Beyond Kyoto 2012: No Prevention of Dangerous Climate Change Without an Internationally Acceptable “Beyond Kyoto” Global Cap-and-Trade Scheme

Lutz Wicke\textsuperscript{a} and Gerd Duerr-Pucher\textsuperscript{b}

The Kyoto Protocol, in its present form, is quantitatively and structurally totally inadequate to combat dangerous climate change. That is—to the authors of this paper—the inevitable conclusion to be drawn from three careful scientific studies on behalf of the Ministry of Environment of the German federal state of Baden-Wuerttemberg, two published in Beyond Kyoto—A New Global Climate Certificate System. Continuing Kyoto Commitments or a New Global Climate “Cap-and-Trade Scheme” for a Sustainable Climate Policy? (Wicke 2005) and one in Cost Impacts of a “Beyond Kyoto”-Global Cap and Trade Scheme (Wicke 2006) However, as the cited publications demonstrate, by a “structural evolution” of the climate regime, there can and should be an efficient and internationally acceptable beyond-Kyoto system.

It is only necessary to combine some brilliant ideas that have already been proposed: the flexible Kyoto cap-and-trade mechanisms (emission trading between states, joint implementation, and the clean development mechanism) “invented” by US scientists and implemented in the Kyoto Protocol should be enlarged to a global cap-and-trade system, while the idea of equal per capita emission rights from India and Pakistan—which has been unfairly written off as not a serious proposal—can be the basic key to fair distribution of emission rights.\textsuperscript{1} Additionally, there must be economic corrections and mechanisms within such a free-market-oriented cap-and-trade scheme to make it economically acceptable for all countries to combat successfully dangerous climate change. This system would give incentives for climate-efficient behavior and structures worldwide and provide adequate means and incentives for sustainable, climate-friendly development and for the elimination of poverty—especially in developing countries. This paper attempts to prove both the inadequacy of the current Kyoto system and the feasibility and necessity of such a global cap-and-trade scheme—being nearly completely in line with a recent urgent call for a global cap-and-trade scheme by the World Economic Forum (World Economic Forum 2005).

\textit{Keywords:} Beyond Kyoto, Global Climate Certificate System, Kyoto Protocol, Cap and trade, Prevention of dangerous climate change

1. The importance and merits of the Kyoto Protocol process

The expected dangerous climate change is one of the biggest challenges the world has ever faced. Its destructive potential has forced the world community into a multilateral process of negotiations to

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\textsuperscript{1} The equal per capita distribution concept—starting with the “grandfathering” principle after a transition period of 30 to 50 years—is incorporated also within the contraction and convergence proposal of the London-based Global Commons Institute (GCI 1999) and its head Aubrey Meyer (Meyer 2000), put forward in the 1990s.
prevent at least the most horrific consequences and to slow the speed of the change. The first step towards this goal was the UN Framework Convention on Climate Change (UNFCCC), and specifically the Kyoto Protocol, which entered into force in February 2005.

Besides all the inefficiencies of the Protocol, which we discuss below, it is astounding that the international community has come so far with this treaty. Why? On the one hand, there exists very reliable scientific evidence for anthropogenic climate change (a global temperature rise of 0.6°C since 1760). However, there are powerful international forces acting “under the command” of fossil fuel energy companies like Exxon, which try to ignore scientific evidence and, by lobbying massively, to influence national governments.² Within the US Senate, these forces have, since 1997, been in the overwhelming majority, which is largely why the United States left the Kyoto process at a very early stage.³ However, overall this process was a success and has led to an international binding obligation to make significant efforts, mainly in the industrialized countries and those in transition (the “Annex I countries”), aimed at reducing greenhouse gas (GHG) emissions.

The maxim “Never change a winning team” captures why we should be very careful of criticizing this process: in case there is no better alternative. We fully understand that some environmentalists feared that criticizing the Kyoto Protocol before its final ratification and talking about a better alternative could have been dangerous. On the other hand, it is our obligation as scientists and as environmentalists to search for an alternative, since we cannot shut our eyes to the obvious serious quantitative and structural failures and shortcomings in the Kyoto process. The most important of these is not the fact that we will not reach the reduction goals of the first commitment period but rather the lack of sufficient incentives for industrialized countries, even greater for developing countries, to go further in the second period in order to trigger economic development that really can prevent dangerous climate change.

Although the Global Climate Certificate System (GCCS) has already been developed in much detail—so much so that co-author Lutz Wicke is convinced that it is “in a condition generally ready for application” (Wicke and Knebel 2003b, 1), we nevertheless know that in this paper we will be comparing a system that is still a model with the Kyoto Protocol, which has been developed in a very complicated political environment and through very sensitive negotiations (even if it has not followed its theoretical road map).⁴ This, in fact, is not quite fair and may be methodologically disputable. Nevertheless, an unbiased evaluation of the Kyoto Protocol and comparison with the GCCS, which has been carefully designed to be both in theory and in practice an optimal climate-protection system, should lead to necessary reflection by the Kyoto community as to whether we are on the right track for climate protection.

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2. In Ecologist (2001) can be found a (somewhat biased) compilation of Exxon’s ecological and other sins, and those of its head, Lee Raymond.


4. Although GCCS has not yet been discussed in detail with and within the “Kyoto community”, there has already been hot discussion of it (and of the clear shortcomings of the Kyoto Protocol) with climate-protection specialists of German non-government organizations in January 2004 (at the headquarters of Bund für Umwelt und Naturschutz Deutschland, Germany’s biggest environmental non-governmental organization), with the German Federal Environmental Agency (Umweltbundesamt) in December 2003, and with the heads of the German delegation to the Kyoto Protocol Conference of the Parties in January 2005, and a presentation at a side event of the Twenty-second Sessions of the Subsidiary Bodies of the UNFCCC in Bonn, May 2005.
As with all other conceivable effective schemes for improving the current system, extremely high hurdles will have to be passed when implementing the GCCS. This system will need to be incorporated into an approved, ratified, and reformed multinational climate-protection treaty. However, thanks to the important merits of the GCCS, which are outlined below, it still offers a small chance for mankind to prevent dangerous climate change.

2. The foreseeable but regrettable failure of the Kyoto commitment strategy

Two figures among thousands in the latest World Energy Outlook of the International Energy Agency (IEA 2004) clearly show the complete failure of the Kyoto climate-protection strategy’s reliance on national climate commitments: taking into account all energy- and CO₂-relevant decisions worldwide—also initiated by the Kyoto process—up to the summer of 2004, the IEA’s projection reveals that up to the year 2010, the industrialized countries (the members of the Organisation for Economic Cooperation in Development, OECD) will increase their CO₂ emissions by 25.3 percent (ibid., 437, “change since 1990”) instead of reducing them by (at least) 5.2 percent, their original commitment in the Kyoto Protocol. Thus they will miss the target by as much as 30.5 percent! Even the European Union (EU), the self-declared world leader in CO₂ reduction, will also fail dramatically; instead of its members’ CO₂ emissions falling by 8 percent, they will increase by 9.1 percent (IEA 2004, 469), missing the ratified, and therefore legally binding, target by 17.1 percent!

These figures clearly show that with the failure to achieve the very limited emission reductions committed to by the industrialized countries, particularly the EU, the whole future Kyoto strategy, which was very unrealistic from the beginning, falls apart; industrialized countries are de facto not taking the lead in combating climate change.

Even if there is some overestimation in the IEA projection, given this situation, clearly there is no chance whatsoever of persuading even one newly industrialized or developing country to commit to a reduction of its emissions growth or even of its absolute emissions. The failure to meet commitments by the Annex I countries adds a new and decisive argument to the two traditional and understandable arguments cited by developing countries for refusal to commit to emissions reduction: that they have

5. The quoted 5.2 percent reduction is a target for all Annex I countries. The projected rise among OECD countries of 25.3 percent, therefore, is only partly comparable with the reduction target. However, all of the OECD member countries have higher reduction targets than the average for Annex I countries!

