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Squaring the Circle of Mitigation Adequacy and Equity: Options and Perspectives

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Squaring the Circle of Mitigation Adequacy and Equity: Options and Perspectives

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Abstract

The Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) aims to "develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties", ready for adoption by the end of 2015. In this report we evaluate available options for a variety of aspects around the differentiation of mitigation commitments. We find that for the level of participation, the selection of commitment types, and choice of effort-sharing approaches there is no silver bullet. A portfolio approach that incorporates multiple options may be most suited to ensure environmental effectiveness, cost-effectiveness and political feasibility.

Decisions taken at the 2013 climate conference in Warsaw set the process to arrive at differentiated mitigation commitments by 2015 on a path towards a mostly bottom-up approach, with perhaps some international discussion of Parties' initial offers. This is unlikely to deliver the required level of aggregate ambition to limit warming below 2°C – or even 1.5°C. There is still a window of opportunity to define a review process during 2014 that would enable a rigorous evaluation of initial offers and create the political pressure to enhance ambition. The summit organised by UN Secretary-General Ban Ki Moon in 2014 will be an important milestone in this process.

Key to ensure political pressure is that the most vulnerable - and least responsible for the problem - are able to impact the decision on the overall level of commitments. This requires a process that involves reaching a joint agreement. However, even with a rigorous review process and the need to reach joint agreement, commitments are unlikely to be sufficient. Ultimately the conscious consideration of the length of the commitment period and a formal process for regular review of commitments will be crucial to ensure ambition can be ramped up suitably fast.

Kurzbeschreibung

Das Ziel der Ad-hoc Arbeitsgruppe zur Durban Plattform (ADP) besteht darin „ein Protokoll, ein weiteres Rechtsinstrument oder ein vereinbartes und rechtlich verbindliches Dokument für alle Parteien zu entwickeln“, das Ende 2015 verabschiedet werden kann. In diesem Bericht werden verfügbare Optionen der Differenzierung von Emissionsminderungsverpflichtungen in einem zukünftigen Abkommen evaluiert. Der Bericht zieht das Fazit, dass es für das Maß der Partizipation, die Art der Verpflichtung und die Wahl des Ansatzes zur Lastenverteilung keinen Königsweg gibt. Ein Ansatz, der mehrere Optionen kombiniert, könnte am besten geeignet sein, um die Umweltwirksamkeit, die Kosteneffizienz und die politische Durchführbarkeit zu gewährleisten.

Entscheidungen der Klimakonferenz in Warschau 2013 haben den Prozess in Gang gesetzt, bis 2015 verschiedene Emissionsminderungsziele größtenteils über einen bottom-up Ansatz festzulegen, welcher eventuell durch internationale Diskussionen über die ersten Vorschläge der Parteien ergänzt wird. Dieses Vorgehen macht es unwahrscheinlich, direkt das globale Ambitionsniveau zu erreichen, das nötig ist, um die Erwärmung auf 2°C – oder sogar 1,5°C zu begrenzen. Es gibt noch immer die Gelegenheit während des Jahres 2014 einen Bewertungsprozess zu definieren, der eine gründliche Überprüfung der ersten Minderungsangebote auslösen und politischen Druck für ambitioniertere Ziele erzeugen würde. Das von UN-Generalsekretär Ban Ki Moon organisierte Gipfeltreffen in 2014 wird in diesem Prozess ein wichtiger Meilenstein sein.

Um einen zügigen und ambitionierten politischen Prozess zu gewährleisten, ist es von zentraler Bedeutung, dass die verwundbarsten Parteien - die am wenigsten zum Klimawandel beigetragen haben - die Möglichkeit haben, Einfluss auf Entscheidungen zum Gesamtmaß der

Verpflichtungen zu nehmen. Dies erfordert einen Prozess, der sich als Ziel setzt, eine global akzeptierte Vereinbarung zu erreichen. Jedoch ist es selbst mit einem gründlichen Bewertungsprozess und einer global akzeptierten Vereinbarung unwahrscheinlich, dass die Minderungsziele anfangs ausreichen werden. Letztendlich werden ein bewusster Umgang mit der Dauer der Zielperiode und ein formaler Prozess für die regelmäßige Überprüfung der Ziele entscheidend sein um sicherzustellen, dass das Ambitionsniveau schnell und angemessen gesteigert werden kann.

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1 Executive summary

The Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) aims to "develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties", ready for adoption by the end of 2015. Unlike earlier instruments the new agreement is set to cover all Parties in a legally binding manner. This already is a major step forward. However, the basic dilemma remains: How to ensure adequate action by all Parties that is sufficient to achieve the jointly agreed goal to limit warming below 2°C – or even 1.5°C as called for by the most vulnerable – and at the same time ensure a fair and equitable distribution of effort.

In our analysis we evaluate available options for a variety of aspects around the differentiation of mitigation commitments. Key findings are:

Broad and deep participation is required. Current pledges and commitments remain disappointingly close to business-as-usual (BAU), even though participation has increased substantially compared to the Kyoto Protocol. To achieve the stated goal of holding warming below 2°C we need both broad participation and ambitious commitments. This is even more so for the more ambitious goal of limiting warming below 1.5°C.

Multiple commitments could address important concerns. Our analysis of possible commitment types shows that there is no silver bullet. A combination of approaches may provide the best way forward. Emission limitation/reduction targets could determine a floor for ambition. Commitments on technologies or policies adapted to national circumstances could support them, with a goal to possibly overachieve the targets. This approach could also be more failsafe than focusing on only one commitment type: if one approach fails to significantly reduce emissions, this deficit could be compensated by the other commitments. Differentiation of types of commitments for specific country groups may provide those groups with stronger incentives to take on mitigation commitments and increase participation.

An agreed equity framework remains a challenge. Similar to the question of commitment types, there is no silver bullet when it comes to effort-sharing proposals. Some Parties even oppose the overall concept. A more complex equity framework based on a larger number of indicators that reflect the whole spectrum of equity principles could help ensure all countries find their own priorities reflected. However, it seems challenging, if not completely unrealistic, to negotiate this or to develop this from Parties' divergent and often individual definitions of fairness.

Ensuring adequacy of commitments needs to be back on the agenda. Warsaw ended without any guidance on a process that would include a – more or less – formal review of the initial offers which Parties are to put forward before COP21 in Paris. There is still a window of opportunity to define such a review process during 2014. The summit organised by the UN Secretary-General Ban Ki Moon in 2014 could be a defined moment by when initial proposals are made, ahead of the agreed time frame in order to show true leadership. In 2015, these proposals would then be assessed according to the process agreed in Lima, negotiated, increased if necessary, and agreed upon. A link could be made between the 2015 review process and its structured expert dialogue (SED) and the ADP consideration of adequacy of emission commitments/offers put forward in relation to the agreed global goal.

Short commitment periods combined with strong long-term targets prevent lock-in of low ambition. The outcome of the first set of commitments is likely to be insufficient even with a robust review and negotiation process. It is therefore important to provide scope to dynamically adjust commitments to continuous scientific and technological advances and

changes in economic circumstances. An important element for the new agreement is therefore that emission commitments are time bound with a short time horizon (e.g. five years) and that each subsequent set of commitments is linked to a scientific assessment process which also compares the new element to the long-term goals.

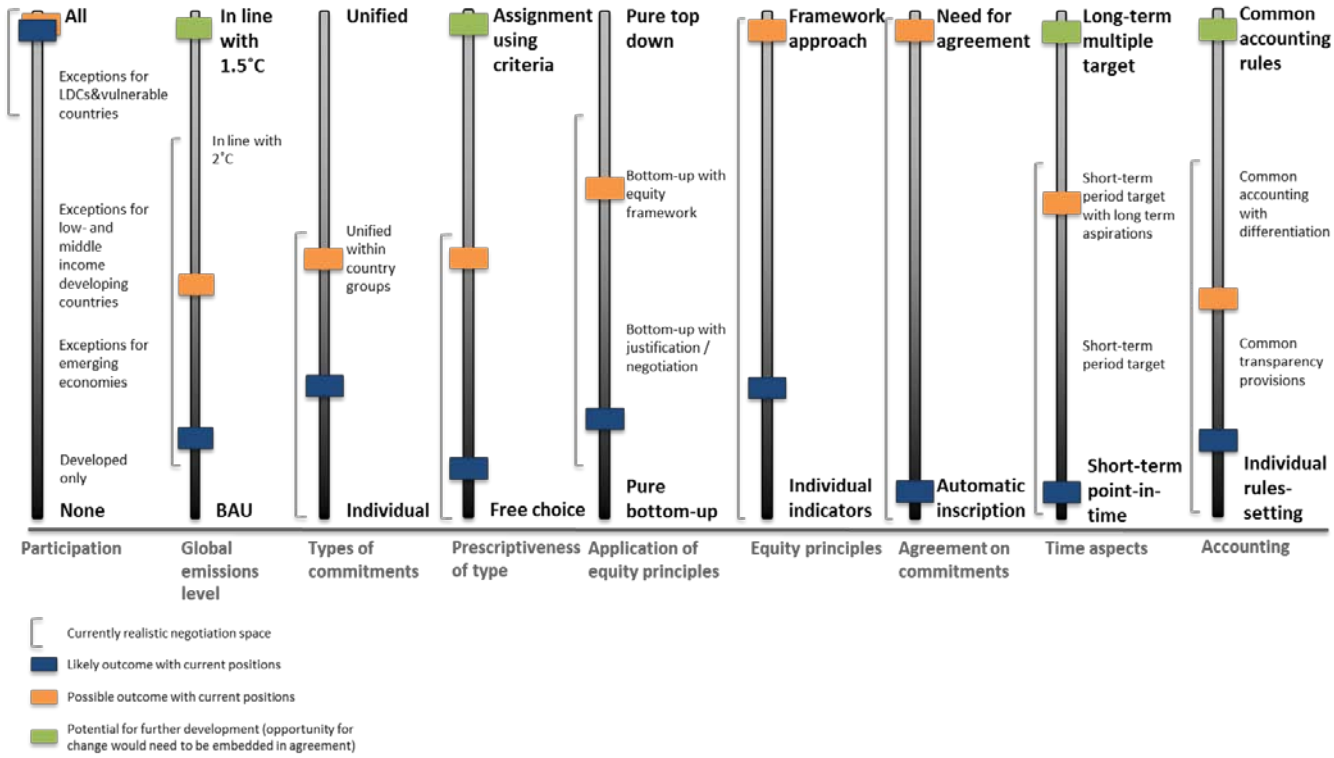
Dynamic agreement is important. Dynamic elements of the ADP agreement will be relevant to questions of whether or not "adequacy" can be achieved over time, if not achieved in Paris. These elements include the length of commitment period, the character of the process to develop the second and subsequent sets of commitments, linkage to the science reviews, including IPCC assessment reports or other assessment products, and the review of ongoing progress towards achieving the global goals. The dynamic elements of the agreement will be relevant to the broadness of participation and the strategic significance of the level of ambition actually adopted in Paris.

Mitigation commitments will be linked to other issues by many parties. Mitigation commitments will not be negotiated in isolation from other elements of the agreement, whose outcome and level of ambition appear likely to influence the ambition and scope of mitigation actions and commitments. Many parties will be seeking clarity on the means of implementation (finance, technology and other measures) and linking this to the level of mitigation commitments and their legal character. Others will also seek to include issues such as adaptation, and related funding, into the new ADP agreement and may want to link mitigation commitments to the level and character of commitments on adaptation.

Adoption of commitments by all Parties is key. A central question with diverging positions is whether commitments need to be adopted by all Parties or could be inscribed individually by each Party. The requirement to reach agreement by all Parties implies a stronger multilateral approach to commitments, irrespective of the manner in which the targets are set. Impacts and damage resulting from insufficient commitments are likely to mostly affect the most vulnerable, who are the least responsible for the problem. This points to the need for those Parties to be able to impact a decision on the overall level of commitments. Such a consideration would tend to support a process that involves reaching a joint agreement.

Figure 1 provides an overview of current positions in the UNFCCC process regarding the most important aspects of a new agreement, including: Participation, global emissions target, types of commitments, equity principles, time period and accounting rules.

Figure 1: Overview of aspects of differentiation



Source: own illustration

2 Introduction

2.1 The background: International negotiations related to mitigation commitments

The need to balance ambitious action with the differences in responsibilities and capabilities of countries has been at the core of climate negotiations ever since the UN Framework Convention on Climate Change (UNFCCC) was agreed in 1992. The establishment of the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) in 2011 set a new milestone in this discussion. The ADP aims to "develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties" (UNFCCC 2011). Whilst the climate convention is almost universal, the reference within the ADP to all parties and legal force is understood to refer to (but not be limited to) the question of mitigation commitments. This already is a major step forward. However, the basic dilemma remains: How to ensure adequate action by all Parties that is sufficient to achieve the jointly agreed goal to limit warming below 2°C – or even 1.5°C as called for by the most vulnerable – and at the same time ensure a fair and equitable distribution of effort.

Given that international climate policy has accepted the goal of holding warming below 2°C increase above preindustrial levels, the urgency and timing of mitigation is quite critical. Future emission trajectories consistent with limiting warming below this level are constrained and require steeply dropping emission levels throughout the 21st-century.

The new agreement is to be adopted at COP21 in 2015 and to enter into force in 2020, with the mitigation commitments developed applying for an as yet undefined period beyond 2020. In Warsaw in November 2013, Parties discussed the process of reaching an agreement by 2015 and agreed to “communicate them [the contributions] well in advance of the twenty-first session of the Conference of the Parties (by the first quarter of 2015 by those Parties ready to do so)”. While this excludes any top-down application of equity in the formal process, the fairness of contributions will remain one central point of negotiations.

The urgency of securing an agreement by this time is further supported by the growing evidence of the impacts of climate change. Not only do we already experience severe impacts, also the latest projections of future impacts highlight the need for urgent action (IPCC 2013).

Under the ADP, Parties will negotiate all elements of the 2015 agreement, their design and the processes how to get there. Negotiations will need to agree on questions of legal form and structure and the agreement will encompass all elements outlined in the decision establishing the Durban Platform (1/CP.17), including mitigation, adaptation, finance, technology development and transfer, transparency of action and support, and capacity-building, which were already laid down in the Bali Action Plan. In addition to the Workstream 1 (WS1) on the 2015 agreement, the ADP also has a Workstream 2 (WS2) that focuses on options and means to enhance the pre-2020 mitigation ambition.

The negotiation of the new agreement comes at a time where the second commitment period of the Kyoto Protocol has just been agreed, although with substantially reduced participation. It is also clear that the aggregate of the pledges made under the Copenhagen Accord and the Cancún Agreements will not provide sufficient emission reductions to limit global warming below 2°C. The 2013 UNEP Gap report again confirmed that the gap between pledges and pathways consistent with 2°C is not being closed and remains at a high 8-12 $GtCO_2e$ (UNEP 2013).

