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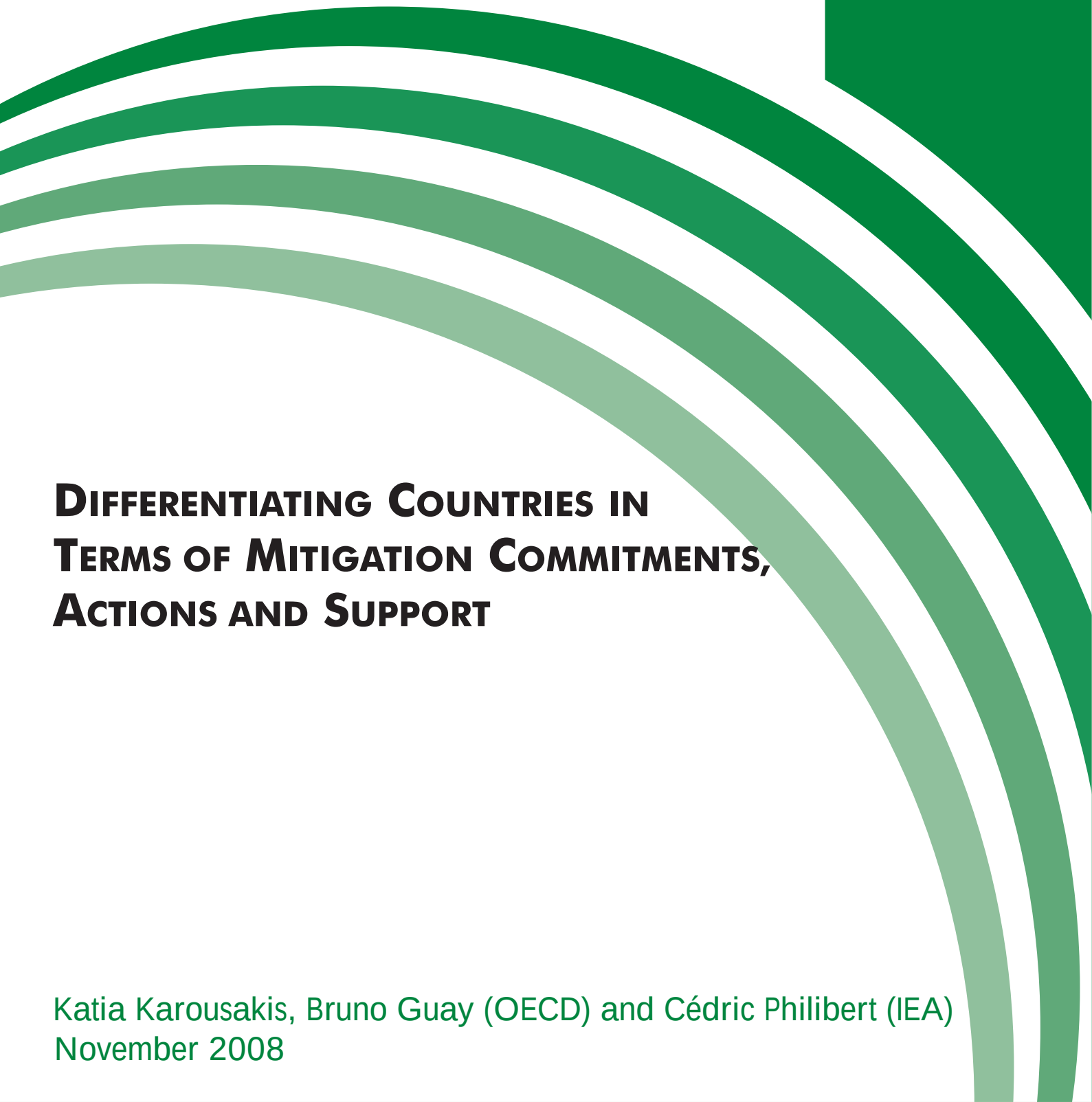

Differentiating Countries in Terms of Mitigation Commitments, Actions and Support

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The ideas expressed in this paper are those of the authors and do not necessarily represent views of the OECD, the IEA, or their member countries, or the endorsement of any approach described herein.

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FOREWORD

This document was prepared by the OECD and IEA Secretariats in Autumn 2008 in response to the Annex I Expert Group on the United Nations Framework Convention on Climate Change (UNFCCC). The Annex I Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. In a collaborative effort, authors work with the Annex I Expert Group to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the Annex I Expert Group. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

The Annex I Parties or countries referred to in this document are those listed in Annex I of the UNFCCC (as amended at the 3rd Conference of the Parties in December 1997): Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, the European Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States of America. Korea and Mexico, as OECD member countries, also participate in the Annex I Expert Group. Where this document refers to "countries" or "governments", it is also intended to include "regional economic organisations", if appropriate.

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All OECD and IEA information papers for the Annex I Expert Group on the UNFCCC can be downloaded from: **www.oecd.org/env/cc/aixg**

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Significant cuts in global greenhouse gas emissions are needed to meet the objectives of the United Nations' Framework Convention on Climate Change. This will require enhanced climate change mitigation action in both developed and developing countries (IPCC, 2007; OECD, 2008). The Bali Action Plan calls for enhanced national/international action on mitigation of climate change, bearing in mind different circumstances of developed and developing countries.

This paper examines approaches to differentiation to inform policy-making for a post-2012 climate change regime. In principle, differentiation seeks to reflect the different national circumstances across countries to ensure equitable climate change mitigation policy. First and foremost, this paper explores various indicators that could be used for the purpose of differentiating countries, and how such indicators could be combined if Parties wished to create various country categories, associated with different levels of mitigation effort. Given the aim to enhance and promote national/international action in developed and developing countries to mitigate climate change, this paper also briefly discusses what may be considered nationally appropriate in terms of mitigation commitments, actions and support, and how these may evolve as national circumstances change over time.

Differentiation can thus be used to inform climate policy-makers on three issues:

- Possible country groupings based on national circumstances;
- The appropriateness of different types (and stringencies) of mitigation commitments or actions in a post-2012 climate change regime; and
- The eligibility of different countries to various types of support for mitigation actions.

A number of differentiation frameworks have been proposed in the literature. These vary in terms of the indicators proposed for differentiation; the number of differentiated categories; the levels of thresholds for graduation between one category to another; and the actions and support associated with each. The proposals reviewed are based on between one to as many as six combined indicators for differentiation. The most common indicators are GDP per capita and GHG emissions per capita. The number of differentiated categories proposed ranges from two to seven.

This paper takes two broad approaches to differentiation. The first examines possible definitions of "developed" and "developing" countries and the impacts of these on the composition of countries in either group. The second examines differentiation across all countries, based on indicators that may be considered relevant to reflect national circumstances pertinent to climate change.

None of the indicators *individually* is able to reflect the multiple principles laid out in Article 3 of the UNFCCC, including that of equity and "common but differentiated responsibilities and respective capabilities". Multiple principles can be better reflected with composite indicators. This paper constructs a range of scenarios to analyse the effects of different combinations of indicators on the ranking of countries. Depending on how the scenarios are constructed, they can be used to inform on one or more of the three differentiation issues outlined above. If the scenarios result in fairly robust rankings, then this can inform how a differentiation framework for mitigation commitments, actions and support could be set up.

How countries may be differentiated is inherently related to how one could consider linking such a framework to a graduation of actions and commitments as national circumstances change over time. Countries could graduate from one level (or category) of commitments and actions to another, thereby

creating a directional pathway for deeper and more ambitious emission reduction objectives over time. Graduation may also be important to target support resources most effectively, to ensure that the often limited resources reach those countries that need it the most. For example, as countries enhanced their mitigation actions and commitments, and may no longer be eligible for particular types of mitigation support, a relatively larger pool of support resources could become available for a smaller set of countries.

A possible framework for differentiating mitigation commitments, actions and support across all countries, and graduating from one category to another, might incorporate the following considerations:

- Allow progressively greater flexibility in the types of mitigation actions as countries go down the differentiation scale.

- Ensure that a country could, at any time, take on more ambitious types and levels of mitigation commitments and actions in a higher tier of the differentiation framework.

- Include possible sunset clauses or thresholds for when a country would no longer be deemed eligible for a particular type of support.

- Be flexible, to account for changing national circumstances over time.

1. Introduction

The Bali Action Plan (BAP), adopted at COP-13, is expected to lead to the adoption at COP-15/CMP5 (Copenhagen, 2009) of an agreement to enable "full, effective and sustained implementation" of the UN Framework Convention on Climate Change (UNFCCC) up to and beyond 2012.

Paragraph 1b of the BAP calls for (emphasis added) …"enhanced national/international action on mitigation of climate change, including consideration of:

> (i) Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances;
>
> (ii) Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.

The BAP also calls for consideration of "Various approaches, including opportunities for using markets, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries".

In accordance with Article 3.1 of the UNFCCC, Parties should protect the climate system "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities". These principles also relate to the concept of "a shared vision" for long-term cooperative action, as called for in the Bali Action Plan, and require answers to difficult questions, namely: What are the greenhouse gas (GHG) emissions goals we are striving for and the timeframes for achieving them; where will emission reductions take place; who will bear the cost of emission reductions over time and how will the framework be set up to achieve these (i.e. what, when, where, who, how)?

This paper examines approaches to differentiation frameworks that could be used to inform policy-making for a post-2012 climate change regime. In principle, differentiation seeks to reflect the different national circumstances across countries to ensure equitable climate change mitigation policy. Given the aim to enhance and promote national/international mitigation action of climate change in developed and developing countries, this paper also briefly explores what may be considered nationally appropriate mitigation commitments, actions and support, and how these may evolve as national circumstances change over time.

Differentiation can thus be used to inform climate policy-makers on three issues:

- Possible country groupings based on national circumstances
- The appropriateness of different types (and stringencies) of mitigation commitments or actions in a post-2012 climate change regime
- The eligibility of different countries for various types of support for mitigation actions.

1.1 Background

Under the UNFCCC, countries are differentiated into three broad categories: Annex I (AI) Parties, Annex II (AII) Parties and all other Parties[1]. AI Parties comprise the member countries of the OECD in 1992 (when the UNFCCC was negotiated) and countries with Economies in Transition. AI Parties agreed to GHG mitigation commitments (as specified under Article 4.2b). Annex II Parties (a sub-set of AI countries, consisting of the OECD countries) agreed to *additional* commitments to provide finance and facilitate transfer of technology to developing countries as well as to provide financial assistance for capacity building and for adaptation (Articles 4.3, 4.4 and 4.5). The Kyoto Protocol (KP) further differentiated AI/B Parties[2] by assigning different quantified emission limitation or reduction objectives (QELROs). These ranged from -8% to +10% against 1990 levels over the 2008-2012 commitment period[3].

This differentiation framework was adopted in 1992, and continued in 1997, for the UNFCCC and KP respectively, based on national circumstances prevalent at that time. Over the course of nearly two decades, there have been significant changes in terms of emissions growth, economic development, and technological and institutional progress within and between the groups of countries established in the UNFCCC. There is hence today an increasingly large heterogeneity in national circumstances both *across* developed and developing countries, as well as *within* developed and developing countries. Ideally, a post-2012 climate change framework would need to reflect these differences so as to distribute mitigation action and support in the most effective, efficient and equitable manner possible.

This is important because achieving the transition to a low-carbon economy in order to meet the objectives of the Convention will be a significant challenge. Any ambitious mitigation target will necessarily require participation of all major economies due to the relatively rapid pace of emissions growth and overall scale of their contributions to global emissions in the future. For example, reducing or even eliminating greenhouse gas (GHG) emissions in AI countries, which accounted for 48% of global emissions in 2005 (OECD 2008), will not suffice to stabilise GHG concentrations or global emissions. GHG emissions from Non-Annex I (NAI) countries alone are projected to reach 49 $GtCO_2e$ by 2050 under the Baseline Scenario of the OECD ENV-Linkages Model (OECD 2008) – an emission level higher than the global GHG emissions in 2005 (39 $GtCO_2e$). Enhancing the cost-effectiveness of GHG mitigation actions is an integral part of making the UNFCCC objectives achievable. Indeed, there is still significant, and as yet untapped, scope for further low-cost mitigation action in developing countries (IPCC, 2007). Moreover, delaying mitigation action in developing countries entails a risk of locking in irreversible paths of GHG emissions (due to investments in primary capital equipment and infrastructure) for decades to come.

Broader climate change mitigation action by countries matters for at least two other reasons. The first is the risk of GHG leakage, i.e., that emission cuts in a limited number of participating countries might be partly offset by increases elsewhere, for example due to relocation of activities from zones with climate change policies to those without[4]. Though the magnitude of carbon leakage remains uncertain, most estimates

[1] Within these broad categories, further differentiation is noted for Economies in Transition (e.g. Article 4, para. 6) and Least Developed Countries (e.g., Article 4, para. 9).

[2] Annex B of the KP lists the commitments taken by all countries under Annex I of the UNFCCC, with the exception of Belarus and Turkey.

[3] The EU burdensharing agreement reallocated the aggregate EU target of -8% amongst its member countries, ranging from -28% (Luxembourg) to + 27% (Portugal).

[4] Carbon leakage can also occur without full relocation – i.e. if carbon constrained zones loose international market shares to the advantage of other zones without. Carbon leakage can also occur for other reasons, such as lower international fossil fuel prices, which result from the fall in world demand for fossil fuels, and lead to more fossil-fuel intensive production in countries not participating in emission reductions.

range in the order of 5 to 20% in the case of the KP (IPCC, 2007): in the worst-case scenario, a fifth of all reductions achieved in a region would be offset by higher emissions occurring elsewhere[5]. The second reason is fairness in economic competition: mitigation measures taken by Parties can be perceived to provide an economic advantage to competing sectors in countries that do not take mitigation measures, i.e. through lower relative production cost of energy-intensive, trade-exposed sectors in unconstrained countries. Such a phenomenon could inhibit the extent and ambition of further mitigation commitments and actions of developed countries.