6. The EU’s target of an 8 percent reduction of emissions would require a reduction of around 700 million tons of CO₂; in fact, it is predicted to increase its emissions up to around 4.1 billion tons by 2010 (IEA 2004, 469). It is inconceivable that it will take appropriate measures internally by 2010 to reach this target. The only way it will be able to fulfill its commitment is by buying emission credits from non-EU countries. Besides gaining emission credits through joint implementation (JI) in Annex I countries or through clean development mechanism (CDM) measures in developing non-Annex I countries, the EU can legally buy up to around 1.5 billion tons of “hot air”. This is defined by Grubb et al. (1999, xxviii) as the excess emission allowances over projected business-as-usual emissions in the commitment period, believed to exist mainly in Russia and some Central and Eastern European states—presumably primarily from Russia or the Ukraine. However, buying “hot air” is not a means to reduce climate change. According to Grubb et al., the existence of too much “hot air” could undermine the trading regime or even the whole climate change regime. The EU case seems to confirm Grubb and his co-authors’ belief, especially for the example of Russia: Russia has negotiated emission allowances (so called assigned amounts) on the basis of zero emission growth up to 2012, while in fact its business-as-usual path is predicted to lead to a reduction in emissions of at least 30 percent, a difference of nearly 1.5 billion tons of “hot air” CO₂! (European Commission 2002, 45).

7. The IEA claims that, “since 1993, IEA projections for global energy demand have been within 2.2% of the most recently reported data.” (IEA 2004, 519).
much lower per capita emissions and income, and the indubitable historic guilt of industrialized nations (that is, their contribution to the current anthropogenic CO₂-concentration in the atmosphere). Thus it is the final nail in the coffin of the current Kyoto commitment-based strategy. There will be no inclusion of non-Annex I countries in the Kyoto commitment system; even the completely inadequate commitments by the industrialized countries and countries in transition have no future!\(^8\) There is no chance at all that future commitment periods will start with appropriate commitments by all of the countries that originally signed the Protocol in 1997.

This means no prevention of dangerous climate change; in fact it means its reverse: if there is no radical and efficient structural evolution of the existing Kyoto system, the world is directly heading towards a CO₂-concentration of 750 ppm or more, as shown in figure 1, if the IEA projected increase up to 2030—90 percent(!) on 1990 levels, or 38.2 billion tons of CO₂ emissions (IEA 2004, 76 and 433)—proves correct.\(^9\) And this—there can be no doubt for any serious scientist—will produce dangerous, if not catastrophic, climate change! To achieve the EU’s target of limiting the rise in average global temperature by and after 2100 to 2°C (and keep atmospheric concentrations of CO₂ at or below 550 ppm) in order to prevent dangerous climate change, worldwide emissions up to 2050 must be reduced by 60 percent, as can be (indirectly) seen in the 550 ppm CO₂-stabilization curve in figure 1. Even this, according to the latest findings in various climate-change scenarios (Berk and den Elzen 2001; Hare and Meinshausen 2004), is not enough of a reduction to reach the EU temperature target; only a concentration of 450 ppm CO₂ equivalent (including all other GHGs) would be sufficient (Hare and Meinshausen 2004). There remains only the vague hope that in the second half of the twenty-first century there might be enormous decreases of worldwide GHG emissions, thus compensating for the projected overshoot in the first half of the century, enabling the world to realize the EU temperature target.

3. The structural inadequacy of the Kyoto commitment strategy

This section will demonstrate, as objectively as possible, that the commitment system of the Kyoto Protocol is indeed structurally unable to meet the UNFCCC’s main objective, “to prevent dangerous anthropogenic interference with the climate system” (UNFCCC, article 2). This can be demonstrated based on careful studies of relevant literature evaluating the prospects of success of different climate-protection systems, chiefly Philibert and Pershing (2001, 2002) and Höhne et al. (2002). By taking into account the experiences and the evaluation criteria of these sources, the authors of this article, and of the book on which it is based (Wicke 2005), have developed a comprehensive standard system for evaluating the prospect of success of different climate-protection systems. All the criteria and 19 sub-criteria of the abovementioned literature have been integrated and given individual weighting. The possibility of achieving climate sustainability with a certain climate-protection system counts for 50

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\(^8\) Contrary to some pronouncements, it seems inconceivable that even climate-committed Annex I states will commit, at the end of the first commitment period, to adequate reductions for global climate stabilization, in the light of their predicted failure to comply in the first period and the disaster of the non-compliance of the whole group of Annex I states, by both subgroups of countries that have and have not ratified the Kyoto Protocol.

\(^9\) Additionally, one has to consider the (almost proved) dramatic increase of worldwide CO₂ emissions since 1990 of 38.9 percent by 2010, or plus 7.8 billion tons per annum (IEA 2004, 433).
percent of the total score, and is thus called the paramount criterion. Another study by Höhne et al. (2002) evaluates climate sustainability with a weight of only 33 percent. However, the weighting assigned in this study is fully in line with the following remarks:

Environmental effectiveness—measured in terms of the ability of a policy to stabilize atmospheric concentrations of GHGs—is in this sense the overriding priority of international climate policy. Political considerations of equity, efficiency and so on must take second place to this priority; there would be little point in implementing a politically feasible approach that isn’t up to the environmental job in hand. (Evans and Simms 2002, 5)

The remaining 50 percent is made up of economic efficiency, counting for 18 percent, technical applicability for 8 percent, and political acceptability for 24 percent of the maximum score. On that basis, which of course is open to scientific debate and criticism, Lutz Wicke makes a comprehensive evaluation of the Kyoto Protocol and of the GCCS.

**Criterion 1: Climate sustainability**

To start with the paramount criterion of climate sustainability or effectiveness, the important question here is whether, if the climate-protection targets laid down in the system in question are implemented,
the climate goals will be reached. As far as the weighting of the nine sub-criteria under this criterion (shown in table 1) is concerned, it must be noted that because most of them were taken directly from the sources cited above, they sometimes evaluate similar effects. This is why some very important sub-criteria (for instance, those regarding the opportunity to fully and actively include developing countries in the global climate-protection system) appear in at least three sub-criteria. To compensate for this, the weights of the relevant sub-criteria (in this example, 1, 3, and 4) have to be summed up. Also, the incentives and compulsions of all countries and GHG emitters for climate-friendly behavior are so important that they are counted in several different sub-criteria.

Especially in this paramount criterion, it can be shown that the Kyoto Protocol commitment system, based on negotiated commitments of only Annex I countries and with no greenhouse-gas-relevant commitments at all among developing or newly industrialized countries, is structurally unable to “do its environmental job in hand,” to produce climate stability.

As can be seen in table 1, the Kyoto Protocol performs extremely poorly (scoring only 4 points out of a total 22) against the first four sub-criteria. These are taken directly from demands by the IEA (Philibert and Pershing 2002), thus including the most important US and other literature, and the positions of IEA’s Standing Group on Long-Term Cooperation and of the expert group of the Annex-I states (IEA and OECD 2002, 3). The scores given for each sub-criterion are explained below.

Sub-criterion 1: There exists virtually no general incentive in the regulations of the Kyoto Protocol for developing countries to reduce the increase of their CO2 emissions (0 points out of 4).10

Sub-criterion 2: Deplorably, the second sub-criterion of the IEA for a successful climate-protection system—additional action to stop the rise in developed countries’ aggregate emissions (Philibert and Pershing 2002, 40), preferably by “permanent incentive/compulsion for substantial reduction measures in developed industrialized countries whose aggregate emissions continue to rise,” (ibid., 40)—is fulfilled by the Kyoto Protocol only to a very limited extent; only the Annex I countries that have ratified the Protocol only to a very limited extent; only the Annex I countries that have ratified the Protocol have a legally binding commitment.

As shown above, on balance, those countries will not meet that objective. Even the EU will not meet its commitments or will do so only, if at all, with the help of some JI or CDM projects and mainly by buying “hot air” (see note 6 above). The Marrakech compliance and sanctions modalities under article 18 of the Kyoto Protocol for non-complying countries (UBA 2003) seem to be pretty dull weapons.11

Taking into account the fact that nearly all industrialized countries are almost certain to fail to meet their commitments, a score of 3 out of 10 is rather optimistic for this sub-criterion.

