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Crossing the Threshold: Ambitious Baselines for the UNFCCC New Market-Based Mechanism

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ABSTRACT

At COP 17 in Durban, countries defined a new market-based mechanism to promote cost-effective mitigation actions, guided by a set of principles previously agreed at COP 16. These principles include "stimulating mitigation across broad segments of the economy", "ensuring a net decrease and/or avoidance of global greenhouse gas emissions" and "assisting developed countries to meet part of their mitigation targets". This paper explores the use of ambitious crediting baselines for groups of emitters as the basis for a new market mechanism that meets the principles listed above. It focuses on how to define groups of emitters and explores different approaches for building ambition into baselines including using emissions projections and performance benchmarks. Potential elements of a process for setting baselines for subsequent international recognition are also presented. The paper builds on extensive previous analyses carried out on emissions baselines for market mechanisms, taking into account recent developments in the international negotiations.

JEL Classification: F53, Q54, Q56, Q58
Keywords: Climate change, mitigation, baselines, new market mechanism.

RÉSUMÉ

Lors de la COP 17, à Durban, les pays ont défini un nouveau mécanisme de marché pour promouvoir les mesures d'atténuation offrant un bon rapport coût / efficacité. Cette action s'inscrit dans la continuité des principes convenus lors de la COP 16 et qui visent à « stimuler l'atténuation dans de vastes secteurs de l'économie », « contribuer à une diminution nette et/ou à la prévention des émissions mondiales de gaz à effet de serre » et « aider les pays développés à atteindre une partie de leurs objectifs d'atténuation ». Le présent document envisage, pour fixer les crédits des groupes d'émetteurs, de retenir des niveaux de base ambitieux comme fondement d'un nouveau mécanisme de marché qui soit conforme aux principes énumérés précédemment. Il s'interroge également sur la manière de définir les groupes d'émetteurs et envisage différentes approches pour rendre ces niveaux de base plus ambitieux, notamment en exploitant les projections en matière d'émissions et les critères de performance. Sont aussi présentés les éléments possibles d'un processus qui aboutirait à fixer des niveaux de base en vue de leur reconnaissance internationale. Le document s'inspire des nombreuses analyses déjà réalisées sur les niveaux de base d'émissions dans une perspective de mécanisme de marché, et il prend en compte les dernières évolutions résultant des négociations internationales.

Classification JEL: F53, Q54, Q56, Q58
Mots-clés: Changement climatique, atténuation, niveaux de base, nouveau mécanisme de marché.

FOREWORD

This document was prepared by the OECD and IEA Secretariats in winter 2012 in response to a request from the Climate Change Expert Group (CCXG) on the United Nations Framework Convention on Climate Change (UNFCCC). The CCXG oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. Authors work with the CCXG to develop these papers in a collaborative effort. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the CCXG. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

Members of the CCXG are Annex I and OECD countries. The Annex I Parties or countries referred to in this document are those listed in Annex I of the UNFCCC (as amended by the Conference of the Parties in 1997 and 2010): Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, the European Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, the Netherlands, New Zealand, Norway, Poland, Portugal, Romania, the Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom of Great Britain and Northern Ireland, and the United States of America. As OECD member countries, Korea, Mexico, Chile, and Israel are also members of the CCXG. Where this document refers to "countries" or "governments", it is also intended to include "regional economic organisations", if appropriate.

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Executive summary

Progress was made in the negotiations on market-based mechanisms under the UN Framework Convention on Climate Change (UNFCCC) at Durban in December 2011. In particular, the Conference of the Parties (COP) to the UNFCCC defined a new market mechanism to promote cost-effective mitigation actions while taking into account a set of principles previously agreed at COP 16 (hereafter referred to as the "Cancun principles"). These principles include "stimulating mitigation across broad segments of the economy", "ensuring a net decrease and/or avoidance of global greenhouse gas (GHG) emissions" and "assisting developed countries to meet part of their mitigation targets".

This paper explores how setting baselines for broad segments of the economy could form the basis of the new market mechanism under the UNFCCC. It builds on the analyses carried out on emissions baselines since the inception of the Kyoto Protocol (KP) flexible mechanisms, taking into account recent developments in the UNFCCC negotiations.

A market requires demand in order to function. The global demand for GHG units is forecast to be weak in the near future. Two key drivers of demand for GHG units are the level of ambition of mitigation targets in developed countries and the rules to be agreed regarding carryover of GHG units from the first commitment period of the Kyoto Protocol (KP). Global demand for GHG units after 2020 remains uncertain. Further clarity may be provided by 2015, when the shape of the post-2020 international climate agreement may become clearer. Over time, the new market mechanism may also help countries to increase the ambition of their mitigation targets and actions by lowering the cost of meeting targets.

Several forms of market-based mechanism, including emissions trading systems (ETSs), crediting mechanisms and bilateral offset schemes, are already being implemented in a range of developed and developing countries. The COP 17 decision text does not explicitly state whether the new market mechanism will be based on emissions trading (with allowance units issued ex ante) or crediting (with credits issued ex post). In a crediting mechanism, credits are awarded if measured emissions are below a baseline level. In a trading system, a baseline is used to establish the total number of permits to allocate. This paper focuses on setting baselines for a crediting mechanism operating according to the Cancun principles, while recognising that many of the issues outlined are also relevant for baselines under ETSs. Furthermore, even if the new market mechanism operates as a crediting mechanism, domestic ETSs implemented in developing countries could be designed to operate in parallel with a new international crediting mechanism.

The new market mechanism and the CDM

There are a number of ways in which the design of the new market mechanism is likely to be distinct from that of the Clean Development Mechanism (CDM). In addition to operating outside of the KP, the new mechanism could be distinct in the coverage of emission sources, how baselines or thresholds are calculated and applied, how credits are distributed and how the mechanism is governed. The requirement for the new mechanism to achieve a net global decrease and/or avoidance of emissions is a further key distinction, as this is not an explicit objective for the CDM. Design features that could ensure a net decrease and/or avoidance of emissions include discounting credits once issued, mandatory retirement of a proportion of credits, shortened crediting periods and use of ambitious (i.e. stringent) baselines. This paper explores the use of ambitious crediting baselines as a means to achieve a net global decrease/avoidance of emissions.

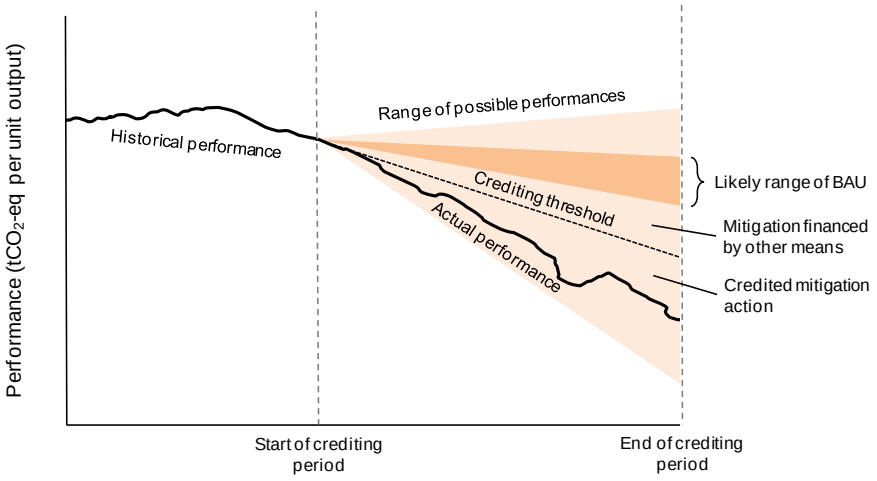
Ambitious crediting thresholds

Emissions baselines are counter-factual scenarios describing how emissions may evolve in future given a particular set of assumptions. In an "ambitious" baseline it is assumed that some level of domestic mitigation action will be implemented in the country concerned as part of the baseline scenario. Therefore the emissions in such a scenario are generally lower than those estimated in "business-as-usual" (BAU) scenarios (i.e. scenarios that estimate what would happen in the absence of the new market mechanism or certain other policy instruments aiming to reduce emissions).

In this paper, ambitious crediting baselines of this kind are referred to as "crediting thresholds". Only further emissions reductions in excess of the crediting threshold would be eligible for credits and therefore only this part of the total mitigation achieved by a country could, in theory, be financed through sales of GHG credits. This means that only some of the total emissions reductions achieved in the host country are used to offset emissions elsewhere, so this approach should ensure that a net global decrease and/or avoidance of GHG emissions is achieved. Political recognition for the total emissions reductions achieved would be divided between the buyer and seller.

In theory the amount of net decrease or avoidance of emissions is equal to the difference between the crediting threshold and the BAU scenario. However, because BAU is an uncertain concept and highly sensitive to assumptions, it could be possible to set crediting thresholds relative to a range of plausible BAU scenarios rather than a single BAU scenario. Such a threshold would therefore be justified as being ambitious if it is shown to be an improvement on the likely range of plausible scenarios that might represent BAU. A clear and transparent crediting threshold is key to the issuance of credits, whereas the exact quantity of net decrease or avoidance of emissions is more a matter for negotiation. Figure ES1 shows a clear crediting threshold set below the likely range of plausible BAU scenarios, indicating also how the crediting threshold could mark the divide between credited emissions reductions and mitigation actions financed by other means.

