avoid moral hazard by the insured. Adaptation funding granted in advance of settlements could be transformed into prepayments for later awards. Thus, there would be a proper nexus between adaptation funding for vulnerable areas and ex post compensation for unavoided damages, using the former as prepayment towards the latter.

### ***Is a Liability Fund Politically Realistic?***

Whether a sovereign entity (or any other credible actor) is willing to bind itself for centuries to come remains an open question. States are organizations build originally for eternity with long-term dependence of the rulers on the ruled or its selectorate, i.e., those factually keeping rulers in power or replacing them with alternative rulers (Bueno de Mesquita et al. 2003). By this benchmark and several millennia of experience with political organization, cautious optimism is warranted. Nothing qualitatively new is required of countries, private actors or other actors in the creation of a long-term liability system.

### ***What are The Ulterior Motives for a Climate Liability Fund?***

In essence, selfishness on behalf of the plaintiffs and limited altruism if not selfishness on the part of the frontrunner are needed to create a global public good. While human organization can always lead to undesired and counterintuitive consequences (e.g., liability for gynecologists may lead to a reduction in medical assistance to those wishing to deliver

babies), it is conceivable that a climate-related liability system will encourage strong mitigation and reserve a minor role for litigation. In this case, the expectations mechanism would have achieved the desired goal. In the case of a substantial role for liability, making excessive awards would certainly run the system bankrupt. This would be properly picked up by the PCX. Judges aware of such a possibility and with a mind on their future employment are likely to keep an eye on the tradeoff between actual damages, putative fines, and the liquidity of the liability fund. And even if such a system were to undergo bankruptcy, members of a successor liability system could treat past contributions as a prepayment to a successor liability fund. At best, selfishness would propel strong mitigation while insuring damaged parties that they will not be left alone if mitigation is less than perfect.

## 5 The Case for Decentralized Responses

Carbon-labeling of foods is emerging, organic food has acquired substantial market share in several countries despite unproven health effects and a premium on prices, and some industries consider carbon neutrality. Even a whole industrialized country such as Norway has proposed to become carbon-neutral by 2050.<sup>15</sup> Thus, there is enthusiasm for a more climate-friendly future, and we have some reason for cautious optimism. An ambitious “global deal” appears unlikely to emerge in the near future due to a variety of simultaneous challenges. Instead, a simple, decentralized system of liability funds could take over some of the challenge to avoid dangerous climate change.

Long-term climate policy needs a reminder why it is useful and for whom. Once financial power is given to those facing damages, the emissions side will be reminded of its exposure. A liability system by itself is unlikely to deliver avoidance of dangerous climate change, but it can

- establish a well-known social mechanism of compensation for damages based on the polluter-pays principle,
- it is fully adjustable to various levels of the maturity of science,
- the architecture outlined here does not require international agreement,
- invites the damaged to become part of a permanent liability club while erstwhile recipients may become net contributors later,
- signals powerful incentives to mitigate,
- it furthers the rule of law in all member countries as well as among sub-national and trans-national plaintiffs, and
- we have considerable experience with most of the components needed.

The system outlined here does not require new preferences, a new world order, global agreement, a green consciousness, political correctness, or other characteristics. It simply requires appropriate allocation of property rights, business sense, legal experience, and a politically courageous frontrunner. Keep it simple, and let a frontrunner step forward!

