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# **Broadening the climate regime**

## Design and feasibility of multi-stage climate agreements

**Asbjørn Torvanger, Guri Bang, Hans H. Kolshus and Jonas Vevatne**

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**Sammendrag:**

For å nå klimamål som maksimal oppvarming på 2 °C til 2100 er det nødvendig med ei breiare deltaking av land enn i Kyotoprotokollen. Dette vil også krevje at utsleppa frå utviklingsland blir redusert. Ein interessant ide er ei 'fleir-trinns' tilnærming, der land må ta på seg strengare klimamål etter som dei utviklar seg og får større brutto nasjonalprodukt (BNP) og utslepp av klimagassar per capita. Vi analyserer ein fleir-trinns avtale med tre trinn, der land med lav BNP og utslepp per capita blir plassert i trinn 1 og har ingen krav om å redusere sine utslepp, land med middels BNP og utslepp per capita blir plassert i trinn 2 og må redusere sine utslepp relativt til BNP, og land med høgast BNP og utslepp per capita blir plassert i trinn 3 og må redusere sine utslepp av klimagassar. Vi studerer kor langt ulike variantar av ein indeks basert på BNP per capita og utslepp per capita kan føre oss mot avtaler som kan godtakast av det einskilde land, der den viktigaste indikatoren for at land skal kunne akseptere avtalen er at industrialiserte land kjem i trinn 3, og dei minst utvikla landa kjem i trinn 1. Denne tilnærminga medfører at utviklingsland med rask vekst kan bli plassert i trinn 3. Eit hovudresultat er at ein avtale basert på ein indeks som berre inneheld BNP per capita og utslepp per capita har ein relativt liten sjansje til å bli godteke av mange land. Tek vi i tillegg med mål på institusjonell kapasitet, som indeksar for 'Human Development' og 'Governance', vil sjansen for at landa skal godta ein slik avtale stige, og endå meir dersom det er ein føresetnad at alle industrialiserte land blir plassert i trinn 3. Tilpassing til klimaendring er spesielt viktig for utviklingsland, men kan sannsynlegvis takast betre vare på gjennom ein eigen protokoll enn gjennom ei direkte kopling til ein fleir-trinns avtale.

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**Abstract:** To meet a climate target like maximum 2 °C temperature increase by 2100, participation in efforts to reduce emissions of greenhouse gases must be broader than that in the Kyoto Protocol. It will also require emission reductions efforts in developing countries. The 'multi-stage' approach is an interesting idea, where countries take on stronger emission mitigation commitments as they develop and expand their per capita gross domestic product and greenhouse gas emissions. This report examines a three-stage variant of the multi-stage approach, where countries with low GDP and emissions per capita are placed in stage 1 and have no commitments, countries with medium level GDP and emissions are placed in stage 2 and must limit emissions relative to GDP, and countries with the highest GDP and emissions per capita are placed in stage 3 and must reduce emissions in absolute terms. We explore how far different variants of an index based on per capita GDP and emissions can take us in the direction of pointing out a politically feasible regime architecture, where the most important political feasibility indicator is the placement of industrialized countries in stage 3 and least developed countries in stage 1. This approach may result in rapidly industrializing developing countries being placed in stage 3. A main finding is that an agreement based on an index containing GDP per capita and emissions per capita only has a relatively low political feasibility, but this is improved if Human Development or Governance indices are included, and furthermore if we require that all industrialized countries are placed in stage 3. Adaptation to climate change is of particular importance to developing countries, but is better handled through a separate protocol than linking this issue directly to the multi-stage approach.

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## 1 Introduction

The Kyoto Protocol, with its target period 2008 to 2012, entered into force 16 February 2005. So far there have not been any real negotiations on ‘beyond-Kyoto’ climate policy commitments. Such negotiations will face two major challenges: The first is to develop stronger commitments for the Annex I Parties (industrialized countries as defined by the UN Framework Convention on Climate Change, UNFCCC) and to include the United States and Australia in multilateral climate policy collaboration beyond Kyoto. The second is to broaden the participation from non-Annex I Parties (developing countries). In this report we focus on a multi-stage framework as a promising approach to engage developing countries more strongly than what has so far been possible. In a companion study, Tjernshaugen (2005) has assessed major obstacles to U.S. participation in multilateral efforts to control greenhouse gas emissions, and suggests some possible strategies for reengaging the United States. Both reports are efforts to prepare parties and stakeholders for upcoming negotiations. There are a number of other issues that are important for beyond-Kyoto negotiations. A second companion study explores these, see Torvanger et al. (2004).

A major challenge in the efforts to control man-made emissions of greenhouse gases (GHG) beyond the Kyoto Protocol is to engage developing countries in limiting the growth of their emissions of greenhouse gases (GHG), and eventually stabilizing their emissions. Because industrialized countries have both been responsible for the bulk of the emissions up to the present and have a greater economic capacity, and because poor countries need to develop their economies and provide better living conditions for their citizens, both the UNFCCC and the Kyoto Protocol state that industrialized countries must take the lead to reduce global GHG emissions. However, it will be impossible to limit global temperature increase by 2100 to e.g. 2 °C without controlling and eventually reducing emissions from developing countries.<sup>1</sup> Large developing countries with fast-growing economies, such as China and India, are particularly important. Some countries that are considered to be developing (i.e. not included in Annex I of the Climate Convention), such as South Korea, Taiwan and Chile, have a higher per capita GDP than industrialized countries such as Latvia and Russia.<sup>2</sup>

We argue that to engage developing countries in more active efforts to limit emissions, a more flexible agreement framework than the Kyoto Protocol is needed. In this article we discuss one important category of flexibility, namely the grouping of non-Annex I Parties (i.e. developing countries) and determining when these countries should take on different types of commitments to limit their emissions (see Ott et al. 2004, and Höhne et al. 2003, and 2004). Thus we explore variants of the “multi-stage approach” (confer Gupta 1998 and 2003, and Berk and den Elzen 2001). We focus on the “Capacity-Responsibility (CR)” index, defined as the sum of emissions per capita and GDP per capita measured in suitable units (see Criqui et al. 2003a and den Elzen et al. 2003), which is a tool that allows further differentiation between the Parties in the heterogeneous group of non-Annex I countries. Lately the EU has expressed some preference for this approach (EC 2005:45).<sup>3</sup> In a multi-stage approach countries are assigned to one of three (or four) categories, or stages, on the basis of their development level. Countries in the first category have no commitments to limit their emissions, whereas countries in the second category should reduce their emissions relative to

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<sup>1</sup> The EU has proposed a long-term climate policy target defined as a maximum global warming of 2 °C by 2100.

<sup>2</sup> Based on the World Resources Institute CAIT database, where GDP is measured in 2000 USD adjusted for purchasing power parities.

<sup>3</sup> “The ‘staged approach’ is a promising way to provide for differentiated participation by developing countries” (EC 2005:45).

GDP. Countries in the third category should achieve an absolute reduction of their emissions. In this report, we explore different variants of and modifications of the CR index as alternative indicators for defining the stages or thresholds for participation. These indicators are then combined with a Human Development Index (HDI), a Governance index, and an institutional affiliation index.<sup>4</sup> The general idea is that when developing countries grow and increase their GDP, GHG emissions tend to grow also. At some stage they will graduate from stage 1 to stage 2, or from stage 2 to stage 3. *The aim of this study is to explore how far different variants of the Capacity-Responsibility index, including Human Development and Governance indices, can take us in the direction of pointing out a politically feasible regime architecture, where the most important political feasibility indicator is the placement of Annex I (industrialized) countries in stage 3, least developed countries in stage 1, and other developing countries in stages 1 or 2. This approach makes it possible for rapidly industrializing developing countries with sufficiently high per capita GDP and GHG emissions to be placed in stage 3.*

We limit the discussion to choice of indicators and threshold values that define the transition (graduation) thresholds between the three stages. This means that we do not elaborate on the various types of commitments or targets that the different stages could contain, or discuss how commitments should be differentiated across countries within each stage based on the CR index or other indicators. Furthermore, we use single year observations of emissions and GDP, and do not elaborate on the dynamic (graduation) aspects of the multi-stage approach, for example when specific countries will graduate to higher stages given a development scenario.

In the second section we survey major interpretations of the multi-stage approach based on existing literature. The third and main section of the article analyses eight cases of graduation thresholds and consequences for countries in terms of positioning in stage 1, 2 or 3, followed by a political feasibility assessment of the outcomes. For feasibility reasons, Annex I countries should end up in stage 3, whereas e.g. least developed countries should end up in stage 1. Section four discusses adaptation to climate change with a focus on developing countries and an adaptation protocol as an addition to a multi-stage climate policy agreement. Finally, in section five the analysis is summarized to assess the overall feasibility of the multi-stage approach and provide policy implications. An annex presents tables showing the detailed results for all countries of the world based on a selection of a few of the graduation threshold cases.

## **2 A survey of multi-stage climate policy approaches**

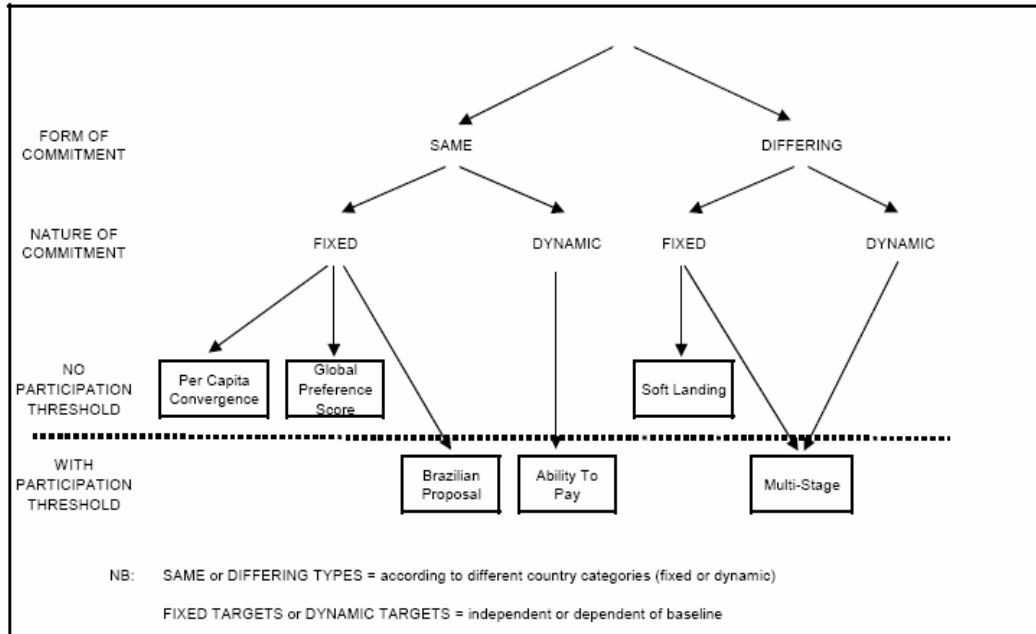
With the need for broader participation in the climate regime, the development of a future international architecture may take different directions. Assuming a Kyoto Protocol-type regime with national GHG emission constraints, there are two ways to broaden participation. Either an incremental evolution of the regime, i.e. gradual expansion of the Annex I group, or a “structural regime change, i.e. defining the evolution of emission allowances for all Parties over a longer period” (Berk and den Elzen 2001:465). The latter ‘full participation’ regime could adopt a set of rules or targets that define the evolution of emission quotas for all Parties over a long time period, e.g. such as ‘Per capita Convergence’ (Convergence and Contraction) (Meyer 2000), ‘Soft landing’ (Blanchard et al. 2001) and ‘Global Preference Score approach’ (Bartsch and Müller 2000). See figure 1 for a general overview of these different approaches to a global climate regime.

This report focuses on the alternative direction, namely an incremental broadening of the climate regime. How can the group of countries with binding quantified emission limitation

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<sup>4</sup> The HDI index is used by UN bodies, see UNDP (2004). The HDI and Governance indices are from the CAIT database (<http://cait.wri.org/>).

or reduction objectives be gradually expanded? Berk and den Elzen (2001) call this track an *'increasing participation'* regime and label it a *'multi-stage regime'* when different categories of countries and targets are considered. Differentiation between the Parties in terms of *when* (to take on commitments) and *what* (commitments to take on) is the central idea of a multi-stage regime.