Figure ES1: Setting crediting thresholds for the new market mechanism



Source: Authors

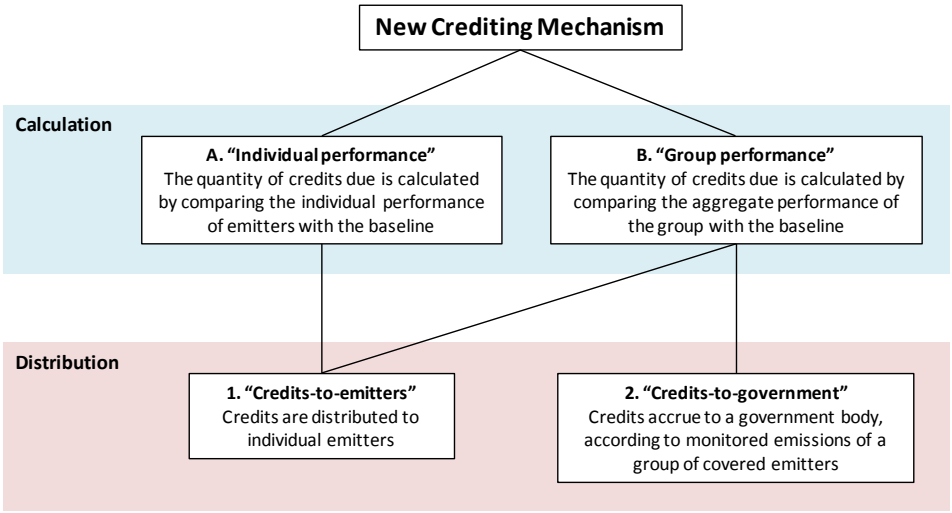
Baselines in the context of mechanism design

The design of a crediting mechanism may influence how crediting thresholds are set. In a crediting mechanism, performance is compared to an emissions baseline to calculate the quantity of credits due. The scope of emissions to be compared to the baseline could be the individual performance of each emitter (the "individual performance" approach) or the aggregate performance of a group of emitters (the "group performance" approach). If the same crediting threshold were used in both cases, the number of credits

generated would generally be lower in the group performance approach (since the group may include both "good" and "bad" performers) than the individual performance approach (since only "good" performers receive credits), all other things being equal. Group performance approaches may therefore promote more environmentally ambitious outcomes for a given crediting threshold level, but with the risk of weakened or more indirect investment incentives for "good" performers.

If the individual performance approach is taken, credits are distributed directly to individual emitters (the "credits-to-emitters" approach, like the CDM). If the group performance approach is taken, credits could either be distributed to emitters based on each emitter's contribution to the group performance (the "credits-to-emitters" approach) or accrue to a government body (the "credits-to-government" approach). In this latter approach, the government would decide whether credits are passed on to emitters and how to incentivise reduced emissions if credits are not passed on. Figure ES2 outlines the three possible combined approaches.

Figure ES2: Typology of approaches for calculating and distributing credits



Source: Authors

The three possible approaches differ in their practical implementation:

- The **individual performance, credits-to-emitters approach** (A.1) is that taken by existing crediting mechanisms (e.g. the CDM, Verified Carbon Standard, Climate Action Reserve). Under this approach the risk of over- or under-allocation of credits can be relatively low (since projects are evaluated on a case by case basis) and investors react to the international carbon price signal. However, the project-specific nature of this approach leads to relatively high transaction costs and thus makes it impractical to scale up (though standardised baselines and programmes of activities may help in this regard).

- The **group performance, credits-to-emitters approach** (B.1) may be easier to apply at scale but faces a key problem: the quantity of credits received by each emitter would depend in part on the performance of other emitters, thus creating significant extra investment risk. The host government could mitigate this risk by guaranteeing some level of credits to each good performer, possibly financed by introducing penalties on poor-performing emitters. However, to do this the host government would need to accept international liability for the group's aggregate performance, which may prove politically difficult.

- The **group performance, credits-to-government approach** (B.2) could potentially address the investment risk problem by removing altogether the direct issuance of credits to individual

performers. In this case the principal incentive for investments in emissions reductions would be provided by domestic policy instruments rather than the promise of GHG credits received directly. Such policy measures could be part-financed by expected government revenues from credits and potentially also other sources of climate finance. This approach may therefore facilitate the interaction of the new market mechanism with other sources of domestic and/or international climate finance. The main disadvantage of this approach is that significant regulatory capacity would be required, given the more prominent role of national or sub-national governments in implementing domestic mitigation policies, interacting with potential credit buyers and handling credits.

Defining groups of emitters covered by a baseline

The process of setting a baseline for a broad segment of the economy involves the identification of an emitter or group of emitters and the development of a plausible scenario, based on a set of assumptions, for how the emissions of the emitter or group of emitters may change over time. Different degrees of standardisation are possible. Most baseline setting exercises under existing project-specific mechanisms employ at least some standardised variables (e.g. global warming potentials of GHGs). Baselines with greater degrees of standardisation have been developed under the CDM and other crediting mechanisms and can inform baseline setting under the new market mechanism. However, if the mechanism operates with a group performance approach, the emissions of all emitters in the group used to define the baseline would be compared to the group baseline. This is a key difference from standardised baselines under existing crediting systems that are applied only to individual projects within a group.

Analysis of standardised approaches developed to date shows that the extent to which emitters can be aggregated into a group depends on the segment of the economy concerned and national circumstances. The criteria used to group emitters could include product or output, age (vintage), technology or process used, or other factors depending on the emitters concerned. New additions will affect the emissions performance of the group over time and therefore need to be taken into account when setting the baseline. It is likely that different countries or regions may seek to define groups of emitters differently, reflecting national circumstances and coverage of domestic mitigation goals. This paper refers to "groups of emitters" rather than "sectors", since the term "sector" can carry preconceptions as to what is or is not included.

Approaches to setting baselines

Once the group of emitters is defined, two broad approaches to setting crediting thresholds are:

- **emissions projections** (in terms of tCO_2-eq or a GHG-related index), whereby the expected emissions for a group of emissions sources are modelled over a time-period using historical data or other simulation methods; or
- **performance benchmarks** (in terms of a GHG-related index such as tCO_2-eq per unit product, or other performance-related metric) based on recent performance data or other means.

Several developing countries have already prepared emissions projections at the national or sector level. In the absence of internationally-agreed guidelines on emissions baselines, different approaches and modelling techniques have been used. In some cases, these sector-specific modelling exercises could provide an indication of where the crediting threshold might lie for some segments of the economy. However, important outstanding questions include:

- Are credited emissions reductions to be included or excluded from developing countries' domestic mitigation goals? If included, this could lead to double counting of emissions reductions towards the mitigation efforts of more than one country and may therefore have important consequences for what can be considered an ambitious crediting threshold.

- Which existing and/or planned domestic policy measures are to be included in the crediting threshold? Experience with CDM projects affected by preferential renewable energy tariffs suggests that decisions on how to treat domestic policy measures in the baseline are best taken at a high level and early on in the process.

Existing market mechanisms have developed a range of tools to estimate performance benchmarks. A useful example is the calculation of electricity grid emissions factors for CDM projects. Currently used to estimate BAU emissions, this methodology could be adapted to estimate the performance level of the most recent additions to the power grid and provide a possible reference for an ambitious crediting threshold. Alternatively, the level of a performance benchmark is sometimes set relative to the performance of the top performers in the group. Choosing which percentage of top performers to use (e.g. 5%, 10%, 20%, etc.) is a somewhat arbitrary decision, and should take into account the variance of emissions performance within the group of emitters concerned.

In many cases, the performance benchmarks approach has some important advantages over the emissions projections approach. Performance benchmarks are objective (although defining the ambition level of such benchmarks is subjective), generally simpler to implement and less affected by unforeseen changes in macroeconomic conditions. They can therefore provide predictability for emitters and investors and are potentially more easily comparable between geographic areas. A disadvantage, however, is that the absolute level of emissions abatement to be achieved by the group of emitters is not known in advance.

Data issues

Many developing countries do not yet have sufficient data to calculate performance benchmarks for some segments of the economy. In the absence of high quality historical data, it is possible that performance data and historical trends from other countries or similar technology options could be adapted for use in the country concerned. For example, though designed to facilitate allocation of permits, the product benchmarks calculated for Phase III of the EU ETS could inform the development of crediting thresholds in other countries. These benchmarks estimate the average emissions performance of the best 10% emitters in each category and the methodology could serve as a framework for developing specific figures in other countries.

Alternatively, performance benchmarks could be initially set using survey data from a selection of key emitters or by estimating the existing technology in use and using data from manufacturers or other stakeholders. The level of the performance benchmark could be set relative to best commercially available technology (nationally, regionally or globally) or the world-wide average.

Governance of baseline setting

A clear process for setting crediting thresholds is required so that all stakeholders are aware of what the valid approaches are, how crediting thresholds can be questioned and by whom. A process for international recognition of crediting thresholds under the UNFCCC could be effective if it provides guidance for each step of baseline development whilst allowing countries flexibility in the precise approach that they choose. The process could also include a system of checks and balances so that the credibility of a chosen baseline is demonstrated in more than one way to ensure its integrity. For example, if there is sufficient data and capacity available, a crediting threshold based on a performance benchmark could be cross-checked with an emissions projection assessment for the same group of emissions sources.

The overall governance structure of the new market mechanism is likely to influence the process for international recognition of crediting thresholds. If Parties agree that a designated committee or board should have authority over what is appropriate as a crediting threshold, this body would require significant resources with expert knowledge of particular countries and the emitters concerned in order to make a balanced assessment of the appropriateness of any particular baseline. An expert review or analysis process could be valuable and could potentially become a component of the wider measurement, reporting and

verification (MRV) processes taking shape under the UNFCCC after COP 16. If guidelines are developed for crediting thresholds, these could be designed to link to any future UNFCCC guidelines on the development of emissions baselines and assumptions at the national or sub-national level. Further work could focus on possible approaches for making assumptions relating to key emissions drivers, which in turn could provide a basis for any future guidance on developing crediting thresholds.