2.2 Setting the scope of this report

This report focuses on one of the aspects of the future agreement – mitigation. This includes mitigation ambition, ways for differentiation of commitments and participation. The discussion on means of differentiation is based on the principles of equity and "*common but differentiated responsibilities and respective capabilities*" in the Framework Convention (United Nations 1992).

A host of literature has over the years discussed what these principles could mean for mitigation and how they could be operationalized within the UNFCCC[1] and related legal instruments. Approaches range from a pure focus on historic responsibility to capability-based metrics with a growing focus on the need to ensure sustainable development (see for example Ngwadla 2013). This discussion has continued to inform the international negotiations and will play an important role in the ADP negotiations.

Differentiation of the scale of mitigation effort of each Party to the UNFCCC has long been the main focus of this discussion. Access to finance, technology, adaptation and other means of implementation, the scope of participation, MRV and compliance are also important aspects related to the effectiveness of the new agreement (Aldy, Barrett, and Stavins 2003; Bodansky 2012a). These aspects are beyond the scope of this study though.

The problem can be seen as a multi-criteria decision making process, where the outcome of each aspect determines the others. This delivers a matrix of possible combinations between participation, scope and time aspects of commitments, equity dimensions, and negotiation process considerations. Optimization of the effectiveness matrix is complex in itself and made more complex by the fact that also purely national considerations are undergoing constant change. Negotiations under the UNFCCC and in other international fora influence public awareness and will ideally help to move national considerations towards higher ambition.

We will start our analysis looking at different options and aspects of participation. The next section then discusses types of commitments, followed by a comprehensive assessment of the available literature on equity principles and approaches. We then take a look at process related aspects from a conceptual point of view as well as within the concrete negotiation context, and provide a synthesis of the findings in the conclusions.

1 see for example: Elzen, Schaeffer, & Lucas, 2005; Höhne, den Elzen, & Escalante, 2013; Phylipsen, Bode, Blok, Merkus, & Metz, 1998; Winkler et al., 2011

3 Methodology

This study aims to provide a comprehensive overview of the dimensions and options around the differentiation of mitigation commitments. We base this on existing literature, and the expert knowledge of the writing team. The analysis provides the full set of options, even though some are seen as less realistic for implementation, to demonstrate the full toolset available and hopefully enable new combinations of elements that can move negotiations forward.

We describe different dimensions and options and discuss their respective advantages and disadvantages based on the criteria for the evaluation of climate policy instruments applied by the IPCC's Working Group 3 (Gupta et al. 2007):

- Environmental effectiveness: The extent to which an option promises to achieve the intended environmental objective.
- Cost-effectiveness: The extent to which an option promises to achieve the environmental objective at a minimum cost to society. This includes direct costs and transaction costs such as impacts of administering and implementing an instrument. It also includes different time scales. Dynamic cost-effectiveness for example looks at how well an instrument drives cost-reducing technological change. This criterion takes the environmental objective as given. By contrast, economic efficiency, which is often used as an evaluation criterion, also involves variation of the goal itself in order to maximise the balance of costs and benefits.
- Distributional considerations: The extent to which an option can be expected to have distributional consequences, including dimensions such as fairness and equity. In political discussions, distributional impacts are often more important than aggregate cost-effectiveness.
- Institutional feasibility: The extent to which an option is likely to be viewed as legitimate, to gain acceptance, to be adoptable and implementable. This includes political as well as administrative and technical aspects of feasibility.

Other criteria that are often used such as impacts on competitiveness are subsumed within these four categories. We use these categories to discuss the different elements of participation, types of commitments, allocation and effort-sharing and process considerations outlined in sections 3 to 6.

4 Participation

The UNFCCC applies to all Parties, however, the Convention refers to mitigation commitments only on a very general level. It asks Parties to *"Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change"* (UNFCCC, Article 4). The UNFCCC groups Parties into Annex I (developed countries) and non-Annex I countries.

To more concretely define commitments and demonstrate ambition, the Kyoto Protocol in 1997 set quantified economy-wide emission limitations or reduction targets for a limited number of countries - developed countries and economies in transition, classified as the Annex B countries of the Kyoto Protocol. With some exemptions, Annex I of the Convention and Annex B of the Kyoto Protocol contain the same countries.

The Copenhagen Accord and subsequently the Cancun decisions increased the number of Parties with more concrete mitigation pledges. A wide range of countries not covered by the targets under the Kyoto Protocol (i.e. the non-Annex B countries) put forward pledges of various natures.

This historic trend towards a situation where both Annex I and non-Annex I countries now present mitigation pledges and/or targets does not only lead to different types of participation (see section 4.1 for further discussion) but also different levels of participation and how they link to the level of ambition. The classification of countries into Annexes is discussed in further detail in chapter 4.2.

4.1 Options for participation

Reflecting this situation and the experiences made over recent decades, literature has identified two main categories for participation (e.g. (Aldy et al., 2003; Bodansky, 2012a)):

- "Broad-but-shallow": similar to the approach taken in the Convention, an agreement following this approach would achieve relatively little mitigation per country, but would allow nearly full participation.
- "Narrow-but-deep": structured more 'Kyoto-like,' this approach would achieve ambitious mitigation reductions per country, but would be limited in participation.

These two approaches define extremes of a potential continuum. The general commitments under the Convention are very broad. The mitigation commitments under the Kyoto Protocol are a narrow approach, but the level of ambition is certainly not at the extreme end of 'deep.'

In principle, the ADP decision in Durban represents a step towards the broad but shallow approach of the UNFCCC, whilst at the same time building upon the deeper elements of the Annex B commitments under the Kyoto Protocol for the post 2020 period. This could be seen as an evolution along the continuum with the broad participation and weak commitments at present leading into, and attempting to deepen the commitments for the post 2020 period.

In this context, we need to clearly differentiate between the aggregate level of ambition and the individual level of ambition required from Parties. Decisions on participation (and compliance) of countries will ultimately depend on the mix of the individual effort required and the effort required from other countries, mainly peers or such countries that are seen as important partners or competitors. So even low levels of aggregate ambition can result in non-participation if the individual effort is judged to be 'unfair' compared to others. Conversely, a

high level of ambition could encourage high participation if the effort is seen to be distributed equitably.

Thus there is not necessarily a 1:1 relationship between participation and aggregate level of ambition. It is, however, much more likely that under low ambition scenarios more countries would see their share (likely a smaller absolute value) as being a fair contribution. Especially since the perception of equity is not necessarily linked to objective criteria, but can be a relatively subjective evaluation. It strongly depends on sets of values reflected in different priorities for categories of equity (see chapter 6.1). It further depends on the overall political situation of a country and its relationship with other countries, which are mostly determined by activities and politics outside the UNFCCC.

4.2 Options for differentiating groups

Another important aspect in this discussion is the metric or metrics used to differentiate various groups of participants. Participation is not a simple yes/no decision. Different levels of participation can take the form of variation in type and/or stringency of commitment. This can be reflected through the differentiation of groups of countries.

In the past this differentiation has been dominated by the Annexes of the Convention. These are the result of negotiations in 1992 rather than application of agreed metrics, although quantitative metrics, like the aggregate level of economic development and the share of global emissions in the past and at that point in time played a role.

However, all metrics of differentiation, including aggregate emissions, income levels, GDP, etc. change over time. Under the UNFCCC, participation has so far only been differentiated by Parties "with binding commitments" and those "with voluntary actions". Overcoming the currently static differentiation is at the core of the ADP negotiations.

Although the new agreement is meant to apply to all, the need for differentiation on types of commitments and stringency remains. Essentially all industrialised countries argue that the world has changed significantly since 1992 and that this needs to be reflected in the new climate agreement. They therefore want to remove the so-called “firewall”, the distinction between the above mentioned binding commitments for Annex I countries (industrialised countries in 1992) and voluntary action for non-Annex I countries (developing countries) that has so far characterised the mitigation and finance elements climate regime (Sterk et al. 2012).

This view is generally supported by Ethiopia, which suggests revising Annexes in five-year periods according to countries’ GDP and per capita GDP (Ethiopia 2013). The newly formed AILAC (Independent Association for Latin America and the Caribbean) also calls for a more flexible handling. In contrast, the so-called group of Like-Minded Developing Countries (LMDC), which consists of China, India, several Arab and Latin American countries, such as Bolivia, Cuba and Venezuela, and further middle-income countries such as Malaysia, Pakistan and the Philippines, is strongly opposed to any explicit or implicit opening of the Annexes (Sterk et al. 2012).

While there are a number of proposals on the table to differentiate stringency for indicators and criteria (see section 6.1), there is little discussion on how to formally differentiate country groups or types of commitments. The LDC Group for example called for a differentiation of "developed countries, emerging economies, middle income countries, the most vulnerable and the least developed countries based on agreed criteria" (Nepal on behalf of the Least Developed Countries Group 2013). In such a scenario the question is which criteria to use. This could in theory lead to the creation of new categories of countries that would not be static. The regular

application of agreed criteria would create dynamic groups of countries. In practice, however, if graduation from one category to another implies adoption of more demanding commitments, countries would have a strong incentive to defer graduation as long as possible, depending upon the incentive system employed. Significant attention and care would need to be taken in designing and negotiating graduating rules and incentives to avoid new rounds of deadlock with little advantage compared to the current situation.

A less formal way would be to leave it up to countries to 'self-select' or negotiate their peer group. This could be politically problematic as it would imply that some developed countries could migrate to obligations of a much lower character than under the Kyoto Protocol. It could also undermine other elements of the regime including those relating to MRV, compliance and finance. Hence there appears to be an incentive for parties within the ADP context to consider more structured approaches to categorizing countries that could be based on objective criteria available to all to review.

A further variation of the topic is the option of introducing small groups inside or outside the UNFCCC that take on a more progressive role regarding overall mitigation commitments or focusing on specific mitigation areas (for example renewable energy support). These groups could be placed outside the UNFCCC within existing settings, such as the MEF, the G20 - or new ones. Progressive players could also form such groups within the UNFCCC, such as The Majuro Declaration (Pacific Island Forum 2013).

4.3 Implications of options

The elements of participation introduced above all have certain advantages and challenges. The following paragraphs further explain their implications for the criteria environmental effectiveness, cost-effectiveness, distributional considerations and institutional feasibility.

Environmental effectiveness: Theoretically both broad-but-shallow and narrow-but-deep approaches could have the same environmental outcome. This depends on the countries that participate and the level of ambition. In 2010, the world's ten largest emitters contributed to more than 70% of the global greenhouse gas emissions. If the major emitters would commit themselves to "deep" mitigation targets, it would have an immense impact. Effectiveness will finally depend on the ability to move ambition and participation towards the ideal situation of a broad-and-deep scenario. This would combine full participation with highly ambitious commitments.

Combinations of a 'medium-medium' approach, i.e. not all, but a large part of countries participate at a medium level of ambition, with frontrunner "clubs" could be another possibility. This could speed up movement towards this ideal situation (Weischer and Morgan 2013). Broad participation could mitigate the fear of emissions leakage which is likely to be an issue with smaller groups (Aldy et al. 2003).

Cost-effectiveness: As described above, broader participation is mostly seen as resulting in lower levels of ambition. Under this assumption it likely requires lower mitigation costs in the short term, but higher costs later on, both for catching up with mitigation targets as well as for additional adaptation needs and residual damage. On the other hand, broad participation distributes abatement costs between a larger number of countries and allows for regional flexibility and international trading systems, which increases cost-effectiveness. Narrow participation with high ambition can also lead to enhanced technology development and rapidly decreasing cost for important mitigation technologies.

The more the ambition moves towards a broad-and-deep scenario, marginal abatement costs rise in the short term. On the other hand, adaptation costs and the socio-economic costs of climate change decrease. Calculations carried out by Stern have shown that in the long-term, a broad and deep agreement will be the most cost-effective (Stern, 2006).

Distributional considerations: Leakage is likely to be an issue with smaller groups due to potential loss of competitiveness. At the same time small groups with high ambition can generate first mover advantages and positive spill-over effects. This can be observed in the renewable energy sector, where a number of frontrunners with support schemes triggered a rapid development and finally mass production with sharply dropping global technology prices.

Institutional feasibility: Broad-but-shallow approaches are easier to agree on for a bigger group. In this case no individual Party is required to make commitments at a level of ambition where adverse short-term economic implications are more likely to be expected, for example due to increasing marginal abatement costs or negative competitiveness effects. At the same time, fears of free-riding and leakage are (at least partly) alleviated. However, if “broad” means “universal,” countries with no interest in climate protection whatsoever still have blocking power. The advantage of smaller groups negotiating more ambitious commitments is that similar interest groups can speed up negotiations (Aldy et al. 2003), demonstrate leadership, show advantages related to decarbonisation strategies and thus move others to eventually participate (Weischer and Morgan 2013).

5 Types of mitigation commitments

5.1 Scope of commitments

Commitment types can be grouped into two main categories: "obligations of result" or "obligations of conduct" (Bodansky 2012b). That is, they can refer to what countries are supposed *to do* or to what they are supposed *to achieve*. The climate regime has so far mostly focused on emissions results. An example for a conduct-based approach is the World Trade Organisation.

Within these two basic types there are different sub-types. For example, result-based commitments may relate to intermediate results such as the energy intensity of the economy, the emissions intensity of energy supply, or market shares of specific technologies such as renewables.

The following sections give an overview of the main types of commitments that have been identified in the literature. This synopsis mostly relies on existing overviews of proposals (Aldy et al. 2003; Aldy and Stavins 2007; Gupta et al. 2007; Kuik et al. 2008; Philibert 2005) and the expert judgement of the authors.

5.1.1 Result-based Commitments

The following types of result-based commitments have been proposed in literature:

5.1.1.1 Economy-wide GHG emission limitation/reduction targets (absolute/relative)

Under this approach economy-wide emissions are limited either in absolute terms as in the Kyoto Protocol, or relative to a business as usual scenario or to an index such as GDP. Absolute targets are defined in relation to a historical reference year or as absolute values[2]. Relative targets are linked to a value in the future that needs to be projected to allow an evaluation of the resulting level of emissions from the commitment.

5.1.1.2 Sectoral emission limitation/reduction targets (absolute/relative)

There are three forms of sectoral emission limitation/reduction targets:

National sectoral commitments: In this approach, emission limitation/reduction targets are set for individual sectors, such as electricity generation, steel, cement etc., rather than entire countries. Sector definitions and boundaries might be harmonised internationally or be left to each individual country. Many of the current non-Annex I pledges are in fact at a sectoral level. In the most far-reaching proposal, countries would disaggregate the entirety of their national emissions and commit to separate targets for each CO_2-emitting sector and each non-CO_2 gas in order to allow for international coordination of sectoral actions and to adequately account for the different warming properties of the different gases (e.g. Barrett & Toman, 2010).

[2] For example the commitments to become carbon-neutral by a certain year. This constitutes an absolute emissions target with an absolute value, although it can be also argued that it represents a 100% reduction to any reference year.