10. The very small incentives supplied by financing of CDM projects are evaluated under sub-criterion 5.

11. An example is the threat of a reduced assigned amount of emission allowances in the following commitment period, by a “reparation factor” of 1.3 times the amount by which a country misses its target in the current commitment period. This is hardly effective now because in 2006 nobody can really predict whether there will be a second commitment period or what modalities a second commitment period would have.
Table 1. Evaluation of the climate sustainability of the Kyoto Protocol and the GCCS

<table>
<thead>
<tr>
<th>Sub-criterion</th>
<th>Kyoto Protocol</th>
<th>GCCS</th>
<th>Maximum score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General incentive to reduce the increase in CO₂ in developing countries</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2. Incentive/compulsion for fast, substantial reductions in industrialized nations</td>
<td>10</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>3. Fastest possible involvement of developing countries</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4. Financing emission reductions in developing countries</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>5. Encouraging early action worldwide</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6. Avoidance of emission shifting (leakage) effects</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>7. Permanent interest in climate-friendly behavior worldwide</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>8. Quantified climate protection aim of the climate system</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>9. Avoidance of &quot;hot air&quot; worldwide</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>4</td>
<td>45</td>
</tr>
</tbody>
</table>

Source: Based on Wicke 2005, 38

Sub-criterion 3: From the very beginning, developing countries categorically refused to take part in the Kyoto Protocol commitment system, mainly because of much smaller per capita emissions and income and also because of the “historic emission guilt” of the industrialized countries. As noted above, the failure of the industrialized countries to take the lead and meet their initial commitments makes it even more unlikely that developing countries will be willing to be integrated into that commitment system (0 points out of 4).

Sub-criterion 4: Philibert and Pershing (2002, 40) rightly demand that “solutions must be found to finance emission reduction costs, particularly in the developing world” because “GDP levels projected for developing countries imply that capital resources to reduce emissions will be extremely scarce.” The financial assistance mechanisms outlined in article 11 of the UNFCCC and in the Kyoto Protocol are inadequate compared with the huge capital needed even to slow CO₂ emission growth in developing and newly industrialized countries. Above that, some additional emission-reduction measures can be financed by foreign investors within the scope of the extremely complicated CDM to meet the obligations resulting from their countries’ commitments under the Kyoto Protocol. But this mechanism again can bring only a very small contribution to the huge costs of financing emission reductions in developing countries. Hence the score of 1 out of 4 for the fourth sub-criterion again is very optimistic.

The fifth to ninth sub-criteria are taken directly from the literature, especially from a literature summary by Höhne et al. (2002). Lamentably, the Kyoto Protocol also cannot fulfill these sub-criteria, and hence scores 0 for each of them.

Sub-criterion 5: Early action in developing and industrialized countries is not encouraged by the Kyoto Protocol. As long as reducing emissions is more costly than not doing so, the Kyoto mechanisms...
actually promote late action in these countries, and even more so in non-committed developing and newly industrialized countries (0 points out of 4).

Sub-criterion 6: There is no “avoidance of emission shifting (leakage) effects” (sub-criterion 6) through the Kyoto Protocol. On the contrary, industrialized countries in principle can comply with their commitments (of reduction or limiting their CO₂ emissions) by shifting their highly emitting industry to non-committed developing countries. There are even incentives for such behavior for countries that are “taking their Kyoto commitments seriously”! (0 points out of 4)

Sub-criterion 7: Because the Kyoto Protocol is based on commitments and not on a market-oriented incentive system, CO₂ emission remains free of cost worldwide. Thus the Protocol does not stimulate permanent interest on the part of all states and economic players worldwide in contributing to climate-friendly behavior and minimizing CO₂ emissions. There may be some tiny incentives to adopt more climate-friendly behavior by way of the flexible mechanisms of the Protocol and of the EU Emissions Trading System, but as long no state or group of states really cares about compliance with their commitments, these mechanisms have no significant effect on CO₂ emissions at the global scale. It must be admitted that some spectators who have high confidence in the willingness of Annex I states to comply with their commitments may evaluate this very important sub-criterion higher than the 0 out of 10 points given by the—at this point—pessimistic author.

Sub-criterion 8: Evidently there exists no clear link between the climate-protection system in place and a targeted, quantified climate-sustainability/CO₂-stabilization goal (Höhne et al. 2002). Besides the overall 5.2 percent reduction target of Annex I states, there exists no overall global emission or GHG concentration target whatsoever (0 points out of 6).  

Sub-criterion 9: Finally, the European Commission’s World Energy, Technology and Climate Policy Outlook (European Commission 2002) demonstrates that there exists at least 1.5 billion tons of “hot air” in the current Kyoto commitments. Every new commitment period negotiation can be expected to produce new “hot air”. This is because the interest of each party would be to obtain a commitment that can be easily fulfilled, in order to be able to sell unused assigned amounts for a profit. Such a bargaining result cannot be blocked as long the rule requiring decisions to be unanimous is in place! Hence a score of 0 out of 4 for the last sub-criterion.

Thus the Kyoto system scores a very sobering 4 points out of 50 for climate sustainability or effectiveness —far below even a “poor” result, and therefore completely inadequate!

**Criterion 2: Economic efficiency**

The Kyoto Protocol scores slightly better in terms of the second criterion, economic efficiency, as can be seen in table 2. In the overall evaluation score of 100 points, this criterion accounts for 18 points. It should be noted that economic efficiency also plays an important role in political acceptance, and is thus included in evaluation of that criterion too (see table 4). The various economic criteria and sub-criteria

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12. The UNFCCC’s objective of preventing dangerous interference with the climate system was never officially quantified by the Conferences of the Parties, unlike the EU’s target of +2°C or its now outdated second target of a maximum atmospheric concentration of 550 ppm CO₂.
of Philibert and Pershing (2001), Höhne et al. (2002), and Böhringer and Welsch (1999) have been merged into four sub-criteria. The scores assigned under each are explained below.

The first two sub-criteria are cost-efficiency (minimizing global costs), and flexibility during national implementation (minimizing national costs) and financial assistance for development countries. The JI, emissions trading, and CDM flexible elements, supplemented by the EU Emissions Trading System, contribute, with overall low (climate-based) requirements, toward cost-efficiency and financing. Therefore these two sub-criteria are both given scores of 2, out of 6 and 5 points respectively.

The third sub-criterion takes into account structural differences in climate-related requirements. Because developing countries and transition countries are not subject to any targets, and because there are only very low and differentiated (climate-based) commitments for industrialized countries, the structural differences of various countries are recognized to a high degree within the Kyoto Protocol, which thus receives 3 out of 4 points for this sub-criterion.

Because the commitments of the industrialized countries are quite low, the potential positive (growth) impetus for an energy- and cost-saving restructuring of the various national economies of industrialized states, as well as for developing countries through CDM measures, remains low (1 out of 3 points for sub-criterion 4).

Overall, the economic efficiency of the Kyoto Protocol is evaluated at 8 points out of 18.

**Table 2. Evaluation of the economic efficiency of the Kyoto Protocol and the GCCS**

<table>
<thead>
<tr>
<th>Sub-criteria for securing the main criterion:</th>
<th>Maximum score</th>
<th>Actual score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Cost-efficiency: Minimizing global costs</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>2) Flexibility during national implementation (minimizing national costs) and financial assistance for development countries</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>3) Taking into account structural differences in climate-related requirements</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4) Positive economic (growth) impetus</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

*Source: Based on Wicke 2005, 38.*

**Criterion 3: Technical applicability**

Technical applicability also plays an important role in the implementation capability of a system. This criterion accounts for 8 points out of the total 100. This criterion and its sub-criteria are evaluated in table 3.

Only Höhne et al. (2002) provide data and references on this criterion. The following issues are mentioned there: compatibility with the UNFCCC and the Kyoto Protocol, and moderate political and technical requirements in the negotiating process (simple approach, low number of decisions, data, and
calculation methods available). These aspects are certainly important for the negotiation process. They are, however, certainly not exclusively technical applicability criteria. The following sub-criteria are therefore defined for this criterion: easy applicability of elements, and capacity to implement and check adherence to the rules in order to achieve climate sustainability and avoid fraud and corruption.