1. Introduction

Market-based mechanisms using tradable GHG allowances or credits can be cost-effective policy instruments to reduce GHG emissions and play a key role in climate policies at the international, national and sub-national level. The KP defined three market-based flexibility mechanisms: emissions trading, based on trading of national allowance units; and two project-based crediting mechanisms, the CDM and Joint Implementation (JI). Several national and sub-national governments have also developed their own ETSs and offset mechanisms, in some cases linked to the KP mechanisms.

Progress was made at COP 17 on the evolution of market mechanisms under the UNFCCC (UNFCCC, 2011a). The COP (a) took steps towards considering a framework for various approaches, including using markets, for promoting cost-effective mitigation actions, and (b) defined a new market mechanism, operating under the guidance and authority of the COP, that will take into account a set of principles previously agreed at COP 16 (hereafter referred to as the "Cancun principles"). These principles include "stimulating mitigation across broad segments of the economy" and "ensuring a net decrease and/or avoidance of global GHG emissions". The modalities and procedures for the new market mechanism are yet to be elaborated, and its relationship to the framework for various approaches is not yet clear.

The aim of this paper is explore how internationally-recognised, ambitious crediting baselines could be used in the new market mechanism under the UNFCCC, as defined in paragraph 83 of decision 2/CP.17.[1] Ambitious crediting baselines include a degree of non-credited mitigation action in the baseline and therefore lie below the range of plausible BAU trajectories. Such baselines are referred to as "crediting thresholds" in this paper. While this paper focuses on the use of crediting thresholds, there are other ways in which a net decrease and/or avoidance of global GHG emissions could be achieved. These include discounting credits once issued, labelling credits with ratings, introducing mandatory retirement of some credits and using shortened crediting periods. Each approach has its own pros and cons (see, for example, Kollmuss *et al.*, 2010 for a closer examination of discounting credits).

In addition to being a mechanism under the Convention rather than the KP, the new market mechanism is likely to be functionally distinct from the CDM. In particular, it is likely to be broader in scale (in order to stimulate mitigation across broad segments of the economy) and aims to provide a net decrease and/or avoidance of global GHG emissions (which is not an explicit objective of the CDM). Like the CDM, however, the new market mechanism aims to assist developed countries to meet part of their mitigation targets by enhancing the overall cost-effectiveness of mitigation.

A crediting mechanism has three general steps: (1) a crediting baseline or threshold is set against which performance will be measured; (2) the quantity of credits due is calculated (by comparing actual performance with the baseline or threshold and performing an additionality test if needed); and (3) the tradable credits are distributed. The focus of this paper is on step 1 above, taking into account different potential approaches to steps 2 and 3. In the CDM, credits for a project or programme are awarded directly to project participants. This may not be the case under the new market mechanism (e.g. credits could be issued to government bodies and not distributed to individual emitters) and so a distinction is made between steps 2 and 3.

Any market needs demand in order to function. In the case of GHG units, strong demand creates a buoyant carbon price signal that can incentivise investment in low-carbon technologies. Demand is principally determined by the level of ambition of the emissions reduction targets of Annex I countries, taking into account any rules regarding carryover of GHG units from the first commitment period of the KP as well as any qualitative domestic restrictions (such as the EU ETS restrictions on CERs from some project types

[1] Other aspects of the modalities of the new market mechanism that are important but not covered in this paper include: the length of the crediting period; provisions for monitoring, reporting and verification of emissions; provisions for issuance of units; and provisions for accreditation of validators and verifiers.

under the CDM). Additional demand may also come from the voluntary sectors. Market analysts currently predict that overall demand for GHG credits until 2020 will be weak from the EU ETS (Deutsche Bank, 2011) and Annex I KP country governments (Baron et al., 2009). Nevertheless, for units arising from the new market mechanism, the demand prospects may be improved if countries were to agree (i) that these units could be used to meet commitments under the second commitment period of the KP, and/or (ii) that these units could potentially become eligible in the near-term for use in domestic instruments such as the EU ETS. In addition, the new market mechanism might, over time, help countries to increase the level of ambition of their mitigation targets and actions by lowering the overall cost of emissions mitigation actions.

Section 2 of this paper explores the form and principles of the new market mechanism in the context of recent developments in the negotiations, and outlines different approaches for how credits could be calculated and distributed. Section 3 considers different approaches for defining groups of emitters and setting the level of ambition of the crediting threshold. Section 4 outlines possible elements of a process for international recognition of crediting thresholds. Section 5 presents conclusions.

2. Defining a new market mechanism under the UNFCCC

2.1 Crediting mechanism or trading mechanism?

The decision text agreed at COP 17 (see Box 1) does not explicitly state whether the new market mechanism will be a crediting mechanism (where credits are issued ex post for emissions reductions achieved against a specified baseline) or a trading mechanism (where an emissions cap is set and tradable allowances are allocated or auctioned *ex ante*). Previous analyses have explored both as possible options for a post-2012 sector-level market mechanism under the UNFCCC (UNFCCC, 2011c; Baron *et al.*, 2009). Figure 1 provides examples of existing trading and crediting mechanisms covering different geographic regions and sectoral coverage.

Emissions trading systems feature *ex ante* issuance of tradable allowance units up to a fixed cap. Covered entities are in effect rewarded for emissions reductions by the opportunity to sell excess allowances and penalised for inaction by the need to purchase allowances or face penalties for non-compliance. Crediting mechanisms, on the other hand, reward the achievement of emissions reductions with tradable credits (issued *ex post*) but generally do not penalise emitters that fail to achieve emissions reductions. They are therefore compatible with voluntary mitigation goals but can also be combined with mandatory policy instruments in order to act as a stepping stone towards full carbon pricing internationally.

Box 1: Relevant decision text from COP 16 and COP 17

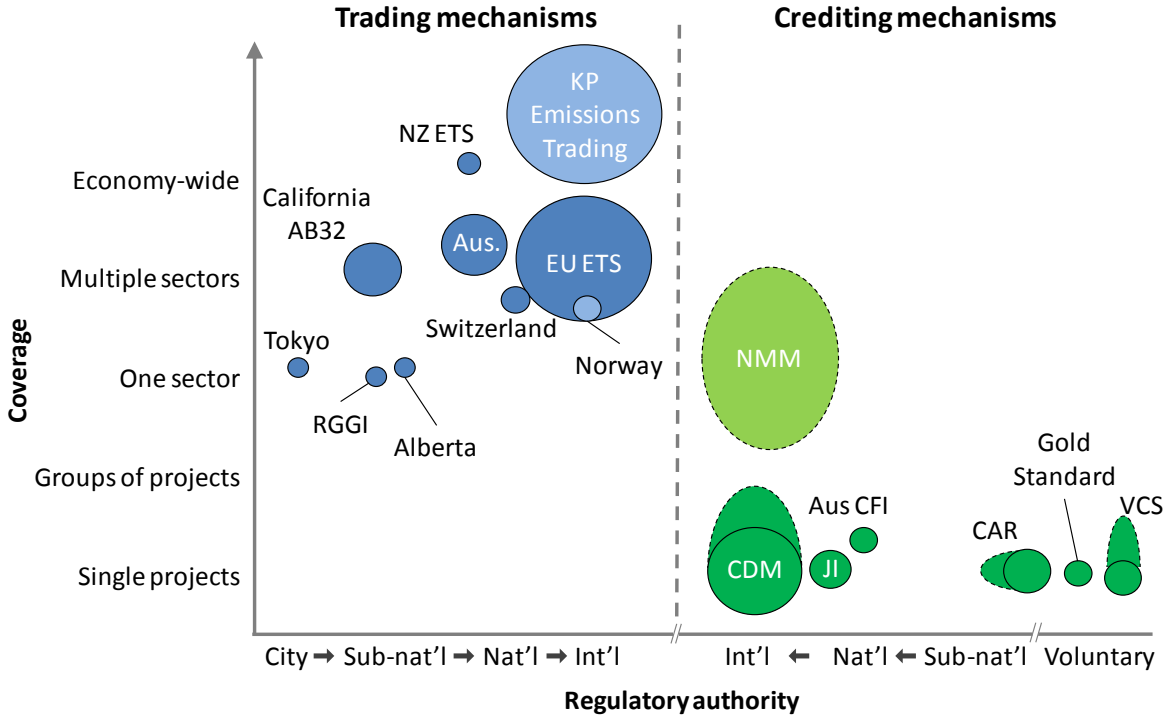
The following decision text relating to market mechanisms was agreed at COP 17 (UNFCCC, 2011a):

> *79. Emphasizes that various approaches, including opportunities for using markets, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries, must meet standards that deliver real, permanent, additional and verified mitigation outcomes, avoid double counting of effort, and achieve a net decrease and/or avoidance of greenhouse gas emissions;*
>
> *80. Requests the Ad Hoc Working Group on Long-term Cooperative Action under the Convention to conduct a work programme to consider a framework for such approaches, with a view to recommending a decision to the Conference of the Parties at its eighteenth session;*
>
> *83. Defines a new market-based mechanism, operating under the guidance and authority of the Conference of the Parties, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries, which is guided by decision 1/CP.16, paragraph 80,* [see below] *and which, subject to conditions to be elaborated, may assist developed countries to meet part of their mitigation targets or commitments under the Convention;*
>
> *84. Requests the Ad Hoc Working Group on Long-term Cooperative Action under the Convention to conduct a work programme to elaborate modalities and procedures for the mechanism referred to in paragraph 83 above, with a view to recommending a decision to the Conference of the Parties at its eighteenth session;*

The text of decision 1/CP.16, paragraph 80, agreed at COP 16 (UNFCCC, 2010a):

> *80. Decides to consider the establishment, at the seventeenth session of the Conference of the Parties, of one or more market-based mechanisms to enhance the cost-effectiveness of, and to promote, mitigation actions, taking into account the following:*
>
> > *(a) Ensuring voluntary participation of Parties, supported by the promotion of fair and equitable access for all Parties;*
> >
> > *(b) Complementing other means of support for nationally appropriate mitigation actions by developing country Parties;*
> >
> > *(c) Stimulating mitigation across broad segments of the economy;*
> >
> > *(d) Safeguarding environmental integrity;*
> >
> > *(e) Ensuring a net decrease and/or avoidance of global greenhouse gas emissions;*
> >
> > *(f) Assisting developed country Parties to meet part of their mitigation targets, while ensuring that the use of such a mechanism or mechanisms is supplemental to domestic mitigation efforts;*
> >
> > *(g) Ensuring good governance and robust market functioning and regulation;*

Figure 1: Summary of some existing and proposed trading and crediting mechanisms (not exhaustive and not to scale)[2]



The provisions contained in the definition of the new market mechanism imply that it would be simplest to implement as a crediting mechanism. However, this paper does not rule out the possibility that the new market mechanism could be a trading mechanism. A trading mechanism developed under the UNFCCC to "[assist] developed country Parties to meet part of their mitigation targets" could take two possible forms. The first option is that a segment of the economy in a developing country would be issued with international allowance units that are fungible with international allowances issued to developed countries to track implementation of their economy-wide targets. The second option is that ETSs in developing countries would be implemented under the guidance and authority of the COP and that these would link directly with systems in developed countries.[3] These options are not discussed further in this paper.