1.2 Scope, aim and approach

This paper focuses on national circumstances in developed and developing countries and the implications of these national circumstances for possible differentiation frameworks for climate change mitigation commitments and actions, as well as support. A greater common understanding of possible differentiation approaches may facilitate agreement on a post-2012 framework by enhancing transparency. Though ultimately how the post-2012 climate change regime develops will be determined by political negotiations, analysis of possible frameworks for differentiation can help to inform the policy-making process. The purpose of this paper is analysis of technical issues; it does not attempt to recommend any one particular approach to differentiation nor does it discuss whether the establishment of specific differentiation criteria or methodologies might be feasible in the negotiations.

The aim of this paper is thus two-fold: First, to systematically examine how countries compare based on different criteria or indicators of national circumstances that may be deemed relevant for differentiation. Second, to consider how national circumstances could relate to possible mitigation commitments, actions as well as enabling support in terms of technology, financing and capacity building.

The paper is organised as follows: Section 2 provides a brief overview of the differentiation indicators that have been proposed in the recent literature; the thresholds that have been suggested; and the mitigation actions and support associated with each. Section 3 explores two broad approaches to differentiation. The first examines possible definitions of developed and developing countries and the impacts of country grouping on these. The second examines differentiation across all countries. It assesses indicators that may be relevant for differentiation and proceeds to examine (i) how the use of different combinations of indicators affect the ranking of countries; and (ii) how robust the ranking is. In section 4, different commitments, actions, and support are considered. Section 5 concludes.

[5] More recently, OECD (2008) simulation analysis does not show much leakage of industrial activity, energy use and CO_2 emissions from the OECD to other parts of the world.

2. Overview of Differentiation Proposals

A number of differentiation frameworks for mitigation action and support, also called multi-stage approaches (see Gupta, 1998; Berk and den Elzen, 2001), have been proposed to date. The central question of a multi-stage approach is how to differentiate between countries in terms of the timing and stringency of mitigation commitments/actions. Recent literature on this issue, in terms of the indicators proposed for differentiation, the thresholds for graduation, and the mitigation commitments/actions associated with each group[6] is summarised in Table 1.

Indicators for national circumstances that have been proposed for differentiation are:

- Total national GHG emissions
- Emissions per capita
- Share of global emissions
- Proportion of world average per capita emissions[7]
- Emissions per GDP
- Emission growth rate
- GDP per capita
- Human Development Index (HDI)
- Cumulative emissions
- Climate vulnerability indicator
- Institutional indicators.

The proposals for differentiating countries vary in terms of the indicators they use, the number of thresholds proposed and the types of actions associated with each. The proposals reviewed here rely on one to as many as six combined indicators for differentiation. The most common indicators are emissions per capita and GDP per capita. The number of categories proposed for differentiating commitments/actions and support range between two and seven. Moreover, the mitigation actions associated with different thresholds vary in terms of the level of detail provided, the level of ambition associated with each category, and the type of actions proposed. All the proposals focus on mitigation while some also discuss differentiation for support.

Table 1 thus illustrates the wide range of possible indicators and approaches that could be used for differentiation.

[6] Further information on these proposals is provided in Annex 1.

[7] This aims to accommodate the change over time in the average per capita emission levels (see den Elzen et al 2006). This has two advantages: (1) it helps ensures timely participation of developing countries to keep total emissions below a global emission ceiling for meeting stabilisation targets, and (2) it rewards Annex I action by bringing the threshold-level down.

Table 1: Summary of Differentiation Proposals

Source	Indicators for Differentiation	Categories	Graduation Thresholds	Mitigation Actions and Support	Examples of Countries/ Regions in these Categories
Ott et al. 2004	Emissions per capita Emissions per GDP Emission growth rate GDP per capita HDI Cumulative emissions since 1990	6	Thresholds set in terms of standard deviation from mean of index. • Annex II • Annex I but not Annex II • Newly Industrialised Countries (NICs) • Rapidly Industrialised Developing Countries (RIDCs) • Other Developing Countries (ODCs) • Least Developed Countries (LDCs)	Domestic action dependent on mitigation potential Financial support dependent on responsibility and capability Annex II EU15: 30% reduction below 1990 levels by 2020 Annex II Others: 15% reduction below 1990 levels by 2020 AI but not II: 20% reduction below 1990 levels NICs: 30% reduction below reference level RIDCs: 10% reduction below reference level ODCs and LDCs: Follow reference level	Annex II: USA, Japan, Germany, Canada, EU Annex I but not Annex II: Russia, Ukraine, Poland, Romania NICs: Korea, Saudi Arabia RIDCs: China, Brazil, Mexico, Iran, South Africa ODCs: India, Indonesia, Pakistan, Venezuela LDCs: Bangladesh, Sudan, Myanmar
Hoehne et al. 2005 *****results summarised here are from the 550 ppmv stabilisation, long-term (2100) scenario	Emissions per capita	4	• Stage 1 to 2: 4-8 tCO_2e/capita • Stage 2 to 3: 6-10 tCO_2e/capita • Stage 3 to 4: 9-12 tCO_2e/capita Ranges in emissions per capita are due to the use of different reference scenarios.	Stage 1: No commitments Stage 2: (Enhanced sustainable development) 5% below projected baseline within 10 years Stage 3: (Moderate absolute target) 10-15% further reduction below baseline within 10 years Stage 4: Absolute reductions to 1.5-4 tCO_2e/capita	Stages aiming at 550ppmv in the long-term (2100) Stage 2: Indonesia (2.3), India (2.5) Stage 3: Brazil (3.8) Stage 4: China (4.0), Mexico (4.2), South Korea (4.5), Saudi Arabia (4.7), Singapore (4.7), Annex I (4.7)
Torvanger et al. 2005	Capacity-Responsibility (CR) index HDI Governance index Institutional affiliation index	3	Stage 1: Low GDP and emissions per capita Stage 2: Medium GDP and emissions per capita Stage 3: High GDP and emissions per capita	Stage 1: No commitments Stage 2: Limit emissions relative to GDP Stage 3: Emission reduction targets	Stage 1: LDCs Stage 2: OPEC countries Stage 3: Singapore, Taiwan, South Korea, Cyprus[8], Israel, Mexico, Argentina, Chile, Uruguay.

[8] **On behalf of Turkey:** The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus" issue. On behalf of **all the European Union member states of the OECD and the European Commission:** The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source	Indicators for Differentiation	Categories	Graduation Thresholds	Mitigation Actions and Support	Examples of Countries/ Regions in these Categories
Michaelowa et al. 2005	Emissions per capita GDP per capita Institutional thresholds	4	Graduation index above Annex B average Graduation index above lowest Annex II Graduation index above lowest Annex B Large emitters below graduation index threshold	-6% reduction below 1990 levels -3% reduction below 1990 levels Stabilize at 2012 level Country-wide CDM	
Den Elzen et al. 2006	Emissions per capita GDP per capita -(combined in a Capability–Responsibility [CR] index) Percentage of world average emissions per capita	3	• Stage 1 to 2: 550ppm scenario CR = 5 650ppm scenario CR = 12 • Stage 2 to 3 : A) Percentage of world-average per capita emissions 550ppm scenario = 100% 650ppm scenario = 120% *or* B) CR-index value 550ppm scenario = 12 650ppm scenario = 20	Stage 1: No commitments Stage 2: Emission (growth) limitation targets (intensity based targets or prescribed slow-down in the emissions growth to stabilization) Stage 3: Emission reduction targets (burden sharing key: GHG/cap)	
IGES 2008	Emissions per capita Share of global emissions HDI Climate vulnerability indicator (CVI)	7	*Developed Countries* Group A: > 4tCO_2e emissions per capita and HDI > 0.9 Group B: EIT countries with HDI b/w 0.75 and 0.9 (e.g. Russia) *Developing Countries* Group 1: >4tCO_2e emissions per capita and HDI > 0.9 Group 2: HDI >0.75 and >1% global emissions Group 3: HDI <0.75 and >1% global emissions Group 4: HDI > 0.75 and <1% global emissions, per capita emissions >2tCO2e, and high climate vulnerability Group 5: HDI < 0.75 (mainly LDCs) low gross national emissions, low per capita emissions, high climate vulnerability	Group A: Strong international and national commitments for mitigation and adaptation (assistance) Group B: Substantial national and limited international commitments for mitigation (e.g. Group A and B together 25-40% reduction by 2020; 60-80% reduction by 2050) Group 1: National commitments for mitigation Group 2: National commitments for mitigation e.g. sectoral EE targets by 2020 supported by technology and financial flows Group 3: Strengthen EE and RE goals, fuel economy for automobiles etc during 2013-2020. Targets in 1-2 sectors with international support. Group 4: No mitigation commitments. Adaptation commitments Group 5: Eligible for all types of incentives primarily adaptation	Group A: Japan Group B: Russia Group 1: Korea, Mexico, Singapore Group 2: China Group 3: India Group 4: Fiji Group 5: Bangladesh

Source	Indicators for Differentiation	Categories	Graduation Thresholds	Mitigation Actions and Support	Examples of Countries/Regions in these Categories
Egenhofer et al. 2008	Emissions Emissions per capita No differentiation for globally trading energy intensive industries with common technology and natural resource endowments (triptych like approach)	3	Category 1: 13.5 t/CO_2 average emissions per capita in 2005 Category 2: Above 3t/CO_2 emissions and 5.5 t/CO_2 emissions per capita Category 3: Below 1t/CO_2 average emissions per capita	Category 1 and 2: Most of the global mitigation effort and massive contributions to multilateral climate change funding Category 3: SD-PAMs	US: 32% EU: 25% China: 7% reductions by 2025 for a 2 degrees pathway.
Mexico (2008)	GHG emissions -current -contribution to increasing temperatures -cumulative from 1990 Population -per capita emissions GDP -GDP per capita	N/A	Not explicit. Greater capacity implies greater contribution. To be reached by consensus Voluntary opt-in	Funds for mitigation action, adaptation, technical assistance and technology transfer Mitigation actions proposed: Grey agenda: energy efficiency in various sectors, renewable energy, GHG capture and storage. Green agenda: reducing emissions from deforestation and forest degradation, afforestation, reforestation, revegetation.	N/A
Stern (2008)		3	Developed countries Developing countries Fast growing middle-income developing countries		Developed countries: 20-40% emission reductions by 2020 from 1990 levels; at least 80% by 2050 Developing countries: Binding national targets by 2020. Until then, one-sided selling. Fast growing middle income developing countries: Immediate action (sectoral or national targets) before 2020

Source	Indicators for Differentiation	Categories	Graduation Thresholds	Mitigation Actions and Support	Examples of Countries/Regoins in these Categories
Japan (2008)	-GDP per capita -GHG emissions per capita -HDI -GHG emissions per GDP -Share of the country's GHG emissions in the world -Contributions to historically accumulated GHG emissions / future GHG emissions -Industrial structure, energy composition -Population, demographics -Natural and geographical characteristics (including land area and climate conditions such as temperature, etc.)	4	Category 1: Annex I + (i) OECD member countries, (ii) countries that are not OECD members but whose economic development stages are equivalent to those of the OECD members, and (iii) countries which do not satisfy the conditions of (i) and (ii), but which voluntarily wish to be treated as Annex I country. Category 2: developing countries which are expected to take further mitigation actions, based on their economic development stages, response capabilities, shares of GHG emissions in the world, etc Category 3: developing countries whose emissions are small and which are vulnerable to adverse effects of climate change, especially LDCs and SIDS Category 4: other developing countries	Category 1: QELROs ensuring comparability of effort based on potential using sectoral approach Category 2: - Binding targets for "GHG emissions per unit" or "energy consumption per unit" in major sectors (e.g. power generation, iron and steel, cement, aluminium and road transport). - Binding targets for economy-wide "GHG emissions per GDP" or "energy consumption per GDP", taking into consideration national circumstances. -Establish MRV system -Submit its voluntary national action plan (PaMs) to COP -Support in the form of sectoral crediting and support for private sector investment in technology. Category 3 and 4: -Submit its voluntary national action plan (PaMs) to COP -Specific adaptation support for category 3	

Note: The CVI used is developed by the Oxford Centre for Water Research and is an extension of the Water Poverty Index.

3. Assessment of Indicators and Implications for Differentiation

A number of different approaches can be envisioned to differentiate countries in terms of what may be considered nationally appropriate mitigation commitments, actions and support. Section 3.1 examines the notion of differentiation between developed and developing countries and the impacts of possible definitions on country groupings. Section 3.2 examines differentiation across all countries, based on possible indicators that could be used to reflect national circumstances.

3.1 Differentiating Between Developed and Developing Countries

The only differentiation benchmark that is currently agreed with respect to taking on climate change mitigation action is that provided by the group of AI/B Parties when they adopted nationally binding fixed emission commitments. This categorisation was based on a concept of industrialisation that existed in 1990 and focused primarily on GDP per capita. This list has been subject to criticism, reflecting that some countries not included in AI have a higher per capita income than some countries on the list.

If the concept of industrialisation were applied today based on standards used in 1990 (the latest data that would have been available when deciding which countries should be included in AI of the UNFCCC), NAI Parties such as Bahrain, Israel, Kuwait, Singapore, South Korea, and United Arab Emirates, whose levels of GDP per capita are above mean AI GDP per capita in 1990 (i.e., USD 18,800[9]) would qualify for national binding fixed emission reduction commitments. Alternatively, if the threshold adopted were that of the lowest GDP per capita level of an AI country in 2005 (i.e., USD 6,092 constant 2000 per capita of Ukraine), then a broader group of NAI Parties would be eligible for mitigation commitments including Argentina, Botswana, Brazil, Chile, South Africa, and Thailand, among others (see Table 2).