Sectoral crediting/trading: A specific form of sectoral commitments, so called 'Sectoral approaches' have been under discussion for quite a while. These crediting/trading mechanisms present one possibility for scaling up the CDM. Introducing new mechanisms that would be based on sectoral targets have been discussed for more than ten years (starting with Samaniago & Figueres, 2002). This approach is mainly an offset mechanism, but most design variants under discussion also include an element of additional domestic reduction in the host country.

Transnational sectoral agreements: There has also been some discussion about introducing transnational sectoral approaches/agreements. Here internationally uniform benchmarks would be agreed for specific sectors, for example for the emission intensity of cement production (see also section 4.1.2 on technology-based commitments). These discussions have so far not yielded results. A special case are the two sectors that are excluded from the current commitments under the Kyoto Protocol – international aviation and marine transport. For both sectors a transnational sectoral solution through the respective international associations has been favoured to deliver fair and ambitious mitigation. So far ICAO and IMO have not yet decided on concrete commitments and modalities for implementation.

5.1.1.3 Targets for intermediate results (e.g. energy intensity of the economy, emission intensity of energy supply, specific technologies)

In addition to or as a replacement of emissions-related targets, commitments may link to intermediate outcomes. These would preferably address key emission drivers. Taking the example of energy-related CO_2 emissions, which account for about 60% of global emissions, these are determined by: size of the population, size of the economy, energy intensity of the economy, and CO_2 intensity of energy supply. Mathematically, these emission drivers may be expressed as:

$$CO_2 \text{ emissions} = \text{Number of People} \times \frac{\$ \text{ GDP}}{\text{Person}} \times \frac{\text{kWh energy}}{\$ \text{ GDP}} \times \frac{CO_2 \text{ emissions}}{\text{kWh energy}}$$

Economic and population trends are largely beyond the influence of governments and are unlikely to be made the subject of any international agreement. Governments could therefore commit to reducing the emission or energy intensity of the economy and reducing the CO_2 intensity of energy provision (Verbruggen 2011).

The EU provides a real-life illustration of this approach with its internal targets for renewables and energy efficiency. A number of current non-Annex I pledges also contain targets for intermediate outputs. For example, China, in addition to its emission intensity target, also pledged to increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020.

5.1.2 Conduct-Based Commitments

Achieving targets requires the introduction of new – or strengthening of existing – policies and measures (PAMs). Therefore some propose that the climate regime should skip the step of setting targets and directly negotiate PAMs. Many of the current pledges from non-Annex I countries are already conduct-based, especially those from LDCs and other low-income countries. Coordinating PAMs was one plank of the original Kyoto negotiations in 1995-1997, but this process was not successful. Available options and existing pledges can be grouped and are described in the next sections.

5.1.2.1 Emission price commitments

Under this approach countries would commit to imposing a certain price on their national emissions. National implementation could for example be done through a tax or through an emissions trading system with a minimum allowance price. Both induce an emission price, which would reduce emissions. The price and the instrument used could be determined at the national level or be coordinated at the international level or among a group of countries.

5.1.2.2 Technology-oriented agreement(s)

Some argue that a focus on research, development and diffusion of climate-friendly technologies, provides higher incentives for participation than emission targets and timetables. There are two types of technology-related commitments.

As mentioned above there is the option to establish an international agreement. Technology-oriented international agreements may relate to collaborative research and development and/or to requirements for common standards for key technologies. These could be performance standards for power and other industry plants, vehicles, fuel quality and others. Joint R&D and joint standard-setting are usually proposed to be implemented as a package, in particular to use standard-setting to promote the diffusion of the results of the joint R&D. Standards could be phased in over time, starting with new installations and later extension to existing infrastructure and equipment, and phased application to different groups of countries.

The other option for technology-based commitments is the implementation of national measures to promote specific technologies. The difference is that a country could commit to promote a technology, for example solar thermal heating, through a number of measures. Different to the result-based commitments the achievement of the commitment would be measured against the actions undertaken to promote the technology, not against the result achieved.

5.1.2.3 Packages of policies and measures

Price commitments and technology-oriented proposals are particular variants of conduct-based commitments. There are also more general proposals to base the climate regime on packages of policies and measures (PAMs) rather than targets. Winkler et al. propose that stronger participation of developing countries should take the form of committing to certain sustainable development PAMs (SD PAMs). They aim to promote development objectives while at the same time reducing emissions, for example low-energy housing programmes (Winkler et al. 2002). While in the SD PAMs proposal by Winkler et al. Annex I countries would continue following the Kyoto approach, Victor for example proposes to shift the entire climate regime to a PAM basis (Victor 2011).

5.1.2.4 Individual actions and projects

Many current non-Annex I pledges are essentially lists of projects or activities. The difference to the above discussed variants is the smaller scale. Projects and activities are usually targeted to individual installations, groups of installations or other sub-national or sub-sectoral targets. Depending on the individual project and the national context they can nevertheless lead to substantial emissions reductions.

5.1.3 Summary Evaluation of Options

The following section 5.1.4 contains a detailed discussion of the options on the basis of the four assessment criteria outlined in the methodology and the below table contains a summary overview. It has to be noted that particularly environmental effectiveness ultimately hinges on the level of stringency. Whether the approach chosen is an emission target, an emission price commitment or another type has only limited impact on the final outcome and depends on a number of details of how the commitment is implemented. No commitment type is intrinsically more environmentally effective than the others. Their overall effectiveness hinges largely on the assessment of the other three criteria, which determine how likely it is that a commitment type is in fact deployed at an ambitious level and followed up with adequate implementation.

Also in general there is no silver bullet: each approach has its strengths and weaknesses. Emission-based approaches provide environmental clarity, the potential to maximise cost-effectiveness and political flexibility. However, they do not directly demonstrate the link between climate concerns and other development goals of a country in the same way as other commitment types such as technology targets or policy-based approaches. To the contrary, emission targets are frequently associated with constraining "development space" and posing risks to economic development and employment. And while much of the political discussion revolves around competitiveness concerns, comparable country-wide emission targets do not automatically constitute a "level playing field" for internationally competing industries exactly because they give the most flexibility to governments on where to reduce emissions. Governments can thus easily choose to partially or fully exempt internationally competing industries from mitigation obligations.

Other commitment types may be politically more attractive. Many countries have an inherent interest in promoting energy efficiency or certain technologies. Commitments based on intermediate results, sectors or policies can directly address these interests and generate less fear of constituting a "cap on development." Transnational sectoral and conduct-based approaches also offer the potential to internationally coordinate mitigation actions in internationally competing sectors. It is, however, more difficult to project their environmental impact.

A combination of approaches may have several advantages. Parties could be encouraged to adopt lists of various types of commitments instead of only an emission limitation/reduction target. Real-life examples are provided by the EU's 20-20-20 targets, which include targets on greenhouse gases, efficiency and renewables, and some non-Annex I pledges, such as those of Brazil and China, which also combine country-wide emission limitation/reduction targets with sectoral targets.

Emission limitation/reduction targets could be used to determine a floor on ambition. Commitments on technologies or policies could support them, with a goal to possibly overachieve. A multi-dimensional approach combining various types of commitments could be more failsafe, compared to focusing only on one single commitment type. If one approach fails to significantly reduce emissions this deficit could be compensated by the other commitments. This requires consistency among the different components of the target.

However, if all these various dimensions were to be negotiated internationally, negotiation complexity would increase substantially. Some authors (e.g. Victor, 2011) argue that this is exactly the required level of complexity, given the complexity of the climate problem, and suggest the WTO as an example to follow. However, the WTO did not attain its current level of complexity in just a few years. The international trade regime started out more than six decades ago as a rather modest General Agreement on Tariffs and Trade. And the political

incentives are different as governments see the potential for direct benefits in the trade negotiations but apparently not in the climate negotiations. In the climate regime, countries have in the past been strongly allergic to co-ordinating policies and measures internationally.

In addition, care would need to be taken to ensure that parties are not allowed to pick and choose on implementation and to ensure that overall emission limitation/reduction goals are met in the end. Any possibility to shift from more to less ambitious parts of a menu of commitments would have to be clearly ruled out. Therefore, if a country submitted multiple commitments, there would need to clarity on the overall level of effort it would be held to and the overall effort would have to be internationally assessable. In practice, countries undertaking climate policy action deploy a range of hard and soft policies, measures and goals in the short, medium and long term. Not all of these need to be written into international agreements in order to be operationalized, and to attempt to do so would be counter-productive.

Tab. 1: Summary Evaluation of Options

	Environmental Effectiveness	Cost-effectiveness	Distributional considerations	Institutional feasibility
Economy-wide targets	+ Highest ex ante clarity for absolute targets - If tradable and bankable, minimum = maximum reduction - If relative, incentive to inflate projections	+ Maximum flexibility - Risk of focusing on low-hanging fruit, neglecting long-term perspective	+ Easiest to calibrate internationally - Governments may exempt sectors facing international competition	+ Maximum flexibility +/- Feasibility differs among sectors - Absolute targets more risky for governments than relative targets - If tradable, strong MRV capacity required
Sectoral targets	Same as above	+ Allows calibration of actions to needs - No equalisation of marginal abatement costs	+ Coordination at sector level, may help to address competitiveness concerns	+ Helps to deal with differences in feasibility among sectors + Compliance may address individual sector rather than entire country - Less flexibility once commitment for a certain sector is set - Complex negotiations - Transnational sector approach in past strongly rejected by non-Annex I - If tradable strong MRV required
Targets for inter-mediate outcomes	- Emission outcome less clear ex ante than with absolute targets	+ Allows calibration of actions to sectoral needs - No equalisation of marginal abatement costs	+ Coordination at sector level, may help to address competitiveness concerns	+ Compliance may address individual sector rather than entire country + Intermediate outcomes easier to influence than overall emissions +/- Feasibility of MRV depends on types of targets - Complex negotiations
Emission price	+ Direct reduction incentive - Emission outcome less clear ex ante than with absolute	- Risk of focusing on low-hanging fruit, neglecting long-term perspective	- No automatic 'level playing field' as often claimed - Uniform price is socially regressive	+ Delivering policy inputs easier than delivering certain outcomes +/- Complexity of MRV depends on point of imposition - Taxation lies at core of national

	Environmental Effectiveness	Cost-effectiveness	Distributional considerations	Institutional feasibility
	targets - Need for supporting policies			sovereignty
Technology-oriented	+/- Difficult to predict + Adoption of standards by critical mass sufficient to ensure global effect - Not amenable to all sectors - May not foster behavioural changes	+ Allows calibration of actions to sectoral needs + Allows to harness network externalities - No equalisation of marginal abatement costs	+/- May strongly favour technology exporters, but provides incentives to enhance development and share information	+ Delivering policy inputs easier than delivering certain outcomes + Direct positive benefits for participating countries +/- MRV of implementation feasible, MRV of compliance challenging - Transnational sector approach in past strongly rejected by non-Annex I
Packages of policies and measures	+ Direct reduction incentives - Emission outcome less clear ex ante than with absolute targets	+ Allows calibration of actions to sectoral needs - No equalisation of marginal abatement costs	- Probably at best qualitative international calibration possible	+ Delivering policy inputs easier than delivering certain outcomes + No incentive to maximise emission allocation +/- MRV depends on specific policies - More complex negotiations
Individual actions and projects	- May be strong at project level but usually no transformative sectoral impact	+/- May be positive or negative at project level - No equalisation of marginal abatement costs	+/- Depends on individual project and finance	+ May be contentious locally but less international commitment required than for other options + Easier to MRV than entire sectors/countries, may thus be most adequate for countries with low capacity - COP not the adequate body to assess proposals

5.1.4 Detailed Evaluation

Tab. 2: Evaluation of environmental effectiveness of different types of commitments

Commitment type	Specification	Impact on environmental outcome
Economy wide / sector-based targets	Absolute targets	Highest ex-ante clarity about the envisaged environmental outcome (if accounting is done properly).
Economy wide / sector-based targets	Absolute/relative targets	**If tradable and bankable**, which is the established model, emission limitation/reduction targets constitute not only the minimum but also the maximum emission reduction. This can prevent additional mitigation in case reductions turn out to be easier than expected. Such a model thus inhibits the development of a dynamic race to the top. Approaches not based on emission limitation/reduction targets entail less risk of setting a "cap on ambition". One may perhaps draw an analogy to the impacts of feed-in tariffs and quota models for promoting renewables. Quotas give certainty on the outcome, but have not engendered anything close to the dynamics engendered by feed-in tariffs.

Commitment type	Specification	Impact on environmental outcome
Economy wide / sector-based targets	Relative targets	There is an intrinsic incentive to inflate expected BAU emissions to exaggerate the required mitigation effort.
Sector-based targets / intermediate outcomes / conduct-based approaches		These commitment types may not cover all emissions in a country to the extent economy wide targets do. Theoretically all emissions could be covered if commitments for all sectors were taken or conduct-based commitments addressed all emission sources. This is, however, highly unlikely and one rationale for the selection of such approaches is the ability to focus on the most appropriate sectors and activities depending on national circumstances. In principle, managing an ensemble of targets or policies in concert can be as effective as an overall target if their interaction is taken into account appropriately. When it comes to implementation, a country-wide target has to be broken down to individual sectors and implemented through a number of policies anyway.
Emission pricing (also applies to emission limitation/reduction targets with cap-and-trade)		Can influence investments and behaviour strongly if price is sufficiently high, but there are many non-price barriers that stand in the way of the necessary investment decisions or behavioural change. These include risk aversion against new solutions, split incentives, lack of information and technical capacity, personal preferences etc. (see e.g. International Energy Agency, 2012). Emission pricing on its own is therefore often not sufficient but should be complemented by other instruments, nationally or internationally.
Technology oriented	Transnational technology standards	Adoption of technology standards by a critical mass of countries may be sufficient to ensure global diffusion. Even if manufactured according to internationally agreed standards, the sizes and uses of equipment and appliances, and thus the related emissions, differ strongly among countries. Technology standards are therefore by themselves not likely to be sufficient but should be complemented by other instruments.
Individual actions and projects		Individual investments may have strong impact locally, but can usually not achieve the necessary sector-wide transformations.

Tab. 3: Evaluation of cost-effectiveness of different types of commitments

Commitment type	Specification	Impact on economic effectiveness
Economy wide targets	Absolute/relative targets	In theory allows to reduce emissions where costs are lowest. In practice, national distribution of effort is often more strongly influenced by lobbying rather than the aim of maximizing cost effectiveness. Examples are the allocation of emission allowances during the first and second phase of the EU ETS or the development of benchmarking criteria for industry for the third phase of the EU ETS.
Economy wide targets / emissions	Absolute/relative targets	Country-wide emission limitation/reduction targets and emission pricing may entail a risk that the focus of action may be laid on short-term rather than long-term considerations and hence dynamic cost-effectiveness is not met. New

Commitment type	Specification	Impact on economic effectiveness
price		technologies may be neglected that in their infancy have high costs but may ultimately become the most cost-effective option, see e.g. the rapid cost decrease of renewables in recent years. Some solutions such as re-organisation of urban settlement structures and transport systems as well as industry or power generation infrastructure have long implementation times. Activities need to start now to achieve the desired effect by 2050.
Sector-based targets/ intermediate results / policies		Approaches allow to calibrate actions according to specific needs of sectors regarding short-term and long-term costs, implementation timelines etc. However, they do not allow equalisation of marginal abatement costs and thus reduce the ability to compensate between sectors with higher and lower cost.
Emissions price		Directly setting an emission price rather than emission targets equalises marginal abatement costs ex-ante. However, as noted above, the presence of non-price barriers may result in cost-effective actions not being taken if these barriers are not removed by dedicated instruments.
Technology oriented	Transnational technology standards	International technology standards would allow to harness network externalities, i.e. a country's benefit from adopting a certain standard increases in line with the number of other countries adopting the same standard.
Individual actions and projects		The cost effectiveness of individual actions may be very positive or very negative depending on the design of the individual project.