Although this paper focuses on options for setting crediting thresholds under a new international crediting mechanism, many of the issues discussed (such as defining groups of emitters and setting levels of ambition) would also be relevant to the setting of emission caps and development of allowance allocation plans for an allowance trading mechanism. The implementation of a broad-based crediting mechanism in conjunction with other policy measures could also be a useful step towards establishing ETSs in more developing countries in future. For example, participation in the crediting mechanism could provide countries with experience in data gathering and improved institutional competencies that could pave the way for the implementation of a future ETS. The crediting mechanism described here could also be operated in parallel with domestic ETSs in some sectors. In these cases the ETS cap would be set equal to or less than the internationally-agreed crediting baseline, so that domestic permits might be ultimately

[2] AB32 = Global Warming Solutions Act 2006; CAR = Climate Action Reserve; CFI = Carbon Farming Initiative; CRC = Carbon Reduction Commitment; NMM = New Market Mechanism; RGGI = Regional Greenhouse Gas Initiative; VCS = Voluntary Carbon Standard

[3] In this case a distinction may also need to be made between "new" emissions trading systems and "existing" emissions trading systems, since the latter would presumably not be subject to the rules and procedures of the new market mechanism.

convertible into international credit units (i.e. an ETS could be the policy instrument used to surpass the crediting threshold).

2.2 The Cancun principles

The Cancun principles for the new market mechanism build on many years of analysis of how market mechanisms could develop and increase in scale (e.g. Bosi and Ellis, 2005; Baron *et al.*, 2009; Schneider and Cames, 2009). Each principle is examined in more detail below.

Ensuring voluntary participation of Parties, supported by the promotion of fair and equitable access for all Parties

As for the existing crediting mechanisms under the KP, country governments will be able to choose whether or not to participate in the new market mechanism.[4] Countries wishing to participate may, however, need to meet certain conditions. Defining the terms "fair" and "equitable" in the context of access is difficult. One characteristic of the CDM is that the regional distribution of projects to date has not been uniform.[5] Since the CDM is likely to continue to operate in parallel to the new market mechanism, the issue of "fair and equitable access" could be considered in the context of both new and existing mechanisms together. Parties will also need to consider whether the type of nationally appropriate mitigation action submitted by a developing country to the UNFCCC will influence its access to the new market mechanism (e.g. whether countries without quantitative mitigation goals could participate in the new market mechanism).

Complementing other means of support for nationally appropriate mitigation actions by developing country Parties

In addition to finance from the new market mechanism, there could be many other sources of support for mitigation actions undertaken in developing countries (Buchner *et al.* 2011). The new market mechanism will need to complement these other means of support. While terms such as "unilateral", "supported" and "credited" are often used to describe mitigation actions in developing countries, in reality most actions will be implemented using a blend of different sources of finance as well as various forms of support including technology and capacity building. Therefore cleanly categorising actions in this way may be difficult in practice. Also, while this language implies that the focus of the new market mechanism will be on mitigation actions undertaken in non-Annex I countries, it does not rule out the possibility of credited actions undertaken in Annex I countries.

Stimulating mitigation across broad segments of the economy

Further emissions reductions are needed rapidly in both developed and developing countries. To reflect this, the new market mechanism is likely to operate at a larger scale than existing project-based crediting mechanisms. A "broad segment" of the economy could include one or more "sectors" (e.g. as defined by the GHG Protocol) or sub-sectors in a developing country. If abatement costs in different segments of the economy vary, the coverage of the new market mechanism may have implications for the options available to developing countries to meet their domestic mitigation actions cost-effectively. Sectors and different gases will vary in their suitability to be covered by the new market mechanism and coverage of the

[4] Under the CDM, participation is also voluntary for project developers and emitters (unlike a mandatory emissions trading system). In a scaled up crediting mechanism, however, data may be collected from all emitters in the segment of the economy covered by the mechanism in order to calculate the baseline, so mandatory provisions regarding the measurement and reporting of performance data may be required for these emitters.

[5] Although arguably a market-based mechanism such as the CDM would not normally be expected to be distributed equally in terms of sectors or countries unless low-cost mitigation opportunities were also distributed in such a manner (Ellis and Kamel, 2007).

mechanism in each geographic area may need to be assessed based on data availability, regulatory capacity and other aspects.

Safeguarding environmental integrity

Although international environmental integrity checks for the CDM and JI have focused on GHG measurement, environmental integrity could be interpreted as broader than measurement of GHG emissions. The Gold Standard, for example, requires extensive assessment of sustainable development criteria including social and environmental aspects. To ensure that claimed emissions reductions are "real", the new market mechanism could require countries to demonstrate that crediting thresholds are below the range of likely BAU scenarios and employ a robust MRV system including verification of emissions reductions by accredited third parties. For other aspects of environmental integrity and sustainability, safeguards could be put in place to ensure that the new market mechanism contributes to the sustainable development goals of the host country (although the COP 17 decision is ambiguous about the relationship between the new mechanism and sustainable development, in contrast to the CDM where promoting sustainable development is an explicit aim).

Ensuring a net decrease and/or avoidance of global greenhouse gas emissions

This is a key development as it represents a significant departure from the wholly "offsetting" nature of the existing project-based crediting mechanisms. It is also arguably the most difficult of the Cancun principles to implement. Several solutions have been proposed for how a new crediting mechanism could achieve a net global decrease in GHG emissions. These include the use of ambitious crediting thresholds, discounting of credit units and shortened crediting periods (Kolmuss *et* al., 2010 and Baron *et al.*, 2009). This paper focuses on setting ambitious baselines in which non-credited mitigation actions in developing countries are the driver for the net global decrease and/or avoidance of GHG emissions. This approach places an emphasis on the explicit inclusion or exclusion of domestic mitigation measures in the baseline.

Double counting of emission reductions needs to be avoided if a net global decrease in emissions is to be achieved. One approach would be that each emissions reduction achieved in the host country counts towards either the achievement of the mitigation goal of the host country (if there is one) or the achievement of the mitigation target of a developed country (or possibly the mitigation goal of another developing country), but not both (Prag *et al.*, 2011). However, some mitigation actions already proposed by developing countries explicitly state that the use of market mechanisms is not excluded; this could lead to emissions reductions being counted towards more than one country's efforts. In such cases, a high degree of transparency would be required to ensure that the net level of mitigation achieved is clear to all stakeholders. The level of the crediting threshold might also need to be adjusted accordingly.

Including the term "avoidance" in this Cancun principle means that the net effect of the new market mechanism may not necessarily be to reduce global emissions in absolute terms (i.e. tCO_2-eq), since the baseline could be set in terms of an indexed metric allowing overall growth in output and emissions. This may be relevant for rapidly expanding segments of the economy, including cases where lack of energy access or other development issues mean that there is currently significant suppressed demand.

Assisting developed country Parties to meet part of their mitigation targets, while ensuring that the use of such a mechanism or mechanisms is supplemental to domestic mitigation efforts

This principle is linked to the principle of achieving a net global decrease/avoidance of GHG emissions. The existing project-based crediting mechanisms were developed as mechanisms under the Kyoto Protocol and therefore credit purchasers are Annex I KP Parties (or entities acting on their behalf). By contrast, the new market mechanism has been developed under the auspices of the Ad hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) and therefore credit purchasers may include all developed countries. Further, the possibility that tradable credits could be purchased by other developing countries to meet part of their own mitigation goals is not ruled out by the decision text.

The new market mechanism could be designed to complement any domestic climate change and sustainable development objectives in the host country. The host country could decide to explicitly exclude certain groups of emitters or mitigation actions from the crediting mechanism. For example, governments could decide to keep low-cost reductions from certain sets of emitters for use towards their own emissions goals now or in future.

Ensuring good governance and robust market functioning and regulation

Aspects of "good governance" of the new market mechanism could include ensuring that all market stakeholders are informed how the system will work in advance and that any decision-making processes at UN level (e.g. pertaining to recognition of crediting baselines or issuance of credits) are undertaken in a clear and transparent manner. For market functioning, the fungibility of units with other international carbon market instruments is important. Fungibility under the UNFCCC system is assured if credits are certified as being eligible to meet UNFCCC national mitigation targets or goals, as is the case for Certified Emissions Reductions (CERs) and Emission Reduction Units (ERUs) under the KP.