**Figure 1:** Categorization of emission endowment schemes (Criqui 2003a: 15).

### 2.1 Multi-stage approaches

'Multi-stage' approaches have been developed by Gupta (1998), Stewart and Wiener (2001) and den Elzen et al. (2001). 'The aim with such a system is to ensure that countries with comparative circumstances in economic, developmental and environmental terms have comparative responsibilities/commitments under the climate regime. Moreover, the system defines when their level of responsibility/commitment change as their circumstances change.' (Berk et al. 2001a:29).

Gupta (1998) proposed a categorisation of five different groups that have different commitments depending on their capabilities (in the form of ability to pay): Least-Developed Countries (LDCs) with low emissions; other LDCs; MIC – middle-income developing countries; and high-income developing countries (HIDC) (Gupta 1998).

The Parties may alternatively be grouped according to mainly economic criteria and emissions levels, such as in Blanchard et al. (2001) and Criqui et al. (2003a). Three variants of the multi-stage approach are presented in table 1, taken from Criqui et al. (2003b).

The upper part of the table relates to the S550e scenario, which is stabilization of the concentration of the six Kyoto Protocol GHGs in the atmosphere at 550 parts per million by volume CO<sub>2</sub> equivalents by 2100, whereas the lower part of the table relates to the similar 650 parts per million by volume scenario. There are three stages: stage 1 with no commitments; stage 2 with intensity targets (reduce emissions relative to GDP); and stage 3 with absolute emission reduction targets. Then there are three variants of the multi-stage approach: MS1, MS2, and MS3. In terms of thresholds, these variants differ only in the transition from stages 2 to 3, which is from intensity targets to absolute targets. In the first variant (MS1), a country's entry into stage 3 depends on a threshold that is defined as a proportion of the world average per capita emission level (100% in the 550 scenario, and 120% in the 650 scenario).

In the second variant (MS2), a Capacity-Responsibility (CR) index is used, with a value that is about twice that used for the stage 1 to stage 2 threshold.<sup>5</sup> In the third variant (MS3), entry into stage 3 begins after a stabilization period, which is fixed and pre-determined, and allows the rate of growth in emissions to be progressively reduced to zero. In addition there are differences in the way targets are defined across the multi-stage approach variants and between stages 2 and 3. These are not commented on further since in this study we focus on graduation thresholds. The different thresholds and the differentiation rules at each stage have to be differentiated according to the global emission profile. Under the S650e case, where the concentrations of the six Kyoto Protocol GHGs in the atmosphere are stabilized at 650 parts per million by volume CO<sub>2</sub> equivalents by 2100, there is a less pressing need for developing countries to contribute to global emissions control. This means that the parameters can be substantially relaxed compared to the much more stringent S550e case. Furthermore, the CR threshold values are higher, the stabilization periods are longer, and the maximum value for the de-carbonization rate is lower.

**Table 1:** A multi-stage approach based on economic criteria and emissions.

S550e		MS1	MS2	MS3
Stage 2	Threshold	CR = 5		
	Target	dynamic targets, decarbonisation rate function of per capita GDP (*), max = -3 %/yr		stabilisation period, function of per capita emissions (**) (constant = 70)
Stage 3	Threshold	100 % of average per capita emissions	CR = 12	
	Target	absolute targets, reductions proportional to per capita emissions		

S650e		MS1	MS2	MS3
Stage 2	Threshold	CR = 12		
	Target	dynamic targets, decarbonisation rate function of per capita GDP (*), max = -2.5 %/yr		stabilisation period, function of per capita emissions (**) (constant = 100)
Stage 3	Threshold	120 % of average per capita emissions	CR = 20	
	Target	absolute targets, reductions proportional to per capita emissions		

Source: Criqui et al. (2003b).

(\*)The de-carbonisation rate, expressed in percentage reduction per year, is a linear function of per capita income (GDP/cap):  $a \times \text{GDP/cap}$ ,  $a = 0.33$ , with a maximum de-carbonisation rate.

(\*\*)The length of the stabilisation period is given by the transition constant (TC) and is calculated by dividing the TC by per capita emissions (in tCO<sub>2</sub>/cap.yr) in the reference period: e.g. if the transition constant is 70, a region with a per capita emission level of 5 will have to bring down its emission growth rate to zero in 14 years.

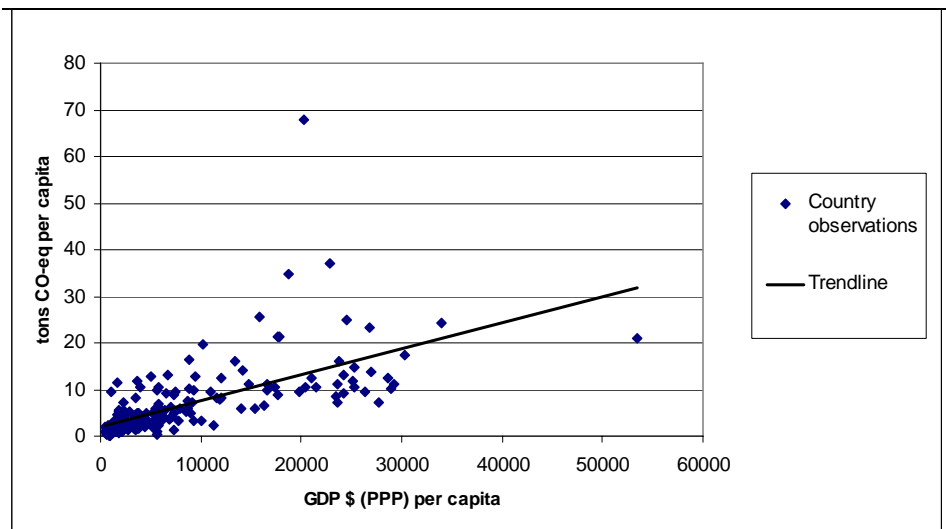
<sup>5</sup> See section 2.2 for details on the CR index.

## 2.2 Methods and indicators for grouping and graduation of countries

In future agreements, it is a likely option that the Parties, particularly the non-Annex I Parties, will be differentiated and split in different groups. Such grouping for the purpose of differentiation of commitments could be based on a given indicator or a combination of several indicators, such as emissions per capita, GDP per capita, human development index, total emissions, or historical responsibility for temperature change (Claussen and McNeilly 1998; Bodansky 2003).

In this section, the main indicators used in this report for grouping and graduation of countries to higher stages are discussed. The main indicators are capacity-responsibility (CR) index, the human development index (HDI), the governance index, and institutional affiliation.<sup>6</sup>

As illustrated by figure 2, there is a clear positive correlation between emissions per capita (responsibility) and GDP per capita (capacity/ability to pay),<sup>7</sup> although the carbon intensity (emissions per GDP) of the economy decreases over time/with income in most countries.<sup>8</sup>



**Figure 2.** Emissions (tons CO<sub>2</sub> equivalents) per capita and income (GDP \$ PPP) per capita for 184 countries in the CAIT database. 2000.

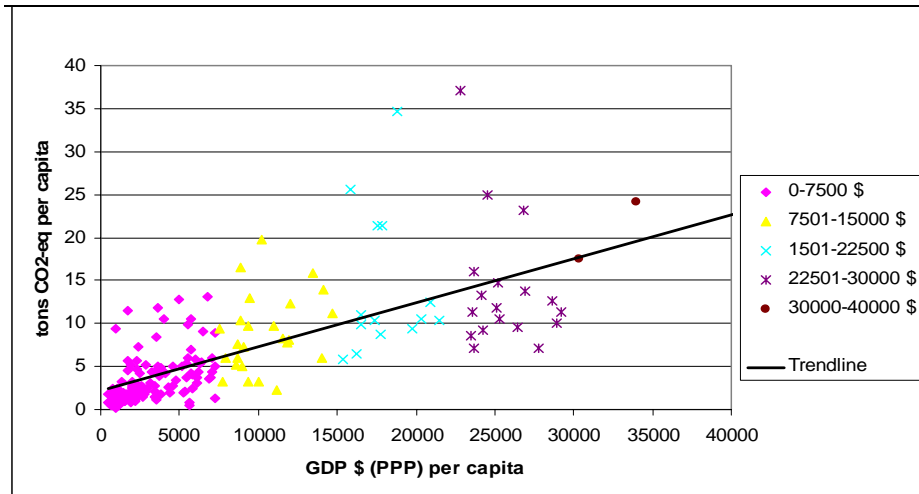
Figure 3 groups the countries by their income per capita levels, but excludes the two countries Qatar and Luxembourg due to their extreme values on emissions and income, respectively. Excluding the extreme outliers Qatar and Luxembourg better illustrates the distribution of the large majority of countries in the scatter plot.

<sup>6</sup> In this study, countries are divided into two groups by institutional affiliation, either Annex I (i.e. industrialized countries as defined by the UNFCCC) or non-Annex I countries.

<sup>7</sup> Jacoby et al. (1999) propose ability to pay as the single indicator for participation in a future climate architecture.

<sup>8</sup> See Ringius et al. (2002) for a discussion of fairness principles in the context of climate policy.





**Figure 3.** Emissions (tons CO<sub>2</sub> equivalents) per capita and income (GDP \$ PPP) per capita. Qatar and Luxembourg are excluded due to their extreme values. 2000.

### 2.2.1 CR index

The Capacity-Responsibility (CR) index builds on the positive correlation between emissions per capita and income per capita as shown in figures 2 and 3. The CR index is a mixed indicator drawing from Article 3.1 of the UNFCCC, which states that ‘common but differentiated responsibilities and respective capabilities’ should be taken into account in defining the appropriate action of the different Parties. Criqui et al. (2003a) define the CR index as the per capita income in thousand 1999 Euros plus the per capita CO<sub>2</sub>-equivalent emissions in tCO<sub>2</sub> in 2000. Per capita income is a common variant of the ‘ability to pay’ or ‘capacity’ fairness principle, whereas emissions per capita is a variant of the ‘polluter pays’ (or ‘responsibility’) principle, or even the ‘egalitarian’ (or ‘need’) principle (Ringius et al. 2002).

This composite index combines values of different nature and can thus in principle be weighted or normalized in various ways, as we do in cases 5–8 in the next section. However, Criqui et al. (2003a) find that a one-to-one weight produces fairly satisfactory results for grouping regions and countries. Calculating the CR index values for some selected countries (USA, Canada, Japan, China and India) but mostly on a regional basis, they place countries and regions into three stages of commitments based on the resulting CR index values. The idea is then that as countries over time become richer and/or larger GHG emitters, their CR index values will increase and they may graduate into a different stage in terms of commitments to reduce GHG emissions. The three different stages are defined as:

- Stage 1 (CR<5): no commitment;
- Stage 2 (5<CR<12): carbon intensity targets; and
- Stage 3 (CR>12): absolute emission reduction targets.

### 2.2.2 Human Development Index (HDI)

The human development index (HDI) is commonly used to assess, rank and group countries in terms of their development. The HDI is a composite index reflecting life expectancy at birth; adult literacy rate and the combined gross enrolment ratio for primary, secondary and tertiary schools; and GDP per capita in purchasing power parity (PPP) US dollars (UNDP 2004). The HDI ranges from 0 to 1. Countries are often placed into three different groups, namely high human development (HDI>0.8), medium human development (0.8>HDI>0.5) and low human development (HDI<0.5).

### 2.2.3 Governance index

The Aggregated Governance Indicator attempts to capture the complex and multifaceted aspects of governance as a composite index based on six dimensions of governance: (1) political stability, (2) government effectiveness, (3) regulatory quality, (4) rule of law, (5) voice and accountability, and (6) corruption. These dimensions are weighted equally in the indicator. This governance indicator, devised by the World Bank, draws on many separate sources of subjective data on perceptions of governance constructed by multiple organizations. (CAIT 2005; underlying source is World Bank (Kaufmann et al. 2003)).