Tab. 4: Evaluation of distributional effects of different types of commitments

Commitment type	Specification	Impact on international distribution
Economy wide targets	Absolute/relative	Compared to the other options, country-wide emission limitation/reduction targets are the least complex and hence probably the easiest commitment option to calibrate internationally according to equity considerations. With country-wide targets governments have full flexibility on where to reduce emissions, there is thus a risk that they may largely or fully exempt sectors that face international competition from emission control obligations. Even national targets that have comparable stringency therefore do not automatically constitute a "level playing field" for internationally competing industries.
Sector-based targets	Absolute/relative	Efforts would be calibrated at sector level instead of country-wide, which would allow to internationally co-ordinate mitigation actions in sectors that are competing internationally.
Emissions price (also applies to emission limitation/reduction targets with cap-and-trade)		Some argue that an internationally uniform carbon price would be the fairest possible approach. However, since countries usually also have other relevant taxes, subsidies and regulations, a uniform carbon price does not automatically constitute a "level playing field" for internationally competing industries. Countries might offset the carbon price by lowering other taxes or introducing new subsidies. Minimising competitive impacts would therefore require a broader coordination of policies.

Commitment type	Specification	Impact on international distribution
		In addition, due to national and international differences in capacity to pay, a uniform carbon price is socially regressive. Treating dissimilar cases alike is as inequitable as treating similar cases differently (Verbruggen 2011).
Technology oriented	Transnational technology standards	While all countries would profit from the development and diffusion of more efficient technologies, international technology standards might strongly favour technology exporters while most countries are technology importers. On the other hand, making standards international and providing an export market would reduce the incentive for technology developers to keep new innovations a secret out of fear of higher standards.
Policies		With a policy-based approach, probably at best a qualitative international calibration of levels of effort would be possible.

Tab. 5: Evaluation of institutional feasibility of different types of commitments

Commitment type	Political (national)	Institutional and technical	Negotiations (international)
Economy wide targets (absolute / relative)	Country-wide targets give countries flexibility on where to reduce emissions and thus allow tailoring of national policy according to national preferences which minimises possible concerns about infringement of sovereignty. With a focus on overall national ambition, national discussions may be stymied by competitiveness concerns of some industries even though they account only for minor shares of total national emissions. There is a risk of reaching only the lowest common denominator.	Emission limitation/reduction targets require strong institutional capacity for accounting. They require capacity across all sectors and the involvement of a multitude of stakeholders. On the positive side, substantial experience and capacity has been built up over the last two decades.	With emission limitation/reduction targets, individual countries' incentive to participate hinges on level of mitigation that is required from them. Participation of key countries has in the past been bought by allocation of substantial surplus allowances. This approach is not compatible with the requirement of steep global reductions. Transforming emissions into a scarce and thus valuable resource arguably exacerbates the distributional controversy among countries on who should contribute how much to the global effort[3]. This problem is exacerbated if targets are made tradable and bankable but also exists without tradability.
Economy wide targets (absolute)	Absolute emission-based reduction targets are risky for governments as there is substantial uncertainty on what the costs of mitigation	See above.	For the same reasons as described under political feasibility, absolute targets are seen as a potential "cap on development" by non-Annex I

[3] Stiglitz opines that, "If emissions were appropriately restricted, the value of emission rights would be a couple trillion dollars a year – no wonder that there is a squabble over who should get them." (Stiglitz 2010)

Commitment type	Political (national)	Institutional and technical	Negotiations (international)
	options really are. In addition, key emission drivers such as economic and population development are largely beyond government control. This incentivises weak targets and/or "safety valves" such as offsetting mechanisms to minimise the risk of a cost explosion.		countries, making them difficult to negotiate for developing countries.
Economy wide targets (relative)	Relative targets can partially address concerns discussed above for absolute targets.	MRV of relative targets requires even more effort than absolute targets. Additional to the monitoring of emissions, BAU targets require complex projections of future BAU and intensity targets require projection and monitoring of index value.	
Sector-based targets	Approaches based on sectors, intermediate outcomes or policies could allow actions to move forward in some sectors without being held back by problems in other sectors. Many current non-Annex I pledges are sector-based, so political viability appears to be given. Countries lose flexibility on how to distribute reduction effort domestically.	A sectoral commitment allows to focus on sectors where MRV of emission outcomes is most feasible with existing technical capacity (e.g. sectors with few large point sources).	More complex to negotiate than one country-wide target per country. Compliance mechanisms that are geared towards individual sectors might be easier to agree than compliance mechanisms addressing the entire country. Proposals for a transnational sectoral approach – setting one global benchmark for a certain sector – have in the past been strongly rejected by non-Annex I countries as an attempt to impose foreign standards.
Intermediate outcomes / policies	Do not transform emissions into a scarce and thus valuable resource and may thus generate less perverse incentives to set weak targets. Non-emission based approaches may be politically more attractive as they may generate less fear of becoming a "cap on development"	The feasibility of MRV of intermediate outcomes depends on the specific target. It is relative easy if expressed in absolute terms like a defined renewable energy share in energy supply,	To determine the final outcome of aggregate commitments and to determine if contributions are fair is more complex for sector, intermediate outcome or policy-based approaches than for country-wide emission-based reduction targets.

Commitment type	Political (national)	Institutional and technical	Negotiations (international)
	and many countries have a strong interest to promote certain technologies or energy efficiency. Intermediate outcomes such as scale-up of certain technologies or efficiency improvements are easier to influence for governments than emission outcomes. Delivery of policy implementation is easier for governments to guarantee than delivery of specific outcomes.	or specific rate of energy efficiency improvement. As with emission targets it is more difficult if expressed in terms of deviation from BAU, such as the EU's efficiency target.	
Emissions price	From experiences in the EU, Australia and other countries that introduced pricing systems, there is substantial political opposition to overcome from a number of national stakeholders.	Complexity depends on the point of imposition (upstream or downstream)	The proponents of a price commitment maintain that it is not a tax commitment. It could be implemented in various ways nationally, for example through a tax or through an emission trading system with a minimum price. This creates the flexibility to potentially make it an acceptable approach. Policy-makers are nonetheless likely to see this as an attempt to harmonise taxation, and taxation issues are usually seen as being at the core of country's sovereignty. One reason why the PAM approach failed in the 1990s was that it was seen as an attempt to harmonise energy taxation.
Technology oriented	Joint R&D yields direct positive benefits for participating countries.	MRV of implementation of technology standards and R&D activities is feasible, MRV of compliance with standards is more challenging.	The transnational sectoral approach has in the past been strongly rejected by non-Annex I countries as an attempt to impose foreign standards
Policies	New policies will be politically most feasible if designed to not only address mitigation targets, but contribute to overall sustainable development. At the national level policies will receive more attention and potentially opposition than internationally negotiated targets. Stakeholders could see international commitments related	MRV of policies depends on the specific policy and whether only policy inputs or also outputs are to be monitored. Measuring the implementation grade of policies related to incentive schemes, such as a feed-in tariff	International negotiation of policies would be especially complex, especially if not only broad headlines but also details of specific PAMs were to be negotiated. Some proponents maintain that this is indeed the adequate level of complexity, given that climate negotiations are effectively economic negotiations. On the one hand, the policies and measures approach was tried in the

Commitment type	Political (national)	Institutional and technical	Negotiations (international)
	to individual policies as an infringement on national political processes. This will depend on the level of detail that is prescribed by the international commitments. The level and quality of information provided to stakeholders will also play a role in the political feasibility.	is relatively easy. Monitoring the energy savings achieved by certain policies is more difficult. Complex policies could be MRVed related to their inputs (dedicated budget, staff etc.) and intermediate outcomes. Emission outcomes could be MRVed at the level of the national inventory.	Kyoto negotiations but was not successful. On the other hand, the WTO coordinates policies and measures at a very high level of very prescriptive detail. The difference can probably be explained by the fact that countries see direct benefits for themselves in trade negotiations while in the climate regime there is no such possibility of a direct quid pro quo. As Bodansky notes, the result is that most countries have so far been "more concerned about binding themselves than they have been desirous of binding others."
Individual actions and projects	Individual projects can be very contentious locally, but compared to the other options only limited political commitment is required as they only related to individual interventions rather than sectoral or even national re-orientation of economies.	In terms of technical feasibility individual actions may be the most adequate option for least developed and similarly poor countries.	The COP would probably not be the appropriate body to assess whether what may potentially be very long lists of individual projects and actions constitute an adequate contribution by the respective country.

5.2 Time aspects of commitments

Studies of the emission pathways consistent with limiting warming to 2°C or even 1.5°C above pre-industrial levels, taking into account technical and economic feasibility, show clear constraints on emission pathways. Recent policy analyses have identified a substantial "emissions gap" in 2020 (UNEP 2013). The gap is defined as the difference between where emissions in 2020 from present policies and measures are projected to be and where they would need to lie to be on a pathway consistent with meeting the agreed global warming goals. Not closing the gap by 2020 has important policy implications and increases overall risks: Higher long-term and overall costs, further lock-in in carbon-intensive and energy-intensive infrastructure, a narrowing of options and choices for society, including the flexibility to opt out of certain technologies, imperatively deeper emission reductions later on, and increased climatic damages due to higher rates of warming.

The level of ambition needed for the 2030s is directly related to the national and international action that is undertaken in the decade of the 2020s. This situation has important implications for the time aspects of commitments, and for the design of the ADP agreement and its linkages to scientifically review processes. In the negotiations, much of the present discussion has focused on objectives being put forward for 2030. It is, however, clear from the science that if ADP commitments and pledges for this timeframe are insufficient to hold warming below 2°C, the possibility to limit warming to this level may be closed off. In this respect, the national and international action that is undertaken in the decade of the 2020s could be fundamental for avoiding a lock-in of a 4°C Celsius world.

If the ADP agreement in 2015 were to lock in insufficient emission commitments until 2030, there is a considerable risk that it could be politically impossible, or at least extremely difficult to change this outcome. An example of this risk can be seen with the present eight-year European ETS target, which was set in 2009 at an inadequate level for 2020 and has proved impossible to change, or modify, despite the substantial problems this created for the European ETS itself (extreme drop in prices) and for the deployment of renewable energy across the continent. A set of five year periods for the ETS would have provided greater flexibility to deal with changing external circumstances as well as issues internal to the ETS itself.

5.2.1 The need for both short- and long-term perspectives

Given the urgency of action, the question of short term vs. medium and long term is an important element in the discussion. While the main starting point for this was the negotiation around the length of the second commitment period of the Kyoto Protocol, it has evolved beyond that and provides interesting possibilities.

Long-term and short-term goals serve quite different roles and would need to be structured differently within an ADP agreement. Longer-term goals are essentially aspirational and give a longer-term outlook to both parties and stakeholders about where policy needs to go. Short-term goals, preferably encoded into a legally binding agreement provide stricter policy and legal guidance about the scope for national action and flexibility over the defined period of these goals.

We need to differentiate global or aggregate goals, for example for country groups, and individual goals and commitments for Parties. Given the physical processes underlying climate change the important variable in mitigation is aggregate GHG emissions. Therefore the real long term global emission trajectory is what finally determines the impact on our climate.

However, the Ad hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) from 2007 to 2012 proved impossible to agree on such a long term global emission goal.

Adoption of a long-term emissions reduction goal by the ADP could indeed be valuable, however this would be difficult to achieve politically given the inevitable demands that will arise from many developing countries for clarity about means of implementation (finance, technology) before agreeing on global long-term goals.

In national or regional contexts, such as for the European Union, setting aspirational goals either directly or through longer term outlook documents provides useful guidance to countries and stakeholders without binding any entity to achieving those. As a consequence such goals have been easier to adopt, having little legal and political consequence in the shorter term. Long-term objectives are in many cases politically easier to agree to, as they go far beyond election cycles and individual officials' careers. While ambitious long-term targets also require immediate action to be achieved, concrete measures are more easily postponed, pointing to the long time horizon. Long-term achievements are at the same time harder to project due to the long time horizon and increasing uncertainty of many assumptions needed to assess future effects of measures.

Of more direct relevance is the question of the appropriate length for the ADP commitments. As noted above, there has been a presumption by many that the ADP will discuss 2030 emission goals. If this results in a 10-year “commitment” period without an integrated review process and at the same time, the level of emissions agreed in 2015 is insufficient to place the world on a pathway consistent with 2°C, this would probably be the end of keeping

temperature increase below 2°C. Instead, lock-in of carbon intensive development in this period would easily push the world towards a temperature increase of 4°C above preindustrial levels.

This is recognized for example in the September 2013 submission of the Least Developed Countries (Nepal on behalf of the Least Developed Countries Group 2013). They called for a more pathway-oriented approach reflecting "historical, current and future trend of emissions," pointing to commitments with an overall longer time horizon and multiple targets in the short, medium and long-term. The idea is to find a balance between more uncertain long-term targets and more concrete short term commitments.

If sufficiently ambitious, short-term commitments should require direct action. They can be more easily monitored – trends need to show after a relatively short time frame, which allows to assess progress and take corrective action where needed. It is also easier to evaluate the feasibility of the implementation of short-term commitments. The current political system, available institutions and the existing policy framework are a good basis for this. Uncertainty about the long-term development of these framework conditions make the assessment of long-term commitments more difficult.

However, given all the advantages of short-term commitments there is a risk that there is a pure focus on short-term activities only, neglecting the need for action in sectors where planning and implementation take a long time, like transport systems and urban structures. Also many activities that are connected to high short-term cost may ultimately become the most cost-effective option in the long-term, which we can see for example in the rapid cost decrease of renewables.

Whilst these are important considerations, there is also the need to consider what issues can be effectively addressed at the international level and which should rather be treated at the national level, within the context of the ADP agreements. The complexity of the longer term issues, sensitivity about sovereignty and divergent national circumstances indicate that dealing with long-term issues within the ADP context could be very difficult, if not unrealistic. On the other hand, the existence of shorter term emission commitments adopted at the multilateral level provides a powerful political signal to national constituencies about the likely direction of future controls on greenhouse gas emissions, which again sets a strong signal for effective prices on carbon. However, an international binding agreement appears more likely to motivate longer term national policies and measures, beyond those covered strictly by short-term commitments.