Another approach to differentiation would be to take guidance from language in the Bali Action Plan which calls for nationally appropriate mitigation action, based on national circumstances of developed and developing countries. Developing countries have not hitherto been defined in the UNFCCC context and different countries could be classified as either developed or developing depending on which definition is used. These could include:

- "**Adjusted UNFCCC**": AI countries defined as the 24 -now 30- members of the OECD as well as countries with economies in transition to a market economy. All but two of the six new OECD countries since 1992 are already in AI (i.e. Slovakia, Poland, Hungary, and Czech Republic vs. Mexico and Korea).

- "**Adjusted Kyoto Protocol**": This would include the same countries as those in the "adjusted UNFCCC" category above, with the exception of Turkey and Belarus (which are not included in Annex B because they had not ratified the Convention by the time the Kyoto Protocol was agreed);

- "**High human development**": the UN Development Programme (UNDP) ranks different countries according to their level of human development based on a Human Development Index (HDI). In the 2007 UNDP Human Development Report (UNDP, 2007), 71 countries were listed as having "high human development" (HDI of 0.8 or above). The index is updated every year to reflect changing circumstances of countries over time. For example, in 2005, 57 countries were listed as high HDI countries whereas 46 countries were listed in 2000.

[9] Calculated using 2000 dollars and purchasing power parities.

- **"High income economies"**: The World Bank classifies countries into 4 main categories based on 2007 Gross National Income (GNI)[10] per capita: High-income, upper-middle-income, lower-middle-income, and low-income. A fifth category is that of LDCs, as defined by UNCTAD (see Table 3). There are 65 countries in the high-income category. Most AI countries appear in the first category, with several others in the upper-middle-income and lower-middle-income category.

- **UNCTAD definition**: The UN Conference on Trade and Development (UNCTAD) (2005) classifies countries into three main groups: (i) Developed; (ii) South-East Europe and Commonwealth of Independent States (CIS); and (iii) Developing Countries[11]. Developing countries are further separated into three groups according to their 2000 per capita current GDP: high-income, middle-income and low-income developing countries. The high-income developing country group is classified as all countries not in (i) and (ii), with 2000 per capita current GDP above USD 4,500. No maximum GDP per capita threshold is specified above which countries are no longer considered developing.

Table 2 indicates which countries would fall under each of these approaches and definitions.

A binary approach for differentiation of countries (i.e. developed and developing), which follows the precedent of the UNFCCC and the KP, is one possible approach for identifying which countries might be considered eligible for specific commitments or actions, for example QELROs. As mentioned above, the KP further differentiated AI/B countries to identify the stringency/ambition of these QELROs for the 2008-2012 commitment period in order to address the heterogeneity in national circumstances within this AI/B group. Hence, under such an approach, the stringency/ambition of QELROs for any new countries considered developed could therefore be evaluated in tandem with criteria used to assess the stringency/ambition of post-2012 commitments for the current AI/B Parties.[12] All other countries would be classified as developing countries and would therefore be eligible, in accordance with the BAP, for taking on nationally appropriate mitigation actions. Given the large heterogeneity in national circumstances *within* developing countries, and the broad scope of mitigation actions that are feasible within these (discussed in section 4), different types of mitigation actions may be considered more appropriate for certain developing countries than for others.

[10] NB: GDP is a measure of national income and output for a given country's economy. GDP = consumption + investment + government expenditures + (exports – imports). In contrast, GNI includes net foreign income, rather than net exports, i.e. GNI includes the primary incomes receivable from non-resident units but does not include the primary incomes payable to non-resident units.

[11] UNCTAD has other categories as well, such as Newly Industrialised Economies, in which Korea, Singapore and Hong Kong (China) and Taiwan (China) fall in Tier 1, and Indonesia, Malaysia, Philippines and Thailand fall under Tier 2.

[12] For example, the European Parliament and Council proposal to share effort of the EU's unilateral emission reduction goal to 2020 compared to 2005 (which is -20%) uses GDP per capita to determine their emission limits (CEC, 2008).

Table 2: Possible definitions of "developed/developing" and their impact on country groupings

Definition of developed	**Annex I countries not included in this definition**	**Non-Annex I countries/territories included in this definition**
2005 GDP/capita above 1990 Annex I average	Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Slovak Republic, Turkey, Ukraine	Bahrain, Brunei Darussalam, Cyprus[13], Israel, Korea, Kuwait, Qatar, Singapore, United Arab Emirates
2005 GDP/capita above lowest 2005 Annex I country	N/A	Algeria, Argentina, Bahrain, Bosnia, Brazil, Brunei Darussalam, Botswana, Chile, Colombia, Costa Rica, Cuba, Cyprus, Dominican Republic, FYROM, Gabon, Gibraltar, Iran, Israel, Kazakhstan, Korea, Kuwait, Libya, Malaysia, Malta, Mexico, Namibia, Oman, Panama, Qatar, Saudi Arabia, Singapore, South Africa, Thailand, Trinidad and Tobago, Tunisia, Turkmenistan, United Arab Emirates, and Uruguay (as would Belarus and Turkey, who though Annex I in the UNFCCC, are not Annex B under the Kyoto Protocol).
Adjusted UNFCCC	--	Cyprus, Korea, Malta, Mexico
Adjusted Kyoto Protocol	Belarus, Turkey	Korea, Mexico
High human development in HDI* (2007/08)	Turkey, Ukraine	Albania, Antigua and Barbuda, Argentina, Bahamas, Bahrain, Barbados, Bosnia and Herzegovina, Brazil, Brunei Darussalam, Chile, Costa Rica, Cuba, Cyprus, Israel, Korea, Kuwait, Libya, Malaysia, Malta, Mauritius, FYROM, Mexico, Oman, Panama, Qatar, Saint Kitts and Nevis, Saudi Arabia, Seychelles, Singapore, Tonga, Trinidad and Tobago, United Arab Emirates, Uruguay
High human development in HDI* (2000)	Belarus, Bulgaria, Croatia, Lithuania, Romania, Russian Federation, Romania, Turkey, Ukraine	Antigua and Barbuda, Argentina, Bahamas, Bahrain, Barbados, Brunei Darussalam, Chile, Cyprus, Israel, Korea, Kuwait, Malta, Qatar, Singapore, Uruguay, United Arab Emirates
"High income economies" World Bank (2008)	Belarus, Bulgaria, Croatia, Lithuania, Poland, Romania, Russian Federation, Turkey, Ukraine	Andorra, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Bermuda, Brunei Darussalam, Cayman Islands, Channel Islands, Cyprus, Czech Republic, Estonia, Equatorial Guinea, Faeroe Islands, Greenland, Guam, Isle of Man, Israel, Kuwait, Liechtenstein, Malta, Monaco, Netherlands Antilles, Northern Mariana Islands, Oman, Puerto Rico, Qatar, San Marino, Saudi Arabia, Singapore, Trinidad and Tobago, Korea, Rep., United Arab Emirates, Virgin Islands (U.S.)
UNCTAD (2005)	Turkey	*No maximum GDP per capita threshold is specified above which countries are no longer considered developing therefore N/A*

* NB, this report does not present information for Lichtenstein or Monaco, so these countries are not included in this analysis. ** 1990 data not available (because data for the countries that made up the former Soviet Union are not available before 1992).

Source: adapted from Jane Ellis, personal communication, April 14 2008.

[13] See footnote 8 for all reference to Cyprus in this table.

Differentiating developing countries based on possible indicators of income or financial capacity is in line with the differentiation approach adopted under the UNFCCC and the KP (i.e., between AI and NAI countries). UNCTAD (2005) divides developing countries into three groups: the 50 "high-income" developing countries; the 50 "middle-income" developing countries; and the 65 "low-income" developing countries. The 50 "least-developed country" (LDC) group is a subset of the low-income developing countries, and is characterised by a slightly lower per capita income (below USD 750 for "inclusion", above USD 900 for "graduation"), but also a "human resource weakness criterion", based on indicators of nutrition, health, education and adult literacy; and a complex economic vulnerability criterion. In addition, given the fundamental meaning of the LDC category, i.e. the recognition of structural handicaps, excludes large economies, the population must not exceed 75 million.[14] Table 3 illustrates the UNCTAD categories, the income per capita thresholds for each and under which categories the major NAI GHG emitters fall.

Table 3: UNCTAD Categories of Developing Countries

UNCTAD Categories	**Thresholds**	**Major NAI GHG Emitting Countries included in this definition**
High-income developing countries	Per capita current GDP in 2000 > USD 4,500 per year	Argentina, Korea, Mexico, Saudi Arabia, Venezuela
Middle-income developing countries	Per capita current GDP in 2000 between USD 1,000-4,500 per year	Bolivia, Brazil, Iran, Malaysia, South Africa, Thailand, Turkey
Low-income developing countries	Per capita current GDP in 2000 < USD 1,000 per year	China, India, Indonesia, Nigeria, Pakistan, Philippines, Vietnam
Least developed countries	Per capita current GDP in 2000 < USD 750, > USD 900 for graduation *and* human resource weakness criterion, with population < 75 million	Angola, DR Congo

Source: UNCTAD 2005

Another possible classification for developing countries is that of the World Bank and OECD Development Assistance Committee which classifies developing countries into 5 categories, based on gross national income (GNI) per capita (Table 4).

Table 4: World Bank Categories of Developing Countries

World Bank Categories	**Thresholds**	**Major NAI GHG Emitting Countries included in this definition**
High-income developing countries	Per capita GNI > USD 10,065 in 2004	Korea, Saudi Arabia
Upper-middle-income developing countries	Per capita GNI between USD 3,256 and 10,065 in 2004	Argentina, Malaysia, Mexico, South Africa, Turkey, Venezuela
Lower-middle-income developing countries	Per capita GNI between USD 826 and 3,225 in 2004	Brazil, Bolivia, China, Indonesia, Iran, Thailand
Other low-income developing countries	Non-LDC countries with GNI per capita of USD 825 or less in 2004	India, Pakistan
Least developed countries	Same as UNCTAD	Angola, DR Congo

Source: World Bank 2008

[14] The 50 LDCs thus constitute "only" 741 million people out of a total of 5100 million for the 165 developing countries – the 65 low-income countries, which include the two Asian giants, total 3 979 million people compared with 795 million for the middle-income group and 326 million for the high-income group.

Depending on what mitigation actions are recognised in a post-2012 regime, differentiation frameworks such as these outlined above could help to identify which countries may considered in the categories of developed or industrialised countries versus developing countries, and thus eligible for different types of actions.

These types of differentiation approaches do not explicitly address the *ambition/stringency* of mitigation commitments or action that might be considered appropriate, which lie at the crux of the climate change challenge. Alternative differentiation approaches could incorporate GHG emissions more directly, in an attempt to relate today's efforts/performance to tomorrow's commitments.

In terms of eligibility for the provision and receipt of support, the only differentiation benchmark that currently exists is that for the AII Parties of the UNFCCC who agreed to provide financial resources for developing country Parties activities.

3.2 Differentiating Across All Countries Based on National Circumstances

An alternative possible approach to differentiation is to examine national circumstances across all countries. Which national circumstances are pertinent? Article 3.1 of the Convention offers some guidance on which national circumstances may be considered relevant in determining what types and/or levels of mitigation commitments and actions may be considered appropriate for different countries. It refers to equity and to common but differentiated responsibilities and respective capabilities. Indicators can help to provide a better understanding of how these and other concepts could be implemented in practice. Thus, the use of various indicators is discussed in section 3.2.1. Section 3.2.2 analyses the implications of different indicators on country rankings, and hence differentiation.

3.2.1 Assessment of Possible Indicators

A variety of indicators may be useful for consideration of a differentiation framework. A range of possible indicators is examined in terms of what they reflect with respect to national circumstances, and their possible advantages and disadvantages (Table 5). A range of other indicators may also be relevant for differentiation, such as energy indicators (e.g. TPES), or income distribution indicators (e.g., GINI coefficient). In order to keep the analysis simple, only key indicators are considered, to provide a general indication of what type (and stringency) of mitigation action may be considered appropriate.

A key issue in the use of such indicators is data availability at the national level, as well as consistency and/or comparability in the data across countries due to differences in data quality (e.g., between developed and developing countries).

Table 5: Possible Indicators for Differentiating Actions and Support

Emissions-related indicators	***Socio-economic indicators***
Total emissions	GDP per capita
Share of global emissions	Human Development Index
Cumulative emissions	Climate vulnerability indicator
Projected emissions	Institutional/ Organisational indicator
Emissions per capita	
Emissions per GDP	
Mitigation potential	
Mitigation effort	
Mitigation costs and benefits	

Total Emissions: Data on total national GHG emissions help to identify and compare the major emitters, in particular the priority countries for participation in mitigation. Absolute emissions are the indicator that is most closely related to the environmental concern, namely increasing concentrations of GHGs in the atmosphere. In terms of data availability, national GHG data officially submitted to the UNFCCC from NAI countries are often incomplete and only available for selected years. Other GHG data does exist, for example from the IEA (see Box 1 for further information).

However, countries differ in terms of population size, wealth, resource endowments, climate, and other factors that can significantly affect aggregate GHG emissions. Relative indicators (per capita or per GDP) are therefore generally more suited for international comparisons for the assessment of what may constitute appropriate mitigation action.

Share of global emissions: This indicator provides information on the relative (annual) GHG emissions contributions of different countries. The higher the contribution to global GHG emissions, the more important it becomes from a climate perspective for these countries to take on action. This indicator is directly related to total emissions.

Cumulative emissions: Cumulative emissions are sometimes suggested as an indicator for historical responsibility. These levels will depend on the selection of gases, sources, and timeframes (see Hoehne et al. 2007). See Box 1.