### 2.2.4 Institutional affiliation

Differentiation between the Parties is central to the idea of a multi-stage regime. The Kyoto Protocol and the Climate Convention differentiate between the Parties on the basis of institutional membership. In 1992, the Parties listed in Annex I to the UNFCCC were the 24 original members of OECD and countries with economies in transition (EIT), see table 2.<sup>9</sup>

**Table 2.** Institutional affiliation of countries in Annex I of the UN Framework Convention on Climate Change (UNFCCC) and Annex B of the Kyoto Protocol

<b>Annex I to the UNFCCC (41 countries plus EEC as a separate party)</b> <b>These Parties agreed to try to limit/return their greenhouse-gas emissions to 1990 levels by the year 2000 as per Article 4.2 (a) and (b).</b>		<b>OECD (and IEA) members among the non-Annex I Parties</b>
<b>24 original OECD members,<sup>d</sup> the European Union</b>	<b>14 countries with economies in transition<sup>e</sup></b>	<b>Recent (post-1992) OECD entries</b>
Australia, Austria, Belgium, Canada, Denmark, European Economic Community (EEC), Finland, France, Germany, Greece, Iceland, <sup>d</sup> Ireland, Italy, Japan, Kazakhstan, <sup>b</sup> Liechtenstein, <sup>a</sup> Luxembourg, Monaco, <sup>a</sup> The Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, <sup>c</sup> United Kingdom of Great Britain and Northern Ireland, United States	Belarus, <sup>f</sup> Bulgaria, Croatia, <sup>a</sup> Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, <sup>d</sup> Romania, Russian Federation, Slovakia, <sup>d</sup> Slovenia, <sup>a</sup> Ukraine	Korea (12 December 1996), Mexico (18 May 1994) <sup>d</sup>

<sup>a</sup> Liechtenstein and Monaco are not members of OECD, but joined Annex I at COP 3 together with Croatia and Slovenia.

<sup>b</sup> Added to Annex I only for the purpose of the Kyoto Protocol at COP 7, but is not listed under Annex B of the Kyoto Protocol.

<sup>c</sup> Turkey, an original member of OECD, did not ratify the Climate Convention before February 2004 and is not listed in Annex B of the Kyoto Protocol.

<sup>d</sup> These Parties are not members of the International Energy Agency (IEA).

<sup>e</sup> Slovakia (2000), Poland (1996), Hungary (1996) and Czech Republic (1995) have all become members of OECD recently, but were already listed in Annex I of the UNFCCC from 1992.

<sup>f</sup> Belarus is not listed under Annex B of the Kyoto Protocol.

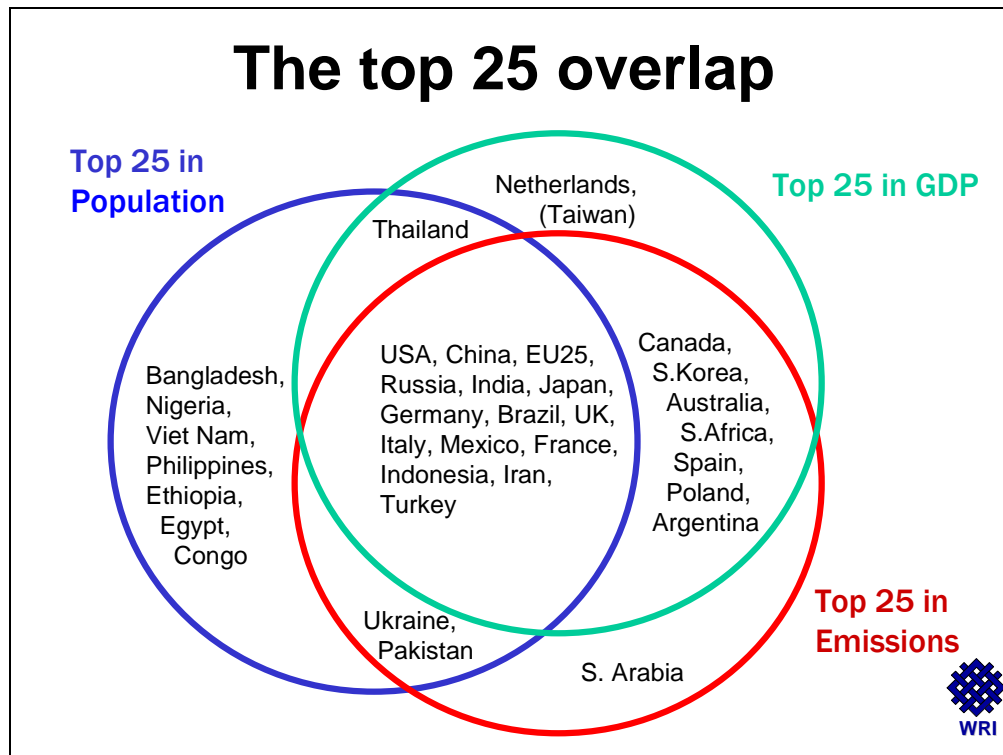
According to institutional membership (as referred to in Michaelowa et al. 2004), recent entries to the OECD and IEA should become members of Annex I and subject to absolute emissions targets. South Korea and Mexico are likely candidates for reduction commitments for a second commitment period.<sup>10</sup> Malta and Cyprus that are 'economies in transition', but

<sup>9</sup> The division between Annex I and Non-Annex I Parties has developed into a very rigid divide which has been further reinforced by the Kyoto Protocol which put emissions commitments for Annex I Parties only.

<sup>10</sup> "However, the two countries are expected to be pressured to participate in the reduction commitment for the second commitment period of 2013-17, as they are members of the Organization of the

new members of the EU from 2005 are other obvious candidates. Michaelowa et al. (2004) propose that no least-developed countries (“recipients of IDA funds or food aid”) <sup>11</sup> be subject to any commitments, and that all OECD and IEA-members automatically be in stage 3.

Pershing et al. (2004) propose to focus on the largest countries, for example the 5 or 25 largest countries in terms of population, largest GDP, or largest emissions, see the illustration in figure 4.



Source: Pershing et al. (2004).

Figure 4. Overlap between top 25 countries in population, GDP, and emissions.

### 2.3 Political feasibility

Assessing the political feasibility of any mode of participation in a GHG-abatement regime will inevitably be based on an evaluation of what kind of commitment different countries are willing to accept in future negotiations. In other words, a negotiated agreement is the only way forward in the global handling of the climate change issue. Furthermore, an evaluation of possible future commitments must be based on the experience we already have with countries' positions in previous rounds of negotiations. Positions have been fairly well established over the decade of negotiations that have passed, and our discussion is based on how different versions of a multi-stage regime (i.e. different thresholds and indicators for commitments) can help alter traditional positions enough to achieve a regime with broader participation. Our discussion is therefore founded on a discussion of differentiating responsibilities among countries in accordance with their ability and willingness to help mitigate anthropogenic global warming.

Economic Cooperation and Development (OECD) and have produced a large amount of emissions annually." [The Korea Times](#), 16. 12. 04.

<sup>11</sup> IDA: International Development Aid.

In our analysis, the various cases of the CR index provide an argument for using various criteria (equity, past/current/future responsibility etc.) to persuade certain developing countries or groups of developing countries, immediately or in the not-so-distant future, to accept being placed in specific stages and thereby be obliged to take on a specific or voluntary set of commitments. The core issue in the political feasibility assessment is therefore whether, how and which non-Annex I countries can be placed in stages 2 and 3. In particular, we find it pertinent to analyze how developing countries can become stronger participants in and contributors to a future regime.

Applying standard assumptions of rationality, we make an underlying assessment based on who stands to gain or lose from a move of developing countries from stage 1 to stage 2. Industrialized countries will gain (or at least not lose) in the longer term, since a move of large and fast-growing developing countries into stage 2 would mean that they commit to reducing their emission intensity over time. A broader group of countries that address/reduce their emissions mean that the costs of mandatory reductions for industrialized Annex I countries will drop in the longer term. In order to achieve this desirable effect, i.e. to make a transfer from stage 1 to stage 2 politically feasible, industrialized countries must be willing to increase their transfer of funds and technology to developing countries – in particular increased funds for adaptation purposes. Increased transfers of funds and technology would potentially mean that developing countries could have a net gain (or at least not lose) by moving from stage 1 to stage 2. One challenge to this solution is that industrialized countries may not be sufficiently willing to substantially increase their engagement in transfer of money and technology from what they are already contributing.

Furthermore, in previous rounds of negotiations the G77/China group has been acting as a remarkably unified coalition resisting any proposals from the Annex I group to accept any sort of commitments. Therefore, in our discussion of how various cases of the CR index can be applied as a tool to make developing countries accept a move from stage 1 to stage 2, we assume that developing countries are willing to let go of the negotiating power they have had during previous rounds by acting as a unified group. Underlying self-interests within G77/China are divergent, between groups representing preferences that vary from the low-lying island states in AOSIS to the oil-exporting countries in OPEC. These differences in preferences may over time make it less likely that G77/China can continue acting as a unified negotiator. Hence, in this report, we argue that in a future regime developing countries must accept differentiation of commitments within the G77 if the regime is to move forward towards broader participation and stronger commitments. Since developing countries are predicted to suffer the worst impacts of climate change in the future, it would seem to be in their self-interest to achieve such a regime. In the following section, we assess various criteria and indicators for differentiation among developing countries in terms of what stage they belong to, and how these indicators can be a fruitful tool in future rounds of negotiations.

### **3 Variations of the Capacity-Responsibility index**

In this section, we explore eight cases of the CR index (see table 3) to test their political feasibility in terms of grouping countries. In case 1, we reconstruct the CR index as in Criqui et al. (2003a) with the same threshold values, but for 184 countries instead of a regional basis. In case 2, we adjust the threshold values since case 1 shows significant differences between countries and within regions. Case 3 explores the option of including the countries' level of development by adding the Human Development Index (HDI). Case 4 also uses the HDI, but by grouping the countries initially and not adding HDI to the CR index. Cases 5 through 8 address the problem of adding two indicators of different nature by normalizing the indicators. Case 5 includes only income and emissions per capita, while case 6 also includes the HDI. Case 7 includes the dimension of governance in addition to income and emissions per capita. Case 8 builds on case 7, but adds an institutional affiliation requirement.

**Table 3.** Explored cases and characteristics

Case	Characteristics
Case 1	Original CR index with original thresholds
Case 2	Original CR index with adjusted thresholds
Case 3	Original CR index + 10 HDI and adjusted thresholds
Case 4	Original CR index with HDI values and adjusted thresholds
Case 5	Normalized CR index and adjusted thresholds
Case 6	Normalized CR index with HDI and adjusted thresholds
Case 7	Normalized CR index with governance and adjusted thresholds
Case 8	Normalized CR index with governance + institutional affiliation and adjusted thresholds

### 3.1 Case 1: Original CR index with original thresholds

We follow the methodology of Criqui et al. (2003a), but use data from the Climate Analysis Indicators Tool (CAIT) database.<sup>12</sup> The difference in terms of the data is that while we both use per capita CO<sub>2</sub> (t) equivalent emissions from 2000, Criqui et al. (2003a) use 1000 €/per capita PPP from 1999 and we use 1000 \$ per capita PPP from 2001.<sup>13</sup> The resulting CR index values are only slightly higher than those specified in Criqui et al.'s analysis. In this first case, we therefore use the same graduation threshold values as Criqui et al., in that countries with a CR index value below 5 are in stage 1, countries with CR index values between 5 and 12 are in stage 2, and countries with CR index values higher than 12 are in stage 3.

**Table 4.** Case 1 - Original CR index with original thresholds (5 and 12)

Main countries in stage 1 (CR<5)	Main countries in stage 2 (5<CR<12)	Main countries in stage 3 (CR>12)
<p><b>Annex I:</b> (none)</p> <p><b>Oil-producing countries:</b> Angola, Nigeria</p> <p><b>Others:</b> Sri Lanka, India, Pakistan, Vietnam, Honduras, Haiti, Kiribati, Bangladesh</p>	<p><b>Annex I:</b> Turkey, Romania</p> <p><b>Oil-producing countries:</b> Iraq, Algeria</p> <p><b>Others:</b> China, Philippines, Indonesia, Costa Rica, Peru, Bolivia, Namibia, Congo, Thailand, Egypt</p>	<p><b>Annex I:</b> (except two countries)</p> <p><b>Oil-producing countries:</b> Qatar, Saudi Arabia, UAE, Brunei, Equatorial Guinea, Trinidad &amp; Tobago, Libya, Venezuela, Iran</p> <p><b>Others:</b> Singapore, Israel, Cyprus, Taiwan, South Korea, Malta, Mexico, Argentina, Brazil, Chile, South Africa, Botswana, Uruguay, Mongolia, Malaysia</p>

Table 4 presents the distribution of major countries across the three stages. Out of the 184 countries, 72 countries accounting for about 65% of the global GHG emissions fall into stage 3. All Annex I countries except Turkey and Romania fall into stage 3, but there are a number

<sup>12</sup> CAIT is an information and analysis tool on global climate change developed by the World Resources Institute. CAIT provides a comprehensive and comparable database of greenhouse gas emissions data (including all major sources and sinks) and other climate-relevant indicators (<http://cait.wri.org>).