The first sub-criterion is fulfilled completely (4 out of 4 points). If one looks into the extremely high and complicated prescription of the Marrakech Accords about the functioning of the Kyoto Protocol and its supervision, one sees that its application is not easy; nevertheless it has been successfully set in operation. Therefore the Kyoto Protocol scores 3 out of 4 points for sub-criterion 2, giving 7 out of 8 points for technical applicability.

Table 3: Evaluation of the technical applicability of the Kyoto Protocol and the GCCS

<table>
<thead>
<tr>
<th>Sub-criteria for securing the main criterion:</th>
<th>Maximum score</th>
<th>Kyoto Protocol</th>
<th>GCCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Ability to fit into the international climate-protection system and the</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>negotiation process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Easy applicability and control capability in order to ensure practical</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>functioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Based on Wicke 2005, 3.

Criterion 4: Political acceptability

The fourth criterion, which is the second most important with a weight of 24 out of 100 points, is political acceptability of the climate-protection system. Unlike the climate sustainability criterion, the decisive question for the political acceptance criterion is just how likely is it that the system will be accepted in international climate-protection negotiations, leading to the signing of an agreement.

Höhne et al. (2002, vii), writing for the environmental consultancy ECOFYS, give the following—largely acceptable—political criteria: equity/fairness principles (are the three equity principles of need, capability, and responsibility covered?), and agreement with fundamental positions of all major constituencies. The latter issue seems to be somehow problematic, because only if a climate-protection system does not demand serious effort by all parties can it be acceptable for all major constituencies from the very beginning.

Despite the principle of unanimity in international climate-protection treaties and negotiations, one should not rule out from the very beginning the possibility that conceivable (large) majorities in favor of certain further-developed or new climate-protection systems could in fact lead to unanimous acceptance. This holds true not least because the negotiating process and compromise (as well as international
pressure on countries that refuse at first) could make many initially inconceivable proposals acceptable for all states.

Taking into consideration the lengthy negotiating process that will be necessary during the first commitment period of the ratified Kyoto Protocol, the further-developed Kyoto Protocol (second commitment period) or an alternative climate-protection concept will not come into effect before the year 2013. The second ECOFYS political criterion is hence broken down into two sub-criteria: acceptance by all key players (and groups of players), and acceptance by the largest possible number of contracting states.

These sub-criteria, together with two sub-criteria to give a more detailed analysis of the equity principles described by Höhne et al. and others, are shown in table 4.

**Table 4. Evaluation of the political acceptability of the Kyoto Protocol and the GCCS**

<table>
<thead>
<tr>
<th>Sub-criteria for securing the main criterion</th>
<th>Actual score</th>
<th>Kyoto Protocol</th>
<th>GCCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulfillment of the equity principles</td>
<td>Maximum score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Promotion/non-prevention of sustainable development</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2) Stronger burden on industrialized nations bearing main responsibility and capable of bearing more burdens</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Political acceptability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Acceptance by all key players (and groups of players)</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4) Acceptance by the largest possible number of contracting states</td>
<td>9</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>18</td>
<td>18</td>
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*Source: Based on Wicke 2005, 39.*

The Kyoto Protocol fulfills the two equity sub-criteria only around 60 percent. On the one hand, there are relatively few incentives for sustainable development, both in industrialized and in developing countries; on the other hand, the climate-related requirements and commitments of industrialized states are in total very low.

As for the political acceptability of the Protocol, it was originally signed in Kyoto, though it was quickly rejected by the US administration (and the Australian). On balance, then, the political acceptability of the Kyoto Protocol is quite high, and scores 18 points out of 24.

The result of this evaluation of the existing Kyoto system—a score of only 37 out of 100—sends a very depressing message: the existing Kyoto system is, according to the English scoring system (see Wicke 2005, 15), “poor” or even a “complete failure”.

Interested readers can read the appendix to this article for a much more detailed discussion of the structural deficits of the Kyoto Protocol.
4. Structural evolution towards a global cap-and-trade scheme

The preceding sections have constituted an unofficial review of the Kyoto Protocol in advance of the official review, which is to be initiated in 2005 according to articles 3.2, 3.9, 13.4.a, and 13.4.b of the Protocol. According to article 9.1, the Conference and Meeting of the Parties must take “appropriate action” if the official review findings are as poor as those of our review, as they inevitably must be. In Wicke’s book (2005), all major proposals for an incremental evolution (Berk and den Elzen 2001) summarized and described by Höhne et al. (2002) are awarded—because of the same or similar structural deficits—a similarly poor score. Therefore, in order to actually prevent dangerous interference with the climate system, there must be a substantial structural change and reformation, leading to a new beyond-Kyoto-2012 system.

After evaluating all the major proposals, Wicke (2005) demonstrates that an effective climate-protection system can be achieved only by expanding the existing flexible Kyoto mechanisms to a global cap-and-trade scheme. These mechanisms are: emissions trading between ratifying Annex I countries; JI; the CDM; and the additional EU Emissions Trading System, which comes into operation in 2005.

World economic leaders, members of the Climate Change Roundtable of the World Economic Forum recently made a similar urgent call for a global cap-and-trade scheme:13

The current “patchwork” scheme of regulatory, financial, and technology incentives that has evolved in various parts of the world is not conducive to a cost-effective and efficient approach to the problem of climate change. The difficulty is exacerbated by the short term nature of the Kyoto Protocol and related policy mechanisms whose targets and timetables do not extend beyond 2012. For an investor seeking to gain a fair return on low capital projects whose life cycle may often be in the 25–60 year range (e.g. power plants), the level of risk can become a significant disincentive. The same kind of uncertainty clouds the future value of tradable emission credits and the value of investment in low carbon infrastructure in emerging markets.

For these reasons, we urge the G8 governments to

- establish a long term, market-based policy framework extending to 2030, that will give investors in climate change mitigation confidence in the long term value of their investments. Establishing indicative signals extending to 2050 would also be beneficial.

- Ensure that the policy framework is global in scope—utilizing a coordinated and consistent set of national or regional regimes, with maximum fungibility between regimes, and opportunity for future consolidation into a single regime.

- Define greenhouse gas emission rights through a cap-and-trade system or other market-based mechanisms that can be adjusted over time to reflect evolving scientific, technological and/or economic developments and that will help shape consumer choices.

- Address climate change as part of an overall sustainable development agenda, putting in place mechanisms which address the challenges of poverty, energy, and economic growth in

emerging markets while mitigating greenhouse gas emissions.” (World Economic Forum 2005, 3. Emphasis by the authors.)

Up to now, two such global cap-and-trade schemes have been proposed. The first is the contraction-and-convergence (C&C) approach from GCI (1999) and Meyer (2000), strongly backed by Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen, the Scientific Advisory Board of the German Federal Government for Global Environmental Changes (Graßl et al. 2003). The second approach, which has been elaborated in much more detail to the stage of “general application maturity,” is presented by Wicke (2005) in the form of the Global Climate Certificate System.¹⁴

Both of these schemes, which involve structural evolution of the existing Kyoto Protocol, have in principle at least an unquestionable advantage over all incremental-evolution approaches: with cap-and-trade schemes—if they are properly implemented—the paramount criterion of preventing dangerous interference with the climate can be achieved, because they include a clear-cut emission cap set expressly to prevent dangerous climate change. This is one important reason why these two schemes score much higher than the Kyoto system (Wicke 2005; see also section 6 below and tables 1 to 4 for evaluation of the GCCS). Global cap-and-trade schemes should be the preferred approaches for future climate negotiations.