Projected emissions: Countries projected to have high emissions in the future may merit additional attention compared with countries with low emissions projections. It could also be useful to examine how countries are likely to compare based on projected (business-as-usual emissions) --as well as other indicators-- in 2020 or 2030. Reliable, comprehensive, comparable national data across all countries is not available however, thus making comparisons of national emission projections particularly difficult.

Emissions per capita: Population growth is a significant driver of GHG emissions growth. A per capita emissions criterion would make an emission goal relative to the size of the population. For example, AI countries' per capita emissions ranges significantly, e.g. more than 25 t CO_2e/capita for Luxembourg and Australia in 2005 whereas Latvia was a net sink (to the level of 1.5tCO_2e/capita)[15].

Emissions per GDP: i.e., emissions intensity, which depending on the structure of the economy could be a rough proxy to highlight mitigation potential. However, countries with economic structures based on heavy industry and/or with a high level of coal in their fuel mix, or with high levels of unsustainable biomass fuel use and/or forest fires may have high emissions intensity but would not necessarily have high mitigation potential. If emissions intensity is used as a proxy for mitigation potential, it therefore needs to be interpreted with care (see 'mitigation potential' below).

GDP per capita: Per capita GDP is an indicator of income. It is frequently used to assess economic capability to mitigate GHGs (i.e. domestically and at the international level).

Human Development Index (HDI): HDI is a composite index that measures a country's average achievements in three basic aspects of human development: health, knowledge, and standard of living. Health is measured by life expectancy at birth; knowledge is measured by a combination of the adult literacy rate and the combined primary, secondary, and tertiary gross enrolment ratio; and standard of living by GDP per capita (PPP USD).

Institutional/ Organisational: Existing institutional categories of countries (e.g. OECD countries, DAC member countries of the OECD) may be helpful as particular precedents for country groupings. In terms of climate change however, existing institutional thresholds may not adequately reflect national circumstances that may be relevant and the principles agreed upon in the UNFCCC and the BAP.

[15] Based on national inventory data for 2005, including emissions or sinks from LULUCF, as submitted to the UNFCCC in 2007.

Mitigation potential: A more accurate (albeit far from perfect) proxy for mitigation potential could rely on emissions intensity in conjunction with fuel mix and perhaps also trends in land use. Mitigation potential will also depend on *inter alia* a country's land area, industrial structure, and temperature. Developing accurate indicators for mitigation potential is therefore likely to be very data-intensive, although some efforts are underway based on bottom-up analysis of sector-by-sector potential. In the absence of more detailed data availability, data on GHG emissions per GDP is used as a rough proxy for mitigation potential in the analysis here.

Mitigation effort: Mitigation effort can refer to domestic and international mitigation actions, whereby effort is also dependent on mitigation potential. Actions can result in direct emission reductions, or indirect and/or longer-term impact on GHG emission levels such as R&D in low-GHG technology. Metrics to assess mitigation actions could therefore be in monetary terms, in changes in GHG emissions trends, or other more qualitative terms[16]. There is as yet no agreed methodology for how to assess mitigation action and hence effort, though costs of mitigation policies (measured in monetary terms) is one feasible way. Thus, indicators on mitigation effort are not used further in this analysis.

Mitigation costs and benefits: The projected costs and benefits of climate change mitigation policies, e.g. measured in terms of impacts on % GDP from a baseline scenario, can provide insights on how to differentiate countries. Costs and benefits (including co-benefits) of mitigation policies are expected to be unevenly distributed between countries and sectors. Though regional estimates on costs and benefits of mitigation policies do exist, there is a lack of comprehensive and comparable *national* data on these costs and benefits. It is therefore not possible to include indicators of this kind for the analysis here.

Climate vulnerability indicator: Countries that are more vulnerable to climate change impacts will experience greater damages (i.e. linked to mitigation benefits above), even though they may not be high GHG-emitting countries. Such an indicator could be used to direct international support to adaptation.

Table 6 provides data on the top 30 countries for some of these indicators where national data is readily available, and compares them to the mean AI values (in 1990) and minimum AI values (in 2005).

[16] If mitigation effort is measured in monetary terms, then it would also reflect the costs of climate change mitigation policy.

Box 1: Data caveats

Recent and consistent data on total GHG emissions across all countries is available by IEA (2007) from the EDGAR database, which includes annual data on energy-related CO_2 emissions as well as data for 1990, 1995, 2000 and 2005 for emissions of all 6 GHGs. However, this data set does not include all CO_2 emissions associated with land-use change and forestry. The EDGAR database includes emissions from large-scale biomass burning (i.e. direct emissions from tropical forest fires) with a tentative estimate of 10% of biofuel combustion CO_2 emissions, which is the fraction assumed to be produced unsustainably (uncertainty of $\pm$ 100% or more). The EDGAR database does not include emissions from the decay of remaining biomass (estimated at approximately equal size of direct emissions from biomass burning) and peat fires[17] so may significantly underestimate emissions from some countries e.g. Indonesia (peat fires) and Brazil (large forest fires inducing decay of remaining biomass).

Data on cumulative energy-related CO_2 emissions between 1990-2004 is from CAIT 5.0 (2008). Data is compiled from the Carbon Dioxide Information Analysis Center (CDIAC) and from IEA (EDGAR database). The CAIT cumulative emissions data used here does not include LULUCF emissions, as this data is only available up to the year 2000. Generally, data in CAIT is drawn from "reputable national and international sources". However, some of the data has inherent weaknesses, including significant uncertainties[18].

Population and GDP data is that used by IEA (2007) which for OECD countries comes from OECD National Accounts Volume I 2007; for non-OECD member countries the data comes from the World Bank's World Development Indicators 2007.

[17] Jos Olivier, PBL. Personal communication 1 October 2008.

[18] Further information is available at www.cait.org

Table 6: Top 30 Countries/regions for selected indicators

Total GHG emissions		**6-gas GHG emissions per capita**		**Cumulative CO_2-related emissions**		**GDP PPP per capita**		**GHG emissions per GDP**	
$MtCO_2e$ 2005		**tCO_2e 2005**		**1990-2004 $MtCO_2$ energy**		**USD (2000 constant) 2005**		**$MtCO_2e$ per billion USD 2005**	
IEA, 2007		**IEA, 2007**		**CAIT 5.0, 2008**		**IEA, 2007**		**IEA, 2007**	
China	7484	Qatar	53	*US*	81339	*Luxembourg*	56261	DR Congo	12.7
US	7282	Kuwait	36	*EU27*	60892	*Norway*	39061	Bolivia	11.7
EU27	5121	Brunei Darussalam	34	China	49870	Qatar	38556	Angola	9.1
India	2380	UAE	34	*Russia*	25295	*US*	37063	Mongolia	7.9
Russia	2206	*Australia*	30	*Japan*	18319	*Ireland*	34039	Congo	7.3
Brazil	1857	Bolivia	29	India	13646	Iceland	33400	Zambia	7.0
Japan	1405	Bahrain	28	*Germany*	13439	*Switzerland*	30800	Côte d'Ivoire	5.6
Germany	1006	Luxembourg	26	*UK*	8352	*Canada*	30693	Tanzania	5.0
Indonesia	869	*US*	25	*Canada*	7277	*Denmark*	30338	Iraq	4.0
Canada	728	*New Zealand*	23	*Italy*	6450	*Australia*	30129	Uzbekistan	3.8
Mexico	682	*Canada*	23	*Ukraine*	6123	*Austria*	30049	Benin	3.6
UK	662	Trinidad &Tobago	21	S Korea	6019	*Sweden*	30002	Korea North	3.1
Australia	621	Angola	19	*France*	5646	*Netherlands*	29337	Myanmar	2.7
Iran	604	Saudi Arabia	18	Mexico	5427	*Finland*	29105	Serbia &Montenegro	2.7
Italy	583	Gibraltar	16	South Africa	5164	*UK*	28222	Paraguay	2.4
France	554	*Russia*	15	*Poland*	4976	*Belgium*	28049	Sudan	2.4
S Korea	538	*Ireland*	15	*Australia*	4596	*Japan*	27190	Turkmenistan	2.3
Spain	470	Oman	14	Iran	4418	*France*	27049	Mozambique	2.1
DRC	463	Czech Republic	14	Brazil	4388	Singapore	26401	Yemen	2.1
South Africa	434	Turkmenistan	14	*Spain*	4112	*Germany*	26309	Togo	2.1
Ukraine	409	*Belgium*	14	Saudi Arabia	4040	*Italy*	25998	Venezuela	2.0
Saudi Arabia	406	Estonia	14	Indonesia	3912	*Greece*	25461	Nigeria	1.9
Poland	392	*Netherlands*	14	Turkey	2820	*EU 27*	23560	Cameroon	1.9

Total GHG emissions		**6-gas GHG emissions per capita**		**Cumulative CO_2-related emissions**		**GDP PPP per capita**		**GHG emissions per GDP**	
$MtCO_2e$ 2005		**tCO_2e 2005**		**1990-2004 $MtCO_2$ energy**		**USD (2000 constant) 2005**		**$MtCO_2e$ per billion USD 2005**	
IEA, 2007		**IEA, 2007**		**CAIT 5.0, 2008**		**IEA, 2007**		**IEA, 2007**	
Thailand	375	Mongolia	13	Kazakhstan	2655	Kuwait	23374	Ethiopia	1.9
Pakistan	335	*Finland*	13	*Netherlands*	2612	*New Zealand*	23280	Kazakhstan	1.8
Argentina	330	Kazakhstan	13	Thailand	2445	Israel	23022	Trinidad & Tobago	1.7
Turkey	315	*Norway*	12	Venezuela	2008	*Spain*	22937	Azerbaijan	1.6
Venezuela	315	Singapore	12	Argentina	1950	UAE	22715	*Russia*	1.6
Angola	303	*Germany*	12	*Czech Republic*	1941	Brunei Darussalam	22000	Republic of Moldova	1.6
Bolivia	269	Venezuela	12	Uzbekistan	1833	Gibraltar	21667	Brunei Darussalam	1.5
NAI Parties	23866	*Mean AI 1990*	*16*			*Mean AI 1990*	*18800*	*Mean AI 1990*	*0.8*
AI Parties	*18466*	*Lowest AI 2005*	*5.2*	*Lowest AI*	*31.8*	*Lowest AI 2005*	*6092*	*Highest AI 2005*	*1.6*

Note: AI countries are in *italics*.

The data in Table 6 shows that the values of indicators commonly used as proxies for equity, responsibility, and capability, as well as other national circumstances, across all countries are often significantly above the minimum AI country values, shown at the bottom of the table. Countries that rank high on all three indicators could qualify as "developed" countries, and thus as candidates for more ambitious climate change mitigation commitments and actions. For other countries, alternative options for mitigation action -supported by financing, technology, and capacity building- may be more feasible in the shorter term.

Table 6 indicates however that there are few cases (at least in the top 30 shown here) where countries rank high on both emissions indicators and socio-economic indicators. Exceptions include the US, Singapore, Qatar and Kuwait, as well as Canada and Australia. Table 7 presents the correlation coefficient matrix for data available across all countries. A correlation coefficient provides an indication of the strength and direction of a linear relationship between two variables.

Table 7: Correlation Matrix of Variables

	2005 GHG emissions	**GHG emissions per capita**	**Cumulative CO_2 emissions**	**GDP per capita**	**GHG emissions per GDP**
2005 GHG emissions	1				
GHG emissions per capita	0.115	1			
Cumulative CO_2 emissions	0.456	0.060	1		
GDP per capita	0.137	0.630	0.159	1	
GHG emissions per GDP	0.005	0.078	-0.067	-0.238	1

Table 7 shows that there are very few cases of a strong correlation coefficient between these indicators. Thus, none of these indicators is *individually* able to reflect the multiple principles laid out in the UNFCCC and the precedent that has already been set by most AI countries when taking on QELROs.

3.2.2 Analysis of Options for Differentiation Frameworks

The multiple principles set out under the UNFCCC can be more systematically examined via the use of composite indices. The individual indicators *selected* to create a composite index, and the way in which the indicators are *weighted* will have an impact on the relative ranking of countries and thus implications for different possible differentiation frameworks. This section examines a range of scenarios to analyse the effects that different combinations of indicators have on the ranking of countries. Depending on how the scenarios are constructed, they can be used to inform different aspects of differentiation. For example, identifying who the large emitters are, where there is high emissions intensity (and hence, possibly, high mitigation potential), and who has the ability to pay, can provide insights into different facets of differentiation i.e. which countries might bear the costs of emission reductions (given current national circumstances), or on where the emission reductions could take place (e.g. to lower the overall costs of compliance). If different combinations of indicators (and weighting schemes) result in country rankings that are fairly robust, then this can offer useful insights for climate change policy-makers.

Given data and other restrictions, not all of the indicators outlined in Section 3.2.1 are used to create the scenarios below. Hence, though a scenario combining growth in projected emissions with, for example, mitigation potential could highlight where mitigation action is needed most, the lack of consistent, comparable projected GHG emissions data at the national level renders this difficult. HDI

is not included in the scenarios constructed below because it is already a composite index, partially constructed with GDP per capita.

Averaging across multiple indicators with different units and ranges of absolute values is not appropriate as it implicitly weighs indicators with higher values/ranges more heavily. For example, the highest GDP per capita value is 56,261 USD (2000 constant); highest total emissions is 7,484 $MtCO_2e$; and highest GHG emissions per capita is 53 tCO_2e. The indicators are therefore normalised so that each indicator's index ranges from 0 to 100, using the following formula:

100 x ((actual value - minimum value) / (maximum value-minimum value))

Equal weights are then assigned to the normalised indicators and a composite index is calculated based on different combinations of indicators. Hence, when a composite index is created using two indicators, each indicator is assigned a weight of 0.5; if a composite index is created from three indicators, each indicator is weighted by a third[19]. This enables a comparison of how different indices affect the ranking of countries and hence how they may be grouped for different possible differentiation frameworks.