<sup>13</sup> Includes land use, land-use change and forestry (LULUCF) activities. The CAIT database does include emissions from LULUCF activities, and global GHG emissions increase by about 22 percent when these emissions are included. We have chosen not to include LULUCF-related emissions since the CR-index is sensitive to such activities and their inclusion tends to penalize developing countries. If LULUCF activities were to somehow be included, the reference period should be longer (for instance 10 years) and not based on one random year.

of non-Annex I countries that fall into the same stage. These are mainly oil-producing countries such as Qatar, United Arab Emirates, Kuwait and Bahrain, but also very different countries such as Israel, Argentina, Botswana, Chile, Mongolia and Brazil. Taiwan also falls in this stage. However, the country is not a party to the UNFCCC (and other UN-based agreements) since this has been blocked by China. In stage 2 ( $5 < CR < 12$ ), we find 56 countries accounting for about 25 percent of the global GHG emissions. Countries that fall into stage 2 are Romania, Turkey (both Annex I countries), Thailand, China, Peru, Egypt, Philippines and Indonesia. The remaining 56 countries accounting for about 10 percent of the global GHG emissions are placed in stage 1 ( $CR < 5$ ). Here we find countries such as India, Pakistan, Angola, Vietnam, Bangladesh and Nigeria.

### **3.1.1 Political feasibility assessment**

A serious concern with the results in case 1 is the placement and grouping of countries in stage 3. In terms of political feasibility, it is vital that all Annex-I countries fall into in stage 3 and take on reduction commitments. This is important to enable stronger commitments from developing countries. The results in table 4 show that some Annex I countries are placed in stage 2 due to their CR index values.

Furthermore, some of the major oil-producing (and exporting) countries have high CR index values and therefore fall into stage 3 (see Table 4). This is a result not only from their large CO<sub>2</sub>-equivalent emissions per capita, but also from fairly high per capita incomes. It is, however, not likely that oil-exporting countries (that have a history of opposing GHG emission controls) would be willing to participate in stage 3 in the near future. The likelihood of transfer of funds and technology from industrialized countries in order to abate their potential loss of income as a result of lower petroleum exports is deemed low.

Table 4 also shows that countries such as Argentina, Brazil, Chile, Botswana, South Africa, Mongolia, and Malaysia fall into stage 3. This is a problematic result, since it is highly unlikely that these countries would accept mandatory emissions reductions. It is a timely question to ask whether these countries would even accept a placement in stage 2. If we take a look at the countries that are placed in stage 2, we find among others China, Indonesia and Thailand. Based on the previous positions of these countries in the negotiations, it is unlikely that at least China and Indonesia will accept any kind of commitments on their emissions, even if they got modest transfers as a return.

Direct side-payments in the form of, for example, earmarked transfers could attract countries to move from stage 1 to stage 2 or from stage 2 to stage 3. This could speed up the graduation of key developing countries (like India and China) that according to our CR index (see Table 4) are currently close to graduating to a higher stage, or actually ripe for participation in stage 2 (India) or stage 3 (China). For instance, India has a CR index value of 4.34. This means that the country is only 0.66 points away from graduating to stage 2. The composite nature of the CR index implies that this gap could translate into 660 kg CO<sub>2</sub> equivalents per capita or \$660 per capita (or a mix of both). The CR index implicitly values 1 additional ton CO<sub>2</sub> equivalent per capita equal to an additional \$1000 per capita. Although the per capita gap in monetary terms is small, India's population of more than 1 billion potentially requires about \$680 billion in transfers from industrialized countries to graduate into stage 2. Although such a side-payment could, for instance, be spread over 10 years and be tied to the condition that the side-payments are used for mitigation or adaptation measures, it is not likely to occur. On this background we find that adaptation transfers could be better handled through an adaptation protocol, see section 4.

Our assessment of the results shows that there are several problems with applying the original CR index with original thresholds as a tool for future negotiations of a climate regime with broader participation. Countries that are clearly out of range of stage 3, according to an assessment based on positions in previous negotiations, fall within that stage when applying the index. The same feasibility problems also occur when the index indicates placement of

developing countries in stage 2. In particular it would be difficult to envision acceptance of graduation to stage 2 if not all Annex I countries fall into stage 3.

To address these difficulties, we will in the next case (original CR index with adjusted thresholds) examine whether adjusting the original thresholds can make a difference in terms of grouping countries and whether this leads to improved political feasibility.

### **3.2 Case 2: Original CR index with adjusted thresholds**

Criqui et al. (2003a)'s use of graduation levels 5 and 12 appears to be set in order to group on a regional basis. The lower threshold of 5 was chosen because as a result, all middle- and high-income non-Annex I regions would have some commitments. The threshold of 12 was chosen because a higher value would delay participation of the Middle East region and a lower value would imply immediate participation of the Central America and East Asia regions. In the previous section, we assessed the difficulties with such a result in terms of political feasibility.

Although calculating CR index values for all countries makes the grouping of countries more complicated, it could produce some valuable results for analytic purposes. As case 1 shows, there are significant variations within and between regions in terms of the CR index values. In case 2, we therefore examine whether the threshold values can be adjusted (to 8 and 14) to change the grouping of countries and possibly improve the political feasibility.

Table 5 presents the distribution of major countries across the three stages. With the new threshold values of 8 and 14, minor changes are observed compared to the 'original' thresholds of 5 and 12. A total of 65 countries accounting for about 61% of the total emissions now fall into stage 3. Seven countries that were in stage 3 are now in stage 2. These seven countries are Lithuania, Mauritius, Iran, Belarus, Mongolia, Latvia and Brazil. The 'new' stage 2 will include 37 countries accounting for 24% of the total emissions. Adjusting the lower threshold from 5 to 8 adds 26 countries to stage 1 where the countries have no emission reduction commitments. This group totals 82 countries accounting for 15% of total emissions. Interesting countries that move from stage 2 to stage 1 are Peru, Bolivia, Iraq, Egypt, Philippines and Indonesia.

**Table 5.** Case 2 - Original CR index with adjusted thresholds

<b>Main countries in stage 1 (CR&lt;8)</b>	<b>Main countries in stage 2 (8&lt;CR&lt;14)</b>	<b>Main countries in stage 3 (CR&gt;14)</b>
<p><b>Annex I:</b></p> <p><b>Oil-producing countries:</b> Iraq, Angola, Nigeria</p> <p><b>Others:</b> Peru, Bolivia, Egypt, Philippines, Indonesia, India, Pakistan, Vietnam, Bangladesh,</p>	<p><b>Annex I:</b> (Lithuania, Belarus, Latvia, Turkey, Romania)</p> <p><b>Oil-producing countries:</b> Iran, Algeria</p> <p><b>Others:</b> Mauritius, Mongolia, Brazil, Costa Rica, China, Namibia, Congo, Thailand</p>	<p><b>Annex I:</b> (except 5 countries)</p> <p><b>Oil-producing countries:</b> Qatar, Saudi Arabia, UAE, Brunei, Equatorial Guinea, Trinidad &amp; Tobago, Libya, Venezuela</p> <p><b>Others:</b> Singapore, Israel, Cyprus, Taiwan, South Korea, Malta, Mexico, Argentina, Chile, South Africa, Botswana, Uruguay, Malaysia</p>

#### **3.2.1 Political feasibility assessment**

Most of the issues raised in terms of political feasibility under case 1 are also relevant in this case. Additional Annex I countries fall into stage 2, while many of the oil-producing countries are still placed in stage 3. Other non-Annex I countries are spread over all three stages. It is clear that adjusting the CR threshold values is not sufficient to significantly improve the political feasibility and that additional variations are required.

Having concluded that the original CR index with original and adjusted thresholds has only limited value for our analytical purposes, we acknowledge that we need to move on to include other indicators to get to a more feasible tool for discussing broader participation in a future regime.

### **3.3 Case 3: Original CR index including HDI indicator and adjusted thresholds**

The original CR index may not adequately reflect the countries' capacity to implement mitigation (and adaptation) measures. The human development index (HDI) is commonly used to assess, rank and group countries in terms of their welfare and/or development. The HDI indicator could be included using various approaches. Simply adding the HDI indicator to the original CR index would lead to little change in the CR index values and hence the grouping of countries because the HDI ranges from 0.273 in Sierra Leone to 0.956 in Norway in 2002. Another approach could be to adjust the original CR index values by multiplying by the countries' HDI indicator value. This approach would, however, not give HDI too much equal weight compared to the two other indicators. In order to give the HDI about equal weight compared to the two indicators already in the CR index, the CR index is adjusted by adding 10 times the HDI to the original CR index. This is because the average values for each of the three indicators are then 6.4 for tons CO<sub>2</sub> equivalent per capita, 8.6 for \$1000 intl. per capita and 6.8 for the HDI.<sup>14</sup> The adjusted CR index will, by adding 10 times the HDI, range from 102 for Qatar to 4 for Sierra Leone. Since another indicator has been added, the thresholds for graduation must be changed (in this case to 15 and 28).

**Table 6.** Case 3 - Original CR index + 10 HDI and adjusted thresholds

<b>Main countries in stage 1 (CR&lt;15)</b>	<b>Main countries in stage 2 (15&lt;CR&lt;28)</b>	<b>Main countries in stage 3 (CR&gt;28)</b>
<p><b>Annex I:</b> (none)</p> <p><b>Oil-producing countries:</b> Iraq, Angola, Nigeria</p> <p><b>Others:</b> Philippines, North Korea, Egypt, Indonesia, Vietnam, India, Pakistan, Bangladesh</p>	<p><b>Annex I:</b> (Croatia, Ukraine, Bulgaria, Lithuania, Belarus, Latvia, Romania and Turkey)</p> <p><b>Oil-producing countries:</b> Libya, Venezuela, Iran</p> <p><b>Others:</b> South Africa, , Kazakhstan, Mexico, Brazil, Thailand, Colombia, China</p>	<p><b>Annex I:</b> (except 8 countries)</p> <p><b>Oil-producing countries:</b> Qatar, UAE, Kuwait, Bahrain, Equatorial Guinea, Saudi Arabia, Oman, Libya, Trinidad &amp; Tobago,</p> <p><b>Others:</b> Singapore, Israel, Antigua &amp; Barbuda, Taiwan, South Korea, Bahamas, Barbados, Malta, Argentina, South Africa, Mexico</p>

Table 6 presents the distribution of major countries across the three stages. Forty-nine countries accounting for about 54% of the GHG emissions fall into stage 3. Several non-Annex I countries fall into stage 3. Examples are eight oil-producing countries and countries such as Singapore, Israel, Antigua & Barbuda, Taiwan, South Korea and Argentina. Stage 2 consists of 52 countries accounting for 31% of the GHG emissions. In addition to Romania and Turkey that also in earlier cases fell into stage 2, a number of additional Annex I

<sup>14</sup> The Human Development Report provides the HDI for a total of 177 countries. It therefore does not provide the HDI for all countries in the CAIT database. For the purpose of this report, we therefore assign HDI values to the countries that have no HDI value in the Human Development report. For Taiwan, a HDI of 0.902 is chosen (<http://www.taiwanheadlines.gov.tw/20040811/20040811b1.html>). For Afghanistan, Cook Island, Iraq, Kiribati, North Korea, Liberia, Nauru, Niue, Palau and Serbia & Montenegro, the HDI is set equal to the lowest HDI available, 0.273.



countries now fall into stage 2. These are Croatia, Ukraine, Bulgaria, Lithuania, Belarus and Latvia. Other important countries are South Africa, Libya, Kazakhstan, Venezuela, Mexico, Iran, Brazil, Thailand, Colombia and China. The remaining 83 countries accounting for about 15% of the global GHG emissions are placed in stage 1. Here we find countries such as Philippines, North Korea, Egypt, Indonesia, Vietnam, India, Iraq, Pakistan, Angola, Bangladesh and Nigeria.