5. Brief description of the GCCS

A clear definition of how to avoid “dangerous interference with the climate system” in terms of maximum temperature rise or GHG concentration (which could be readjusted over time and with new scientific knowledge) is essential for successful international negotiations. For all negotiators, it clarifies from the outset what is globally needed and what should be the outcome of the negotiations. Without this, the negotiators immediately lose sight of the stabilization target. If negotiations for the future climate-protection system are not based on a global emission target, as was the case with the current Kyoto Protocol, and again focus only on commitments to limit or reduce CO₂ emissions by developed and—hopefully—some developing countries based on their past emission levels, the commitments and limitations will once again be without any real connection to the overall stabilization target and the maximum annual global emissions with which it can be achieved. In this article, the authors can give only an overview and quick evaluation of the GCCS global cap-and-trade system developed in great detail by Wicke (2005).¹⁵ In 1996 (before the Kyoto negotiations), the EU became the first, and up to now the only, political entity to define clearly the conditions that would lead to dangerous anthropogenic interference with the climate system: if global temperature increase cannot be stabilized by 2100 at a level below 2°C above the pre-industrialized level; and if the concentration of CO₂ becomes higher than “well below” 550 ppm. According to the majority of climate scientists (for example, Hare and Meinshausen 2004) and NGOs, the second target is far too high to achieve the first

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¹⁴. Recently, an improvement of the C&C proposal has been put forward, called “common but differentiated convergence”, in Höhne et al. (2005).

¹⁵. A four-page summary cannot, of course, adequately reflect nearly 200 pages in Wicke (2005), with a lot of complicated questions and answers. Interested readers should read the relevant sections of the book, starting on page 115.
target. But even this concentration target will be very hard—in fact nearly impossible—to achieve, as demonstrated below.

In its *World Energy Outlook* for 2004, the IEA compared the CO₂ emissions of its projected “reference scenario” (that which is most likely to come about given current trends) up to 2030—38.2 billion tons annually, a rise of 90 percent since 1990!—with the best achievable alternative CO₂ emission scenario, which could be realized if all major CO₂-emitting countries and regions (including developing and emerging countries) do their very best and fully implement policies and measures to reduce CO₂ emissions, or at least slow the rate at which they are increasing.¹⁶ This would result in emissions of around 31.5 billion tons by 2030. If all new fossil fuel power plants in OECD countries from 2015 onwards were equipped for carbon-capture and subsequent safe-storage facilities (at a cost of around US$50 per ton of CO₂), the emissions could be reduced further to around 30 billion tons (IEA 2004). This is the maximum amount of CO₂ emissions that would still allow stabilization at 550ppm CO₂ concentration, as computed by the IPCC (see figures 1 and 2).

A global cap-and-trade system with a strict emissions cap and worldwide incentives for climate-friendly development is the only way to ensure that countries implement adequate policies and measures so that the EU’s maximum concentration level is not exceeded, and that the most cost-effective solutions are found. The stabilizing line for 550 ppm in figure 2 shows how much CO₂ per annum can be emitted globally (the area below the 550 ppm curve).¹⁷ On the basis of the second EU objective, a temperature rise of no more than 2°C, GCCS can be divided into eight main elements, which are discussed below.

1. Global CO₂ emissions, and therefore the cap maximum, are fixed as of 2013–5 at around 30 billion tons for at least 50 years. Since this amount is almost equal to future emissions as of the year 2015 (according to the IEA), there will be no global shortage in the beginning. The annual allowance of 30 billion tons of CO₂ is represented by 30 billion climate certificates (CCs) (see figure 2).

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¹⁶. These enormous but necessary efforts by all major groups of countries are listed in IEA (2004).

¹⁷. The figures given here only illustrate a conceivable compromise between industrialized and developing countries after long negotiations about the GCCS.
2. The fairly limited number of countries directly importing or domestically producing fossil fuel (fuel and resources providers, or FRPs) require a sufficient number of CCs in order to cover CO₂ emissions resulting from their trading of fossil fuel products. Unlike the EU Emissions Trading System, the GCCS starts at the first level of trading—that is, at the level of domestic FRPs, who are the sources of subsequent CO₂ emissions. This constitutes a significant simplification of the emissions-trading system, because all upstream sources of CO₂ emissions (industry, traffic, commerce, trade, and services, as well as the household sector) are thus included. (The costs for the CCs will be passed on to the buyers of the fossil fuels at all selling stages.) This is termed an upstream regime, and is described and discussed at length in the literature, as well as being one of the basics within the two studies of Lutz Wicke for the Ministry of Environment of the German federal state of Baden-Württemberg (Wicke and Knebel 2003a, 2003b), which are summarized in his Beyond Kyoto book (Wicke 2005).

3. The CCs, valid only for the year of their distribution, are at first distributed annually free of charge to all states (and national CC banks, or NCCBs) on the basis of the generally fair distribution scheme of “one person, one climate emission right”—that is, in proportion to the country’s population during a certain fixed reference year.18 Taking the global population of 6.1 billion in 2000 as the basic population figure, these CCs would represent 4.9 tonnes of CO₂ per capita—for example, 400 million tons for Germany; for the United Kingdom and for France, 290 million tons; for the USA 1.39 billion tons; and for India 4.9 billion tons. Developing countries would be able to sell their surplus CCs.

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18. This equal per capita distribution key is based on proposals both from India and Pakistan (Agarwal 2000; Agarwal and Narain 1998; Aslam 2002. Note that since August 2004, Mr Malik Aslam has been the minister for environment of Pakistan). Former Indian prime minister Shri Atal Bihari Vajpayee advocated this distribution key in his closing address at the ninth Conference of the Parties in New Delhi at the end of 2002 (frequently quoted in the press after this conference). Mr Vajpayee certainly also spoke for the vast majority of developing countries when he commented on the prospects for achieving climate sustainability: "We don't believe that the ethical principles of democracy could support any norm other than that all citizens in the world should have equal rights to use ecological resources!"
Industrialized countries could buy CCs in order to continue producing and/or consuming as before. However, under this scheme, emitting CO$_2$ would, for the first time, no longer be free of charge.\footnote{In principle, NGOs both on the environmental and on the development aid side are backing a certificate or cap-and-trade solution for the fight against dangerous climate change (see BUND and Misereor 1996).}

Special assistance could be provided within the GCCS to least-developed countries with small populations (and possibly higher per capita CO$_2$ emissions as a result), as these are particularly vulnerable to the adverse effects of climate change and may not get enough surplus transfer to support climate-friendly development and adequate preparations for the effects of dangerous climate change. The Arctic and Antarctic regions would also need special considerations (Wicke 2005).

4. On a global scale, this would create an enormous incentive for sustainable development. By implementing the GCCS, developing countries would be able to sell large quantities of CCs over several years whilst industrialized countries would have to buy (expensive) CCs. But this textbook type of cap and trade would lead to annual multi-billion dollar or euro transfers from industrialized to developing countries. This, in turn, would lead to unacceptable disruption of the world economy. This huge \textit{prima facie} problem was the reason why the basic idea proposed by India and Pakistan was widely dismissed from the start by Western authors (for example, Michaelowa et al. 2003), without any attempt to develop it into an implementation plan.

Notwithstanding that position, to have a good chance of acceptance by an overwhelming number of states, the GCCS must guarantee at least three conditions:

- The transfer sum between industrialized and developing countries must be limited to an acceptable level—but still giving enough incentives for developing countries to participate in the GCCS
- There must be a guarantee that FRPs get a basic CC supply with moderate prices—but still have enough incentive to limit and reduce CO$_2$
- There must be guarantees against runaway prices on the CC market

This is why the GCCS requires a clear-cut division of markets, as follows:

5. There would be a market for transfer of CCs between states. Via a World Climate Certificate Bank (WCCB), developing countries would (have to) sell their surplus CCs for US$2 per CC to industrialized nations. On the basis of the total amount of CCs (based on the countries’ population as of 2000) allocated free of charge to the NCCBs, plus the CCs returned by developing countries (obligatory CC-surplus re-transfers at US$2), the NCCBs of industrialized countries would allocate CCs to their FRPs on the basis of their demand for the previous year. The FRPs thus would receive a reasonable basic supply. If the US$2 price of the CCs were passed on to consumers, this would add around US$0.005 to the price of a liter or US$0.02 of a gallon of petrol. Of course, there must and can be an efficient system of supervision of all the allocated and marketed CCs, such as that described in detail by Grubb et al. (1998) defining the principles, modalities, rules and guidelines for verification, reporting and accountability for GHG emissions trading. No NCCB of a developing country would be allowed to sell CCs on the free market nor to allocate to the FRPs more than a well-defined number of CCs (an FRP’s demand for fossil fuel sales during the previous year plus a...
national CO\textsubscript{2} growth margin). For more information on these important details, see Wicke (2005, sections VI.E. to VI.H).