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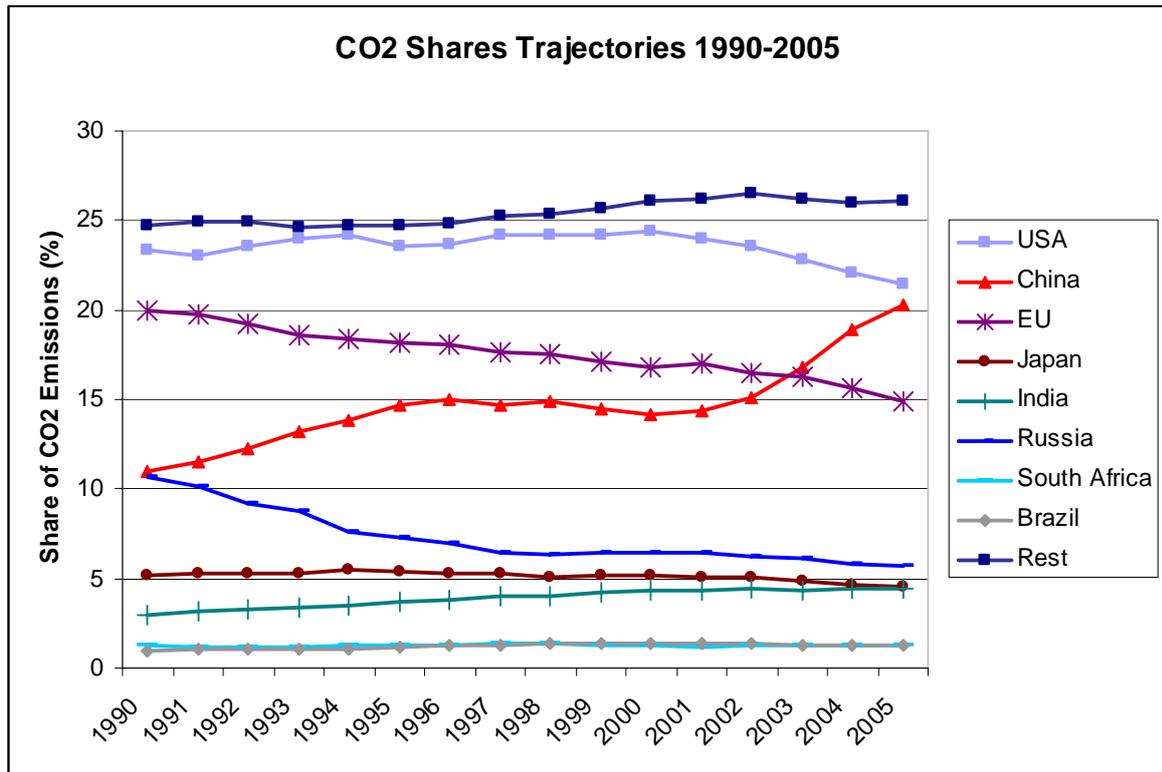
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<sup>15</sup> <http://www.regjeringen.no/en/dep/smk/primeminister/Prime-Minister-Jens-Stoltenberg/Speeches-and-Articles/Speech-at-Trafalgar-Square-London/Speech-to-the-congress-of-the-Labour-Par.html?id=463749>;  
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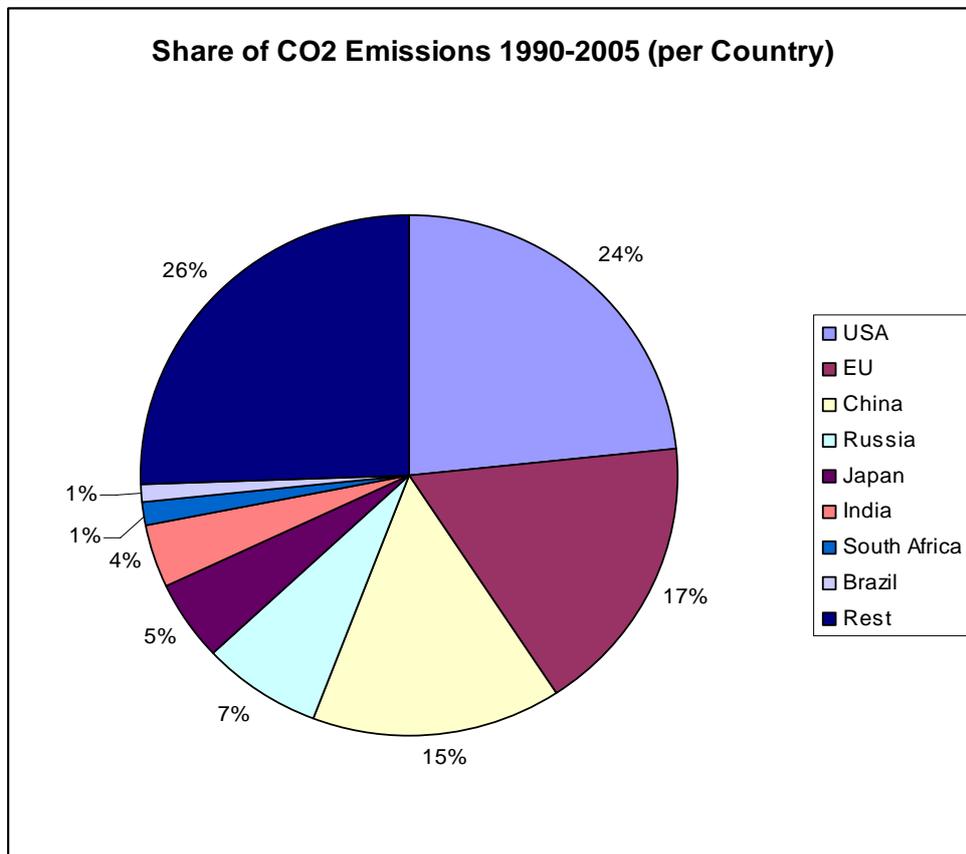
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**Figure 1: CO2 Shares of Major Emitters (1990-2005)**



**Source:** Climate Analysis Indicators Tool (CAIT) (2009).

**Figure 2: Share of CO2 Emissions (1990-2005)**



**Source:** Climate Analysis Indicators Tool (CAIT) (2009).