### **3.3.1 Political feasibility assessment**

Does the distribution of commitments indicated by the CR index become politically more feasible by taking the HDI factor into account? Such an assessment will naturally depend on how the graduation thresholds are set, but 15 and 28 have been selected in order to be comparable with the earlier cases. The inclusion of the HDI indicator enables the CR index to reflect the various countries' level of development. This makes the CR index a better tool for distinguishing between countries, particularly within the G77/China group. It suggests graduation to a higher stage for countries with a high or medium level of development, and not for countries with a low level of development. Examples of countries that have a higher ranking than in the cases without the inclusion of the HDI factor are Tajikistan, Kyrgyzstan, Vietnam, Bangladesh, Cuba, Philippines, Sri Lanka and Nigeria. Examples of countries that receive a lower ranking than before include Iraq, Burkina Faso, Mali, Chad, Congo, Swaziland, Guinea and Angola. As such, this version of the CR index can be a valuable tool in future negotiations in terms of pinpointing differences between developing countries. In particular, it can help illustrate that some developing countries are riper for taking on commitments than others. However, the problems persist that it is unlikely (in terms of political feasibility, and based on experience from previous negotiations) that the G77/China will accept differentiation within the group, or indeed any commitments to reduce their emissions before industrialized countries have shown substantial progress.

Furthermore, this case of the CR index indicates only minor changes in terms of placement and ranking of the top-50 countries ( $CR > 28$ ). This is because their HDI values differ only slightly. Thus, there are still difficulties with some Annex I countries falling into stage 2 while some major oil-producing countries and other non-Annex I countries fall into stage 3.

Although the HDI factor helps to distinguish between countries in terms of their level of development, this case does not substantially improve the analytical tool. Another drawback is that the HDI is partly based on the GDP per capita (PPP) in each country, an indicator which is already in the CR index. However, one could, as the next case shows, use the HDI in a different format to improve analytical features and political feasibility.

### **3.4 Case 4: Original CR index with HDI values and adjusted thresholds**

Simply adding ten times the HDI to the original CR index did little to help a politically feasible grouping of countries into different stages of commitments. However, it is still desirable to somehow use the HDI to group countries. This case therefore takes the HDI values of the countries as a starting point to group countries and combines this with the original CR index.

The Human Development Report places all countries into three different groups, namely high human development, medium human development and low human development. The high human development group consists of 55 countries with a HDI of 0.8 or above. Here we find most Annex I countries and the most developed non-Annex I countries. It is notable that the oil-producing countries do not rank highly within this group, and that some of these countries are not in the high human development group at all. The CR index values for the countries in this group range from 93.65 to 6.76. The medium development group consists of 86 countries with a HDI between 0.5 and 0.8 and a CR index value between 32.55 and 1.71. The Annex I countries Russia, Bulgaria, Romania and Ukraine are found here, along with interesting countries such as Malaysia, Brazil, Thailand, Saudi Arabia, Philippines, Turkey,

China and India. The remaining 36 countries are placed in the low human development group and all have a HDI below 0.5. The most interesting countries in this group are Pakistan and Nigeria. With the exception of Congo and Mauritania, all countries have CR index values below 5.

This variant of the CR index in combination with the HDI values, groups the countries into the three stages according to the following criteria:<sup>15</sup>

Stage 3: HDI > 0.5 and CR > 20.

Stage 2: HDI > 0.5 and 8 < CR < 20.

Stage 1: HDI < 0.8 and CR < 8, or HDI < 0.5.

Table 7 presents the distribution of major countries across the three stages. Forty-nine countries accounting for about 54% of the GHG emissions fall into stage 3. Several non-Annex I countries fall into stage 3. Examples are again oil-producing countries such as Qatar, Kuwait and Saudi Arabia and countries such as Singapore, Cyprus, Bahamas and Argentina. Stage 2 consists of 49 countries accounting for 31% of the GHG emissions. Here we find no less than 8 Annex I countries and non-Annex I countries such as Malaysia, Mexico, Brazil and China. The remaining 87 countries accounting for about 15% of the global GHG emissions are placed in stage 1. Here we find countries such as Iraq, Indonesia, India, Vietnam and Nigeria.

**Table 7.** Case 4 – Original CR index with HDI values and adjusted thresholds

<b>Main countries in stage 1 (HDI&lt;0.8 and CR&lt;8)</b>	<b>Main countries in stage 2 (0.5&lt;HDI and 8&lt;CR&lt;20)</b>	<b>Main countries in stage 3 (HDI&gt;0.5 and CR&gt;20)</b>
<p><b>Annex I:</b> (none)</p> <p><b>Oil-producing countries:</b> Iraq, Angola, Nigeria</p> <p><b>Others:</b> Philippines, Indonesia, Sri Lanka, India, Pakistan, Vietnam, Bangladesh</p>	<p><b>Annex I:</b> Croatia, Ukraine, Bulgaria, Lithuania, Belarus, Latvia and Romania</p> <p><b>Oil-producing countries:</b> Libya, Venezuela, Iran</p> <p><b>Others:</b> South Africa, Malaysia, Mexico, Brazil, Turkey, Thailand and China</p>	<p><b>Annex I:</b> (except 7 countries)</p> <p><b>Oil-producing countries:</b> Qatar, United Arab Emirates, Kuwait, Bahrain, Brunei, Equatorial Guinea, Saudi Arabia, Oman, Trinidad &amp; Tobago</p> <p><b>Others:</b> Singapore, Israel, Antigua &amp; Barbuda, Cyprus, Taiwan, South Korea, Malta, Bahamas, Barbados and Argentina</p>

### 3.4.1 Political feasibility assessment

This case avoids one of the drawbacks from the previous case in that ‘double-counting’ is now avoided since the HDI factor is not directly incorporated into the CR index. Still, many of the same issues raised in the assessment of cases 1–3 also apply here. This case can first and foremost be a useful tool for distinguishing between countries, particularly within the G77+China group, and even more strongly than case 3 emphasizes the need for distinguishing between countries based on their degree of development. It suggests graduation to a higher stage for countries with a high or medium level of development, and not for countries with a low level of development. The index hence pinpoints differences between developing countries, and can be used as a tool to illustrate that some developing countries have a degree of development that can more easily accommodate taking on commitments than others.

<sup>15</sup> The only country that does not fit these criteria is Cuba with a HDI of 0.809 and a CR of 6.76. Due to its low CR value, Cuba is placed in stage 1.

The original CR index has produced problematic results in cases 1–4. In order to improve our analytical tool, therefore, it seems necessary not only add indicators to the original CR index, but also to adjust the CR index itself. This is our approach in the following case.

### 3.5 Case 5: Normalized CR index

The CR index as applied in cases 1–4 combines two indicators of different nature. GDP per capita is given more weight since the level of variance is larger for the capability indicator (between the countries on GDP per capita) than for on the responsibility indicator (emissions per capita). The average values for each of these indicators are then 6.4 for tons CO<sub>2</sub> equivalent per capita and 8.6 for \$1000 per capita PPP. The CR index could be made more reliable through normalization.<sup>16</sup> In comparison to the original CR index, a normalized CR index would give a relatively higher emphasis on responsibility (emissions per capita) because the average value of income is substantially higher. When the two variables are normalized, they are given equal weight, and not just added together as in case 1. This is what we aim to examine in case 5.

Based on data from CAIT database, an index of two normalized indicators representing responsibility (yearly emissions per capita) and capacity (income per capita) gave slightly different results than the original CR index.

**Table 8.** Case 5 - Normalized CR index

Main countries in stage 1 (CR<10)	Main countries in stage 2 (10<CR<20)	Main countries in stage 3 (CR>20)
<p><b>Annex I:</b>(Romania, Turkey)</p> <p><b>Oil-producing countries:</b> Angola, Nigeria</p> <p><b>Others:</b> Costa Rica, Thailand, China, Egypt, Philippines, Indonesia, India, Pakistan, Bangladesh</p>	<p><b>Annex I:</b> (Slovakia, Russian Fed., Hungary, Poland, Croatia, Ukraine, Bulgaria, Lithuania, Belarus, Latvia)</p> <p><b>Oil-producing countries:</b> Venezuela, Libya, Iran</p> <p><b>Others:</b> Malta, South Africa, Argentina, Nauru, Botswana, Malaysia, Kazakhstan, Mexico, Brazil</p>	<p><b>Annex I:</b> (except 10 countries)</p> <p><b>Oil-producing countries:</b> Qatar, United Arab Emirates, Kuwait, Bahrain, Brunei, Trinidad &amp; Tobago, Saudi Arabia, Oman</p> <p><b>Others:</b> Singapore, Israel, Cyprus, Taiwan, South Korea</p>

Table 8 presents the distribution of major countries across the three stages. In particular, oil producing (and exporting) countries score high(er) on this normalized index than on the CR index. Qatar, United Arab Emirates, Kuwait, Bahrain, Brunei, Saudi-Arabia, Equatorial Guinea, Oman and Trinidad & Tobago have all a CR index value of above 20, which is set as the threshold for participation in stage 3. Also a number of “industrialized developing countries” such as Singapore, Israel, Cyprus, Taiwan and South Korea are other non-Annex I Parties that score above 20. (Malta, the new EU entry, comes close). The next group includes South Africa, Argentina, Botswana, Malaysia, Kazakhstan and Venezuela, but also Annex I Parties such as Slovakia, Russian Fed., Hungary, Poland, Croatia, Ukraine, Bulgaria, Lithuania, Belarus, and Latvia. They have all a score above 10. Mexico, Costa Rica and Brazil and Iran score also higher than 10 on the index. The two Annex I Parties Rumania and Turkey have even a lower score and are according to this index placed in stage 1. China has a score of only 6.5 and is ranked 102<sup>nd</sup>, while India has a score of 3.5 and is ranked 136<sup>th</sup>. All LDCs and most west and east African countries have very low scores.

<sup>16</sup> For each indicator (and country), an index is calculated using the following formula:  $100 \times ((\text{actual value} - \text{minimum value}) / (\text{maximum value} - \text{minimum value}))$ . Hence, each indicator’s index ranges from 0 to 100.

Out of the 184 countries, 42 countries accounting for about 46% of the global GHG emissions fall into stage 3. In general, the Annex I countries fall into stage 3, but twelve of them do not. The non-Annex I countries that fall into the same stage are mainly oil-producing countries such as Qatar, United Arab Emirates, Kuwait, Bahrain, Brunei and Saudi, Arabia, but also Singapore, Israel, Cyprus, Taiwan, and South Korea. In stage 2 ( $10 < CR < 20$ ), we find 30 countries accounting for about 19% of the global GHG emissions. Countries that fall into stage 2 are ten economies in transition (Annex I countries), Malta, Venezuela, South Africa, Botswana, Malaysia, Argentina, Mexico, Brazil and Iran. The remaining 114 countries accounting for about 35% of the global GHG emissions are placed in stage 1 ( $CR < 10$ ). Here we find the Annex I countries Romania, Turkey, and countries such as Costa Rica, Thailand, China, Indonesia, India, Pakistan, Angola, Bangladesh and Nigeria.

### 3.5.1 Political feasibility assessment

Most of the same issues in terms of political feasibility discussed for cases 1 and 2 also apply here. In fact, some results are even more problematic, since more Annex I countries are excluded from stage 3, which would probably lead to less willingness from G77 countries to move from stage 1 to 2. Furthermore, an important non-Annex I country like China has fallen into stage 1. These results clearly call for a refinement of the normalized CR index. One way of doing this is to include other indicators. This is our task in case 6.

### 3.6 Case 6: Normalized CR index with HDI

Cases 3 and 4 showed that although including HDI in the original CR index does not result in a politically feasible grouping of countries, it was a useful tool for distinguishing between countries within the G77/China group. This case therefore examines whether including the HDI into the normalized CR index can yield similarly interesting results. As in case 5 we create a normalized CR index, but in this case it is based on three indicators: yearly emissions per capita, income per capita and the HDI index. The three normalized indicators are then added and divided by three to produce a CR index that theoretically could range from 0 to 100, but which in practice ranges from 0.62 to 76.1. The CR index values of most countries increase, so the threshold values are set relatively high at 25 and 35.