2.3 Implications of recent developments in the negotiations

Extensive theoretical analysis of different approaches and design options for post-2012 sectoral market mechanisms has been conducted previously by the CCXG (previously the Annex I Expert Group) and others (see, for example, Bosi and Ellis, 2005; Baron and Ellis, 2006; Baron, 2006; Baron *et al.*, 2009; Aasrud *et al.*, 2009; Schneider and Cames, 2009). However, there have been some important recent developments in the negotiations relevant to the establishment of the new market mechanism, including the following:

1. At COP 17, Parties defined a new market mechanism under the AWG-LCA track and simultaneously decided under the AWG-KP track that a second commitment period of the Kyoto Protocol would begin on 1 January 2013, thereby assuring that the CDM processes will continue to operate until at least 2017 or 2020.[6]

2. Many developing countries have proposed nationally appropriate mitigation actions under the Cancun Agreements (UNFCCC, 2011b). These vary in form and include quantitative and qualitative mitigation goals at various scales (e.g. economy-wide, sector level, project level) and, in the case of quantitative goals, expressed in terms of different metrics (e.g. GHG reductions from a base year, GHG reductions relative to BAU, carbon neutrality goals, tCO_2-eq per unit GDP, hectares of forest cover, share of renewables in the energy mix, etc.). Some of these actions are also conditional on access to international climate finance.

3. A growing number of both Annex I and non-Annex I countries have implemented or are in the process of implementing policies to encourage scaled-up investment in low carbon technologies and energy efficiency, including market-based policy instruments (e.g. emissions trading systems, carbon taxes), subsidies (e.g. feed-in tariffs for low carbon electricity production and tax credits), regulatory instruments (e.g. technology standards and performance standards) and voluntary agreements.

4. Partly as a result of (3), the CDM Executive Board (EB) has encountered increasingly difficult challenges in assessing the additionality of CDM projects and programmes that operate in sectors influenced by domestic policy incentives in the host country. Whilst additionality has always been an unpredictable and difficult to manage factor in the CDM (World Bank, 2010), the policy overlap effect has increased the perceived risk of the CDM as a source of project financing in the private sector. It has also served to further highlight the perverse incentives that a crediting mechanism can create if it encourages developing countries to delay or avoid the implementation

[6] The length of the commitment period is not yet decided. It could end in 2017 or 2020.

of domestic climate policies, so that mitigation activities in their territories remain eligible for credits.

5. Climate finance flows to developing countries have become increasingly central to UNFCCC negotiations, notably through the commitment of developed countries to jointly mobilise USD 100 billion per year by 2020 from both public and private sources, as well as the creation of the Green Climate Fund. While the precise definition of mobilised climate finance is yet to be agreed (Clapp *et al.*, 2012), carbon markets are expected to be able to materially contribute to this total (AGF, 2010).

6. The international price of carbon has recently dropped significantly. For example, the price of CERs from the CDM reached a record low of 3.32 EUR/tCO_2-eq in January 2012 (BusinessGreen, 2012). The downward pressure on prices has been caused by a combination of factors including policy uncertainty (e.g. uncertainty over the post-2012 international climate policy framework) and an unfavourable supply-demand balance with decreased demand due to the wider economic crisis coinciding with increased issuance of CERs from projects already in the pipeline (World Bank, 2010).

These developments will have implications for the shape of the new market mechanism. First, whilst efforts to scale up the CDM are likely to continue, for example through the establishment of standardised baselines and programmes of activities (PoAs),[7] the development in parallel of a new market mechanism provides an opportunity to explore new ways of financing mitigation in developing countries. The new market mechanism can build on the experience gained from the CDM, while the CDM can continue to operate in countries and sectors not covered by the new mechanism (subject to continued demand for CERs).

Second, the CDM was developed at a time when the only quantified international goals for limiting GHG emissions were industrialised countries' targets under the Kyoto Protocol. The economies of developing countries represented a large, generally untapped pool of low-cost emissions abatement opportunities, to which the CDM provided access for developed countries with KP commitments. The policy landscape has changed now that many developing countries have proposed domestic mitigation actions. The new market mechanism will need to take into account the fact that both developed and developing countries will now be seeking cost-effective emissions reduction opportunities in order to meet their respective targets and actions while achieving their sustainable development goals.

Third, these developments highlight that the success of the new market mechanism will depend on getting the incentives right. A mechanism is needed that encourages developing countries to implement domestic mitigation policies, not to delay or avoid them. The concept of project-by-project additionality under the CDM fits awkwardly with the development of domestic mitigation policy measures by developing countries. This issue has become increasingly apparent as policy measures to encourage a low carbon transformation become more widespread (either unilaterally or with international support). The solution introduced by the CDM Executive Board was to exclude from baseline scenarios all policies introduced after the agreement of the Marrakesh Accords in 2001 (UNFCCC, 2001). This was an effective short-term fix but is now out-dated and becoming less effective as time moves on. As more and more domestic policy measures are implemented in developing countries, the new market mechanism will need to provide a more permanent solution to this problem.

Fourth, if the aim of the new market mechanism is to stimulate mitigation in developing countries then the carbon price needs to be high enough to be considered a material factor in investment decisions. The price of units from the new market mechanism will be influenced by factors on both the supply and the demand

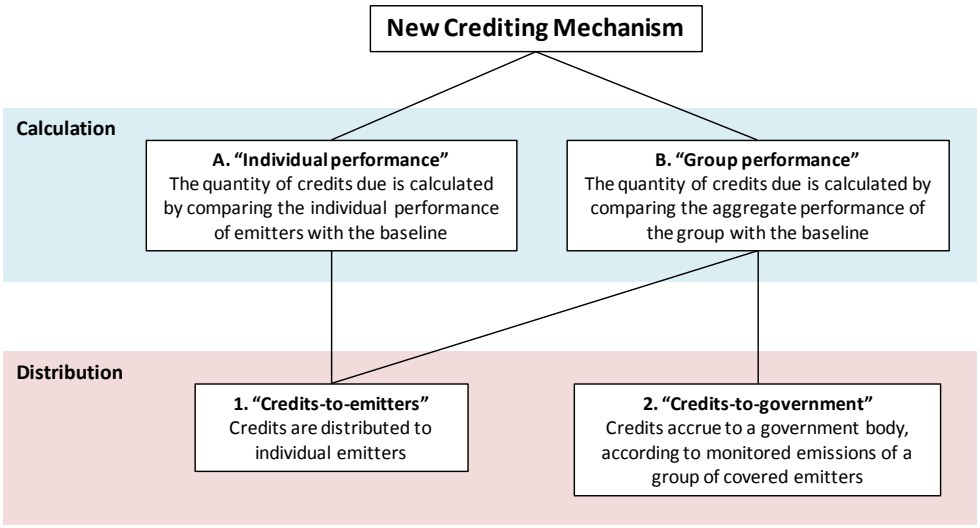
[7] Under a PoA, a group of projects (termed CDM Programme Activities) can be implemented and credited following a one-off registration process.

side. In order to provide a firm and steady price signal, policy-makers need to ensure there is sufficient demand for units and provide market participants with high confidence that the emissions reductions being traded are real and robust. It should also be recognised that the price will always be influenced to some extent by macroeconomic factors beyond the control of carbon market regulators and participants.

2.4 Calculating the quantity of credits due and their distribution

Two important issues regarding the shape of the new market mechanism are how the quantity of credits due will be calculated and who the credits will be distributed to. The quantity of credits due is calculated by comparing actual emissions to the agreed baseline. This can be done using either individual emissions ("individual performance" approach) or aggregate emissions of a group of emitters ("group performance" approach). Under the individual-performance approach, credits are generally distributed to individual emitters as a direct incentive to reduce emissions ("credits-to-emitters" approach). With a group performance approach, however, the credits could either be distributed to emitters or they could accrue to a government body ("credits-to-government" approach). This typology builds on previous analysis (see, for example, Baron *et al.*, 2009; Schneider and Cames, 2009; NERA, 2011) and is summarised in Figure 2.

Figure 2: Typology of approaches for calculating and distributing credits



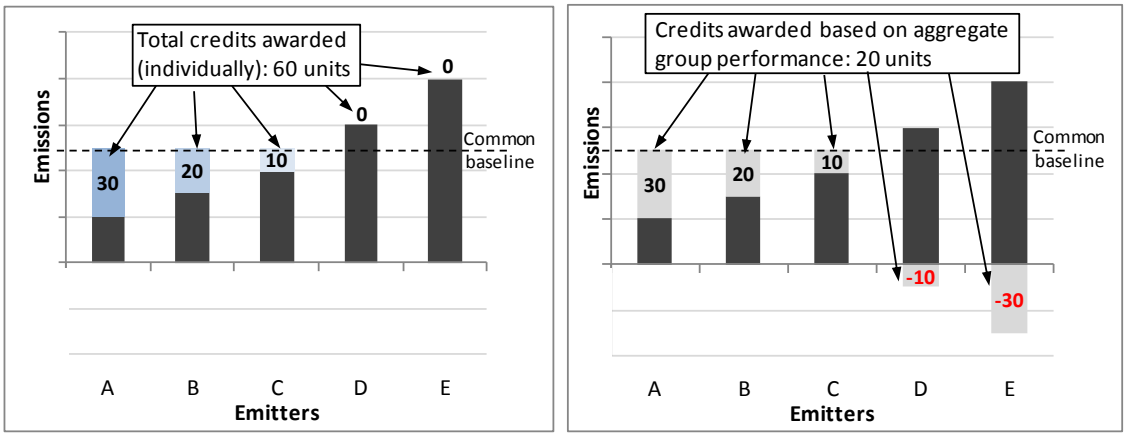
Source: Authors

In the individual-performance-based, credits-to-emitters approach (A.1), the quantity of credits due to each emitter is calculated by comparing the performance of each emitter in the group to a baseline. "Good performers" (i.e. emitters that reduce their emissions below the baseline) will receive credits and "poor performers" (i.e. emitters that do not reduce their emissions below the baseline) will not. The CDM and most voluntary offset schemes are examples of this approach, with the performance of each emitter compared to an individual (or, in some cases, standardised) baseline. A key advantage of this approach is that each emitter is guaranteed a reward for action based only on its own emissions performance. However, an important disadvantage is that options to scale up mitigation from this are limited by at least two factors. Firstly, the project-specific nature of the approach leads to relatively high transaction costs (though standardised baselines and programmes of activities may help in this regard). Secondly, rewarding only good performers with issuance of credits would be unlikely to stimulate widespread mitigation across a broad group of emitters, because bad performers could continue unabated. One way to address this issue would be for the host government to introduce penalties on poor-performing emitters, though this may be politically challenging in some countries (Amatayakul and Fenhann, 2009; Baron *et al.*, 2009).