6. There would also be a free CC market between FRPs. FRPs would have to buy additional CCs if they wished to sell more fossil fuels and resources than in the previous year (for example, due to expanding business) and if this demand were not covered by their basic supply of CCs, as shown in number 5 above. Since developing countries have per capita emissions far below the global average, their (hopefully climate-friendly) development cannot and should not be restricted. Therefore, developing countries would get more CCs according to their economic growth, and the re-transfer of surplus CCs to industrialized nations would anyway decline over the course of time.

In order to prevent runaway CC prices on the free market, the WCCB would sell—by an official market intervention—a sufficient quantity of CCs at an initial free-market price of US$30 per CC. This would establish a price cap on the free market (proposed by Aldy, Orzag, and Stiglitz 2000) and would prevent any overburdening of economies and consumers worldwide. This price cap and the transfer price would be raised every 10 years in order to boost incentives for climate-friendly action on a global scale.

Such a hybrid system, based on free trading of CCs with a price cap, combines “the best features of an emission tax and a pure permit system” (Aldy, Orzag, and Stiglitz 2001, 25). There remains the ecological problem that the WCCB, over the course of time, might sell more CCs than are compatible with the intended emission cap of 30 billion tons of CO\textsubscript{2} yearly. This problem could be—to a certain extent—compensated by purchases of CCs by the WCCB if the price sinks below the price cap. Despite these concerns, such a price cap, or “safety valve” is essential to make the GCCS acceptable to industrialized countries and their businesses, which otherwise could quite realistically fear serious harm to their economies by skyrocketing prices of CCs.\textsuperscript{20}

7. Developing countries could only use the revenue from their sales of surplus CCs to finance measures for climate-friendly sustainable development and elimination of poverty, in line with plans (including climate change adaptation measures) that are developed on a national level and approved on a supranational scale—thus avoiding fraud and corruption to the highest possible degree. This condition is essential to make the GCCS acceptable to the fossil fuel and resources consumers from industrialized nations who may offer transfer financing. Besides the important humanitarian and development reasons, this would ensure that transferred money was used also in the these countries’ interests, because with sustainable development, the rise in use of CCs by developing countries would be slower, leaving more for the industrialized countries.

8. Efficient measures to supervise and control the amounts of fossil fuels and resources sold according to a simplified IPCC reference system, and to protect against fraud and corruption in implementing

\textsuperscript{20} “It is worth emphasizing that the safety valve is not intended to set an inefficiently low carbon price over time. Indeed, the safety valve may allow a higher price of carbon than would be otherwise be the case, because it provides assurance that the costs will not exceed that level. Risk-adverse households and firms may therefore be willing to tolerate a higher price for carbon under the safety valve approach than they would be willing to tolerate under a pure quantity-based approach.” Aldy, Orzag, and Stiglitz (2001, 26).
measures and programs for sustainable development and elimination of poverty, would guarantee correct implementation of the GCCS both in industrialized and in developing countries.

Figure 3 shows how all of these elements interact. As already noted, chapter VI of Wicke (2005) describes all the key elements in such detail that the author considers the GCCS to be in a condition generally ready for application.

The GCCS largely satisfies and embodies almost all of the important wishes, apprehensions, and constructive proposals of both industrialized and developing countries relating to flexible mechanisms within the Kyoto Protocol that are reported in the literature. The GCCS would, of course, be modified in many respects during the course of potential international negotiations up to the years 2010–12.

6. A short evaluation of the GCCS and comments on its chances of implementation

Everybody knows that whatever efficiency improvements we aspire to in a post-Kyoto-2012 global climate-protection system, they will be extremely difficult to obtain, because of the unanimity principle in international treaties. But there are several reasons why GCCS has a relatively good chance of being implemented. These are discussed below.

As can be seen in tables 1–4, the GCCS earns altogether 84 points out of 100, an excellent score, especially because it fulfills all the sub-criteria of climate effectiveness or sustainability nearly completely (see table 1). In this article there is not room to explain in depth the rationale for the individual scores given to the GCCS, but this is done in Wicke (2005). That book also discusses all of the main arguments and criteria for evaluating the prospects of success of different climate-protection schemes (Wicke 2005, 11ff.) put forward in the literature (for example, Höhne et al. 2002; IEA and OECD 2002; Philibert and Pershing 2002). However, for a fair and unbiased evaluation of the GCCS and its prospects of implementation, the following issues are important:

1. The GCCS is an upstream system that exactly fulfills a central requirement of the 2002 Environmental Report by the Rat von Sachverständigen für Umweltfragen (RSU; German Council of Environmental Advisers): "What would be desirable both from an ecological as well as from an economic point of view is a strictly quantity-related trading system with the largest possible international basis which involves all emission sources and which is based on the first trading level." (RSU 2002). By addressing the interests of all countries to the greatest extent possible, while also achieving the EU’s climate stabilization target, GCCS is in principle also feasible in political terms. (The question of acceptability of the GCCS to the United States is discussed in nos 7 and 8 below.)

2. The climate community can be sure that the GCCS would prevent dangerous climate change—or at least achieve the EU’s ambitious but still realistic 550 ppm CO₂ concentration target—without dangerous disruption of the global economic system. (Under realistic assumptions—in a GCCS-plus-target version—it could even lead to achievement of the EU’s original target of a maximum temperature rise of 2°C; Wicke 2006, section VIII.E.) It would involve only:

21. In fact, the GCCS requires no strict cap (see Wicke 2005, chapter V).
- Moderate price increases at the beginning of implementation, rising gradually to achieve the necessary climate efficiency;
- Still-acceptable amounts of transfer payments to developing countries (financed by fossil fuels users, not by states or taxpayers!); and
- No overburdening of the users of fossil resources through high CC prices, because of the price cap.

3. The GCCS also includes an important component in that it would include developing countries for the first time in a global climate-protection scheme by its implementation of the excellent idea of equal per capita emission rights. As their per capita emissions are currently lower than the average in industrialized countries, developing countries could and should use their CCs to generate revenue. With the requirement that such revenues be used for sustainable development and poverty elimination, the GCCS simultaneously encourages climate protection and positive national development, avoiding the “eco-imperialism” often feared by developing countries under the Kyoto commitment system.

4. There should, therefore, be a good chance that a pro-GCCS movement will grow up among some developing countries, especially in South Asia, which first proposed the basic principles that the GCCS is based on. The GCCS concept could certainly be endorsed by many other countries. It should, hence, go without saying that developing countries in particular can and should mount a campaign for the GCCS or a modified form thereof.

5. Such a campaign could lead to a completely changed battle order within the Conferences of the Parties: instead of developing countries being (extremely) critical of present international efforts to prevent dangerous climate change, they could become the driving force. This, in turn, would provide, at the outset of the negotiation process, a two-thirds majority in favour of structural evolution of the Kyoto Protocol into a global cap-and-trade scheme.

6. There even seems to be a good chance that the United States, after intensive negotiations, could accept the GCCS. The GCCS was developed under the premise that it is completely counter-productive (and, even worse, arrogant) to negate the criticism of the Kyoto Protocol in the United States. The main US criticisms were that the emissions from strongly growing economies of developing countries might outweigh potential efforts on the part of the United States in the climate sector and that the US economy might suffer serious harm if action by the United States and other industrialized countries was not matched by similar action from developing countries. These cannot be dismissed as irrational, even if one is critical of the resulting US policy.
Figure 3. Operation of the Global Climate Certificate System

For this reason, these and other points arising from US political and scientific discussions are explicitly taken into consideration in the design of the GCCS. There will be no “inconsistent exemption for Developing Countries Parties” nor “serious harm to the United States economy” (US Senate 1997), and there will be no runaway prices for CCs and only a moderate rise in the prices of fossil fuels. The GCCS system is the most efficient system conceivable that still ensures maximum business compatibility.