The scenarios examined are summarised below[20]:

Scenario 1: GHG emissions; GDP per capita; emissions per capita

Scenario 2: Cumulative emissions 1990-2004; GDP per capita; emissions per capita

Scenario 3: GHG emissions; GDP per capita

Scenario 4: GHG emissions; Emissions per capita

Scenario 5: GHG emissions per GDP; GDP per capita

Scenario 6: GHG emissions; GHG emissions per GDP; GDP per capita

Scenario 7: GDP per capita; GHG emissions per capita

Scenario 8: GHG emissions; GHG emissions per GDP

The full list of country scores is provided in Annex 2. Table 8 below summarises the composite indices (or scores) for the top 25 and bottom 5 countries.

[19] Other weighting functions are possible. Given the relative consistency of results (see Table 8 and discussion thereof), alternative weighting functions are not presented here.

[20] Note that GHG emissions per capita is in effect a product of GDP per capita and GHG emissions per GDP. Thus in scenario 7 for example, even though equal weights of 0.5 are assigned to GDP per capita and GHG emissions per capita, there is an implicit weighting within this due to the relative high correlation between these two variables. Ideally, principal components analysis (PCA) should be undertaken to address this issue. This is beyond the scope of this paper in its' present form however.

Table 8: Scenario Results for the Top 25 and Bottom 5 Countries

TOP 25

Scenario 1: GHG GDPpc GHGpc	Score	Scenario 2: Cumul. GHG GDPpc GHGpc	Score	Scenario 3 GHG GDPpc	Score	Scenario 4: GHG GHGpc	Score	Scenario 5: GHG/GDP GDPpc	Score	Scenario 6: GHG GHG/GDP GDPpc	Score	Scenario 7: GDPpc GHGpc	Score	Scenario 8: GHG GHG/GDP	Score
USA	69	USA	63	USA	81	USA	71	Luxembourg	51	USA	55	Qatar	84	DRC	53
Qatar	56	Qatar	56	China	55	China	54	DRC	50	China	39	Luxembourg	74	China	53
Luxembourg	49	Luxembourg	49	*EU 27**	55	Qatar	50	Bolivia	48	*EU 27**	37	USA	55	USA	51
*EU 27**	42	*EU 27**	39	Luxembourg	50	*EU 27**	43	Qatar	39	DRC	35	Australia	55	Bolivia	48
China	39	Australia	38	Norway	35	Kuwait	34	Angola	37	Luxembourg	34	Kuwait	53	Angola	38
Australia	39	Kuwait	36	Qatar	34	UAE	32	Norway	35	Bolivia	33	UAE	51	*EU 27**	35
Kuwait	36	UAE	34	Japan	33	Australia	32	USA	35	Angola	26	Brunei	51	Mongolia	31
Canada	35	Canada	34	Canada	32	Brunei	32	Mongolia	32	Qatar	26	Canada	48	Congo	29
UAE	35	Brunei	34	Australia	31	Bolivia	29	Ireland	31	Norway	24	Norway	45	Zambia	28
Brunei	34	Norway	30	Ireland	30	Russia	28	Iceland	30	Japan	23	Ireland	44	Côte d'Ivoire	23
Norway	30	Ireland	29	Germany	30	Bahrain	26	Australia	30	Canada	23	Bahrain	43	Russia	20
Ireland	29	Bahrain	28	Iceland	29	Canada	25	Canada	29	Australia	23	N Z	41	Tanzania	20
Bahrain	28	Japan	28	UK	29	Luxembourg	24	Congo	29	Mongolia	21	Iceland	39	India	18
Japan	28	N Z	27	Switzerland	27	N Z	21	Zambia	28	Ireland	21	Netherlands	38	Brazil	17
N Z	28	Germany	27	France	27	Brazil	21	Denmark	27	Germany	21	Finland	37	Iraq	16
Germany	27	Iceland	26	Netherlands	27	Trin & Tob	19	Switzerland	27	Iceland	20	Denmark	37	Uzbekistan	15
Netherlands	26	Netherlands	26	Denmark	27	Angola	19	Austria	27	UK	20	Belgium	37	Benin	14
Iceland	26	UK	25	Austria	27	Japan	19	Netherlands	27	Congo	19	Austria	37	North Korea	12
UK	26	Finland	25	Sweden	27	Saudi Arabia	18	Finland	27	Russia	19	UK	34	Myanmar	12
Belgium	25	Belgium	25	Italy	27	Germany	17	Sweden	27	Netherlands	19	Singapore	34	Serbia	11
Finland	25	Denmark	25	Finland	26	India	17	Belgium	26	Zambia	19	Germany	34	Japan	10
Austria	25	Austria	25	Belgium	26	Ireland	14	Kuwait	26	France	19	Switzerland	33	Sudan	10
Denmark	25	Italy	23	Singapore	24	UK	14	UK	26	Denmark	19	Japan	33	Indonesia	10
Russia	24	Singapore	23	Spain	23	Czech Rep	14	UAE	25	Austria	19	Sweden	32	Paraguay	9
Italy	23	Russia	23	Greece	23	Netherlands	13	Japan	25	Switzerland	18	Greece	32	Venezuela	9
France	23	France	23	Russia	23	Korea	13	**		Italy	18	**		Turkmen	9
Total emission for Top 25 countries in 2005 (MtCO2e): 25320		Total emission for Top 25 countries in 2005 (MtCO2e): 17890		Total emission for Top 25 countries in 2005 (MtCO2e): 25062		Total emission for Top 25 countries in 2005 (MtCO2e): 31041		Total emission for Top 25 countries in 2005 (MtCO2e): 13033		Total emission for Top 25 countries in 2005 (MtCO2e): 26188		Total emission for Top 25 countries in 2005 (MtCO2e): 13735		Total emission for Top 25 countries in 2005 (MtCO2e): 31361	

Table 8: Scenario Results for the Top 25 and Bottom 5 Countries (continued)

													BOTTOM 5			
Kenya	1	Kenya	1	Congo	1	El Salvador	1	India	4	Honduras	3	Kenya	1	Sri Lanka	1
Tajikistan	1	Ethiopia	1	Tajikistan	1	Tajikistan	0	Ghana	4	El Salvador	3	Ethiopia	1	Sweden	1
Yemen	1	Haiti	1	Benin	1	Sri Lanka	0	Sri Lanka	4	Ghana	3	Haiti	1	Switzerland	1
Haiti	1	Yemen	0	Yemen	0	Eritrea	0	Bangladesh	3	Sri Lanka	3	Yemen	1	Iceland	1
Eritrea	0	Eritrea	0	Eritrea	0	Haiti	0	Haiti	3	Haiti	2	Eritrea	0	Costa Rica	0

*The EU numbers provided here include the 27 member states. When the EU as a whole ranks amongst the top 25, *total emission in 2005* are calculated using EU as a whole rather than the sum of individual EU countries raking amongst the top 25. For scenarios 5 and 7, the EU does not rank amongst the top 25; total emissions are calculated using emissions from individual EU countries amongst the top 25.
** For scenarios 1, 2, 3, 4, 6 and 8 the top 25 countries plus the EU are shown, in scenarios 5 and 7 only the top 25 countries are shown.

The top ranking countries depicted in Table 8 suggest a much higher degree of consistency across composite indices than in Table 6 for individual indicators. Table 9 below provides the correlation coefficients between the 8 scenarios constructed.

Comparing the ranking of countries in scenarios 1 (i.e. GHG emissions in 2005; GDP per capita; emissions per capita) and 2 (i.e. cumulative CO_2 emissions 1990-2004; GDP per capita; emissions per capita) reveals a negligible difference. Indeed, the correlation coefficient between these two scenarios is very high (0.98). For example, the only difference in the "top 25" ranking countries between these two scenarios is China in scenario 1 and Singapore in scenario 2. This may be explained by the relatively rapid recent growth in GHG emissions in China, whereas emissions in Singapore have been more consistently high.

Comparing scenarios 1 and 3, the difference between the two indices is that in addition to GHG emissions and GDP per capita (scenario 3), scenario 1 also reflects emissions per capita. Kuwait, UAE, Brunei Darussalam, Bahrain, and New Zealand are among the top 25 in scenario 1, but not under scenario 3.

In scenario 4, only total emissions and emissions per capita are used to create the index. GDP per capita is therefore not reflected. Nevertheless, most of the countries that appear are the same as those under scenarios 1-3. New countries that appear in the top 25 under this scenario are Bolivia, Brazil, Trinidad and Tobago, Angola, Saudi Arabia, and India. These countries are therefore important from an emissions perspective; depending on how low they rank in terms of GDP per capita and how cost-effective emissions reductions in these countries may be, these countries could be prioritised in terms of mitigation support.

Scenarios 5 and 6 also incorporate GHG emissions per GDP in the composite index, an attempt to reflect mitigation potential. For example, more ambitious mitigation objectives may be considered appropriate for countries with high GDP per capita and high GHG emissions per GDP (scenario 5). New countries that appear in the top 25 under this scenario include Democratic Republic of Congo, Angola, Mongolia, Congo and Zambia. In addition to GDP per capita and GHG emissions per GDP, scenario 6 also includes GHG emissions.

Scenario 7, constructed using GDP per capita and GHG emissions per capita, indicates a ranking of countries that is most similar to the AI country grouping. It suggests that countries such as Qatar, Kuwait, UAE, Brunei Darussalam, Bahrain, and Singapore, might be considered appropriate for taking on emission reduction targets similar to those of AI countries. Note that Ukraine, which is an AI country, has a score of 12 and ranks 67th on this index (see Annex 2). Comparing scenarios 1 and 7 indicates that these are very similar, with the exception of China and Singapore. China appears in the top 25 countries under scenario 1 whereas Singapore appears under scenario 7.

Scenario 8 is constructed using GHG emissions and GHG emissions per GDP (and thus differs from scenario 4 in that the composite index uses emissions intensity rather than emissions per capita). GDP per capita is not included as an indicator in Scenario 8 and thus, the ranking of countries are quite different from scenarios 1, 2, 3 and 7 for example (see Table 9). Scenario 8 could serve to indicate where there may be a substantial source of mitigation potential and thus where mitigation support could be prioritised (i.e. depending on how low countries rank in terms of GDP per capita).

Countries that consistently appear at the bottom of these rankings (e.g. Eritrea, Yemen, Tajikistan, among many others), are countries that may not necessarily be considered a priority in terms of mitigation actions (though they may merit support, be it in the form of financing, technology and/or capacity building).

Given that absolute national GHG emissions is a key indicator, it is reflected in most of the scenarios constructed. In general, scenarios which can provide insights on which countries might bear the costs of emission reductions (e.g. scenarios 1, 2, 3, and 7) are all highly correlated, indicating that the ranking of countries is robust.

Table 9: Correlation Matrix of Indices

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Scenario 1	1							
Scenario 2	0.98	1						
Scenario 3	0.93	0.90	1					
Scenario 4	0.89	0.84	0.80	1				
Scenario 5	0.71	0.74	0.59	0.56	1			
Scenario 6	0.84	0.80	0.82	0.83	0.85	1		
Scenario 7	0.93	0.96	0.79	0.72	0.72	0.70	1	
Scenario 8	0.22	0.14	0.21	0.52	0.52	0.66	-0.2	1

4. Differentiating Commitments, Actions and Support

A range of different mitigation commitments, actions and support are feasible in a post-2012 climate change regime. Under the current regime, recognised mitigation actions are fixed binding national targets (and Joint Implementation projects within participating countries), and Clean Development Mechanism projects. A broader range of actions are currently being considered for a post-2012 regime, many of which were tabled in Accra[21]. These include:

- Fixed binding targets –national or sectoral
- Indexed binding targets –national or sectoral
- Non-binding approaches (also called no-lose targets) –national or sectoral
- Sectoral crediting mechanisms (e.g. scaling-up CDM)
- Clean Development Mechanism
- Non-credited actions, such as (sustainable development) policies and measures.

For most of these, further work is needed to consider how they would be integrated into the existing climate change regime (e.g. in terms of *inter alia* negotiations, coverage and eligibility, and implementation issues). Several of these issues are examined for example in Philibert (2005a, b); Ellis et al (2007); Baron et al (2008); Ellis and Larsen (2008). Further discussion of these issues lie beyond the scope of this paper.

It is important to highlight however, that these mitigation options differ significantly in terms of the benefits and/or costs they may generate for different countries or sectors. A fixed or indexed binding target, if constraining, would result in a net cost to those participating, while a sectoral crediting mechanism could greatly increase revenues (i.e. financing) from credits. Moreover, the CDM for example directly links mitigation action with capacity building, technology transfer and financing. In cases where there is no direct link between mitigation action and enabling support, other specific measures could be envisioned to support mitigation action in developing countries, such as technology-oriented agreements and financing.

Thus, the *types* of mitigation commitments and actions that may be recognised under a post-2012 climate change regime are likely to have an impact on who may participate and when. In addition to the distribution of benefits and costs of these different mitigation actions and support, other factors relevant for

[21] See UNFCCC/AWGLCA/2008CRP.4 and UNFCCC/KP/AWG/2008/L.12

differentiation include: the domestic capacity to implement these mitigation commitments and actions, the cost-effectiveness of a broader climate change regime, and competitiveness and leakage issues.

Depending on which types of commitments, actions and support are agreed upon for inclusion in a post-2012 climate change regime, policy-makers could use the analysis in section 3 to inform what types and levels of commitments, actions and support might be considered appropriate.

How countries may be differentiated is inherently related to how one could consider a framework for graduation of actions and commitments, as national circumstances change over time. As circumstances change, countries could graduate from one participation mechanism to another, thereby creating a directional pathway for deeper involvement and more ambitious emission reduction objectives over time. Graduation is also important so as to target support resources most effectively. For example, as countries take on more enhanced mitigation actions and commitments, and are no longer eligible for particular types of mitigation support, other resources and opportunities will become available for countries that are lower down in a differentiation framework.