In group-performance-based approaches (B.1 and B.2), performance data from all emitters covered by the baseline is aggregated at the end of the crediting period and the performance of the group as a whole is

compared to the crediting baseline. In other words, the total quantity of credits due is a function of the performance data from good performers as well as poor performers. When compared to an individual performance approach, a group performance approach will deliver fewer overall credits for the same common baseline level (all other things being equal). This is because any emitters not achieving the baseline level will detract from the total number of credits issued. Figure 3 demonstrates this difference using hypothetical numbers for a small group of emitters. The approach used for calculating credits is therefore an important factor in determining the environmental stringency of a crediting threshold. It should be noted, however, that the more stringent the crediting threshold, the greater the need to provide other, non-credit sources of finance and/or support for mitigation actions (domestically or internationally), as the total number of credits received decreases.

Figure 3: Comparison of total credits issued in individual performance and group performance approaches



If a group performance approach for calculation is used in conjunction with a credits-to-emitters approach for distribution (B.1), the resulting pool of credits would be divided between good performers and the number of credits received by each good performer would depend on the performance of other emitters in the group. If other emitters take little or no action, the overall quantity of credits rewarded would be decreased. This introduces a high level of investment risk outside of the control of individual investors and may therefore deter participation, unless the host government can provide strong assurances that good performance will be rewarded, either through domestic policy rewards or by guaranteeing credits to good performers. The latter, in turn, may require the government to take liability for purchasing credits on the international market, which may be politically difficult.

Under the group performance, credits-to-emitters approach (B.1), credits finally accrue to individual emitters or firms. Therefore the incentive for investment in projects is provided by a blend of domestic policy measures (to reach the crediting threshold) and expectation of future revenues from credit sales (to exceed the threshold). In this way, the strength of the incentive is linked to the international price for credits and the expected quantity of credits received. However, the need for the host government to guarantee performance may run contrary to developing country views that a crediting mechanism should carry no potential penalty for participating non-Annex I governments (see, for example, China's submission; in UNFCCC, 2011c).

Alternatively, a group performance approach can be combined with a credits-to-government approach whereby credits accrue to a government body and are not directly allocated to emitters (B.2). Instead, incentives from domestic mitigation policies would provide the principal incentive for investment. Credits would be earned by the government based on the performance of all the entities in the covered sector but would not be automatically passed down to individual emitters; instead they would accrue to a government body and could potentially be used as a source of funding for domestic mitigation policies (which may include an ETS designed to operate alongside the crediting scheme). In this scenario, individual investors

would not be directly exposed to the international price for credits. A disadvantage of this approach would be that there may be a time-lag between the provision of domestic incentives and the receipt of international credits, which could cause a cash flow problem. NERA (2011) points out that the credits-to-emitters and credits-to-government approaches are not necessarily mutually exclusive and a hybrid of approaches may also be possible, although care would need to be taken to avoid conflicting price signals.

The credits-to-government approach provides a solution to the problem of the group performance, credits-to-emitters approach (B.1) where the quantity of credits received by an emitter is dependent on the performance of others. Since under the credits-to-government approach the incentive for emitters to take action is provided mainly by domestic mitigation policies rather than the revenues from credits, individual emitters are not penalised by the poor performance of other emitters in the group. It becomes the government's responsibility to ensure that the emissions performance of the group as a whole is improved. Strong regulatory capability in the country in question would therefore be a pre-requisite for such a system.

The use of an ambitious crediting threshold itself produces an incentive to the host country to implement mitigation policies in order to reach the crediting threshold. The credits-to-government approach could encourage developing countries to go even further with their domestic mitigation policies as a means to receive increased international climate change finance in the form of credit revenues. The mechanism would, however, need to be designed so as to minimise perverse incentives to delay further policy implementation or otherwise inflate the crediting threshold. A key decision for any crediting mechanism is whether an additionality test will be required. The CDM requires an additionality test for every project or PoA, even though early analysis concluded that baseline-only approaches for some project types could be feasible (Lazarus *et al.*, 1999). The CDM therefore poses a double risk of perverse incentives to delay implementation of domestic policy: (i) from project baselines becoming less favourable, and (ii) from financial additionality becoming more difficult to prove. The credits-to-government approach would likely have no additionality test. The minimisation of perverse incentives would therefore depend on a transparent process for setting crediting thresholds.

The domestic mitigation policies used to reduce emissions from the group of emitters could be voluntary incentives (e.g. a feed-in tariff) or mandatory regulation (e.g. an energy efficiency standard or mandatory trading scheme). They would be planned and implemented by the host country and would not need to be subject to any form of approval by other countries. Dransfeld *et al.* (2011) give three examples of policy measures in developing countries with mixed packages of incentives: the ethanol programme in Brazil, domestic energy efficiency incentives in Thailand and the reduction in energy intensity of industry brought about in China's 11th five year plan (2006-2010). All three examples could be envisaged to have occurred under a credits-to-government crediting mechanism.

For a credits-to-government mechanism to work, investors need to have high confidence that the announced domestic policies will be implemented and enforced effectively. The policies could be financed partly by expected credit revenues and partly through climate finance or other means. The international finance component may help to give investors more confidence in the reliability and longevity of price signals introduced by domestic policy measures. The inclusion of some unilateral domestic action in the crediting baseline would ensure that the mechanism is likely to achieve a net global decrease in GHG emissions. In this case, the key parameter determining the demarcation between credited mitigation actions (delivering offsets) and mitigation actions financed by other means is the level of the crediting threshold. Table 1 compares advantages and disadvantages of the credits-to-emitters and credits-to-government approaches.

In all of the options presented there is a risk that the quantity of credits received will be below that expected, as has often occurred in the CDM (see, for example, Clapp *et al.*, 2010). In the credits-to-emitters approach this delivery risk is faced by project developers, while in the credits-to-government approach it is taken on by the government.

Table 1: Comparison of credits-to-emitters and credits-to-government approaches

Issue	Credits-to-emitters approach	Credits-to-government approach
Complexity of price signal for emitters / investors	✘ Risk of overlapping incentives from GHG credits and domestic policy measures (e.g. E+/E- problems in CDM)	✓ Direct incentive to emitters provided only by domestic policy so less risk of complication due to multiple incentives
Incentive to implement domestic policies	✓/✘ If additionality test used, can create perverse incentive to delay implementing of domestic policies that affect BAU. If additionality testing not used (crediting threshold used alone to award credits), transparent procedure for setting crediting thresholds needed to minimise strategic delay of policy implementation	✓/✘ Could incentivise governments to implement domestic mitigation policies, transparent procedure for setting crediting thresholds needed to minimise strategic delaying of policy implementation
Investor confidence in government policies	✓ Requires limited engagement of emitters/investors with host governments and crediting does not depend only on success of domestic policies	✘ High confidence needed among investors that domestic policies will be implemented and enforced
Exposure to international carbon price	✓ Investors and operators exposed to international carbon price signal	✘ Investors and emitters not directly exposed to international carbon price signal (but maybe to domestic price depending on policy instrument used)
Linking of rewards directly to performance of individual emitters	✘ Group performance approach: quantity of credits rewarded depends on the performance of other entities ✓/✘ Individual performance approach: rewards linked to performance but government would need to take on liability for potential credit shortfall	✓/✘ Depends on the type of mitigation policies implemented
Compatibility of crediting mechanism with host countries ETS	✘ Difficult to implement ETS for groups of emitters covered by crediting mechanism	✓ ETS can be implemented in host countries in parallel to crediting, with cap set equal to/less than crediting threshold
Liability for underperformance	✓/✘ Risk of underperformance of projects taken on by investors	✓/✘ Risk of underperformance of the group taken on by the government
Government financing and expenditure	✓ Minimal government expenditure, investments made that may be more efficient at securing capital and implementing mitigation in response to carbon credit incentive	✘ Policy implementation requires government expenditure; public sector funds may be slower and less efficient, especially if government requires up-front financing to implement policy measures
Credit purchasers in developed countries	✓ Private sector buyers (e.g. in EU ETS) familiar dealing with installation level contracts and crediting	✘ Credit purchasers (e.g. EU ETS firms) could only purchase credits from governments, which may complicate contractual arrangements
Unit tracking and traceability	✓ Credits could be tracked to individual emitters using serial numbers	✘ Credits would not be distributed to individual emitters and therefore could not be tracked to this level (if necessary)
Administrative burden	✘ Higher for credit distribution, since credits need to be distributed to emitters, but less policy implementation burden	✓/✘ Lower for credit distribution (credits not distributed to emitters) but may require strong administrative capacity for policy implementation
Emissions monitoring costs	✓/✘ Borne by emitters or investors who need to accurately monitor emissions in order to claim credits	✓/✘ Borne by government, unless domestic policy measures put in place to transfer cost to emitters (e.g. ETS)

3. Setting crediting baselines under the new market mechanism

Setting appropriate emissions baselines will be crucial for the new market mechanism to operate successfully and in accordance with the Cancun principles. If the mechanism operates as a crediting system, the boundary and level of ambition of crediting thresholds, together with the approach taken to updating them, will determine the mechanism's ability to stimulate mitigation across broad segments of the economy and ensure a net decrease and/or avoidance of global GHG emissions. This section examines the challenges posed by these principles for setting crediting thresholds, focusing on (i) how groups of emitters could be defined for the purpose of setting thresholds and stimulating mitigation across broad segments of the economy, building on efforts to standardise baselines in existing crediting mechanisms; and (ii) how ambitious crediting thresholds could be used as a method for ensuring a net decrease and/or avoidance of global emissions.