In relation to the length of the commitment period agreed in the ADP, considerations which would point towards a five year period – as opposed to a ten year period – include the ability to respond to new scientific and technological developments. It would also allow subsequent political leaders to increase political ambition in the aftermath and open for the opportunity to modify inadequate agreements adopted in 2015, improve those by the mid-2020s, and hence register for these improvements by the early 2030s. Important considerations lateral to the ADP process and 2015 agreement include the timing of scientific (i.e. the IPCC), technological and economic reviews relevant to the implementation of shorter term commitments.

A combined approach therefore seems appropriate to serve the need for short-term action and measurability with the need for a long-term perspective. Such a combined approach could be based on a commitment period approach, with a number of commitment periods with more and more ambitious targets over time; a number of point-in-time targets or even a mix with, for example, short-term targets following a commitment period approach and medium- and long-term targets being point in time.

5.2.2 Commitment periods or point-in-time targets?

From the environmental, institutional and cost-effective perspective, a fixed commitment period, as opposed to an individual approach, has several advantages at the international level. It allows a relatively clear prediction of aggregate emissions (assuming compliance and adequate accounting), while it allows sufficient flexibility for countries to compensate individual events that drive emissions up or down. If sufficiently ambitious in scale, it will require policies and measures to be implemented on a permanent or at least multi-year time frame to enable compliance.

A point in time target, set for an individual year, could be reached by chance (e.g. economic crises) or through targeted short-term activities. Had for example 2009 been the target year for commitments, most countries would have met their target, based on the reduced emissions following the economic crisis. However, given economic path dependencies in practice a point-in-time target would, if taken seriously, also require governments to take early action to achieve it. Achievement, however, would depend much more on external factors.

In a combined approach point in time targets could, however, serve to provide an indication for long-term level of ambition and would allow aggregate assessments on the adequacy of commitments towards achieving the objective of the Convention.

6 Allocation and effort-sharing

The concept of "effort-sharing" attempts to respond to the questions of how action needs to be distributed across countries to ensure a global emission path in line with a long term climate objective. In the last decade or so, an ever-growing body of literature on “effort-sharing,” “burden sharing” or “resource allocation” approaches has attempted to answer this question (collectively referred to as “effort-sharing” in the following).

These studies usually take two steps. First they start in defining a global pathway or level of aggregate GHG emissions that is in line with a certain temperature or CO_2 concentration target (in most cases 2°C and 400 – 450 ppm). Second they apply a set of calculations based on rules and assumptions that distribute this level of aggregate GHG emissions to the country or region level. The results are national and/or regional emission pathways or targets.

It is important to note that, depending on the rules applied, the results are not necessarily in line with a cost effective distribution of emission reductions from a global planning perspective. In order to ensure that a globally cost effective emission reduction pathway can be achieved, the trading of emission allowances or other sorts of financial transfers can be undertaken between countries. A clear differentiation between emission allocation pathways/ targets and the actual emission reduction pathway that a country will follow in the end is essential.

In this section[4] we provide a short description of the main principles that have been identified in the past as common elements within existing effort-sharing approaches. These principles help understand the diversity of equity considerations considered for effort-sharing (Section 6.1). We then move on to show how these principles are reflected in existing effort-sharing approaches, and how these approaches compare to each other. We also aim to show what assumptions are made to practically implement effort-sharing and what positions countries take towards these (Section 6.2). Last, but not least, we show what implications the effort-sharing approaches have on the distribution of emission reduction targets per region (Section 6.3).

6.1 Dimensions of effort-sharing

(Höhne, den Elzen, and Escalante 2013) have identified four main effort-sharing or allocation dimensions found repeatedly in the literature: responsibility, equality, capability and cost-effectiveness. In effort-sharing calculations, these are either regarded separately or combined. The figure below shows how these dimensions can be combined leading to seven categories of effort sharing approaches.

In comparison to the other three dimensions, cost effectiveness cannot be regarded as an equity principle in a strict sense[5]. However, since a number of approaches have used it to

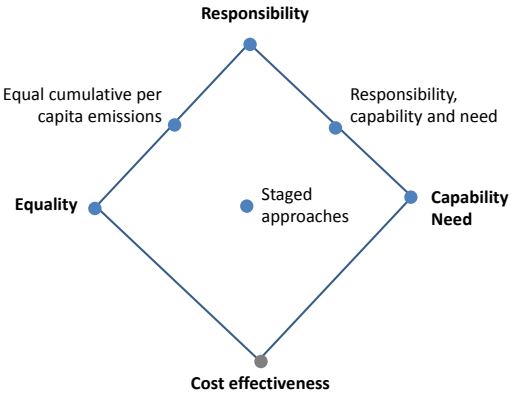
[4] The section is largely based on the scientific publication of (Höhne et al. 2013) and earlier Ecofys work (Moltmann, Hagemann, et al. 2010)

[5] See also the discussion in 6.2. on the difference between allocation of emission allowance and emission reductions, which explains that cost effectiveness can be achieved from any initial allocation through trading or allowing

undertake effort-sharing calculations we have included it here as an effort-sharing dimension. The following sections describe the four dimension further.

As observed in the figure, certain dimensions are more frequently combined in effort-sharing calculations than others: This includes “equal cumulative per capita emissions” and “responsibility, capability and need”, including approaches that put a high emphasis on historical responsibility while simultaneously taking account of the capabilities. The “staged approaches" category summarises approaches that combine all four dimensions.

Figure 2: Seven categories for effort-sharing approaches



Source: (Höhne et al. 2013)

6.1.1 Responsibility

Responsibility represents “the historical contribution to global emissions or warming.” A large number of effort-sharing approaches include this principle in one way or another. The historical contribution can manifest itself in the cumulative historical emissions of a particular country, which represents its contribution to global warming.

Sometimes the beginning of industrialisation is used as a starting point; in other cases it is argued that historical contribution begins at the point when countries became aware of the climate change problem - often the year 1990 is used, which was also chosen as the reference year for the Kyoto Protocol. Together with capability, responsibility is one of the two principles that the UNFCCC directly refers to when mentioning that countries should take action according to “common but differentiated responsibilities and respective capabilities, CBDR-RC.”

6.1.2 Capability and need

Capability represents the availability of resources needed to implement mitigation measures. As with “historical responsibility” it originated from the UNFCCC request to Parties to take action according to “common but differentiated responsibilities and respective capabilities”. Capability is represented either by GDP (per capita) or the Human Development Index (HDI). Other approaches that address capabilities focus on “basic need” or emphasise the “right to

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other means of flexibility, thus actual emissions reductions pathways after trading might differ from the initial emissions allowance pathways which are based on effort-sharing.

development" of a particular country. These approaches argue that the less capable a country is, the more such a country should have a right to fulfil its basic needs first before undertaking an effort to reduce emissions.

6.1.3 Equality

Under the equality principle a group of approaches can be summarised that emphasise equal rights to development for each person in the world. In effort-sharing approaches, this often translates into equal emission allowances allocation per person, i.e. that each person on the globe has the same right to emit as everybody else. This can either refer to one particular point in time (e.g. today) or to cumulative emissions over a time period (e.g. from 1990 till today).

6.1.4 Cost effectiveness

Cost effectiveness is an effort-sharing principle but not an equity principle like the other three principles above. Approaches that base effort-sharing on cost effectiveness allocate emissions on the basis of emission reduction potential: countries with a high emission reduction potential have to undertake more action than countries with a low emission reduction potential. Marginal abatement costs, representing the additional costs for reducing emissions over a given baseline situation, are often used as a basis to determine this cost effective allocation of emission reductions. This dimension is highly contested, partially because past exercises to harmonise abatement costs across modelling groups have proven difficult as the numbers differ tremendously between them.

The next section shows how these effort-sharing dimensions are reflected in actual effort-sharing approaches as can be found in literature.

6.2 Existing effort-sharing approaches

The principles described above are included in existing effort-sharing approaches in various ways. The table below highlights a number of relevant approaches and how they have taken account of the various dimensions.[6] They are grouped into seven categories. In the implementation they make use of different indicators that serve as proxies for the underlying dimensions. These indicators are represented in Tab. 6.

[6] We only include approaches here that deliver quantified emission allocations as only these can be used to make comparisons among the results of effort-sharing.

Tab. 6: Overview of effort-sharing approaches

Category	Responsibility	Capability	Equality	Description	Application in approaches	Indicators applied (examples)
Responsibility	X			The concept to use historical emissions to derive emission reduction targets was first directly proposed by Brazil in the run-up of the Kyoto negotiations (UNFCCC 1997), without allocations. Allowances based only on this principle were quantified by only a few studies.	• Brazilian Proposal • Annex I/Non-Annex I	• Cumulative emissions (per capita), emission trend • Emissions in 1990
Capability		X		Frequently used for allocation relating reduction targets or reduction costs to GDP or human development index (HDI). This includes also approaches that focus exclusively on basic needs.	• Convergence of emissions per GDP • Equal reduction of emissions per GDP • Percentage reduction based on indicator for capacity • Equal cost per GDP • Satisfying basic needs • Annex I/Non-Annex I	• Emissions per GDP • GDP per capita • HDI • Costs • Emissions in 1990
Equality			X	A multitude of studies provide allocations based on immediate or converging per capita emissions (e.g. (Agarwal & Narain, n.d.)). Later studies refine the approach using also per capita distributions within countries (e.g.(Chakravarty et al. 2009)).	• Contraction and Convergence • Reduction based on emissions per capita	• Emissions per capita
Responsibility, capability and need	X	X		Approaches use responsibility and capability as a basis.	• Greenhouse Development Rights • Responsibility, Capability and Sustainable Development (Winkler et al. 2011a)	• Emissions per capita • GDP per capita • National income distribution
Equal cumulative per capita emissions	X		X	Studies that allocate equal cumulative per capita emission rights based on a global carbon budget (Pan, Zhu, and Chen 2005). Studies diverge on how they assign the resulting budget for a country to individual years.	• Carbon budgets • Equal cumulative per capita emission rights	• Carbon budget • Cumulative emissions per capita
Staged approaches	X	X	X	Studies that propose or analyse approaches, where countries take differentiated commitments in various stages. Also approaches based on allocation for sectors such as the Triptych approach (Phylipsen et al. 1998a) or sectoral approaches are included here. Categorisation to a stage and the respective commitments are determined by indicators using the three equity principles responsibility, capability and equality and additionally cost-effectiveness. Finally, studies using equal percentage reduction targets, also called grandfathering, are also placed in this category.	• Multistage • Common but differentiated convergence • EU commission illustrative calculations for Copenhagen • Convergence of sectoral efficiencies (Triptych)	• Mix of indicators , e.g. • For multistage: emissions per capita, GDP per capita, % reduction below base year • For Triptych: various sector specific indicators such as "Share of renewables and emission free fossil in 2050" for electricity
Cost-effectiveness (for reference)				Studies that assume that all countries are supposed to have similar relative mitigation costs and on that basis distribute targets	• Equal marginal mitigation costs	• Marginal Abatement cost (USD/tCO2)

Source: adapted after (Höhne et al. 2013) and (Moltmann, Höhne, and Hagemann 2010)

A number of observations can be made from the table. First of all, certain effort-sharing approaches have clearly been calculated more often than others. A large number of studies have evaluated what is summarised under the equality principle here. This might be explained by the fact that equality issues are closest to the climate negotiations and that there are relatively simple indicators which allow a quantitative approach to this dimension.

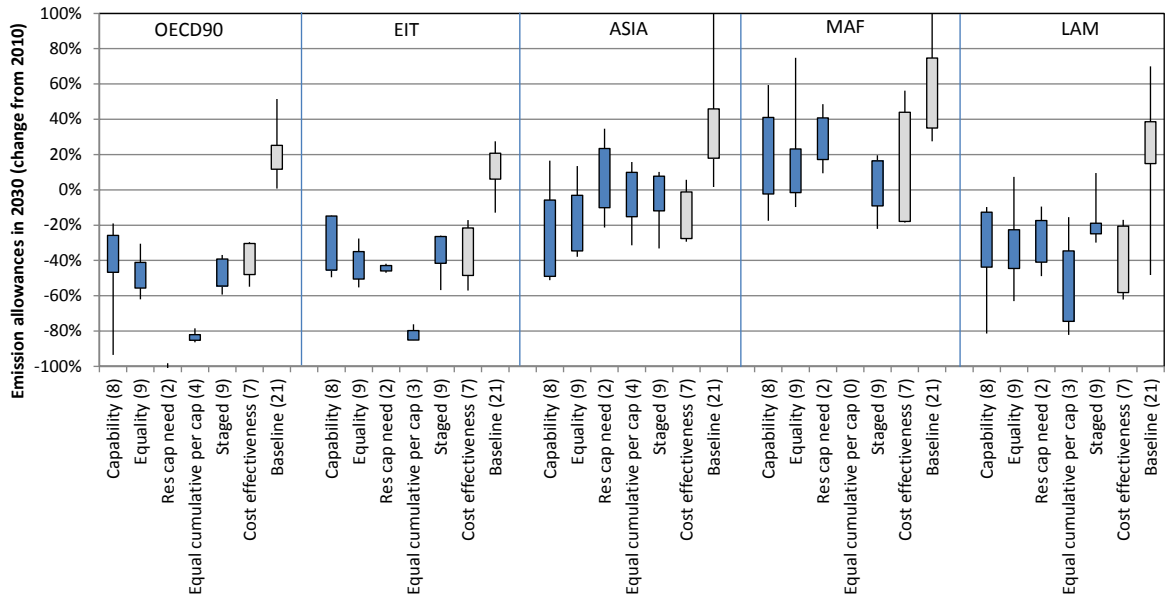
On the other hand, only a limited number of studies have focused on historical responsibility as the only principle. Second, certain indicators are used repeatedly in different contexts, often combined in different manners. These include per capita emission.

Even with agreement on the broader equity dimensions, there is still a large range of indicators and interpretations, e.g. on starting year, making it difficult to agree on the effort-sharing in more detail.

6.3 Quantitative implications of effort-sharing approaches

(Höhne et al. 2013) have reviewed the latest effort-sharing calculations available. An overview of the implications on emission allowances by region for the year 2030 is provided in Figure 3, which shows emission allowances in 2030 compared to emissions in 2010. For each region, the figure illustrates the range of results from different studies considering effort sharing approaches within the seven categories. The graph furthermore shows the baseline emission projections found in the same studies.

Figure 3: Emission allowances by allocation category for 425-475 ppm CO_2e, in 2030 relative to 2010 emissions



Notes: minimum, 20th percentile, 80th percentile, maximum value. Number of data points in brackets. For the category "Responsibility, capability, need" the emission allowances in 2030 are -106% to -128% (20th to 80th percentile) for OECD90 below 2010 level (therefore not shown here). EIT: Economies in Transition, MAF: Middle East and Africa, LAM: Latin America. For the OECD90 list, please refer to the IPCC definition http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=149

Source (Höhne et al. 2013).

A number of interesting observations for the effort-sharing debate under a global climate agreement in 2015 can be drawn from the figures and the calculations undertaken (text below is adapted from (Höhne et al. 2013)).