**Table 9. Case 6 - Normalized CR index with HDI**

<b>Main countries in stage 1 (<math>CR &lt; 25</math>)</b>	<b>Main countries in stage 2 (<math>25 &lt; CR &lt; 35</math>)</b>	<b>Main countries in stage 3 (<math>CR &gt; 35</math>)</b>
<p><b>Annex I:</b> (none)</p> <p><b>Oil-producing countries:</b> Nigeria, Angola</p> <p><b>Others:</b> Indonesia, Vietnam, Egypt, India, Bangladesh,</p>	<p><b>Annex I:</b> (Latvia, Bulgaria, Ukraine, Belarus, Romania, Turkey)</p> <p><b>Oil-producing countries:</b> Libya, Venezuela, Iran</p> <p><b>Others:</b> Botswana, Malaysia, Costa Rica, Mexico, Kazakhstan, Brazil, Thailand, Colombia, South Africa, China, Philippines</p>	<p><b>Annex I:</b> (except 6 countries)</p> <p><b>Oil-producing countries:</b> Qatar, United Arab Emirates, Kuwait, Brunei, Bahrain, Equatorial Guinea, Saudi-Arabia, Oman, Trinidad &amp; Tobago,</p> <p><b>Others:</b> Singapore, Israel, Taiwan, Cyprus, South Korea, Malta, Antigua &amp; Barbuda, Argentina, Uruguay, Chile</p>

Table 9 presents the distribution of major countries across the three stages. Fifty-four countries accounting for about 55% of the global GHG emissions fall into stage 3 ( $CR > 35$ ). In general, the Annex I countries tend to fall into stage 3, with five or six exceptions. The non-Annex I countries that fall into the same stage are mainly nine oil-producing countries such as Qatar, United Arab Emirates, Kuwait, Brunei and Saudi-Arabia, but also countries such as Singapore, Israel, Taiwan, Cyprus, South Korea, Malta, Argentina and Chile. In stage 2 ( $35 < CR < 25$ ), we find 58 countries accounting for about 31% of the global GHG emissions.

Countries that fall into stage 2 are six Annex I countries and non-Annex I countries such as Libya, Venezuela, Malaysia, Mexico, Brazil, Iran, China and the Philippines. The remaining 72 countries, all non-Annex I countries and accounting for about 14% of the global GHG emissions are placed in stage 1 (CR<25). Here we find countries such as Nigeria, Angola, Indonesia, Vietnam, Egypt, India and Bangladesh.

### 3.6.1 Political feasibility assessment

This case seems to be better than case 5 since no Annex I countries qualify for stage 1 and only a few qualify for stage 2. However, since the HDI has been normalized, it does not distinguish much between countries. All CR index values increase, with the exception of those countries with a HDI set to 0.273 (see footnote 6). Oil producing and exporting countries typically do not increase their CR index values as much as most countries in stages 3 and 2. But most of these countries still score high and are thus placed in stage 3. A number of “industrialized” non-Annex I countries such as Singapore, Israel, Cyprus, Taiwan and South Korea also score high and are placed in the same stage along with countries such as Argentina and Chile.

Cases 3 and 4 to some extent benefited from including the HDI factor in that it helped to distinguish between countries in terms of their level of development. The ability to distinguish between countries is not evident in case 6, and therefore it does not substantially improve the analytical tool. Further developments are required, and the following case examines including the dimension of governance.

### 3.7 Case 7: Normalized CR index with governance

A different option to further develop the normalized index developed in case 5 is to include the dimension of governance, which illustrates the ability to implement and follow up commitments. By using the normalized CR index from case 5 in addition to an index of governance from CAIT, we developed a normalized index of three selected indicators representing responsibility (yearly emissions per capita), capacity (income per capita and governance) and governance. Compared to the results from case 5, the main difference by using this indicator is that most of the oil producing/exporting countries have substantially lower scores. However, this index distinguishes between Parties within the Annex I group as well. As many as twelve Annex I Parties are not in stage 3.

**Table 10.** Case 7 - Normalized CR index with governance

<b>Main countries in stage 1 (CR&lt;25)</b>	<b>Main countries in stage 2 (25&lt;CR&lt;35)</b>	<b>Main countries in stage 3 (CR&gt;35)</b>
<p><b>Annex I:</b> (Ukraine, Belarus, Turkey)</p> <p><b>Oil-producing countries:</b> Venezuela, Libya, Angola, Nigeria</p> <p><b>Others:</b> China, India, Egypt, Iran, Philippines, Indonesia, Kazakhstan, Pakistan, Bangladesh</p>	<p><b>Annex I:</b> (Slovakia, Russian Fed., Hungary, Poland, Croatia, Bulgaria, Lithuania, Romania Latvia)</p> <p><b>Oil-producing countries:</b> Saudi-Arabia</p> <p><b>Others:</b> Uruguay, Botswana, South Africa, Costa Rica, Argentina, Malaysia, Thailand, Mexico, and Brazil</p>	<p><b>Annex I:</b> (except 12 countries)</p> <p><b>Oil-producing countries:</b> Qatar, United Arab Emirates, Kuwait, Bahrain, Brunei, Oman, Trinidad &amp; Tobago</p> <p><b>Others:</b> South Korea, Singapore, Malta, Cyprus, Israel, Chile</p>

Table 10 presents the distribution of major countries across the three stages. Out of the 184 countries, 42 countries accounting for about 45% of the global GHG emissions fall into stage 3. Most Annex I countries fall into stage 3, but eleven of them do not and among them three are in stage 1. Some oil-producing countries such as Qatar, United Arab Emirates, Kuwait, Bahrain, and Brunei are still in stage 3, but Saudi-Arabia is relegated from stage 3 to stage 2.

South Korea, Singapore, Malta, Cyprus, Israel and Chile are in stage 3. Malta is promoted from stage 2 in case 5 to stage 3 here. In stage 2 ( $35 < CR < 20$ ), we find only 23 countries accounting for about barely 10% of the global GHG emissions. Countries that fall into stage 2 are nine economies in transition (Annex I countries), Uruguay, Botswana, South Africa, and Costa Rica. Romania and Thailand are promoted from stage 1 to stage 2. The remaining 119 countries accounting for about 45% of the global GHG emissions are placed in stage 1 ( $CR < 25$ ). Here we find the Annex I countries Ukraine, Belarus and Turkey. Ukraine, Belarus, Venezuela, Kazakhstan, Iran, and Libya have all been relegated from stage 2 to stage 1. Countries such as China, Indonesia, India, Pakistan, Angola, Bangladesh and Nigeria are still in stage 1, but it is interesting that India and China receive the same score and that the threshold for stage 2 perhaps should be lowered to ensure a more even distribution.

Even though 31 countries do not have a value on the governance variable, they account for only 0.8 % of the global emissions. Taiwan is by far the most important party in this group since it accounts for 0.6 % of the global emissions.

### **3.7.1 Political feasibility assessment**

A major problem with including this governance indicator is that totalitarian countries, such as Ukraine and Belarus, are put in an early stage and may thereby receive less strict climate commitments. This indicator would therefore reward countries with non-democratic governance in terms of allowing them less strict commitments. Compared to case 5, Malta is then promoted from stage 2 to stage 3, while Romania and Thailand are promoted from stage 1 to stage 2. Ukraine, Belarus, Venezuela, Kazakhstan, Iran, and Libya are relegated from stage 2 to stage 1, and Saudi-Arabia is relegated from stage 3 to stage 2.

Furthermore, most of the same problems found in cases 1 and 2 apply to this index when it comes to political feasibility. An advantage with this index is that it refines the results we found in cases 3 and 4, and gives a new angle to differentiation between countries within the G77.

The major concern in this case is that a number of Annex I countries are placed in stages 1 and 2. Non-Annex I countries are not likely to accept such an outcome, and they are likely to demand that current Annex I countries must be placed in stage 3. In our final case, we therefore build on case 7, but add a dimension of institutional affiliation.

### **3.8 Case 8: Normalized CR index with governance plus institutional affiliation**

Case 7 was promising in that major non-Annex I countries were mostly placed in stages 1 and 2. However, a number of Annex I countries were placed in stage 1 and 2. The political feasibility assessment concluded that non-Annex I countries will not accept that Annex I countries are spread out over all three stages. This indicates that simple criteria are not flexible enough to cover the significantly different circumstances in the countries of the world. In this case, we therefore impose an institutional affiliation requirement. This requires all Annex I countries to be placed in stage 3. In addition, Cyprus and Malta are also placed in stage 3 due to their inclusion in the EU. Mexico and South Korea are also placed in stage 3 due to their membership in the OECD. Countries that over time become members of either Annex I or the OECD would also be placed in stage 3. The CR thresholds are adjusted from case 7 in order to involve some major non-Annex I countries in stage 2.

Table 11 presents the distribution of major countries across the three stages. Fifty-two countries accounting for about 57% of the global GHG emissions fall into stage 3. All Annex I countries are now placed in stage 3, along with the new EU countries Malta and Cyprus, and South Korea and Mexico which are OECD member countries, but not Annex I countries. Several oil-producing countries such as Qatar, United Arab Emirates, Kuwait, Bahrain, and Brunei are still in stage 3, but Saudi-Arabia is in stage 2. Singapore, Israel and Trinidad & Tobago are also in stage 3. By lowering the threshold of graduation from stage 1 to stage 2,

we now have 37 countries accounting for about 32% of the global GHG emissions. Countries that fall into stage 2 are Chile, Uruguay, Botswana, Costa Rica, South Africa, Malaysia, Thailand, Brazil, Egypt, Iran, China, Philippines and India. The remaining 95 countries accounting for about 11% of the global GHG emissions are placed in stage 1 (CR<20). Here we find countries such as Libya, Nigeria, Indonesia, Pakistan and Bangladesh.

**Table 11.** Case 8 - Indexed Normalized CR index with governance plus institutional affiliation

<b>Main countries in stage 1 (CR&lt;20)</b>	<b>Main countries in stage 2 (20&lt;CR&lt;36)</b>	<b>Main countries in stage 3 (CR&gt;36)</b>
<p><b>Annex I:</b> (none)</p> <p><b>Oil-producing countries:</b> Libya, Angola, Nigeria</p> <p><b>Others:</b> Indonesia, Kazakhstan, Pakistan, Bangladesh</p>	<p><b>Annex I:</b> (none)</p> <p><b>Oil-producing countries:</b> Saudi-Arabia, Venezuela</p> <p><b>Others:</b> Chile, Uruguay, Botswana, Costa Rica, Argentina, South Africa, Malaysia, Thailand, Brazil, Egypt, Iran, China, Philippines, India.</p>	<p><b>Annex I:</b> (all)</p> <p><b>Oil-producing countries:</b> Qatar, United Arab Emirates, Kuwait, Bahrain, Brunei, Oman, Trinidad &amp; Tobago</p> <p><b>Others:</b> South Korea, Mexico, Cyprus, Malta, Singapore, Israel,</p>

### 3.8.1 Political feasibility assessment

The issue raised in earlier cases concerning Annex I countries being placed in stages 1 and 2 is in this case resolved by requiring all Annex I countries to be placed in stage 3. This combined with the inclusion of Cyprus, Malta, South Korea and Mexico in stage 3 should satisfy the demand of the G77/China group that the developed countries take the lead in controlling GHG emissions. The case of some major oil producing and exporting countries being placed in stage 3 is not resolved, but this is largely due to their characteristics of high incomes and emissions per capita. In terms of other non-Annex I countries, this case seems more promising than the earlier cases, in that fewer are placed in stage 3, and that it allows for more differentiation between countries within the G77.

### 3.9 Conclusion

Successful future climate policy commitments rely on developing stronger commitments for the Annex I Parties and broadening the participation from non-Annex I Parties. Countries' positions in previous rounds of negotiations are fairly well established over the decade of negotiations that have passed, but a multi-stage regime building on a CR index could help alter traditional positions enough to achieve a regime with broader participation.

The eight CR index cases have explored various criteria and indicators for differentiation among countries, and how these indexes can be a fruitful tool in future rounds of negotiations. Table 12 presents the results from the various cases in terms of how certain non-Annex I countries are placed in stages 1 to 3. In addition, figure 5 shows the distribution in terms of GHG emissions across the three stages for all cases.