The following two possible approaches to setting baselines are explored further in this section:

- **Emissions projections**: expected trends in performance for a group of emitters are simulated over the crediting period, taking into account assumptions on economic growth and technology development. These trends could be expressed in terms of absolute emissions (tCO_2-eq) or a GHG-related index (e.g. tCO_2-eq per unit output). Projections are generally calibrated using historical data to some degree. In some cases the projection could be a simple extrapolation of the recent trend in emissions or even fixed at a constant historical level of total emissions.
- **Performance benchmarks**: one or multiple benchmarks are defined in terms of indexed performance-related metric relevant to the group of emitters concerned. A GHG-related index is often used (e.g. tCO_2-eq per kWh for power plants or tCO_2-eq per unit clinker for cement producers). This approach may be simpler to implement and more transferable than the emissions projections approach, particularly for groups of emitters for which data availability is limited and trends are uncertain (Lazarus *et al.*, 1999; Willems, 2001; Laurikka, 2002; CMIA, 2011).

While baselines could be set either in terms of indices (e.g. tCO_2-eq per unit product) or absolute emissions (tCO_2-eq), it is likely that the tradable GHG units themselves will be issued in terms of tCO_2-eq in order to be fungible with other GHG units in the international carbon market. If a country should choose to implement a domestic ETS in order to exceed its crediting threshold then modelling of absolute emissions could be used to align the emissions cap(s) with the crediting threshold. Given the lack of a common product output across different segments of the economy, it is likely that most domestic ETSs would operate on the basis of absolute emissions.

Early analyses by Lazarus *et al.* (1999; 2000) explored the issue of standardised crediting baselines in the context of the CDM and concluded that key elements to address are the level of aggregation (how broadly the baseline can be applied), environmental stringency, frequency of updating and the data sources used to construct the baseline. The following subsections revisit the first three of these aspects to assess their relevance for the new market mechanism, building on more than ten years of project-based experience. Data issues are considered throughout.

3.1 Standardising baselines

If the new market mechanism is to stimulate mitigation across broad segments of the economy, it will probably need to employ standardised baselines for broad groups of emitters, possibly in more than one economic "sector". As the term "sector" often carries preconceptions as to what is or is not included, this paper refers instead to "groups" of emitters.[8]

Most existing crediting mechanisms – such as the CDM, JI, Verified Carbon Standard (VCS), Climate Action Reserve (CAR) and Regional Greenhouse Gas Initiative (RGGI) offsets – were designed with requirements for baselines to be calculated on a project-specific basis, usually in combination with an additionality test.[9] In this way the boundary for the baseline is tightly defined around emissions sources for individual projects. There has been a growing focus in recent years on the development of standardised or partly-standardised baselines for these mechanisms. Box 2 describes how standardised baselines are now being introduced to broaden the scope of baselines under the CDM, while recent steps towards standardisation undertaken in the VCS and CAR systems are described in the Annex. These efforts have generally focussed on the use of positive lists and/or the provision of standardised (i.e. pre-defined) values for some of the variables used for baseline calculations or additionality testing for a group of emitters. These standardised variables can then be used in combination with project-specific data to set the baseline or prove additionality for individual projects.

A key difference between the new mechanism and standardisation efforts under existing mechanisms could be in the manner in which the baseline is applied. Standardised baselines under existing offset systems are generally *applicable* to a group of emitters but are *applied* only to individual projects (or programmes) that request credits. If the new mechanism uses a group performance approach, however, the aggregate performance of the group as a whole (including both good and bad performers) would be compared to the standardised baseline or crediting threshold to determine the quantity of credits due. This would result in fewer credits being issued overall than if only the performance of good performers were compared to the threshold, all else being equal (as illustrated by Figure 3 in Section 2). This means that the same standardised baseline applied under a new group performance mechanism would be effectively more environmentally stringent than when applied under an existing individual-performance-based mechanism such as the CDM, provided that sufficient total incentive is provided to stimulate investment.

The factors determining how a group of emitters should be defined under a group performance mechanism may therefore be different to how existing standardised approaches have been developed. The crediting threshold could be both *applicable* to a group of emitters and also *applied* to the same group of emitters. Nevertheless, the goal remains to group emitters in such a way that allows a single aggregate baseline to be calculated and then applied in aggregate fashion to each group.

[8] The statistical term "population" could also be used; however, it is not used in this paper in order to avoid confusion with human populations.

[9] Although standardised approaches were originally considered for CDM, the risk of issuing credits to "free-riders" meant that project-specific approaches prevailed, even though some of the key methodologies, such as for grid-connected renewables (ACM0002), are quite standardised in nature.

Box 2: Standardised baselines under the CDM

Small group sizes can lead to high labour and administrative requirements, resulting in high transaction costs. Conventionally, the CDM requires each project to set its own baseline and subsequently demonstrate that the project would not have happened in the absence of the mechanism (an additionality test). "Standardised baselines" are now possible under the CDM, defined as "a baseline established for a Party or a group of Parties to facilitate the calculation of emission reduction and removals and/or the determination of additionality for clean development mechanism project activities, while providing assistance for assuring environmental integrity" (UNFCCC, 2010b).[10]

The UNFCCC Secretariat has released guidelines for standardised baselines (UNFCCC, 2011d) for a limited number of project types where groups of similar emitters are relatively straightforward to define (e.g. fuel switching, energy efficiency improvements, methane destruction and methane formation avoidance). The guidelines suggest grouping emitters by location (i.e. by national boundaries) and by specific product output, while recognising that in some cases further sub-categories may be required. A set of assumptions is then used to calculate a single baseline for each group and to define criteria for additionality. In the event that performance data cannot be collected from all emitters within a group, the guidelines recommend that a "drop-out" rate is estimated as an indication of the comprehensiveness of the data coverage (UNFCCC, 2011e).

The CDM standardised baselines process can inform baseline setting under the new market mechanism, even though CDM credits are awarded to individual projects or programme activities and an additionality test is required. Setting standardised baselines in effect moves a key decision-making point further "upstream" in the process, so that the EB or equivalent body decides in advance how a baseline can be applied for a type of project activity. This may reduce delays in project registration, lower transaction costs, improve predictability and increase objectivity regarding the calculation of emissions reductions achieved. For the new market mechanism, whilst decisions relating to setting the crediting threshold for a group of emitters could often be contentious, establishing the decision point for baseline setting as early as possible in mechanism process (with clear guidelines for how different baseline assumptions are to be presented) may simplify the operation of the mechanism.

Analyses of the design and practical use of standardised baselines have been undertaken for emitters in different segments of the economy and in the context of various existing crediting mechanisms (Lazarus *et al.*, 2000; Lazarus *et al.*, 2010; Sathaye *et al.*, 2001; OECD/IEA, 2000; Willems, 2001; Hayashi *et al.*, 2010; CEPS, 2010). Lessons learned from these studies that may be applicable to the new market mechanism include:

- The extent to which emitters can be aggregated for the purpose of setting a baseline highly depends on the segment of the economy concerned and national circumstances. A high level of aggregation (i.e. a larger, more heterogeneous group) could simplify application of the baseline and potentially provides investors with a greater range of means by which to achieve emissions reductions (e.g. incentives could be provided for fuel-switching in the power sector). On the other hand, a low level of aggregation (i.e. smaller, more homogenous groups) can encourage improvements in performance for a given technology or vintage (albeit often only incremental improvements) and reduces the risk of over or under-crediting.

[10] This is in addition to the development of PoAs that have been eligible for registration under CDM since 2009. However, to date many PoAs have chosen to develop individual baselines for each individual activity within the programme, rather than use a single baseline for the entire programme.

- It needs to be clear to all stakeholders which emitters (including future additions) are included in which group, as well as which gases are covered; this would be particularly important for a group performance mechanism.
- Data availability and quality generally varies by country, by the sector concerned and by the specific activity and emissions type. The lower the data availability and quality, the more difficult it is to construct a robust crediting baseline.
- Although they can potentially reduce transaction costs, standardised approaches may require substantial time and upfront costs for data collection and methodology development. These costs may fall on government bodies in host countries.

The first step of developing baselines under the new market mechanism could be to identify which segments of the host economy are covered (e.g. to decide whether the mechanism will cover electricity generators, land use activities, etc.). If a decision is made to disaggregate further then smaller groups of emitters could be outlined based on clear criteria, depending on the emitters concerned and national circumstances. Some relevant examples of such criteria are described below.

Grouping emitters by product or output

One approach to setting boundaries for baselines is to group emitters according to production outputs. For example, a single baseline could be developed for all plants in the country producing steel, or all plants producing paper. One of the factors determining the extent to which this approach can be effective is the homogeneity of outputs, i.e. the extent to which the product from one source is substitutable for the product from another source. An example of a homogenous product is electricity; it is difficult to distinguish between electricity produced by one power plant and that produced by another power plant (although the fuel or natural energy flow from which the electricity is derived, and therefore the emissions performance, can vary substantially). An example of heterogeneous output is chemicals manufacturing, where similar plants may produce a wide range of different products making attribution of emissions per individual product difficult. In some cases it could also be possible to group emissions sources by input, e.g. distinguishing between metal processing plants using raw ore and plants using recycled scrap metal.