- The way a principle is used in the calculation might be more important than the principle itself: The figures show large ranges for each principle as well as overlaps between the principle ranges. This implies that many times the assumptions made in the translation of a principle to quantifiable indicators are more important than the different principles.
- Effort-sharing outcomes under one category differ tremendously from the other approaches. "Responsibility, capability, need" as well as "Equal per capita accumulative emissions" lead to very low emission allocation to the region defined as OECD90 and the Economies in Transition (EIT). The reason for this lies with the fact that these approaches put a *"heavy weight on the larger responsibility and capability of developed countries"* (Höhne et al. 2013).

- For low stabilisation levels financial transfers become more important to assure global efficiency. Financial transfers depend on the difference between the cost effective approach and any given effort sharing approach: A large difference hints at more financial transfer to make the overall global outcome cost effective. Approaches that would lead to large financial transfer volumes include the "Equal per capita cumulative emissions," "Responsibility, capability and need" as well as some "Staged approaches" while approaches based on "equality" tend to lay in the same range as the "cost effective" approaches and therefore hint to less financial transfer required.

6.4 Country positions on equity in the climate negotiations

When analysing parties' submissions to the ADP, it becomes clear that there are different stances on equity and respective details on the design of a future agreement.

Parties agree that the efforts should be distributed according to the principle of common but differentiated responsibilities and respective capabilities. Annex I countries have committed to absolute emission reductions in the past referring to this principle. A critical point of discussion between countries is how to quantify the distribution of emission reduction efforts. Various developing and emerging countries in the past have sought to incorporate historic emissions as an indicator for responsibility, e.g. Brazil in their proposal in 1997 (UNFCCC 1997) or a number of studies from Chinese research organisations (Anon 2009). These views are partially also reflected in the recent submissions. Brazil maintains its past proposal that historic contribution to temperature change should be the main criterion to determine future targets under the 2015 agreement. It suggests 1850 as a starting year and that the indicator takes into account the accumulation effect of emissions on global temperature increase (Brazil 2013b). During the Conference of Parties in Warsaw, 2013, Brazil further suggested that the IPCC should develop a method to quantify the historic responsibility based on these ideas (Brazil 2013a). This suggestion was, however, not part of the Warsaw decisions.

In the run- up to the climate negotiations in Copenhagen in 2009 a number of countries presented proposals for effort-sharing among Annex I countries. The EU proposed to use an approach based on four indicators that are largely in line with the dimensions listed in Section 6.1 (Commission 2009), while Japan proposed an approach based on the convergence of sectoral efficiencies (Moriya 2009). While their positions might have changed since then, this illustrates the central role of effort-sharing approaches in the negotiations.

A number of countries such as the United States and Japan in their latest submissions to the ADP propose that it should be up to the country to determine their fair share instead of basing commitments on top-down approaches (United States, 2013; Japan, 2013). However, this does not necessarily exclude a role for effort-sharing approaches as these could be used to compare the proposed submissions.

The cases above illustrate the big differences in the countries positions regarding equity, and an agreement on one fixed approach is highly unlikely. The current process on the way towards the 2015 climate agreement as decided in Warsaw does not foresee any guidance on the equitable contribution of countries under the UNFCCC so far (UNFCCC 2014).

7 Issues in the ADP Process relating to mitigation

In this chapter we consider how a number of factors considered in earlier sections contribute to the negotiations for the ADP agreement. There is a range of important conceptual issues which are relevant to securing an ambitious and equitable outcome in 2015. This relates to actual emission commitment levels but also to the strength of the architecture of the new agreement. The latter is relevant to an understanding of how commitments can be progressively enhanced overtime, and of ensuring that actions undertaken are actually achieved.

The Co-Chairs note of 4 February 2014 also emphasizes several points that have come through the discussions in the preceding chapters of this report notably:

- How proposed nationally determined contributions will contribute towards achieving the objective of the convention, in particular in relation to the 2°C goal
- How the total aggregate levels of ambition are to be considered and assessed both in the 2015 context and regularly thereafter so that the objective of the Convention committee met
- And "how equity, fairness and strong links with evolving science will be achieved, in keeping with the need for the 2015 agreement to be flexible and durable."

Relevant elements to consider in the ADP process thus include: Negotiation and adoption of commitments, the review of adequacy of the commitments, the assessment of equity and fairness and MRV rules and accounting.

We will start out with a conceptual description of the issues, focusing the discussion on the elements that appear central to ensure that emission commitments are maximised and fair, and that the architecture of the agreement is able to effectively monitor progress and facilitate regular enhancements of commitments and actions.

7.1 Relevant process elements to be considered

7.1.1 Negotiation and adoption of proposed emission commitments

There is a spectrum of possible approaches to arriving at final commitments in the 2015 agreement, ranging from a pure top-down approach to a complete bottom-up arrangement. Two very different procedural aspects are usually summarized under these terms. While they are closely linked, confusing them can lead to misunderstandings. One is the political process to determine the final commitment of a Party, which goes beyond the pure quantification according to scientific approaches. It addresses the question whether all Parties in the end need to agree to commitments or not, irrespective of the process that led to proposals on the table. The second aspect regards how commitments are to be adopted within a new legal agreement. There is a significant distinction between commitments that can be unilaterally inscribed into an agreement, even if reviewed by all parties first, against those, which must be agreed on and adopted by all parties.

One of the core questions in the discussion of a new international climate agreement is whether it should be framed as a top down or bottom-up approach and what the relative strengths and merits of such constructions are in relation to the global climate goals. It turns out that defining what is top-down or bottom-up is not a single-dimensional question, but

involves a range of factors. Consequently, no approach that would be likely to be adopted in the real world is either fully top-down or bottom-up.

There is a set of issues which together help to determine whether a regime or agreement is "bottom-up" or "top-down". These issues will influence the quality of mitigation agreements and substantive action under an international agreement. The weighting of these issues/elements in determining the strength of an agreement is relative and will be subject to judgment and one could explore different scenario options to examine these and to index their strength. The extent to which different elements are combined together would determine the ultimate strength of the agreement, with some elements being more essential than others. The following table lines out the core elements of a new agreement and properties associated with the top-down and bottom-up approaches.

Tab. 7: Central elements of a new climate agreement and key properties of the bottom-up and top-down approaches

Architecture or process	Bottom Up	Top-Down
Legal form	COP decisions	Protocol or other legal instrument
Negotiation and adoption of proposed emission commitments	Parties inscribe or list commitments in ADP at time of their own choosing	Parties commitments adopted multilaterally ADP outcome
Review of adequacy of 2015 proposed commitments	No official co-ordinated review and no substantive consideration by the ADP of commitments	UNFCCC or other formal process reporting to ADP on adequacy of aggregate emission commitments
Second and subsequent review	Loose timetable with no specified procedure	Timetable agreed in ADP and linked to science assessments
Assessment of equity and fairness	Ad Hoc stakeholder studies and assessments	Agreed framework for considering equity and fairness with reporting to ADP
MRV rules and accounting	MRV approaches determined nationally and no agreed accounting agreed	Agreed MRV rules adopted including for national offers and accounting procedures for implementation and reporting
Compliance	No compliance procedures	Agreed compliance procedures

7.1.2 Review of technical correctness and adequacy of proposed commitments

Assessing how far initial and subsequent proposed commitments are consistent with holding global warming below 2°C remains important to evaluate the adequacy of the ADP agreement. This task could be the subject of a technical paper process under the UNFCCC secretariat to be formally considered by the ADP. It could also be officially outsourced to an external institution, for example, UNEP.

However, it may well be the case that Parties will not be able to agree on providing such a mandate to UNEP, the Secretariat or others. In this case, interested organisations may also take on such a task on their own initiative, as UNEP is already doing with its annual “Emissions Gap Report”, however formal consideration by the ADP would most likely not take place.

In Warsaw, many Parties were pushing for an early deadline for the international submission of initial offers in order to provide sufficient time for countries to assess and negotiate each other’s offers. Many were also in favour of first defining requirements regarding the information countries would have to submit with their initial offers. Guidance on this was for

example outlined in the submission by the EU (Lithuania on behalf of the European Union 2014) or in Morgan et al. (Morgan et al. 2013). Such guidance could decrease the need for clarifications of the pledges after they are made.

The idea was that the information requirements should be agreed by June 2014 to give sufficient time for countries to develop their initial offers accordingly. Parties, however, in the end decided to agree on information requirements at the COP 20 in Lima, in December 2014 (UNFCCC, 2013). This late date is not helpful for ensuring that transparent and adequate contributions will indeed be tabled "well in advance" of the 2015 COP, "by the first quarter of 2015 by those Parties ready to do so", as stipulated in Warsaw (UNFCCC, 2013).

Examples for possible approaches to reviewing mitigation commitments are:

- Each Party assesses the other Parties' offers on its own, without a formal process under the UNFCCC. Discussions would then probably proceed mostly bilaterally, or multilaterally in fora such as the G-20 or the Major Economies Forum. Within this framework there may still need to be an agreed qualitative assessment of the extent to which initial and subsequent proposed commitments are consistent with holding global warming below 2°C.
- Alternatively, the ADP could establish a process, including an expert working group, and/or mandate an existing body, such as the Secretariat, to support the process of reviewing proposed commitments offers. This could have one or several of the following functions:
    - Defining requirements for the information Parties need to submit along with their draft commitments;
    - Synthesising the information made available by Parties according to these common information requirements;
    - Assessing the technical robustness of all data, assumptions and calculations put forward by Parties;
    - Assessing the global level of effort that would result from Parties' proposed commitments and their overall consistency with holding global warming below 2°C;
    - Assessing the proposals against an agreed effort-sharing framework or equity reference framework, if applicable (see next section).

7.1.3 Assessment of equity and fairness:

How "equitable contribution of a Party" should be quantified includes the question of which principles and indicators to choose, as discussed in section 6. Beyond this purely technical discussion it also includes the process of how to agree on the right indicators, metrics, assumptions and data.

In Warsaw there was some support for an international process to assess whether countries' initial offers actually represented their fair shares and would add up to the globally required level of ambition. However, in particular the "group of like-minded developing countries

(LMDCs)[7]" strongly objected to any mentioning of "commitments" in relation to non-Annex I countries. They also strongly objected to any notion that the efforts of non-Annex I countries should be in any way assessed internationally. They maintained that binding commitments as well as any process of assessing efforts should only apply to Annex I countries (Sterk et al. 2013). As a consequence, this is likely to be in play in the ADP in 2014 as an area to be developed.

South Africa, the African Group and the Climate Action Network (CAN) have proposed an independent expert process to develop an "Equity Reference Framework". This Framework would then be used by Parties to formulate their initial offers and as basis for a review of these offers by international experts and for the negotiation among Parties (CAN 2013).

Instead of trying to develop an agreed framework ex ante, Parties could be required to include a justification regarding the applied fairness approach when submitting their initial offers and a description of how the used principles could be applied to all countries. This would result in a (potentially very large) set of effort-sharing proposals. These could be the basis for discussion with the aim to progressively narrow down the number of alternatives in the course of conducting a review of the initial proposed commitments.

7.1.4 MRV Rules and accounting

Even a fully top-down allocation of efforts will not have much force if there are no stringent common accounting rules. Conversely, a fully bottom-up approach regarding mitigation commitments can be strengthened substantially by ensuring stringent common accounting. Common accounting has two main requirements: 1) the ex-post evaluation of actual efforts and 2) the definition of the requirements for the information that parties need to submit along with their draft commitments. We do not further discuss this aspect here, as a parallel research project considers the topic in detail.[8]

7.2 Exemplary scenarios for a process towards a 2015 agreement

This section discusses different process scenarios to illustrate the architectural concepts and processes discussed above, how they might be combined together in different ways and their respective advantages and disadvantages. The four scenarios considered include two hybrid approaches illustrating options between the top-down and bottom up:

- Top-down: Quantifying commitments through the development and application of an agreed effort-sharing formula or system and a negotiation agreement by all Parties to the set of commitments;
- Pure bottom-up: Determining commitments completely bottom-up, with no international review, negotiation and joint agreement, as in the Copenhagen/Cancún pledges.

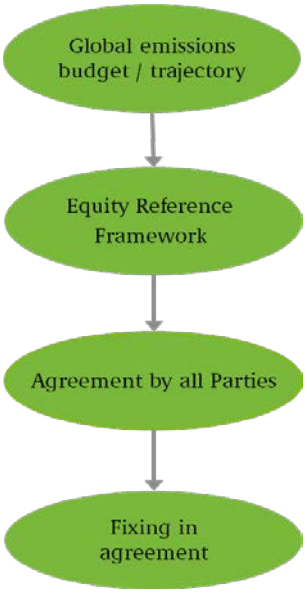
[7] The LMDCs include China and India, some other Asian countries such as Pakistan and the Philippines, OPEC countries such as Saudi Arabia as well as some Latin American countries such as Bolivia and Venezuela.

[8] Accounting rules under the post 2020 agreement for the Federal Environment Agency

- *Bottom-up with negotiated outcome*: An approach where commitments are offered "bottom up", reviewed for consistency with the 2°C goal and then negotiated as part of the final adoption of an agreement. Enabling a meaningful review requires ex-ante definition of information requirements. The negotiation may or may not involve development of an effort-sharing framework or equity reference framework to guide the negotiations;
- *Bottom-up with review*: An approach where commitments are offered "bottom up," again using information requirements defined ex-ante, reviewed for consistency with the 2°C goal and then inscribed in an agreement. The review would have the aim of making countries increase their level of ambition if their initial offers were found wanting, but there would be no negotiation process.

7.2.1 Top down

Figure 4: Top-down process



7.2.1.1 Description of the process

A top-down approach would consist of the following steps:

1. Parties agree on global emission budget or trajectory
2. Parties agree on an effort-sharing approach or a range of approaches and calculate individual allocations for each Party based on this
3. All Parties agree to the resulting commitments
4. Commitments are inscribed in the new agreement

The global emission budget or trajectory should ideally give a high chance of staying below 2°C in line with the objective agreed in Copenhagen and Cancún or even 1.5°C as demanded by some Parties. According to the Working Group 1 contribution to the 5th IPCC assessment report, limiting the warming caused by anthropogenic CO_2 emissions alone to less than 2°C since the period 1861–1880 with a probability of greater than 66% will require cumulative CO_2 emissions from all anthropogenic sources to stay between 0 and about 3670 Gt CO_2 since that period. This amount is reduced to about 2900 Gt CO_2 when accounting for non-CO2 forcings. 1890 Gt CO_2 were already emitted by 2011 (IPCC 2013).

Agreeing on a formula for effort sharing would require agreement on effort-sharing principles, indicators expressing these principles and data sources to quantify the indicators. Parties could, for example, constitute an expert body to develop the formula and resulting (ranges for) allocations.

Based on the agreed budget or trajectory and the effort-sharing framework commitments would be allocated to individual Parties, agreed by all Parties and fixed in the agreement. Parties would also agree on common accounting rules to ensure that progress towards achieving commitments can be robustly monitored, reported and verified.