Thus, a possible framework for differentiating mitigation commitments, actions and support across all countries, and graduating from one category of action to another, should ideally incorporate the following concepts/considerations:

- Allow progressively greater flexibility in mitigation options as countries go down the differentiation scale.

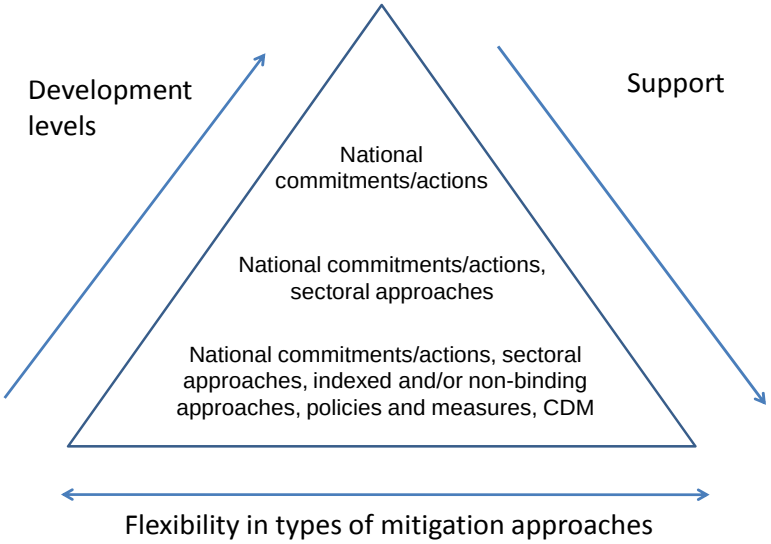
- Ensure that a country could, at any time, opt to take on more ambitious types and levels of mitigation commitments and actions in a higher tier of the differentiation framework[22].

- Possible sunset clauses or thresholds for when a country would no longer be deemed eligible for a particular type of mitigation support.

As national circumstances within a country improve (i.e. “development levels”), countries could take on mitigation commitments and actions that entail inherently less support (e.g. move away from CDM and non-binding approaches), and take on more costly commitments and actions. Moreover, at lower development levels, countries could be able to select from the full gamut of commitments and actions available (Figure 1).

[22] Taking into account any procedural requirements decided upon by Parties associated with transition.

Figure 1: Changing National Circumstances, Mitigation and Support



Source: authors

5. Conclusions

If long-term cooperative action on climate change to meet the ultimate objective of the UNFCCC is to be achieved, it is necessary to consider how to share any global emission reduction objective across countries, in a manner that is appropriate and equitable. A long-term framework for achieving this objective should also seek to be flexible, so as to reflect changing national circumstances across countries over time. These two notions can be addressed via differentiation and graduation (i.e. from one set of actions/commitments to another) respectively.

Differentiation can be used to inform climate policy-makers on three issues:

- Possible country groupings based on national circumstances;
- The appropriateness of different types (and stringencies) of mitigation commitments or actions in a post-2012 climate change regime; and
- The eligibility of different countries to various types of support for mitigation actions.

Though ultimately how the post-2012 climate change regime develops will be determined by political negotiations, analysis of possible frameworks for differentiation can help to inform the policy-making process. This paper has examined two broad approaches to differentiation. The first examines possible definitions of developed and developing countries, and the impact that this would have on different country groupings. These definitions include the "high human development" countries, based on the Human Development Index of the UNDP; the "high income economies" of the World Bank; amongst others. Most of these possible developed country definitions would lead to a significantly broader group of countries than those currently in the "Annex I" group.

The second approach examines differentiation across all countries based on indicators that could be used to reflect the different national circumstances across countries. None of the indicators individually are able to reflect the multiple principles laid out in the Convention. Eight scenarios (or composite indices) are therefore constructed using different combinations of the following indicators: GHG emissions; GHG emissions per capita, GDP per capita; cumulative CO_2 emissions; and GHG emissions per GDP (GHG intensity). Though a number of additional indicators may also be relevant and useful for differentiation (such as mitigation costs and benefits), further analysis is constrained by the lack of readily available consistent and comparable data at the national level.

Depending on how the scenarios (or composite indices) are constructed, this can inform different facets of a differentiation framework. For example, the scenarios can provide insight on which countries might bear the cost of emission reductions, or on where emission reductions might be prioritised (given the national circumstances prevalent at the time). The results show robust country rankings across these different possible facets of differentiation. For example, countries with high current GHG emissions, high GDP per capita, and high GHG emissions per capita (i.e. Scenario 1 in the analysis presented here) could be considered as countries where relatively more stringent climate change mitigation action is appropriate. Scenario 2 examines how the ranking of countries changes if, instead of high current GHG emissions (in 2005), cumulative emissions data (1990-2004) is used in combination with GDP per capita and emissions per capita. The correlation coefficient between scenario 1 and 2 is 0.98 indicating that the ranking of countries across these two scenarios is extremely robust. More generally, scenarios which can provide insights on which countries might bear the cost of emission reductions (e.g. scenarios 1, 2, 3, and 7) are all highly correlated, indicating that the ranking of countries is robust, irrespective of which indicators and combinations thereof are used.

Scenarios 5, 6 and 8 include GHG emissions intensity in the composite index. Bearing in mind the caveats raised in the paper, GHG emissions intensity could provide some indication of countries with higher mitigation potential. Under scenario 8 for example, countries that score high are those with high GHG emissions and high emissions intensity. This could therefore indicate the countries where emission reductions could be prioritised and –depending on the level of GDP per capita in each country – where support could be made available.

This paper provides insights to inform climate change policy-making on possible differentiation frameworks, including where emission reductions might be prioritised, who might bear the costs of emission reductions over time, and what a framework may need to take into account to achieve this. A comprehensive approach to global climate change mitigation policy would need to put differentiation and graduation in the context of specific GHG emission reduction goals and the timeframes for achieving them.

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Glossary

AI	Annex I
AII	Annex II
BAP	Bali Action Plan
CAIT	Climate Analysis Indicators Tool
CDIAC	Carbon Dioxide Information Analysis Center
CDM	Clean Development Mechanism
CIS	Commonwealth of Independent States
COP	Conference of the Parties
CMP	Conference of the Parties Serving as meeting of the Parties
CR	Capacity-Responsibility index
DRC	Democratic Republic of Congo
EE	Energy efficiency
GNI	Gross National Income
$GtCO_2e$	Giga tons of carbon dioxide equivalents
HDI	Human Development Index
KP	Kyoto Protocol
LDC	Least Developed Countries
LUX	Luxembourg
NAI	Non-Annex I
NIC	Newly Industrialised Countries
NZ	New Zealand
OPEC	Organisation of the Petroleum Exporting Countries
ODCs	Other Developing Countries
PCA	Principal Components Analysis
QELRO	Quantified Emission Limitation or Reduction Objective
RE	Renewable Energy
RIDC	Rapidly Industrialised Developing Countries
SD-PAMs	Sustainable Development Policies and Measures
TPES	Total Primary Energy Supply
UAE	United Arab Emirates
UNCTAD	UN Conference on Trade and Development
UNDP	UN Development Programme
UNFCCC	UN Framework Convention on Climate Change

Annex 1. Further Information on Differentiation Proposals

Ott et al. (2004) propose to differentiate countries on the basis of responsibility (i.e., cumulative emissions[23]), capability (via the Human Development Index, HDI) and mitigation potential (CO_2/GDP, GDP per capita, emissions growth rate). Mitigation potential relates essentially to CO_2/GDP (whereby a high ratio suggest inefficient means of production), and GHG/capita (a high value suggests unsustainable lifestyles). Emission growth rates provide an indication of whether a country's emissions are starting to stabilize. Differentiation is done using an index combining responsibility, potential and capability giving equal weighting to cumulative emissions per capita, HDI and an indicator of potential (derived from CO_2/GDP and CO_2/capita).

The framework differentiates between:

- Annex II,
- Annex I but not Annex II,
- newly industrialized countries (NICs) (those with an index value more than one standard deviation above the mean),
- rapidly industrializing countries (RIDCs) (those with a mean standard deviation plus or minus one standard deviation around the mean),
- other DCs (those that fall below one standard deviation but are not LDCs) and;
- LDCs which are not ranked [24].

In terms of mitigation action, this framework differentiates between domestic mitigation burden and financial support burden. Responsibility and capability determine the financial burden of mitigation that a country should accept. In order to maximize the economic efficiency of the system, the amount of emission reductions that a country undertakes domestically is determined by mitigation potential. Countries with high mitigation potential are therefore obliged to undertake mitigation domestically, however they do not necessarily *pay* for such actions.

Torvanger (2005) 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[25], and an institutional affiliation index (Annex I or non-Annex I).

[23] Under their scenario, cumulative emissions are assessed during the period 1990-200X as the consequences of GHG emissions where not well known prior to this.

[24] It is assumed that they have low potential, responsibility and capability

[25] 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)).

- Case 1 Original CR index with original thresholds (<5, 5<CR<12, 12<) (Criqui et al. 2003)
- 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

The CR index as applied in cases 1–4 combines two indicators of different nature. When the two variables are normalized, they are given equal weight, and not just added together as in case 1-4. In cases 5-8 the normalized CR index gives a relatively higher emphasis on responsibility (emissions per capita) because the average value of income (8.6 thousand $) is substantially higher than that of emissions per capita (6.4 tCO_2e).

Hoehne et al. (2005) treat differentiation as an integral part of a wider compromise proposal which consist of four parts: (1) Multistage agreement on emission reductions; **(**2) New technology development and implementation**; (**3) Agreement on adaptation**; (**4) Additional emission reduction efforts.

The multistage setting would include 4 stages:

- In stage 1, countries with low level of development do not have climate commitments. At least all least developed countries (LDCs) would be in this stage.
- In stage 2, countries commit in a clear way to sustainable development. Requirements for such a sustainable pathway could be defined, e.g., that inefficient equipment is phased out and requirements and certain standards are met for any new equipment or a clear deviation from the current policies depending on the countries. The implementation of such sustainable development pathway has to be monitored and verified. The additional costs could be borne by the country itself or by other countries, e.g. official development aid supplemented by additional climate related funds.
- In stage 3, countries commit to a moderate target for absolute emissions. The emission level may be increasing, but should be below a business as usual scenario. The target could also be positively binding, meaning that allowances can be sold, if the target is exceeded, but no allowances have to be bought, if the target is not achieved. An incentive to accept such target would be the possibility to participate in emissions trading.
- Countries in stage 4 have to reduce absolute emissions substantially until a low per-capita level is reached. As time progresses, more and more countries enter stage 4.

Countries move through these stages based on defined thresholds, e.g. their level of emissions per capita. These thresholds depend on the stabilization scenario envisaged. Since “followers do better” (as they benefit from technological developments of others), the threshold for entering the last group decreases with time. In addition to immediate emission reductions, countries need to commit to develop and to implement new GHG

mitigation technologies in exchange for a relaxation of their absolute emission reduction commitments. In this framework, the verifiability of the technology commitment is crucial as not to create a loophole for being exempt from emission reductions.

Michaelowa et al. (2005) integrate two equity proposals for differnetiation: the polluter pays principle (per capita emissions) and the principle of ability to pay (GDP per capita). A 'graduation index' is calculated where both indicators are equally weighted according to the following formula:

$$GI = [GDP/cap\ (thousands\ USD) + GHG/cap\ (tCO_2eq.)]2$$

Three thresholds are defined namely: average Annex B, lowest Annex II and lowest Annex B. Amongst the top 10 NAI emitters, China, Brazil and India do not meet the lowest threshold (whereas Korea, Mexico, South Africa, Iran, Saudi Arabia, Taiwan and Turkey do). All parties that emit more than 50 $MtCO_2e$ but do not meet threshold would be put into a special Annex. They also introduce an institutional threshold: EU, OECD, IEA membership calls for automatic inclusion in Annex B while being an LDC or being a recipient of food aid and International Development Association (IDA) grants exemption from any target.

In terms of action, countries whose graduation index is above the lowest Annex II country value take the lowest Annex B reduction rate (i.e. 3%); countries whose graduation index is above the lowest Annex B country value stabilise emissions at 2012 levels; countries on the large emitters list (i.e., emissions greater than $50MtCO_2e$) that lie below the graduation index threshold can use a country-wide CDM.

The Sao Paolo Proposal (Basic, 2006) suggests NAI Parties would be able to (1) host CDM projects, including programmatic CDM; (2) quantify emissions reductions achieved via sustainable development actions, including policies to reduce deforestation; and (3) adopt a sectoral, or national "no-lose" commitment. Option 2 would not generate credits but would entitle participating countries to simplified procedures to access funding from an Adaptation Fund and a Technology Funding Mechanisms. Option 3 would imply that Parties could earn Voluntary Emission Reduction units (VERs) for the net emission reductions. The proposal suggests the use of a unique "trigger" for each developing country, that takes into account specific circumstances and the effort made by Annex I/B Parties to reduce their emissions to that level. The trigger takes the form of a limit on the transfer of CERs and VERs allowed to each NAI Party. A NAI Party is expected to become an AI/B Party and adopt a national emissions limitation commitment when its transfers of CERs and VERs reach the agreed limit. The global limit is divided among NAI Parties based on each Party's population and an index that reflects the principles of responsibility, capability and potential to mitigate. The transfer limit is recalculated at five-year intervals to reflect changes in developing countries' circumstances. Under this proposal, some developing countries, namely Bahrain, Brunei, Cyprus[26], Israel, Kuwait, Qatar, Saudi Arabia, Singapore and the Emirates, would already qualify for an Annex II limitation commitment in a post-2012 agreement according to this "trigger".