Table A.1 in the Annex shows CR results for all countries in cases 1, 3 and 7. Case 1 is included as a reference that is close to the original CR. Case 3 is included to illustrate the effect of including the HDI indicator. Case 4 has the same CR values as case 1 since HDI is only used for grouping countries initially. Case 7 is close to case 8, the difference being that Annex I countries are forced to be in stage 3 in the latter case.

In case 1, a small share of global GHG emissions are found in stage 1. This could indicate that the original thresholds were set too low. The adjusted thresholds in stage 2 did however, only slightly change the distribution. As for the remaining six cases, the choice of indicators, but mainly the threshold values determine the distribution of commitments. Taking country

concerns into account, a careful balance will be needed to ensure meaningful and sufficient participation across countries.

**Table 12.** Placement of important or interesting non-Annex I countries in the various cases

Country	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
<b>Qatar</b>	3	3	3	3	3	3	3	3
<b>UAE</b>	3	3	3	3	3	3	3	3
<b>Kuwait</b>	3	3	3	3	3	3	3	3
<b>Bahrain</b>	3	3	3	3	3	3	3	3
<b>Brunei</b>	3	3	3	3	3	3	3	3
<b>Singapore</b>	3	3	3	3	3	3	3	3
<b>Thailand</b>	2	2	2	2	2	2	2	2
<b>Philippines</b>	2	1	1	1	2	2	1	2
<b>Cyprus</b>	3	3	3	3	3	3	3	3
<b>Malta</b>	3	3	3	3	2	3	3	3
<b>Saudi Arabia</b>	3	3	3	3	3	3	2	2
<b>Taiwan</b>	3	3	3	3	3	n.a. <sup>17</sup>	n.a.	n.a.
<b>South Korea</b>	3	3	3	3	3	3	3	3
<b>Trinidad &amp; Tobago</b>	3	3	3	3	3	3	3	3
<b>Argentina</b>	3	3	3	3	3	3	2	2
<b>South Africa</b>	3	3	2	2	2	2	2	2
<b>Libya</b>	3	3	2	2	2	2	1	1
<b>Botswana</b>	3	3	2	2	2	2	2	2
<b>Uruguay</b>	3	3	2	2	3	3	2	2
<b>Malaysia</b>	3	3	2	2	2	2	2	2
<b>Venezuela</b>	3	3	2	2	2	2	1	2
<b>Chile</b>	3	3	2	2	3	3	3	2
<b>Mexico</b>	3	2	2	2	2	2	2	3
<b>Iran</b>	3	2	2	2	2	2	1	2
<b>Brazil</b>	3	2	2	2	2	2	2	2
<b>South Korea</b>	3	3	3	3	3	3	3	3
<b>China</b>	2	2	2	2	2	2	1	2
<b>India</b>	1	1	1	1	1	1	1	2

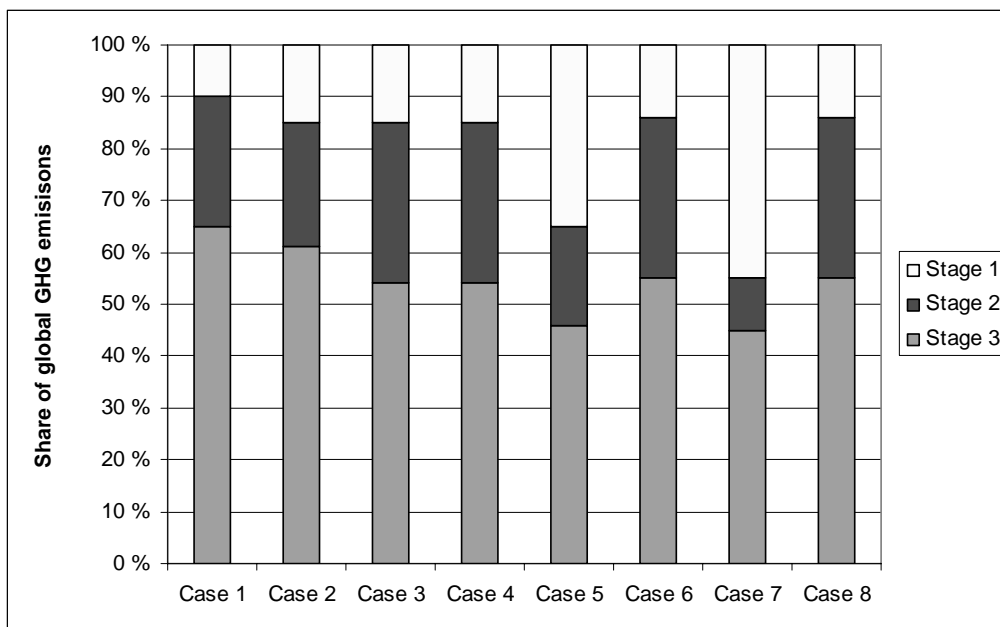
The detailed assessment under each case shows that each presents some difficulties in terms of political feasibility. A major concern in cases 1–7 is that some Annex I countries qualify for one or two stages with less commitments than they currently have. If this is the case, non-Annex I countries are not likely to accept any commitments. Case 8 meets this concern by

<sup>17</sup> Taiwan is not included in CAIT’s governance index. However, Taiwan is a prosperous and democratic country which is close to Annex I countries and should be one of the first non-Annex I countries to enter stage 3.



requiring all current Annex I countries, along with new EU member countries Cyprus and Malta and the OECD members South Korea and Mexico to automatically qualify for stage 3. The core issues in the political feasibility assessments have therefore been how the most developed non-Annex I countries can be placed in stages 2 and 3 and which countries this would be.

Major oil-producing (and exporting) countries have high CR index values and therefore often fall into stages 3 and 2. This is a result not only from their large CO<sub>2</sub>-equivalent emissions per capita, but also from fairly high per capita incomes. It is, however, not likely that many oil-exporting countries (that have a history of opposing GHG emission controls) would be willing to participate in stage 3 in the near future. Various other large non-Annex I countries qualify for stage 3 in some of the cases. This is an interesting result, but it still seems highly unlikely that these countries would accept mandatory emissions reductions. It is a timely question to ask whether these countries would even accept a placement in stage 2.



**Figure 5.** Share of global GHG emissions by stages in the various cases

Based on the previous positions of the G77/China group, it may be unlikely that countries within this group will accept any kind of commitments on their emissions. However, the analysis shows that there are significant differences between countries in this group in terms of responsibility and capability. Some sort of differentiation of commitments within the G77/China group will therefore be needed to move forward towards broader participation and stronger commitments. The CR index has its limitations for grouping all countries. However, by including indicators such as the HDI and governance, it can first and foremost be a useful tool for distinguishing between countries, particularly within the G77/China group. In this way, it emphasizes the need for distinguishing between countries based on their degree of development and governance.

Direct side-payments in the form of, for example, earmarked transfers as a way to attract countries to move from stage 1 to stage 2, or from stage 2 to stage 3, are unlikely to succeed. Even modest transfers purely to engage some countries are less likely, but the issue of transfers could be handled through an adaptation protocol (see the following section).

## **4 Adaptation and mitigation: an adaptation protocol as a supplement to a multi-stage agreement**

Based on the analysis in section 3, we believe that increased funding of adaptation to climate change in developing countries would be difficult to link directly to differentiation of commitments in a multi-stage climate regime. The criteria of responsibility for past emissions and the ability and willingness to take on commitments do not easily combine with the complex issues regarding vulnerability to climate change, and need and ability to adapt. Even so, in the international negotiations it has become an increasingly strong demand from developing countries that adaptation be put higher on the agenda. Currently, funding for adaptation purposes established in the Kyoto Protocol is channeled through three specific financial mechanisms: The Least Developed Countries (LDC) Fund in which the Global Environmental Facility (GEF) is requested to disburse funds for the preparation of National Adaptation Programs for Action (NAPAs); the Special Climate Change Fund, also operated by GEF to finance adaptation, technology transfer and mitigation measures; and the Kyoto Protocol Adaptation Fund to support adaptation projects and programs in developing countries that are Parties to the Protocol. The latter fund is to be financed by a levy on CDM projects (Huq and Burton 2003), while contributions to the LDC Fund and the Special Climate Change Fund are to be voluntary (Adger et al. 2003). Developing countries demand that these and additional financial mechanisms for adaptation be applied more effectively and in accordance with local priorities in the future. The worries of industrialized countries if local priorities are given more weight are that funds originally earmarked for adaptation purposes can be used merely as increased ODA funds, i.e. for development purposes, rather than as climate change measures.

The effects of climate change are predicted to be hardest in the regions of the world where the poorest countries and people are located. Developing countries are more vulnerable to climate change and hence face tougher challenges when it comes to adaptation as a result of four key factors: First, many are dependent on agriculture and natural resources; second, some are dependent on fossil fuel exports; third, many have weak institutions and governance; and fourth, many are located in climatic zones and geographical positions that will experience particularly strong impacts of climate change.

In a future multi-stage climate agreement, adaptation could play a larger role than it has done in earlier agreements. The UNFCCC (Article 4) clearly states that it is the responsibility of developed countries to support developing countries in their adaptation to the negative consequences of climate change. We suggest that the solution is to negotiate an adaptation protocol as a complement to the multi-stage regime that is focused on mitigation issues. We argue that it is possible to expand the room for participation for developing countries in stages 2 or 3 (see section 3) by adding an adaptation protocol.

The core question here would be: How can an adaptation protocol be designed to ensure increased participation? As in section 3, our main concern is to analyze how differentiation between developing countries in terms of ability and responsibility can be used as a tool in future negotiations to group the countries differently. As such, vulnerability to climate change and ability to cope and adapt to changes differ among developing countries. It is the poorest people among the poor countries that stand to be hardest affected by global warming, and it is also inhabitants of these countries that have least resources and capabilities to respond effectively.

Hence, an adaptation protocol included in a multi-stage regime should be designed to secure transfer of funds and technology to countries that are most vulnerable in terms of impacts and ability to cope. The rules for financing must be agreed on in a negotiated agreement to enhance political feasibility. An important issue to settle is whether it is necessary to establish additional financial mechanisms (funds), or whether a transfer of the existing Adaptation Funds from the Kyoto Protocol is sufficient. In terms of identifying the

most vulnerable recipients, our case 4 in section 3 pointed out one possible way to group countries according to a combination of the CR index and HDI, which could be a useful indicator to determine distribution of transfers in an additional adaptation protocol. If these transfers were earmarked for policies and measures that would lead the recipient country's development path in the direction of sustainable development (i.e. a low-emission society with capacity to adapt), adaptation transfers within a protocol could in fact become a tool to graduate developing countries from stage 1 to stage 2, and eventually even to stage 3.

The cooperation between Annex I and developing countries in terms of preparing for, planning for, and facilitating the implementation of adaptation measures is probably more politically feasible if rules for synergy with flexibility mechanisms (CDM and JI) and other mitigation policy instruments are developed. The specifics of how these rules should be designed are beyond the scope of this report.<sup>18</sup> It suffices to point out that when it comes to political feasibility, several distinct and difficult issues have to be addressed when discussing the design of an adaptation protocol (Paavola and Adger 2002):

- First, given experience from previous rounds of negotiations, it is important that developing countries be included when it comes to decision rights. International negotiations have a history of becoming stuck as a result of unresolvable differences over decision rights between the North and the South.
- Second, and closely related to the first point, is the issue of who has control over funding of adaptation projects. It is important for industrialized countries not to give away control over their money flow and to ensure that the funds are actually used for their intended purpose, i.e. adaptation to climate change. At the same time it is important to give developing countries a say in how and where investments should be made.
- Third, therefore, in the negotiation phase of an adaptation protocol it is important who has the agenda-setting power. Ideally this should be shared between developing and developed countries. For instance, given the dilemmas pointed out in bullet points 1 and 2, both Parties would have important stakes in deciding guidelines for identification of most vulnerable areas and countries.
- Fourth, an adaptation protocol must define rights for countries to receive financing for adaptation (for instance, through guidelines for identifying adaptive capacity), and define possible solutions (for instance, sustainable development-driven policies and measures): capacity building, expertise exchange, technology transfer, guidelines for cost-effective national adaptation strategies, etc.
- Fifth, an adaptation protocol secures that action is taken internationally, so that responsibility for adaptation measures is not merely pushed downwards to the national, local, and individual level.