7.2.1.2 Evaluation of this option

Environmental effectiveness of this approach mainly depends on the level of ambition of the overall budget or trajectory rather than individual countries' commitments. Like all other options discussed under this section, it also depends on how far Parties would in fact

implement measures to achieve the allocations resulting from the effort-sharing formula. Assuming that the emission pathway constraining the initial allocation of Parties' emission commitments is consistent with scientific understanding of what is needed to limit warming below 2°C, the environmental goal should be able to be met.

Regarding cost-effectiveness and distributional considerations, as discussed in the previous chapter, the global distribution of effort would most likely not reflect the global distribution of mitigation potential and costs, as most effort sharing proposals aim to achieve distributional equity, not cost effectiveness. Many effort-sharing proposals result in allocations for Annex I countries that are much more stringent than they could achieve through domestic reductions. Annex I countries would thus have to achieve their commitments partly through financing emission reductions in other countries, either via market mechanisms or non-market climate finance.

Regarding institutional feasibility, some countries find it problematic to determine commitment as part of an international negotiation process. The negotiations are conducted by the executive while entry into force requires ratification by the legislature. In addition, Parties have so far favoured vastly different effort-sharing proposals. In essence, approaches that have been found acceptable by Annex I countries have been deemed inacceptable by non-Annex I countries and vice versa. Some non-Annex I countries have taken the position that any international discussion of their level of effort would be unacceptable. Effort sharing proposals should only apply to Annex I countries while non-Annex I countries would define their contributions unilaterally. And some Parties have fully rejected any notion that a "formulaic" approach could work. It might thus be politically impossible to even launch a process to discuss establishing an effort-sharing formula. Even if a process was launched, its ultimate success would probably be far from guaranteed. Nonetheless, even if ultimately unsuccessful, the process as such might play a useful catalytic role for national discussions.

The work to establish the effort-sharing formula would be both highly political and technical. Principles would need to be translated into indicators, allocations would need to be quantified, which would in turn again require political scrutiny to determine whether the outcome is indeed generally agreeable. The work would thus probably be very time consuming. A possible way forward would be to explore several approaches, based on a number of different principles and indicators, and as a result present ranges and not single numbers.

7.2.2 Bottom-up with negotiated outcome vs. bottom up with review

7.2.2.1 Description of the process

The two hybrid approaches discussed here share a number of steps as illustrated in the figure to the right. Steps outlined in green are common to both approaches, while steps in blue are different. In summary the steps are:

1. Parties agree on an effort-sharing approach or a range of approaches (optional)
2. Parties submit their proposals for commitments
3. Proposals are reviewed at the individual and/or aggregate level
4. Proposals are either voluntarily updated by each individual Party based on the review (bottom-up with review) or negotiated and agreed between all Parties (bottom-up with negotiated outcome)
5. Commitments are inscribed in the new agreement

The major difference between these approaches will occur after a review of the initial emission commitments is conducted. In the stronger approach commitments would be negotiated, agreed and adopted by the COP, so there would need to be negotiated agreement on the extent to which initial offers are modified for inclusion in the final agreement. In the weaker version parties would inscribe their commitments unilaterally, as in Copenhagen/Cancún, and would thus be fully free to decide how they respond to the review process and its findings.

For both options the process could include a ratchet-up mechanism that would allow a periodic review of proposals to increase ambition. This could be through short commitment periods, which would automatically start a new process round within a short time frame. It could also take the form of an in-built review within the commitment period, as for example decided in for the second commitment period of the Kyoto Protocol.

7.2.2.2 Evaluation of the option

The environmental effectiveness of the outcome would depend on the degree of Parties' willingness to improve on initial offers if these do not add up to the globally necessary level of effort. In both approaches, it is more than likely that the initial commitments put forward by parties would in aggregate exceed the emission pathways scientifically consistent with holding warming below 2°C. The subsequent process of negotiating on these initial commitments and/or political consideration of a review of the proposals would likely be driven in part by the gap between the initial emission commitments and the aggregate level of emissions required to be consistent with the agreed global goal of holding global mean warming below 2°C above preindustrial. For either of these approaches to improve upon the pure bottom up approach there would need to at least be an implicit understanding that parties would be open to improving upon their initial commitments in order to collectively approach the global goal, based upon the give-and-take with other parties.

In the case of a negotiated outcome, where there is substantial political pressure to reach a final agreement in the context where all other parties are under similar pressure, and with a visible and transparent review process that would indicate the adequacy of the overall achievements against the agreed global, there may be a higher likelihood of aggregate emissions being lower than in the unilateral response to the review case.

Agreement of a global emission budget or trajectory might facilitate such a ratcheting up. The emission pathways by which aggregate levels of commitment could be measured in relation to the 2° goal would best be based on findings of the Intergovernmental Panel on Climate Change AR5. A negotiation over which pathway is consistent with the agreed global goal may not be productive and consequently there would need to be a consideration as to how to ensure that the IPCC findings are embedded and accepted in this process.

Regarding cost-effectiveness and distributional considerations, many Parties would probably use projected economic impacts as key criterion for what levels of ambition they would offer. Distributional equity would depend on the extent to which Parties would be willing to be guided by equity considerations even if these result in comparatively ambitious commitments

for themselves. In the past, only few Parties have been willing to adopt ambitious commitments.[9]

An important consideration in the overall outcome is how damages from climate change resulting from the proposed commitments are distributed. Impacts and damage resulting from insufficient commitments are likely to affect the most vulnerable – and least responsible for the problem – most. This points to the need for those Parties to be able to impact a decision on the overall level of commitments. Such a consideration would tend to support the stronger of these options, i.e. a process that involves reaching a joint agreement.

Regarding institutional feasibility, this approach would impose less initial constraints on the flexibility of Parties than the top-down approach. However, the process of negotiating from initially insufficient commitments towards an outcome with lower aggregate emissions implies significant technical and secretariat support. It also requires a functioning negotiating process built upon a good-faith understanding that initial commitments are to be negotiated towards a better outcome collectively.

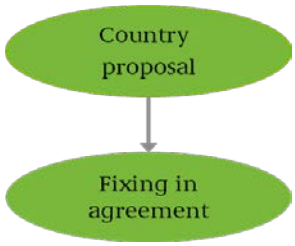
7.2.3 Pure bottom-up with or without common accounting

7.2.3.1 Description of the process

In this approach, countries might be asked to provide a justification for their commitments but there would be no international review, negotiation or joint agreement. Commitments would be inscribed into the new agreement as proposed by the Party.

This approach may or may not include definition of common ex-ante information requirements and common ex-post accounting rules. However, in the most extreme case of a pure bottom-up approach Parties would determine the level of detail provided with their commitments as well as the accounting rules unilaterally.

Figure 5: Bottom-up process



7.2.3.2 Evaluation of the option

Regarding environmental effectiveness, as shown by the Copenhagen/Cancún pledges, a pure bottom-up process without even a formal possibility to ratchet up commitments is very unlikely to deliver the necessary level of ambition. Definition of common accounting rules would help to exert some upward political pressure on the level of ambition as it would allow for increased public scrutiny, while without common rules countries could water down their commitments at will.

Regarding cost-effectiveness and distributional considerations, many countries might be likely to make projected economic impacts rather than equity considerations the main criterion for what levels of ambition they would offer.

[9] See e.g. the assessment of Parties' Copenhagen/Cancún pledges by the Climate Action Tracker, http://climateactiontracker.org/, last accessed 14 October 2013.

Regarding institutional feasibility, this approach puts the least constraints on Parties and does not require establishment of an international body or process to agree on commitments. However, there would probably be strong resistance against a fully bottom-up approach by groups such as AOSIS, the LDCs and the African Group. Common accounting would require providing sufficient resources to the UNFCCC to ensure implementation of the common rules.

7.3 Options to enhance ambition after 2015

7.3.1 How to organise a review to assure ambition level increases after 2020?

Regardless of the process to fix a first set of commitments for some or all countries, it will be essential to review them periodically. Given the current trend in the negotiations, the outcome of the first set of commitments will likely not be sufficient to be in line with the agreed objective of the UNFCCC. Additionally, there are continuous scientific and technological advances and changes in economic circumstances. These need to be adequately reflected in the commitments. A review needs to ensure the original commitments are still sufficiently ambitious and incentivise the further increase of ambition. To keep track of recent developments, short review cycles are important.

An important element for the new agreement therefore is that emission commitments are time bound with a short time horizon (e.g. five years) and that each subsequent set of commitments are linked to a scientific assessment process. Additional mid-period reviews could help Parties to better understand options for further mitigation action and implications for their economies. They could also provide a more regular update on the consequences of non-action.

Independently of those review cycles, countries should always be able to change their commitments to a more ambitious level and to formally inscribe the new commitment in the 2015 agreement at any time. Just as for the first round of proposed commitments, independent review of those new proposals is necessary to guarantee an increase in ambition when changing the commitment. The review could include only technical aspects or could also include a check against a possible equity reference framework.

The targets and associated rules have to be set in way to not present barriers, but incentivise Parties to increase ambition.

7.3.2 How could complementary initiatives be used to raise ambition?

Activities on non-governmental, regional or city level can substantially impact emission reductions of countries. Although such initiatives might not be driven by national government incentives, national circumstances can play a role in to what extent the initiatives are able to decrease emissions.

Such activities are closely linked to national action, as they tap into the same overall potential of the countries. In this way they also all contribute to achieving the national commitments. These reductions can therefore not be separated from national activities and are in fact accounted for in the national inventories and thus contribute to achieving the national target.

The existence of complementary initiatives should not refrain, but encourage national governments to implement further mitigation activities or support such initiatives in their countries. The UNFCCC could play a role in gathering information on such initiatives to promote information sharing and encourage governments to support sub-national and non-

governmental activities within their jurisdiction. A first step was made in Warsaw with invitation to Parties to exchange views on activities of cities, regions etc. under the ADP.

7.4 The ADP Process – options for a way forward

7.4.1 The Warsaw outcomes related to mitigation commitments

In Warsaw, countries agreed on the bare minimum necessary to move the process forward. Countries are now invited "to initiate or intensify domestic preparations for their intended nationally determined contributions, without prejudice to the legal nature of the contributions" (UNFCCC, 2013). Whilst there was no agreement on a process for the international consideration of the intended contributions, the findings of the ADP Co-chairs in their progress of 4 February 2014 noted the "positive result" from Warsaw "confirming its determination to achieve a timely adoption of the 2015 agreement and to enhance pre-2020 ambition" (Ad Hoc Working Group on the Durban Platform for Enhanced Action 2014). They noted three areas of work for 2014:

- Continue to elaborate all the elements of the 2015 agreement in concrete terms;
- Clarify information guidance on national contributions as early as possible, preferably be the end of the first half of 2014; and
- Unlock significant opportunities for raising pre-2020 ambition.

In Warsaw, there was a sustained effort by some Parties to ensure that the mitigation commitments to be inscribed and adopted in the 2015 Agreement would be wholly nationally determined, thereby seeking to do away with the possibility that there would be a process for multilateral analysis, assessment or negotiation of the commitments before they are inscribed.

The language ultimately adopted by the ADP was heavily negotiated, and is therefore quite nuanced and drafted in a way to avoid prejudicing future discussions on a number of important issues:

> "To invite all Parties to initiate or intensify domestic preparations for their intended nationally determined contributions, without prejudice to the legal nature of the contributions, in the context of adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties towards achieving the objective of the Convention as set out in its Article 2 and to communicate them well in advance of the twenty-first session of the Conference of the Parties (by the first quarter of 2015 by those Parties ready to do so) in a manner that facilitates the clarity, transparency and understanding of the intended contributions, without prejudice to the legal nature of the contributions. " (UNFCCC, 2013)

The reference to "intended nationally determined contributions" should be read as referring to the initial preparation of proposed offers by Parties, which would be expected to be done at the national level, with little or no input or feedback from the international community.

The reference to the "context of adopting" refers to the understanding that commitments would be inscribed and adopted multilaterally in the eventual 2015 Agreement. This embeds the assumption that a negotiation over the character, scope and ambition of these commitments would also be conducted in the same multilateral setting.

That "achieving the objective of the Convention" is included can be interpreted as the expressed need to ensure that the collective outcome of the process of considering Parties'

initial proposals is consistent with the agreed objective to hold global warming to less than 2°C above pre-industrial levels.

The request to communicate proposed offers well in advance of COP 21 is meant to facilitate this process by ensuring that there is an opportunity to assess and review the adequacy of the proposed contributions. This will be supported by "information that Parties will provide when putting forward their contributions", the content and nature of which is to be discussed and agreed by Parties by COP20 in Lima.

In addition, the dual use of "without prejudice to the legal nature of the contributions" seems intended to leave for future discussion the legal character of the contributions, even once they are inscribed and adopted in the 2015 Agreement. But of course, this should be read in the context of the legally-binding commitment for all Parties under Article 4.1 of the Convention to "formulate, implement, publish and regularly update" national measures to mitigate climate change.

In short, the ADP outcome leaves open the question of the setting and modalities for reviewing the adequacy of Parties' proposed contributions, as well as the process and timing for eventually inscribing specific commitments within a multilateral agreement, such as a legally binding protocol or other legal instrument to be adopted at COP 21 in Paris in December 2015.

7.4.2 Options for a way forward

As the Warsaw decisions failed to progress many of the issues discussed above there is more pressure during 2014 to strengthen key aspects of the ADP process. The Conference of Parties at the end of 2015 is scheduled to finalise the agreement. The process will depend on many different factors, especially the overall political landscape, which goes beyond the scope of this paper. Here, we have concentrated on a few aspects and outline how different choices impact the negotiation time line.

In a pure bottom-up scenario the time line to 2015 is the least problematic. Commitments put forward in this way would be fixed within the new agreement as communicated. Commitments would likely not be sufficient and the new agreement could include a ratchet-up mechanism to review the commitments after some time as outlined in section 7.3.

More interesting is the question of process if we assume that it is necessary to improve the 2015 outcome to:

a) Incorporate an assessment of commitments before fixing them in the new agreement; or

b) Agree on a common equity reference framework to use for the evaluation of proposals.

For the two options guidance on information to be provided with the offers would be essential to enable subsequent steps. In both cases proposals for commitments need to come on the table well in advance of the COP in 2015 to allow for assessment. Most agree that for such options to be feasible initial proposals would need to be submitted in 2014 (Lithuania 2013, Morgan et al. 2013) or early 2015 (Haites, Yamin, and Höhne 2013). The Warsaw decisions are in line with the latter, but did not follow calls for earlier communication of proposals.

The process to negotiate an agreed equity reference framework adds workload to the negotiation agenda. Timing of agreement on such a framework would need to be closely aligned with the commitment proposals. By when initial proposals would be required to still have sufficient time for subsequent steps mainly depends on the question of how a potential review process would be structured. Even though there was no agreement on such a process in

Warsaw, it would still be possible – although unlikely – to initiate such a review process in Lima. Details on an equity reference framework and information required to evaluate offers accordingly could be negotiated during 2014 and agreed in Lima.