While the "trigger" for graduation in the Sao Paulo Proposal elaborates on a mix of straightforward criteria – per capita GHG, per capita cumulative GHG since 1990 and per capita GDP – it may be perceived as complex. The proposal aims to encourage developing countries to keep emissions low to avoid "graduation" into AI and thus becoming eligible for an indexed binding target.

Den Elzen et al. (2006) propose a multi-stage approach which separates countries in three consecutive stages each representing different commitments. Furthermore there are three proposed Multi-Stage cases (A, B and C) proposing different commitment options at the different stages.

- Stage 1: No quantitative commitments. Non-Annex I regions follow their unconstrained emission path.

[26] See footnote 8

- Stage 2: Emission (growth) limitation targets. The non-Annex I regions adopt intensity improvement targets (Multi-Stages A and B), or follow a prescribed slow-down in the emissions growth to stabilisation (Multi-Stage C).

- Stage 3: Emission reduction targets. The total reduction effort to achieve the global emission profile is shared among all participating regions on the basis of a burden-sharing key (here per capita emissions).

The system defines when a country's level of commitment changes according to pre-determined rules taking modifications in its national circumstances. All Annex I regions including the US are assumed to be in Stage 3 after 2012. The transition from Stage 1 to 2 depends, for all Multi-Stage cases considered, on a Capability–Responsibility (CR) index computed as the sum of GDP and of total GHG emissions, and divided by the population of the region or country considered (as in Criqui et al. 2003). The transition from stage 2 to stage 3 could depend: on a threshold that is defined as a proportion of the world average per capita emission level (multi-stage A); on the CR-index, with a value that is about twice the one used for the Stage 1–2 threshold (multi-stage B); after the period of stabilisation has ended (Multi-Stage C).

The South–North Dialogue Proposal (den Elzen et al. 2007) defines four groups of NAI countries, each including countries with similar national circumstances. These are the newly industrialised countries (NICs); the rapidly industrialising developing countries (RIDCs); the least-developed countries (LDCs); and ''other developing countries'' - consisting of countries not belonging to any of the previous groups. NICS would take on binding targets, while RIDCs would do the same on the condition that industrialised countries provide finance and technology. The remaining two groups are excluded from taking on quantitative commitments but would be required to take on qualitative mitigation commitments (policies and measures).

IGES (2008): This proposal divides developed and developing countries into sub-groups consistent with national circumstances, responsibilities and capacities. Countries that account for > 1% global emissions are considered to have greater responsibility, and also to have greater mitigation potential. The aim is to promote convergence of per capita emissions over time. There are 3 groups based on the Human Development Index (HDI) value:

- Group A is made up of current Annex II countries and

- Group B is made up of countries with HDI between 0.9 and 0.75 (EITs, Korea, Mexico and Singapore)

- Remaining developing countries with HDI < 0.9 are classified into 4 (1-4) groups based on (a) a 2 tCO2e threshold, (b) their contribution to global emissions, and (c) a climate vulnerability indicator.

The "remaining developing country group 1" would be made up of countries with HDI > 0.75 and large gross national emissions (>1% of global emissions), this includes China. Group 2 encompasses countries with large gross national emissions (>1% of global emissions) but HDI < 0.75 (India). Group 3 would embark countries with limited gross national emissions (<1% of global emissions), per capita emissions >2 tCO2e, HDI > 0.75 and high climate vulnerability. Finally the last group is made of countries with low gross national emissions, low per capita emissions, low HDI (mainly LDCs) and high vulnerability.

Egenhofer et al. (2008) differentiate countries based on total emissions and average emissions per capita in 2005. They propose three categories for differentiation:

- Category I (e.g. OECD) with 13.5 t/CO_2 emissions per capita on average in 2005 =some 1 billion population;

- Category II (non-OECD above 3t/CO_2 emissions with 5.5 t/CO_2e per capita on average in 2005 = some 2 billion population (this includes most fast-growing emerging economies but not India, for example, because of its low emissions); and

- Category III (e.g. least developed and other comparable countries) below 1 t/CO2 emissions per capita on average in 2005 = some 3 billion population.

Nearly all of the mitigation effort would be undertaken by Categories I and II including massive contribution to multilateral climate change funds, while Category III would undertake SD PAMs. According to Egenhofer et al. (2008), the rational for differentiating between globally trading energy intensive industries with the same resource endowments is weak and as such they should be excluded from the differentiation framework which would only account for domestic emissions and included in a sectoral agreement.

Japan (2008) has proposed a differentiation framework for mitigation action based on 4 country groupings:

- Category 1 includes Annex I countries as well as OECD member countries not included in Annex I, countries that are not OECD members but whose economic development stages are equivalent to those of the OECD members, and (iii) countries which do not satisfy the conditions of (i) and (ii), but which voluntarily wish to be treated as Annex I country. Category 1 countries are expected to take on QELROs in a manner which ensures comparability of mitigation efforts of each country. (Countries may, individually or jointly, fulfil their agreed reduction targets). Comparability should be ensure using a sectoral approach which compiles reduction potentials in each sector, using indicators such as energy efficiencies or GHG intensities, with due consideration to the marginal abatement costs and total abatement costs as percentage of GDP.

- Category 2 includes developing countries which are expected to take further mitigation actions, based on their economic development stages, response capabilities, shares of GHG emissions in the world, etc. Category 2 countries should take on binding targets for "GHG emissions per unit" or "energy consumption per unit" in major sectors (e.g. power generation, iron and steel, cement, aluminium and road transport), taking into consideration national circumstances. This is not to imply in any way adopting trade restriction measures. Category 2 countries should also set out binding targets for economy-wide "GHG emissions per GDP" or "energy consumption per GDP", taking into consideration national circumstances. Each country should also provide an estimate of total volume of its emission as reference, based on its economic growth forecast.

- These developing countries are also expected to establish a national MRV system for emissions, with international assistance. Data should be submitted to the Conference of the Parties. Experts should verify these data and information.

- Category 3 includes developing countries whose emissions are very little and which are vulnerable to adverse effects of climate change, especially LDCs and SIDS. These countries would benefit from specific support for adaptation.

- Category 4 includes all other developing countries

- All developing countries would have to submit a voluntary national action plan, including policies and measures for mitigation, to the COP. The Conference of the Parties would periodically review these.

Mexico (2008) has proposed a differentiation framework in order to mobilise funds for support Objectives of the Multinational Climate Change Fund (MCCF):

- To foster mitigation activities in developing countries and in some other countries not included in Annex II of the Convention.
- To support efforts on adaptation.
- To promote the transfer and deployment of clean technologies.
- To contribute the the financial provisioning for the new global climate regime.

According to the proposal, all countries should contribute to the fund, in strict accordance with the principles of common but differentiated responsibilities and respective capabilities. The contribution of different countries could be linked to the use of three indicators:

a) Greenhouse gas emissions

b) Population

c) Gross domestic product (GDP)

Contributions would be determined using an objective formula, subject to review after a previously agreed period, based on criteria and basic principles such as:

Polluter pays: Determining each country's contribution based on GHG emissions, such that the largest emitters make the highest financial contributions to the Fund. With regard to historical and cumulative effects, several possibilities are feasible: 1. Disregard cumulative emissions, and only account for current emissions; 2. Calculate responsibility derived from historical emissions in terms of contributions to increasing temperatures (Brazil's proposal); 3. Calculate cumulative emissions from 1990, a general reference for National Communications, or 1992, when the Convention was adopted.

Equity: Take account of both total emissions and per capita emissions.

Efficiency: Differentiate emissions in relation to the scale of the economic activity producing them i.e., carbon intensity of different economies (emissions per unit of GDP).

Payment capacity: A country's economic capacity to address climate change could be reflected by an indicator such as GDP per capita, or in terms of the relative size of a national economy in proportion to the global economy. GDP can be expressed in terms of purchasing power parity, to take into account the relative purchasing power of each country's currency.

Annex 2. Composite Indices – Scenarios 1 to 8

Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5		Scenario 6		Scenario 7		Scenario 8	
Country	Score	Country	Score	Country	Score	Country	Score	Country	Score	Country	Score	Country	Score	Country	Score
USA	69	USA	63	USA	81	USA	71	Lux	51	USA	55	Qatar	84	DRC	53
Qatar	56	Qatar	56	China	55	China	54	DRC	50	China	39	Lux	74	China	53
Lux	49	Lux	49	EU 27	55	Qatar	50	Bolivia	48	EU 27	37	USA	55	USA	51
EU 27	42	EU 27	39	Lux	50	EU 27	43	Qatar	39	DRC	35	Australia	55	Bolivia	48
China	39	Australia	38	Norway	35	Kuwait	34	Angola	37	Lux	34	Kuwait	53	Angola	38
Australia	39	Kuwait	36	Qatar	34	UAE	32	Norway	35	Bolivia	33	UAE	51	EU 27	35
Kuwait	36	UAE	34	Japan	33	Australia	32	USA	35	Angola	26	Brunei	51	Mongolia	31
Canada	35	Canada	34	Canada	32	Brunei	32	Mongolia	32	Qatar	26	Canada	48	Congo	29
UAE	35	Brunei	34	Australia	31	Bolivia	29	Ireland	31	Norway	24	Norway	45	Zambia	28
Brunei	34	Norway	30	Ireland	30	Russia	28	Iceland	30	Japan	23	Ireland	44	Côte d'Ivoire	23
Norway	30	Ireland	29	Germany	30	Bahrain	26	Australia	30	Canada	23	Bahrain	43	Russia	20
Ireland	29	Bahrain	28	Iceland	29	Canada	25	Canada	29	Australia	23	New Zealand	41	Tanzania	20
Bahrain	28	Japan	28	UK	29	Lux	24	Congo	29	Mongolia	21	Iceland	39	India	18
Japan	28	New Zealand	27	Switzerland	27	New Zealand	21	Zambia	28	Ireland	21	Netherlands	38	Brazil	17
New Zealand	28	Germany	27	France	27	Brazil	21	Denmark	27	Germany	21	Finland	37	Iraq	16
Germany	27	Iceland	26	Netherlands	27	Trin.Tob.	19	Switzerland	27	Iceland	20	Denmark	37	Uzbekistan	15
Netherlands	26	Netherlands	26	Denmark	27	Angola	19	Austria	27	UK	20	Belgium	37	Benin	14
Iceland	26	UK	25	Austria	27	Japan	19	Netherlands	27	Congo	19	Austria	37	Korea North	12
UK	26	Finland	25	Sweden	27	Saudi Arab	18	Finland	27	Russia	19	UK	34	Myanmar	12
Belgium	25	Belgium	25	Italy	27	Germany	17	Sweden	27	Netherlands	19	Singapore	34	Serb.and Mont.	11
Finland	25	Denmark	25	Finland	26	India	17	Belgium	26	Zambia	19	Germany	34	Japan	10
Austria	25	Austria	25	Belgium	26	Ireland	14	Kuwait	26	France	19	Switzerland	33	Sudan	10
Denmark	25	Italy	23	Singapore	24	UK	14	UK	26	Denmark	19	Japan	33	Indonesia	10
Russia	24	Singapore	23	Spain	23	Czech Rep.	14	UAE	25	Austria	19	Sweden	32	Paraguay	9
Italy	23	Russia	23	Greece	23	Netherlands	13	Japan	25	Switzerland	18	Greece	32	Venezuela	9
France	23	France	23	Russia	23	Korea	13	Brunei	25	Italy	18	Italy	31	Turkmenistan	9
Singapore	23	Switzerland	22	Kuwait	21	Belgium	13	France	24	Finland	18	France	31	Nigeria	9
Switzerland	22	China	22	New Zealand	21	Oman	13	Singapore	24	Sweden	18	Trin.Tob.	30	Iran	8
Sweden	22	Sweden	22	UAE	21	Turkmenistan	13	Germany	24	Belgium	18	EU 27	29	Mozambique	8
Greece	22	Greece	22	Korea	21	Spain	12	Italy	24	Kuwait	18	Spain	29	Yemen	8
Spain	22	Spain	21	Israel	21	Venezuela	12	New Zealand	23	UAE	17	Bolivia	29	Germany	8
Bolivia	20	Trin.Tob.	20	Brunei	19	Kazakhstan	12	Greece	23	Brunei	16	Israel	28	Kazakhstan	8
Trin.Tob.	20	Korea	20	Brazil	19	Italy	12	Côte d'Ivoire	23	Singapore	16	Czech Rep.	28	Ukraine	8
Saudi Arab	20	Saudi Arab	20	India	18	Estonia	12	Bahrain	22	Spain	16	Cyprus	28	Togo	8
Korea	20	Czech Rep.	19	Cyprus	18	Mongolia	12	EU 27	22	Greece	16	Saudi Arab	28	Ethiopia	7
Czech Rep.	19	Bolivia	19	Slovenia	17	Finland	12	Spain	21	New Zealand	16	Korea	27	Australia	7
Israel	19	Israel	19	Bahrain	17	Iran	11	Israel	21	Côte d'Ivoire	16	Slovenia	26	Cameroon	7
Cyprus	19	Cyprus	19	Portugal	16	Poland	11	Tanzania	19	Brazil	15	Oman	25	Canada	7
Brazil	18	Slovenia	17	Czech Rep.	16	Norway	11	Cyprus	19	Korea	15	Estonia	24	Saudi Arab	7
Slovenia	17	Oman	16	Malta	15	Singapore	11	Korea	19	Bahrain	15	Portugal	22	Mexico	7
Oman	16	Estonia	16	Saudi Arab	15	France	11	Slovenia	19	Israel	14	Russia	22	UAE	6
Estonia	16	Portugal	15	Hungary	14	Austria	11	Czech Rep.	18	Tanzania	14	Malta	20	Azerbaijan	6
Portugal	15	Poland	14	Poland	13	South Africa	11	Portugal	17	India	13	Hungary	20	Trin.Tob.	6
Poland	15	Malta	14	Argentina	13	Greece	11	Trin.Tob.	17	Cyprus	13	Slovak Rep.	19	Kuwait	6
Malta	14	Hungary	14	Mexico	12	Denmark	10	Saudi Arab	16	Saudi Arab	13	Poland	19	South Africa	6
Hungary	14	Slovak Rep.	13	Oman	12	Cyprus	10	Malta	16	Czech Rep.	13	Angola	18	Moldova	6
Angola	14	Argentina	13	Slovak Rep.	12	Uruguay	10	Iraq	15	Slovenia	12	Argentina	18	Pakistan	6
Argentina	13	South Africa	12	Estonia	12	Ukraine	10	Uzbekistan	15	Portugal	12	Turkmenistan	17	Kenya	5
Slovak Rep.	13	Angola	12	South Africa	11	DRC	10	Oman	15	Trin.Tob.	11	Uruguay	17	Brunei	5
India	13	Kazakhstan	12	Lithuania	11	Mexico	10	Estonia	15	Uzbekistan	11	Kazakhstan	17	Libya	5
South Africa	13	Turkmenistan	12	Trin.Tob.	11	Iceland	10	Hungary	15	Iraq	11	South Africa	16	Bahrain	5
Kazakhstan	12	Uruguay	11	Latvia	10	Argentina	9	Benin	14	Malta	10	Lithuania	16	Nepal	5
Turkmenistan	12	Brazil	11	Croatia	10	Libya	9	Russia	14	Poland	10	Croatia	15	UK	5
Mexico	12	Malaysia	11	Iran	10	Paraguay	9	Slovak Rep.	14	Oman	10	Malaysia	15	Poland	5
Uruguay	12	Lithuania	11	Chile	10	Slovenia	9	Turkmenistan	13	Hungary	10	Venezuela	15	Kyrgyzstan	5
Iran	11	Venezuela	11	Malaysia	10	Malaysia	9	Poland	13	Estonia	10	Brazil	15	Belarus	5
Venezuela	11	Croatia	10	Botswana	9	Israel	8	Argentina	13	Argentina	10	Libya	14	Korea	5
Malaysia	11	Mexico	10	Thailand	9	Indonesia	8	Korea North	12	Mexico	10	Botswana	14	Zimbabwe	5
Lithuania	11	Iran	10	Turkey	9	Belarus	8	Serb.and Mon	12	Benin	9	Latvia	14	Qatar	5
Croatia	10	Ukraine	10	Indonesia	8	Slovak Rep.	8	Kazakhstan	12	South Africa	9	Belarus	13	Tajikistan	5
Libya	10	Libya	10	Uruguay	8	Côte d'Ivoire	8	Lithuania	12	Venezuela	9	Chile	13	Thailand	5
Ukraine	10	Botswana	10	Costa Rica	8	Hungary	7	Paraguay	12	Iran	9	Bulgaria	13	Vietnam	5
Botswana	10	Latvia	9	Ukraine	8	Bulgaria	7	Venezuela	12	Slovak Rep.	9	Iran	13	Italy	5
Latvia	9	Belarus	9	Romania	8	Portugal	7	Uruguay	12	Turkmenistan	9	Mexico	13	Uruguay	5
Chile	9	Chile	9	Bulgaria	7	Thailand	7	Croatia	11	Kazakhstan	9	Mongolia	13	Eritrea	4
Belarus	9	Bulgaria	9	Kazakhstan	7	Congo	7	South Africa	11	Korea North	9	Ukraine	12	Malaysia	4
Bulgaria	9	Mongolia	9	Venezuela	7	Serb. and Mor	7	Latvia	11	Serb.and Mon	8	Paraguay	12	Senegal	4
Thailand	9	Romania	8	Colombia	7	Uzbekistan	7	Myanmar	11	Paraguay	8	Romania	11	Jamaica	4
Mongolia	9	Thailand	8	Tunisia	6	Switzerland	7	Malaysia	11	Ukraine	8	Thailand	11	Spain	4
Romania	8	Paraguay	8	Belarus	6	Sweden	7	Botswana	11	Malaysia	8	Gabon	11	France	4