#### **4.1 Conclusions**

The development of an adaptation protocol could be a way of better including the developing countries in the negotiations of the climate change regime. If so, developing countries must show more willingness to contribute and participate actively in a multi-stage regime where the aim is to strengthen mitigation policies (e.g., an agreement for the post-2012 period). According to our case-analysis in section 3, several relatively well-developed non-Annex I countries are ripe for graduation to stage 2 (or even stage 3). An adaptation protocol could be a form of side-payment or 'carrot' that could stimulate such graduation by non-Annex I Parties. Implicitly, such a solution would imply that industrialized countries are willing to put

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<sup>18</sup> Both legal expertise and a thorough analysis of the flexible mechanisms' effect in developing countries are required to answer this issue.

adaptation issues higher on the policy agenda in the future, and that they are willing to pay for higher transfers of adaptation funds as a result of strong concern for the negative consequences that climate changes might inflict.

An adaptation protocol might be a solution that can attract membership in a future, multi-stage climate regime from both developed and developing countries.

## **5 Overall conclusions and policy advice**

A multi-stage approach based on the CR index is interesting as an indicator for capacity to deal with climate policy commitments. However, the original CR index is not flexible enough for the purpose of differentiating between the countries of the world and graduating participation in a future staged climate regime since very different countries are placed at the same stage.

We have assessed a number of modifications to the original CR index and have tried to find a more promising basis for differentiation and graduation of non-Annex I-countries. The emphasis has been on political feasibility. We have assumed that placement of industrialized countries in stage 3 (with absolute emission reduction targets) and least developed countries in stage 1 (with no commitments to reduce emissions) would lead to the highest level of political feasibility. Some improvements in terms of political feasibility have been achieved. The CR index and variants explored are capable of pinpointing important differences between countries, especially in the G77/China group. According to our assessment of political feasibility, the most promising cases are case 4 (original CR index with HDI grouping), case 7 (normalized CR index with governance), and case 8 (normalized CR index with governance and institutional affiliation).

The most likely candidates among non-Annex I countries for near-term graduation to stage 3 are Singapore, Taiwan, South Korea, Cyprus, Israel, Mexico, Argentina, Chile, and Uruguay. We believe it is less likely that OPEC countries will accept placement in stage 3, but possibly in stage 2.

Although the multi-stage approach is promising in many aspects, it may be too complicated for direct use in the multilateral climate negotiations. Therefore there may be need for a simpler model which is easily accessible for all Parties.

Given the political feasibility limitations of the multi-stage approach, additional elements that add flexibility could be useful. Adaptation to climate change is a climate policy-related element that is of interest in this context. A direct link between a multi-stage agreement and adaptation is difficult. Instead we find that a separate protocol on adaptation is a better choice.

A realistic strategy for Norway is to support flexible agreements for future action in upcoming negotiations, and among these a staged approach as explored in this study. On a bilateral note, Norway should engage in discussions with the most likely candidate countries among the non-Annex I group to enter stage 3 and take on absolute emission reduction commitments. In these discussions, provisions for these countries taking up more binding commitments as part of a global climate action should be explored, both with regard to timing, type of commitments, differentiation of commitments, and relations to adaptation policies and support from Annex I countries.

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**Table A.1. CR index values for all countries in three cases**

Country	Case 1	Case 3	Case 7	Country	Case 1	Case 3	Case 7
Qatar	93.65	101.98	71.90	South Africa	19.06	25.72	30.68
<b>Luxembourg</b>	79.68	89.01	76.30	Palau	18.70	21.43	n.a.
<b>United States of America</b>	58.17	67.56	61.42	Libya	17.54	25.48	17.59
United Arab Emirates	52.86	61.10	49.55	Turkmenistan	17.43	24.95	17.13
<b>Australia</b>	52.85	62.31	59.71	Botswana	16.72	22.61	33.93
<b>Canada</b>	50.30	59.73	58.39	Uruguay	16.37	24.70	33.99
<b>Ireland</b>	49.79	59.15	57.70	Malaysia	16.04	23.97	28.40
<b>Norway</b>	47.61	57.17	56.59	Kazakhstan	15.99	23.65	21.51
Kuwait	46.18	54.56	45.49	<b>Croatia</b>	15.50	23.80	28.01
<b>Denmark</b>	42.47	51.79	55.10	Venezuela	15.46	23.24	21.07
<b>Netherlands</b>	41.93	51.35	55.79	<b>Ukraine</b>	15.10	22.87	19.28
<b>Belgium</b>	41.66	51.08	49.90	Chile	14.56	22.95	35.07
Bahrain	40.78	49.21	40.52	<b>Bulgaria</b>	14.44	22.40	26.46
<b>Iceland</b>	40.18	49.59	54.82	Saint Kitts & Nevis	14.24	22.68	n.a.
<b>New Zealand</b>	39.58	48.84	52.34	Mexico	14.08	22.10	25.85
Brunei*	39.24	47.91	41.72	<b>Lithuania</b>	13.83	22.25	28.73
<b>Finland</b>	38.98	48.33	54.56	Mauritius	13.57	21.42	32.72
<b>Germany</b>	38.89	48.14	51.39	Iran	13.15	20.47	20.75
<b>Austria</b>	38.73	48.07	52.04	<b>Belarus</b>	13.06	20.96	16.89
Singapore	38.52	47.54	52.74	Mongolia	13.03	19.71	27.65
<b>Japan</b>	37.06	46.44	47.88	<b>Latvia</b>	12.55	20.78	27.75
<b>Switzerland</b>	36.84	46.20	53.52	Brazil	12.53	20.28	25.32
<b>United Kingdom</b>	36.74	46.10	51.42	Costa Rica	11.99	20.33	32.56
<b>Italy</b>	35.16	44.36	43.82	Macedonia FYR	11.89	19.82	19.42
<b>France</b>	34.99	44.31	46.46	<b>Romania</b>	11.73	19.51	22.59
<b>European Union (25)</b>	33.64	42.64	46.28	Suriname	11.66	19.46	23.14
Equatorial Guinea	32.55	39.58	n.a.	Gabon	11.54	18.02	20.23
<b>Sweden</b>	32.51	41.97	49.88	Namibia	11.31	17.38	28.87
Israel	32.01	41.09	41.18	Belize	11.19	18.56	28.37
<b>Spain</b>	30.30	39.52	45.28	<b>Turkey</b>	11.12	18.63	20.60
Antigua & Barbuda	29.74	37.74	n.a.	Seychelles	11.04	19.57	n.a.
<b>Greece</b>	29.13	38.15	40.36	Thailand	10.89	18.57	25.40
<b>Czech Republic</b>	29.02	37.70	38.99	Congo	10.88	15.82	13.79
Cyprus	28.53	37.36	41.71	Panama	10.35	18.26	25.61
Saudi Arabia	28.27	35.95	31.46	Korea (North)	10.34	13.07	15.28
<b>Estonia</b>	27.58	36.11	39.92	Colombia	10.02	17.75	18.20
Taiwan*	27.55	36.57	n.a.	Dominican Republic	9.93	17.31	24.63
<b>Slovenia</b>	27.27	36.22	40.18	Tunisia	9.73	17.18	28.95
Korea (South)	27.00	35.88	37.00	Paraguay	9.64	17.15	15.38
<b>Portugal</b>	25.85	34.82	41.86	Tonga	9.58	17.45	n.a.
Trinidad & Tobago	25.77	33.78	36.07	Guyana	9.43	16.62	22.68
Oman	25.58	33.28	36.56	Algeria	9.14	16.18	14.18
Malta	23.03	31.78	36.85	Saint Lucia	9.08	16.85	n.a.
Bahamas	22.58	30.73	37.83	Jamaica	8.86	16.50	23.63
Nauru	21.63	24.36	n.a.	Uzbekistan	8.86	15.95	13.65
Barbados	21.38	30.26	n.a.	Jordan	8.78	16.28	25.53
<b>Russian Federation</b>	20.98	28.93	21.83	Fiji	8.60	16.18	23.69
<b>Slovakia</b>	20.57	28.99	32.82	Lebanon	8.44	16.02	20.32
<b>Hungary</b>	20.29	28.77	35.93	Dominica	8.35	15.78	n.a.
Argentina	20.17	28.70	30.72	China	8.12	15.57	20.22
<b>Poland</b>	20.15	28.65	33.78	Azerbaijan	8.09	15.55	15.51

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Grenada	8.03	15.48	n.a.	Cameroon	3.68	8.69	14.53
Serbia & Montenegro	7.94	10.67	15.54	Senegal	3.50	7.87	17.59
Syria	7.81	14.91	15.11	Niue	3.30	6.03	n.a.
Cambodia	7.54	13.22	21.04	Guinea	3.24	7.49	16.65
Vanuatu	7.42	13.12	n.a.	Mali	3.18	6.44	16.25
Peru	7.42	14.94	20.77	Chad	3.14	6.93	n.a.
Saint Vincent & Grenadines	7.13	14.64	n.a.	Kyrgyzstan	3.07	10.08	13.84
Bolivia	6.93	13.74	19.43	Ghana	3.06	8.74	18.93
Swaziland	6.84	12.03	21.42	Laos	2.92	8.26	13.27
Mauritania	6.80	11.45	14.89	Burkina Faso	2.88	5.90	15.44
Maldives	6.79	14.31	n.a.	Madagascar	2.84	7.53	16.08
Cuba	6.76	14.85	16.27	Gambia	2.81	7.33	19.62
El Salvador	6.73	13.93	22.19	Kenya	2.73	7.61	11.87
Iraq*	6.70	9.43	5.55	Nepal	2.73	7.77	15.06
Ecuador	6.61	13.96	15.84	Togo	2.69	7.64	11.24
Egypt	6.41	12.94	21.16	Solomon Islands	2.59	8.83	n.a.
Samoa	6.07	13.76	n.a.	Cote d'Ivoire	2.58	6.57	12.36
Guatemala	5.86	12.35	16.00	Zambia	2.58	6.47	15.87
Bosnia & Herzegovina	5.82	13.63	15.29	Bangladesh	2.57	7.66	15.06
Philippines	5.80	13.33	20.21	Haiti	2.55	7.18	9.98
Albania	5.73	13.54	16.37	Uganda	2.44	7.37	12.74
Morocco	5.72	11.92	22.94	Comoros	2.34	7.64	n.a.
Indonesia	5.46	12.38	13.50	Tanzania	2.27	6.34	16.44
Cape Verde	5.27	12.44	n.a.	Tajikistan	2.23	8.94	7.57
Bhutan	5.19	10.55	n.a.	Yemen	2.22	7.04	12.03
Cook Islands	5.09	7.82	n.a.	Benin	2.18	6.39	n.a.
Nicaragua	5.06	11.73	17.07	Guinea-Bissau	2.16	5.66	9.87
Zimbabwe	4.94	9.85	10.06	Nigeria	2.12	6.78	10.78
Sri Lanka	4.94	12.34	17.03	Kiribati	1.92	4.65	n.a.
Armenia	4.90	12.44	14.70	Sao Tome & Principe	1.91	8.36	n.a.
Sudan	4.79	9.84	8.92	Niger	1.89	4.81	12.40
Honduras	4.61	11.33	16.84	Liberia	1.87	4.60	10.44
Djibouti	4.48	9.02	n.a.	Mozambique	1.83	5.37	17.82
Georgia	4.35	11.74	14.51	Myanmar	1.71	7.22	7.02
India	4.34	10.29	20.21	Ethiopia	1.66	5.25	12.95
Central African Republic	4.21	7.82	n.a.	Rwanda	1.66	5.97	n.a.
Pakistan	3.97	8.94	13.52	Afghanistan	1.58	4.31	1.34
Lesotho	3.97	8.90	n.a.	Sierra Leone	1.25	3.98	8.99
Papua New Guinea	3.97	9.39	15.27	Malawi	1.18	5.06	17.03
Angola	3.96	7.77	7.01	Congo Dem. Republic	1.12	4.77	0.53
Moldova	3.93	10.74	14.36	Burundi	1.07	4.46	7.67
Vietnam	3.82	10.73	15.29	Eritrea	1.06	5.45	n.a.

**Annex I countries in bold.**

**n.a.: not available since countries lack the governance index indicator.**