Options on how the review process would work centre around the question of who would conduct the assessment of proposals. There are a number of options, including a pure peer review process, i.e. Parties review each other's proposals and report on their findings or use them within the subsequent negotiation process. An even more informal process could include external experts and institutions that undertake the assessment on their own account and publish results, which can then be used by Parties in the process. Given the lack of a formal process at the moment this informal review seems to be the most likely option.

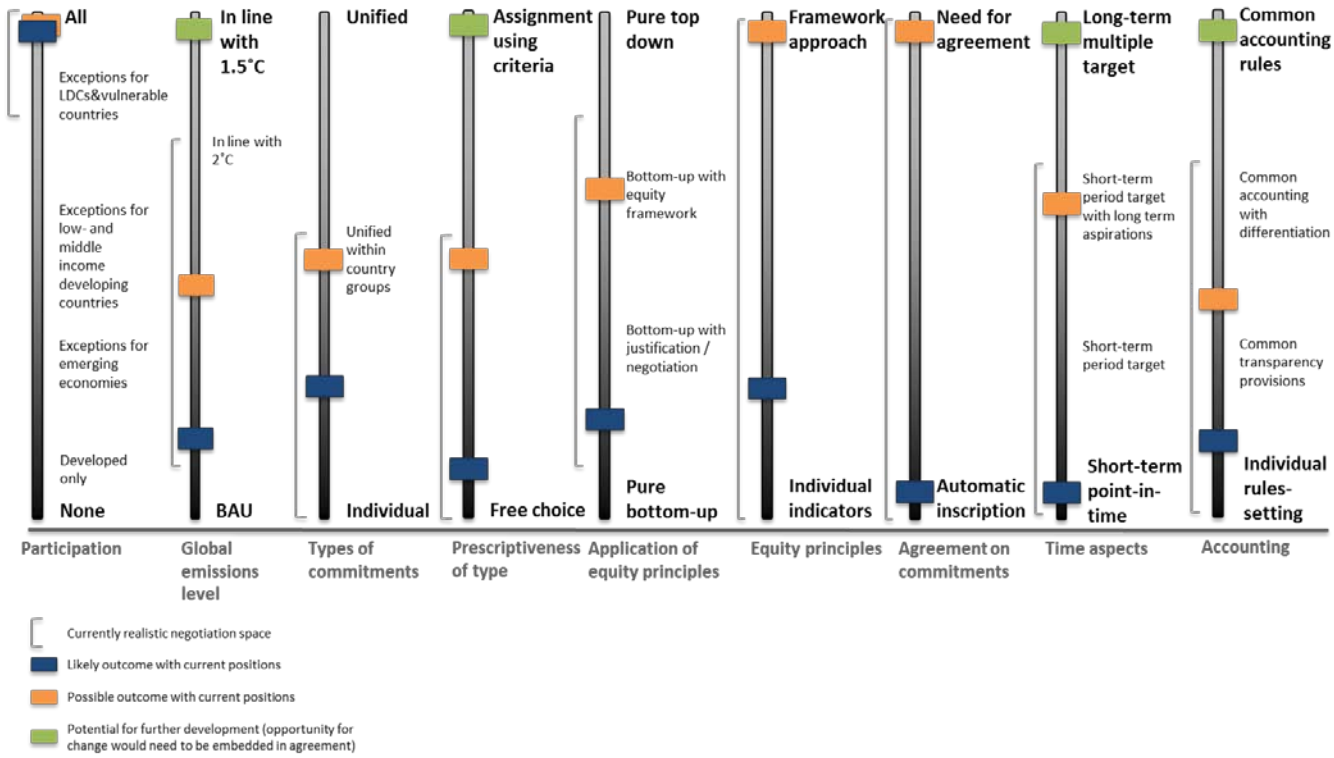
More formalised approaches include the use of already existing processes under the UNFCCC that could be mandated to broaden their scope of work. These include the ICA/IAR process, the clarification of pledges process and the periodic review, each with their own advantages and disadvantages (Morgan et al. 2013). ICA/IAR and the periodic review are likely to be operational too late while the clarification of pledges process would need to be expanded in scope and time line, as it is meant to end in 2014. In any case experts with a high international reputation and standing would be required to support such a technical assessment. These could either feed into one of these (or other) existing processes or into a newly created process that could for example mandate the Secretariat to coordinate the technical input.

Although the Warsaw decision only encourages Parties to communicate their initial offers in early 2015, the summit organised by the UN Secretary-General Ban Ki Moon in 2014 could be a defined moment by when initial proposals should be made. In 2015, these would be assessed, negotiated, if necessary increased, and agreed upon.

8 Conclusions and way forward

Previous chapters discussed the most important aspects that are relevant for the differentiation of commitments and ultimately the success of the negotiations for the new agreement and its environmental outcome. This paints a complex picture, where the different elements must be seen in relation to each other and the final assessment must contain all pieces within the overall framework. Figure 6 provides an overview of the different aspects.

Figure 6: Overview of aspects of differentiation



Source: own illustration

The illustration does not try to capture the existing linkages and trade-offs between different elements, but concentrates on defining the extreme ends and potential intermediate steps. It also provides a first assessment on where we see current boundaries to the negotiation space and likely outcomes given current negotiation positions if there is no strong and concerted push towards more ambitious outcomes.

From the illustration it becomes clear that we are still far away from where we need to be in order to keep emissions below 2°C warming. Also on other key areas like equity principles and common versus individual agreement on commitments and accounting rules, the likely outcome with current positions is far away from what is required to establish a comprehensive and environmental effective climate agreement.

Even though some of these elements, like the 2°C target and unified commitments, might be outside the realistic sphere for this round of negotiations until 2015, it is paramount that appropriate text is included in the final agreement that opens the door for further improvements of the agreement in the future. Designing the system in a dynamic way that ensures increases in ambition and further development of methodologies and principles remain open during a defined commitment period is essential. Revisions that result in reduced ambition need to be effectively barred.

8.1 Broad and deep participation is the only way to meet 2°C

Given the mandate of the ADP, participation needs to be broad. To achieve the stated goal of limiting warming to 2°C we need both broad participation and ambitious commitments. This is even more so for a more ambitious goal.

The analysis carried out however showed that the institutional feasibility for an agreement with broad and deep participation is currently very low. Many parties still want to participate without contributing with own ambitious targets. In addition, the financial resources made available for enhancing mitigation action in developing countries at present is insufficient to outweigh the insufficiency of action and pledges from major emitters.

The most vulnerable countries have long called for a more ambitious global goal of limiting global warming to 1.5°C by the end of the 21st-century. While this discussion is taken up in the process to review the global goal, which started in Durban in 2011, current commitments remain disappointingly close to business-as-usual, even though numerical participation in mitigation pledges/commitments has increased substantially compared to the Kyoto Protocol.

8.2 Multiple commitments could address important concerns

Regarding types of commitments we have identified a whole range of different options, each with their own advantages and disadvantages. The question remains whether countries will have the free choice which of those commitment types to apply or if there are rules that limit this choice. At the extreme end the type of commitment could be allocated automatically based on defined criteria.

Currently we see a situation where developed countries have adopted economy-wide emissions targets in the tradition of the Kyoto Protocol and pledged these internationally. Domestic implementation of these pledges is based on a variety of instruments, including emission trading, sectoral or technology targets applied nationally. In general, these domestic measures have not been part of the international pledging, although they are fully reported within national communications. Under the UNFCCC no rules determine who is eligible for which types of targets. This leads to fears that industrialized countries could in the future opt out of national-level commitments on emissions to choose types of targets that are potentially less environmentally effective and even more difficult to monitor than economy-wide targets.

Developing countries have made their own individual choices. A further differentiation could be possible depending on the development status of countries in narrowing down the options of choice. Many do not see it as very likely that a formalised spectrum of commitments could be agreed which would assign certain commitment types to certain groups of countries.

Our analysis of possible commitment types shows that there is no silver bullet. Each approach has its strengths and weaknesses. A combination of approaches may have several advantages. Emission limitation/reduction targets could determine a floor for ambition. Commitments on technologies or policies could support them, with a goal to possibly overachieve the targets. A multi-dimensional approach combining various types of commitments could provide a failsafe, compared to focusing only on one single commitment type. If one approach fails to significantly reduce emissions, as the carbon price currently does, this deficit could be compensated by the other commitments. Real-life examples are provided by the EU's 20-20-20 targets, which include targets on greenhouse gases, efficiency and renewables. Some non-Annex I pledges, such as those of Brazil and China, also combine country-wide emission limitation/reduction targets with sectoral targets. If parties chose to adopt lists of various types of commitments instead of only an emission limitation/reduction target, there should be a

mechanism to ensure that the more ambitious target is binding, in order to not undermine the environmental integrity of the agreement.

In order to ensure the environmental integrity (and cost effectiveness) of a new agreement, the contributions made under a new agreement should be worked out and specified in advance. Mitigation contributions should be presented in such a way that they can be quantified, compared, and aggregated to a global scale in order to judge their adequacy regarding the emissions pathways for limiting warming to below 2°C. They must also meet the current MRV standards for accounting rules under the UNFCCC.

Different proposals have already been made about the form of the national contributions, but the way forward is still to be paved out. One suggestion is to establish a Registry for all parties for three different mitigation types: goals, policies and projects (Morgan et al. 2013). Another is to establish a registry for best practice policy options that could be managed under different international fora (Höhne et al. 2014).

Essential for these assessments irrespective of the format of the mitigation commitment is that they can be translated into an estimate number for the country's total emissions by the end of the agreed commitment period. This implies that contributions should be made in a comparable format. The submission of a relative economy-wide mitigation target compared to business-as-usual baselines would require the simultaneous submission of a BAU scenario that is 1) a fixed over the commitment period and BAU for all countries proposing such targets and 2) assessed by a 3rd party and internationally accepted by the other parties within the new agreement. Other relative targets like carbon intensity and energy intensity targets would also require an establishment of a BAU for GDP growth in the respective country.

Non-economy-wide commitments such as sectoral targets would require an analysis of both the affected and the residual sectors in the respective country to judge what would be the final effect on the country's total emissions.

8.3 An agreed equity framework remains challenging

Regarding the application of equity principles, we can differentiate two main elements: the question of which principles and indicators to apply (see section 6) and the process of how to apply equity principles (see section 6). As shown in section 6.4, countries have expressed very different priorities for equity principles. In the past, many have focused on one specific element of equity, usually one that favours less ambitious targets for the country proposing it. Some even oppose the whole idea of establishing clear indicators and 'calculate' required reductions.

Similar to the question of commitment types, there is no silver bullet when it comes to effort-sharing proposals. More recently therefore the idea of more complex equity frameworks based on a larger number of indicators that reflect the whole spectrum of equity principles has come up. While such an approach can help ensure all countries find their own priorities reflected, it seems challenging to negotiate on the individual indicators and assumptions required for such a framework. In the current context this would need to be developed with the help of experts and could likely only serve as a guidance to evaluate bottom-up pledges.

Alternatively, Parties could provide a justification regarding the fairness of their own proposal and a description as to how the used principles would be applied to all countries. The resulting variety of approaches could be the basis for discussion with the aim to progressively narrow down the number of alternatives in the course of conducting a review of the initial proposed commitments. Given there is little time until 2015, this option may prove to be technically not feasible to deliver results in the required time frame.

8.4 Ensuring adequacy of commitments needs to be back on the agenda

Hybrid approaches that at a minimum include a review process of the adequacy of targets have been proposed by a number of Parties. So far this has not found traction in the negotiations. Warsaw ended with a text that still leaves open the question of the setting and modalities for reviewing the adequacy of Parties' proposed contributions, as well as the process and timing for eventually inscribing specific commitments within a multilateral agreement, such as a legally binding protocol or other legal instrument to be adopted at COP 21 in Paris in December 2015.

There is still a window of opportunity to define such a review process during the intersessionals of the ADP during 2014 and take a decision at the COP in Lima. The summit organised by the UN Secretary-General Ban Ki Moon in 2014 could be a defined moment by when initial proposals should be made, ahead of the agreed time frame - showing true leadership. In 2015, these would then be assessed according to the process agreed in Lima, negotiated, if necessary increased, and agreed upon.

8.5 Short commitment periods prevent lock-in of low ambition

Dynamic elements of the ADP agreement will be relevant to questions of whether or not "adequacy" can be achieved over time, if not achieved in Paris. These elements include the length of commitment period, the character of the process to develop the second and subsequent sets of commitments, linkage to the science reviews, including IPCC assessment reports or other assessment products, and the review of ongoing progress towards achieving the global goals. The dynamic elements of the agreement will be relevant to the broadness of participation and the strategic significance of the level of ambition actually adopted in Paris.

The outcome of the first set of commitments is likely to be insufficient even with a robust review and negotiation process. It is therefore important to provide scope to dynamically adjust commitments to continuous scientific and technological advances and changes in economic circumstances.

An important element in the new agreement is that emission commitments are time bound with a short time horizon (e.g. five years) and that each subsequent set of commitments are linked to a scientific assessment process. Additional mid-period reviews could help Parties to better understand options for further mitigation action and implications for their economies. They could also provide a more regular update on the consequences of inaction.

Independently of those review cycles, countries should always be able to change their commitments to a more ambitious level and to formally inscribe the new commitment in the 2015 agreement at any time.

8.6 Modality for adopting contributions is key

A central question with diverging positions is whether contributions and accounting rules need to be adopted by all Parties. The requirement for contributions and accounting rules to be adopted would be more in line with a top-down option, but can also be applied to hybrid bottom-up options. Alternatively they would be automatically and unilaterally inscribed into the new agreement once proposals are made and potentially reviewed and / or negotiated. This approach is consistent with all forms of bottom-up approaches.

The requirement to reach agreement by all Parties implies a stronger multilateral approach to contributions, irrespective of the manner in which the targets are set. The main challenge with

individually decided and inscribed contributions is the lack of a mechanism to ensure the achievement of the global 2°C target, which eventually would have severe implications for all countries and parties to the UNFCCC. Still, impacts and damage resulting from insufficient contributions are likely to mostly affect the most vulnerable – and least responsible for the problem. This points to the need for those Parties to be able to impact a decision on the overall level of contributions. Such a consideration would tend to support a process that involves reaching a joint agreement.

What is clear, aside from the legal modalities for adopting commitments, is that in order for Paris to be seen as a ground breaking step most of the world's major emitters would need to have commitments ready for, in some sense, adoption or inscription by the time of the COP. With the United States beginning to take a strong leadership role in this context, the importance of the MEF for informally agreeing on the nature, character, and scope of mitigation commitments/contributions put forward by all the major emitters seems likely to increase very significantly. It is inconceivable, for example, that the United States would put forward an ambitious mitigation commitments/contribution unless large emitters such as China, Brazil and possibly India are also seen to do so. Politically this would need to be done in one "political space" at an agreed moment in time, and that time is now set to December 2015 in Paris.

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