Thus, the GCCS imposes upon the United States the lightest burdens possible while also demanding the smallest possible degree of change in order to achieve climate stabilization. It is greatly in the interests of the United States to avoid the growing dangerous consequences of accelerated climate change, like the possible halt of the Gulf Stream (a real possibility, not just a fictional “Day After Tomorrow”!) Even the energy-intensive American Way of Life will, under the GCCS, not be forbidden or even restricted under stringent directions or instructions, though it will be more expensive. Therefore, energy saving through more climate-friendly behavior by individuals and businesses, by the use of more energy-efficient vehicles and household and other appliances, and by the better insulation of buildings will be much more worthwhile in the United States and in other countries around the world than it is in the present!

7. The global cap-and-trade scheme also has relatively good chances of international acceptance because, unlike the Kyoto I commitment strategy, it imposes no specific reduction limits on single countries or groups. As Kyoto I has shown, many Annex I countries like the United States, Australia, and (nearly) all newly industrialized and developing countries, are unable and/or unwilling (very probably permanently!) to accept distinct individual (reduction or capping) commitments. In addition to that, many of the committed Annex I states are unable to comply even with their very limited commitments in the first commitment period. A global cap and trade system puts tasks of reduction and capping on the market, not on individual governments—but by way of international incentives!

7. Conclusions

Given the arguments above and the findings of comparisons of the GCCS with the most important proposals so far made for the incremental evolution of the Kyoto Protocol and the two most important proposals for its structural change (Wicke 2005, 29ff.), the authors are convinced of the following conclusions:

Should it be at all possible—and the authors are both sceptical and hopeful at the same time in this respect—to reduce global GHG emissions to such an extent that dangerous climate change can be prevented (at least to the EU target), this can only be achieved with the help of a global incentive system in the form of a cap-and-trade emissions-trading scheme where allocation is, at least substantially, based on the principle of “one person—one emission right” (although of course this would be open to variation through generally accepted correction factors).

The design of such a system must ensure that it offers developing countries sufficient incentives to join in, on the one hand, while also ensuring the highest possible degree of economic compatibility in
order to avoid overburdening any country, and still giving worldwide incentives for energy saving and for climate-friendly consumption and production patterns and future development in that direction.

Therefore, the key element of the GCCS—the “one person—one emission right” principle—can and should also be used as the crucial key to solving global climate-change problems to the benefit of all the children and grandchildren of the people currently living on this planet.

References


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Appendix

More details about the structural efficiency deficits of the Kyoto commitment strategy. This section is taken from *Beyond Kyoto—A New Global Climate Certificate System: Continuing Kyoto Commitments or a New Global Climate “Cap and Trade Scheme” for Sustainable Climate Policy?* By Prof. Dr. Lutz Wicke (Wicke 2005, 32ff.).

There is unfortunately little to no hope at all that this foreseeable development of dangerously growing global GHG emission can be changed within the current Kyoto Protocol commitment system. This system is designed in such a manner that it bears from the very beginning the—very likely—risk of failure because of the following structural deficits:

1. There is *no* global, quantified climate sustainability target (and no intermediate target up to 2010). Contrary to the EU, the 'Kyoto' community was unable or unwilling to define the concentration level of GHGs that may not be exceeded in order to prevent dangerous anthropogenic interference with the climate system. Therefore, this system lacks the *one* decisive basic precondition for evaluating the success or failure of the climate-protection process.

2. Developing countries have refused and still refuse—and rightly so from their point of view—to restrict or reduce in any manner the increase in their CO₂ or climate gas emissions in light of
   - their economic development backlog and
   - their by far below-average per capita emissions and
   - the large share of blame borne by industrial countries for burdening the earth's atmosphere with accumulated CO₂ emissions (about 85%, 'historic greenhouse gas debt').

   This is true irrespective of the fact that overall emissions by developing countries and newly industrialized countries are on balance rising strongly and, according to forecasts by the IEA, this will result in their emissions being higher than those of industrial countries in and around 2025.¹ (Per-capita emissions of developing countries, however, will still be far below those of industrial countries.)²

3. This is why, pursuant to the Kyoto protocol, industrial countries should and are to go ahead (initially) alone with effective reductions ('taking the lead'). More or less as a form of voluntary commitment ('voluntary agreement') within the international framework³, the various Annex-I states (or the EU as a whole) offered in the aftermath of a lengthy round of 'poker' negotiations to restrict or reduce in as far as they deemed (at that time) to be possible their increases in emissions—based on (and proportional to) their globally far above-average per capita emissions (grandfathering). This in balance ultimately led to a commitment of an overall emission reduction of 5.2% by 2010/12 against 1990 by industrial Annex I countries. The quantities agreed to were then included in the Kyoto Protocol and thus have been made binding under international law as Assigned Amounts (AA equal to

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the emission permits allocated to the countries (average per year) in the period 2008 - 2012) for the individual countries or the EU as whole.\(^4\)

4. This (voluntary commitment) principle of negotiation and agreement leads to a complete misguidance of the players involved against the global climate protection interest. The result of comprehensive investigations into 'voluntary commitments/agreements (even if they are integrated in a national or international legal binding system') for solving environmental problems is very clear. Voluntary commitments cannot solve really costly environmental problems (even if these commitments should become legally binding immediately or at a later point in time).\(^4\)

Recurring to the climate change problem this means: As soon as energy savings and the resultant cost reductions (or other positive economic effects) make climate protection no longer 'profitable' on a single-economy or a national level, and therefore greenhouse gas reduction can only be reached by increasing costs and reducing consumption, the 'free rider effect' will prevail.\(^6\) All the industrial countries affected try to reduce their climate gas emissions burdens to a level that is economically "painless" and possible without any (economic) sacrifice (thus doing no harm to national economy). The effect of every nation’s single possible share (of slowing dangerous climate change) is small to rather limited (USA, Russia), every nation hopes—'free rider idea' - that other countries will bear the necessary GHG reduction burden. This means for the climate efficiency of the negotiated 'voluntary commitment' system: Emission reductions cannot and will not be defined as what is necessary in terms of climate policy and climate protection, but as what can be expected from and implemented in the individual countries or groups of countries. This even leads to a 'negotiable' CO\(_2\) (growth) potential compared to the business as usual development (example Russia: 'negotiated' zero emission 'growth' up to 2012 compared to a predicted business as usual path of at least minus 30%, difference: 1.5 bill. t of 'hot air' CO\(_2\)).\(^7\)

5. One hence must note that the instrumental approach of the international Kyoto self-commitment system is in no way capable of solving the problem of climate change. The environmental instrument of 'self-commitment' is in fact the weakest instrument of all when it comes to overcoming environmental problems: This instrumental approach is normally adopted if

- there is no chance that nations or supranational institutions are able to set clear standards in order to restrict emissions—here greenhouse gases—to the extent necessary, or
- if no consensus can be reached in order to introduce effective emission charges or taxes on a global scale that 'automatically' steer the behaviour of all relevant businesses and private consumers in the right direction, i.e. towards reduction.
- In such a dilemma (the world community wants do something but is unable to take the right and adequate steps), the instrument of voluntary commitments is adopted merely in order 'to do something' and to 'go in the right direction', but with the implicit and clear aim not to harm national economies or businesses as a whole.

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\(^4\) Due to the binding definition of percentage increases or reductions, which are based on the starting emissions of individual countries, these historically above-proportion per capita and/or absolute national emissions were implicitly recognised as being the basis for agreements governed by international law (the so-called 'grandfathering principle').


\(^6\) Refer also to the following fourth (very long) footnote (starting with this footnote)

Like in the Kyoto process, the outcome is that the world community continues on a course of self-commitments accompanied by disappointment over inadequate commitments where most nations fail to comply with their legally binding commitments or evade their commitments under the Kyoto Protocol.

• If we continue to focus on improving the commitments undertaken by the adopting states (with zero success up to now) and on increasing the number of self-committing nations, our attention will in the long run be distracted even more from the ecological objective, i.e. 'to stabilize greenhouse gas concentrations in the atmosphere in order to prevent dangerous anthropogenic interference with the atmosphere'.

Failure of the Kyoto system of self-commitment is unfortunately pre-programmed: If self-commitment approaches don’t work for (far less) costly environmental problems on a national level, there is no way that they are going to work for the most expensive environmental problem either. Reaching climate stabilization does in fact represent the world's most expensive environmental problem: In order to solve this problem, consumption and production patterns of the world economy must be totally transformed in a climate-friendly and sustainable manner. The 'binding international self commitment approach' of the Kyoto Protocol in fact seems to be its basic instrumental error from the very beginning!