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Paraguay	8	Turkey	7	Domin. Rep.	6	Azerbaijan	6	Libya	11	Lithuania	8	Namibia	10	Argentina	4
Turkey	8	Gabon	7	Libya	6	Croatia	6	Brazil	11	Myanmar	8	Turkey	10	Guatemala	4
Indonesia	7	Namibia	7	Algeria	6	Romania	6	Chile	10	Indonesia	8	Bosnia-Herz.	9	Egypt	4
Gabon	7	India	6	Cuba	6	Gabon	6	Belarus	10	Uruguay	8	Azerbaijan	9	Syria	4
Colombia	7	Bosnia-Herz.	6	Panama	6	Malta	6	Iran	10	Croatia	8	China	9	Gabon	4
Namibia	7	Azerbaijan	6	Namibia	6	Zambia	5	Bulgaria	10	Latvia	8	Costa Rica	9	Lebanon	4
DRC	6	Colombia	6	Bosnia-Herz.	5	Turkey	5	Ukraine	10	Libya	7	Macedonia	9	New Zealand	4
Azerbaijan	6	Costa Rica	6	Turkmenistan	5	Chile	5	Sudan	10	Thailand	7	Colombia	9	Bulgaria	4
Bosnia-Herz.	6	Macedonia	6	Macedonia	5	Lithuania	5	Mexico	10	Chile	7	Serb.and Mont	9	Bangladesh	4
Costa Rica	6	Serb.and Mont	6	Gabon	5	Botswana	5	Azerbaijan	9	Botswana	7	Tunisia	8	Oman	4
Macedonia	6	Tunisia	6	Peru	5	Colombia	5	Romania	9	Sudan	7	Cuba	8	Colombia	4
Serb.and Mont	6	Algeria	6	Philippines	5	Namibia	5	Gabon	9	Belarus	7	Lebanon	8	Turkey	4
Algeria	6	Cuba	5	Egypt	4	Korea North	4	Thailand	9	Bulgaria	7	Domin. Rep.	8	Ecuador	3
Tunisia	6	Lebanon	5	Lebanon	4	Lebanon	4	Mozambique	8	Turkey	7	Algeria	8	Czech Rep.	3
Côte d'Ivoire	6	Domin. Rep.	5	Jordan	4	Bosnia-Herz.	4	Namibia	8	Romania	7	Panama	8	Estonia	3
Cuba	6	Panama	5	Azerbaijan	4	Sudan	4	Togo	8	Azerbaijan	6	Côte d'Ivoire	8	Georgia	3
Lebanon	5	Côte d'Ivoire	5	Albania	4	Myanmar	4	Cameroon	8	Nigeria	6	Congo	7	Romania	3
Domin. Rep.	5	Uzbekistan	5	El Salvador	4	Latvia	4	Costa Rica	8	Colombia	6	Jordan	7	Cambodia	3
Panama	5	Congo	5	Morocco	4	Macedonia	4	Turkey	8	Gabon	6	DRC	7	Ghana	3
Uzbekistan	5	Indonesia	5	Pakistan	4	Algeria	4	China	8	Mozambique	6	Uzbekistan	7	Nicaragua	3
Congo	5	Jordan	5	Paraguay	4	Guatemala	3	Bosnia-Herz.	8	Cameroon	6	Peru	6	Jordan	3
Peru	5	DRC	4	Bolivia	3	Jamaica	3	Yemen	8	Namibia	6	Guatemala	6	Namibia	3
Jordan	5	Peru	4	Guatemala	3	Egypt	3	Macedonia	8	Togo	5	Jamaica	6	Algeria	3
Guatemala	4	Jamaica	4	Armenia	3	Pakistan	3	Lebanon	8	Costa Rica	5	Ecuador	5	Bosnia-Herz.	3
Jamaica	4	Guatemala	4	Vietnam	3	Jordan	3	Colombia	7	Bosnia-Herz.	5	Zambia	5	Haiti	3
Egypt	4	Egypt	4	Angola	3	Cameroon	3	Nigeria	7	Yemen	5	Albania	5	Netherlands	3
Zambia	4	Ecuador	4	Sri Lanka	3	Iraq	3	Tunisia	7	Ethiopia	5	Indonesia	5	Macedonia	2
Ecuador	4	Zambia	3	Ecuador	3	Vietnam	3	Jamaica	7	Algeria	5	Syria	5	Honduras	2
Korea North	4	Albania	3	DRC	3	Tanzania	3	Cuba	7	Macedonia	5	Egypt	5	Peru	2
Albania	3	Korea North	3	Jamaica	3	Cuba	3	Ethiopia	7	Lebanon	5	Korea North	5	Slovak Rep.	2
Syria	3	Syria	3	Syria	3	Syria	3	Domin. Rep.	7	Tunisia	5	Armenia	5	Morocco	2
Sudan	3	Philippines	3	Serb.and Mon	2	Ecuador	3	Algeria	7	Cuba	5	Morocco	4	Belgium	2
Philippines	3	Armenia	3	Nicaragua	2	Peru	3	Panama	7	Jamaica	5	El Salvador	4	Chile	2
Vietnam	3	Morocco	3	Bangladesh	2	Benin	3	Guatemala	7	Guatemala	5	Philippines	4	Philippines	2
Myanmar	3	El Salvador	3	Honduras	2	Tunisia	3	Moldova	7	Domin. Rep.	5	Sudan	4	Hungary	2
Morocco	3	Sudan	3	Uzbekistan	2	Nigeria	2	Jordan	6	Egypt	5	Nicaragua	4	Croatia	2
Armenia	3	Nicaragua	3	Georgia	2	Panama	2	Indonesia	6	Panama	5	Cameroon	4	Cuba	2
Pakistan	3	Cameroon	3	Sudan	2	Domin. Rep.	2	Kyrgyzstan	6	Pakistan	5	Georgia	4	Greece	2
El Salvador	3	Georgia	3	Myanmar	2	Morocco	2	Peru	6	Moldova	4	Myanmar	3	Albania	2
Cameroon	3	Vietnam	2	Nigeria	2	Moldova	2	Ecuador	6	Jordan	4	Vietnam	3	Botswana	2
Nicaragua	3	Myanmar	2	Cambodia	2	Georgia	2	Syria	6	Peru	4	Sri Lanka	3	Cyprus	2
Georgia	3	Sri Lanka	2	Côte d'Ivoire	2	Nicaragua	2	Zimbabwe	6	Vietnam	4	Honduras	3	Finland	1
Sri Lanka	2	Honduras	2	Cameroon	2	Philippines	2	Kenya	6	Syria	4	India	3	Portugal	1
Honduras	2	Iraq	2	Ghana	2	Togo	2	Nepal	6	Ecuador	4	Moldova	3	Armenia	1
Iraq	2	Pakistan	2	Korea North	2	Albania	2	Egypt	5	Kyrgyzstan	4	Benin	3	Singapore	1
Tanzania	2	Moldova	2	Zimbabwe	1	Costa Rica	2	Albania	5	Zimbabwe	4	Cambodia	3	Ireland	1
Benin	2	Benin	2	Mongolia	1	Bangladesh	2	Tajikistan	5	Kenya	4	Iraq	3	Austria	1
Cambodia	2	Cambodia	2	Moldova	1	Zimbabwe	1	Georgia	5	Nepal	4	Zimbabwe	2	Slovenia	1
Moldova	2	Zimbabwe	2	Ethiopia	1	Mozambique	1	Vietnam	5	Philippines	4	Pakistan	2	Panama	1
Nigeria	2	Kyrgyzstan	1	Kyrgyzstan	1	Ethiopia	1	Nicaragua	5	Tajikistan	4	Kyrgyzstan	2	Tunisia	1
Bangladesh	2	Togo	1	Nepal	1	Kyrgyzstan	1	Senegal	5	Albania	4	Togo	2	Israel	1
Zimbabwe	2	Ghana	1	Senegal	1	Honduras	1	Armenia	5	Georgia	4	Tanzania	2	Lithuania	1
Ghana	2	Tanzania	1	Iraq	1	Armenia	1	Morocco	5	Morocco	4	Ghana	2	Denmark	1
Kyrgyzstan	2	Nigeria	1	Tanzania	1	Cambodia	1	Eritrea	5	Nicaragua	3	Senegal	2	Lux	1
Togo	1	Senegal	1	Haiti	1	Nepal	1	Pakistan	5	Senegal	3	Mozambique	2	Domin. Rep.	1
Mozambique	1	Mozambique	1	Kenya	1	Ghana	1	Honduras	5	Armenia	3	Nepal	1	Latvia	1
Senegal	1	Bangladesh	1	Togo	1	Senegal	1	Cambodia	4	Eritrea	3	Bangladesh	1	El Salvador	1
Nepal	1	Nepal	1	Zambia	1	Kenya	1	El Salvador	4	Bangladesh	3	Nigeria	1	Norway	1
Ethiopia	1	Tajikistan	1	Mozambique	1	Yemen	1	Philippines	4	Cambodia	3	Tajikistan	1	Malta	1
Kenya	1	Kenya	1	Congo	1	El Salvador	1	India	4	Honduras	3	Kenya	1	Sri Lanka	1
Tajikistan	1	Ethiopia	1	Tajikistan	1	Tajikistan	0	Ghana	4	El Salvador	3	Ethiopia	1	Sweden	1
Yemen	1	Haiti	1	Benin	1	Sri Lanka	0	Sri Lanka	4	Ghana	3	Haiti	1	Switzerland	1
Haiti	1	Yemen	0	Yemen	0	Eritrea	0	Bangladesh	3	Sri Lanka	3	Yemen	1	Iceland	1
Eritrea	0	Eritrea	0	Eritrea	0	Haiti	0	Haiti	3	Haiti	2	Eritrea	0	Costa Rica	0

* See footnote 8 for all reference to Cyprus in this table.