6. Furthermore the UNFCCC/Kyoto process

• neither offered or offers any incentives whatsoever for Annex-I states to enter into particularly far-reached obligations,

• nor does the Kyoto Protocol offer any particular incentives to actually ratify the Kyoto Agreement (as is demonstrated by the departure of the USA and by Russia's hesitance)

• nor are there sufficient incentives or sufficient 'draconian and feasible sanctions' to observe the commitments entered into (after ratification). (In light of the current failure on the part of many key states to observe their commitments, the performance checks and sanctions pursuant to Article 18 of the Kyoto Protocol, which are defined in great detail in the Marrakesh Accords, including pre-warnings, reporting on the violation of the emission budget, the requirement to buy a corresponding quantity of certificates and the deduction of a higher emission share in the subsequent commitment period seem to be 'dud weapons'.)

7. The market-orientated incentives that were justly included in the Kyoto Protocol 'merely' serve to make implementation on the respective national (or collective—as in the case of the EU) commitments easier and more cost effective, which can without doubt be seen to serve a 'catalyst' function. However, these flexible instruments provide no incentive to reduce emissions further than the level that was ultimately agreed to. Since some states have been granted more (tradable) emission rights than the emissions that would be generated with 'business-as-usual' development, the instrument of joint implementation at least ensures that more emissions than otherwise expected are actually permitted under international law.

Taking a somewhat closer look at the basic problems, the main shortcoming of the Kyoto climate protection system arises from the injustice of the currently free use of the atmosphere, which has not been changed by the Kyoto Protocol. On the contrary, the commitments by Annex-I countries to reduce or maintain or even allowing them to increase their emissions on the basis of emission levels in the 1990s clearly constitute 'recognition' or factual 'acceptance' of these high, absolute and per-capita, zero-cost emissions that pollute the atmosphere with


9. According to Grubb et. al. 1999, such 'hot air' is primarily in the states of the former Soviet Union (Russia, Ukraine and the Baltic states as well as in central and in the eastern European states). (Refer to Grubb, M. et.al. 1999,. xxviii)
potentially dangerous greenhouse gases. Around a fifth of the world's population emits approx. four fifths of all climate gases. This means that developing and threshold countries (and hence approx. 80% of the world's population) are of the opinion that industrial countries with very high per capita climate gas emissions must first of all perform drastic reductions before one can even think of including developing countries into a system of climate gas restrictions or even reductions.

This was the basis for developing and enforcing the inefficient Kyoto climate protection strategies according to the "grandfathering principle" (each industrial state reduces a certain 'negotiated' percentage on the basis of its former climate gas emission, developing countries being not included\(^\text{10}\)). This results in the "Unfairness trap of climate policy" with the following fatal impact on climate policy:

a. Individual industrial countries and the entire group of states have—among other things, due to the 'multiplied global commons problem' with climate protection\(^\text{11}\)—no self-interest, or at least very little self-interest, in suitable climate gas reductions (of a total of 5.2% between 1990 and 2010 or even of up to 80% by the end of the 21st century). This means that the targeted reduction in emissions in industrial countries will in no way be so 'impressive' that it substantially reduces the difference in per capita emissions between industrial and developing countries.

b. Therefore—according to the basic idea on which the system is based and which is the source of a sense of justice, i.e. that 'industrial countries with high emissions must first reduce their emissions significantly ('should take the

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10. 'Grandfathering' allocates emission budgets cost-free according to emissions in a specified base year. ... grandfathering advantages countries with high emission in the reference year ... which basically are industrialized countries.' (Michaelowa, A./Butzengeiger, S./Jung, M./Dutschke, M. (HWWA Hamburg): Beyond 2012—evolution of the Kyoto Protocol regime. An environmental and development economics analysis. Hamburg April 2003, p. 35.)

11. Cf. Wicke, L: Umweltökonomie. § 5 des Handbuchs des deutschen und internationalen Umweltrechtes. Vol. 1, 2nd edition 2002, p. 37 and following. Here, the section "The exponentiated global commons problem with environmental protection" deals with the capacity to solve national and the general incapacity to solve global environmental problems (which is summed up briefly here): Each individual climate (protection) contributes only to a small, at best to a restricted (USA, approx. 20%), degree to climate destruction. The contribution towards global climate protection is just as low and extremely restricted. This familiar collective asset problem with climate protection is aggravated further (with the trend towards 'free riders') by the following aspects:

A climate-influencing reduction can only be achieved, if at all, by all the players affecting climate. This joint action, this global will to take on responsibility and to implement is not yet recognisable and can hardly be expected. As long as climate protection is not possible at no extra cost or even with added revenue (e.g. through energy savings), but continues to be linked with higher costs and sacrifice of whatever kind, citizens living today (and voters in the majority of countries) must be become convinced that they must bear costs and sacrifices (above all) in the interest of future generations. In view of the haziness of forecasts on the impact of climate development/climate change (even the IPCC doesn't dare to define quantitatively at what level 'dangerous interference with the climate' starts!), it is very difficult to forecast with certainty whether future generations in one's own country (one's 'own' children and grandchildren) will have 'climate disadvantages' or even advantages (e.g. more favourable climate) and when (in 10, 50 or 100 years?) the impact of the—minimum, usually not 'measurable'—effect of reduction of one's own actions will be felt. These are hence additional—completely uncertain—preconditions for the vast majority of voters to accept the disadvantages of climate policy for themselves. This implies with (almost) certainty that voters and politicians alike—just as with the "usual" political problems—will decide in favour of current welfare and—unfortunately—against the welfare of future generations. This is particularly true when it comes to serious restrictions and disadvantages which are to be expected (on the basis of current findings) in conjunction with the very high climate gas reductions rates required in particular in industrial countries and/or the serious emission-related 'growth curb' in developing and threshold countries. This is why each climate protection policy is doomed to failure, no matter how committed it is. This can already be seen, for example, with the initial, still very low reduction commitments according to the Kyoto mechanism (and the related, relatively slight increase in prices and disadvantages), for instance, in the blockade behaviour exercised by the USA. Nobody in the EU should "hide" behind the bad example set by the USA, and should not be deceived: If really serious sacrifices are expected, the majority of European voters and European politicians will behave just like the political class in the US!

At first glance, it appears that this fatal logic of the "exponentiated global commons problem of climate protection" can only be overcome by an incentive-based climate protection system that makes it possible to mobilize the economic interest of all the players in climate protection and hence to boost eco-efficiency enormously. The GCCS, described and designed in chapter V and following, attempts to trigger precisely this situation.
lead’)—developing and threshold countries will continue to have no inclination and cannot be enticed to restrict emissions in any way.

c. Global climate policy thus remains caught in its own ‘unfairness trap’ with the resultant consequence: In general, first modest climate gas reductions by some states or groups of states (for example, Germany and Great Britain) will be compensated for or even over-compensated for by higher emissions by other countries. This is the only way to explain the previously stated forecast—fatal from the point of view of climate policy—issued by the International Energy Agency of a large increase in global emissions between 1990 and 2010 (plus 29.1%(!), see above) and beyond.

**Summarizing the structural deficits of the Kyoto Protocol:**

- Without a clear and quantified climate protection objective and
- with the (wrong) instrumental approach of binding self-commitments,
- which therefore includes far too small self-commitments by industrialized countries only (which they are even unable to achieve),
- therefore without the least chance of including developing and newly industrialized countries in the climate protection system with substantial emission growth limits and
- with no (economic) incentives for climate-friendly behavior for all nations and all fossil fuel consumers worldwide,

**there is no chance whatsoever that climate sustainability will be reached,** thus preventing dangerous interference with the climate system.

**Even worse:** By not achieving the ‘commited’ very limited emission (growth) reduction by industrialized countries **the whole basic future Kyoto strategy falls apart:** Because industrialized countries de facto are ‘not taking the lead’ in combating climate change but—on balance fail to comply with their obligations—there will be no chance at all, to go on with appropriate commitments of Annex I states in future ‘commitment periods’ **and** to include even one single newly industrialized or developing country.