The grouping of emitters by output product can be combined with the use of product benchmarks for setting the baseline. For example, in Phase III of the EU ETS the allocation of free allowances to non-electricity-generating installations will be determined using a set of product benchmarks for 52 different products on a weight basis (i.e. tCO_2-eq per tonne of product). The choice to develop benchmarks for products (rather than processes or inputs) was controversial and the process of deciding which products to develop benchmarks for was not straightforward. The EU's stated aim was to have "a maximum amount of emissions covered by a manageable number of product benchmarks" (European Commission, 2011). There is only one benchmark per product; installations producing the same product using different fuels, technologies or located in different countries within the EU will be grouped together. Although these product benchmarks were designed to facilitate allocation of allowances under a trading scheme, a similar approach could be used to develop product benchmarks to serve as crediting thresholds in developing countries.

Grouping emitters by technology or process type

In cases where there are significant variations in per unit emissions between installations producing the same product due to the use of different technologies or processes, emitters could be also grouped by technology or process type. The metal extraction industry provides an example of a heterogeneous set of emitters for which it would be difficult to develop a single baseline for all process types. For example, bauxite (the raw material for aluminium production) can be extracted by open cast mining or via deep underground excavations. For open cast mining, the overburden above the bauxite deposit can range from a thin covering of topsoil to over 70 metres of hard rock and clay (IAI, n.d.). Consequently, different mines

can have very different levels of energy consumption and GHG emissions per unit product, even though the end product (bauxite) is the same.

An example of a forthcoming market mechanism that groups installations by technology is India's "Perform Achieve and Trade" (PAT) scheme which aims to incentivise improvements in energy efficiency (BEE, 2011). Participating installations in the industrial and electricity generation sectors will be allocated targets in terms of reduced energy use and installations that exceed their targets will be issued with tradable Energy Saving Certificates (ESCerts). Given the wide variation in energy efficiencies between installations, each sector will be further divided into several smaller groups, or "bands", based on their current specific energy consumption, to create groups with similar energy consumption profiles. A target will be set for each band of installations in terms of energy per unit product). Targets for each group will be set with a level of ambition defined by the existing best performer in each band. This approach has parallels with establishing a crediting baseline (albeit based on energy use). A risk of this approach is that the process of grouping can be perceived as arbitrary and therefore controversial (similar to the selection of products for benchmarking in the EU ETS). Further, too high a level of disaggregation can erode ambition to the point where the policy achieves little. The first phase of the scheme has not yet started so the effectiveness of this approach remains unproven.[11]

Grouping emitters by vintage

In many segments of the economy, the emissions performance of installations is changing over time – even in the absence of specific emissions policies (this change could be an increase or decrease in GHG emissions intensity). Consequently, it may be useful to group emitters based on their vintage. This could improve environmental stringency by ensuring, for example, that new plants would not get credits simply because they were built more recently than old plants (since they could be expected to be more efficient due to autonomous efficiency improvements). There are two distinct aspects to this: (i) grouping existing emitters based on their date of implementation, and (ii) distinguishing between planned and existing emitters. The latter distinction is important because whilst new sources are likely to be a key driver of rising GHG emissions in a developing country, it is difficult to accurately anticipate their likely emissions performance in order to set an appropriate crediting threshold. Some analysts have proposed dividing emitters into "existing" sources and "new" sources (e.g. NERA, 2011; IEA, 2009), so that the uncertainty of how new emitters may develop does not distort the incentive for existing facilities. However, dividing emitters in this way could distort investment decisions (e.g. provide incentives to delay new investment). One solution for this is to ensure that crediting thresholds applied to new sources are continually or periodically updated (this possibility is discussed further in Section 3.2.3 below).

The extent to which a single baseline is representative of the individual emitters within a group depends on the number of emitters in the group and their heterogeneity. As the number of emitters in a group increases, it is likely that the baseline will be based on increasingly broad assumptions; for example, it would be unfeasible to describe the expected evolution of a country's power sector by describing the expected evolution of every single electricity-generating source, especially with uncertainty over how future sources may develop. Any process to develop ambitious baselines for groups of emitters will therefore need to ensure that the assumptions made are both realistic and conservative (both for existing and planned sources), even if data is only available from a sub-set of existing emitters within the group.

A further complexity in defining groups of sources is where there is ambiguity over how a particular source of emissions should be accounted for; for example, when there are diverse sources of emissions within the same industrial installation. Similar questions arise when defining allocation plans for ETSs. In the EU ETS, for example, detailed guidelines were developed to account for blast furnace gas in iron and steel facilities. Such guidelines could inform the baseline setting process in the new mechanism.

[11] The scheme was due to be implemented in 2011, but has been delayed and is likely to start in 2012.

Addressing emissions "leakage"

An important consideration for the coverage of a carbon market mechanism is emissions leakage. Emissions leakage may occur when a shift in activity is caused by the planning or implementation of a climate policy instrument, resulting in increased emissions occurring outside the boundary of the policy instrument. Leakage can be an issue both for ETSs and crediting mechanisms. In ETSs, the extra cost of production due to the mandatory requirement to acquire emissions permits may force relocation or increased production in locations outside the system boundary. In crediting mechanisms, emissions reduction activities may be credited even if they cause increased emissions elsewhere outside of the crediting boundary.

Application of a crediting mechanism to a broader group of sources can mitigate the risk of leakage, although careful definition of the boundary will be important and highly dependent on characteristics of a particular group of sources. In the case of a credits-to-government crediting mechanism where emitters are incentivised by domestic policy measures and do not receive credits directly, leakage could also be an issue depending on what policy measures are used.

3.2 Level of ambition (environmental stringency)

The level of ambition of climate change mitigation is a core concept in the UNFCCC negotiations and one that is necessarily political (and subjective) in nature. One of the approaches that could be used to ensure the new market mechanism achieves a net decrease and/or avoidance of global emissions would be to set ambitious crediting thresholds – ambitious in the sense that they include an agreed level of non-credited mitigation in the baseline. The challenge is to agree what represents an appropriate level of domestic mitigation when the BAU trajectory is itself an uncertain concept.

The discussion on sector crediting in the literature tends to describe a shift from BAU baselines (as under CDM) to "ambitious" or "beyond BAU" baselines whereby credits will only be issued if emissions performance is shown to be considerably better than that expected under BAU (see e.g. Baron *et al*, 2009; Aasrud *et al*., 2009). However, it is important to note that underlying any emissions baseline is a collection of assumptions, both qualitative (e.g. the technologies that will be employed and policies that will be implemented) and quantitative (e.g. how emissions factors for given technologies will change with time and the impact that new policies will have on technology penetration/fuel mixes). The BAU baseline is often referred to as though it is a robust concept, but this view overlooks the arbitrary (even if well-informed) assumptions used to build any counter-factual baseline (including those for CDM). In most cases, BAU is one of a collection of possible scenarios for how emissions may have progressed in the absence of a given intervention and it is the judgment of the entity or entities setting the baseline (and those reviewing it) as to which set of assumptions is most appropriate.

A useful crediting threshold provides a clear emissions level for a specified time period against which to measure performance, so that all stakeholders are aware of what must be achieved and verified in order for credits to be issued.[12] Graphics depicting ambitious crediting mechanisms often show an emissions trajectory representing BAU and a second, lower emissions trajectory representing the crediting threshold (see, for example, Aasrud *et al*., 2009; Schneider and Cames, 2009). Figure 4 highlights a slightly different depiction of such a mechanism which focuses on fixing a crediting threshold which is demonstrated to be likely outside of the plausible range of BAU scenarios, rather than relying on definition of a single BAU trajectory.

[12] In the case of a policy-driven crediting mechanism with credits accruing to a government body, such stakeholders would involve buyer entities and the government only; in the case of credits accruing to private entities or installations, the installations themselves would also have a direct interest in the exact level of the crediting threshold.

Figure 4: The crediting threshold is just one among many possible baselines.

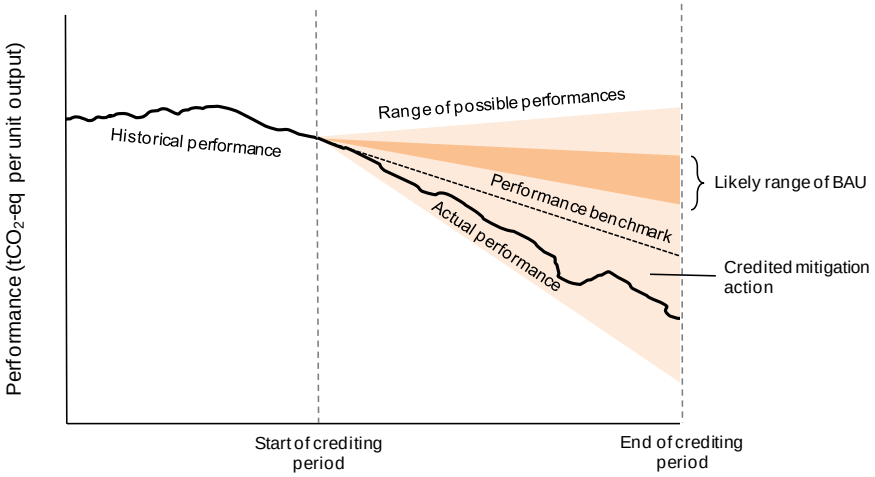


Figure 4 illustrates that the extent to which the crediting threshold deviates from BAU is likely to be uncertain. Whilst in theory this deviation amounts to the quantity of "net decrease and/or avoidance" of global emissions, it does not need to be precisely measured to enable the functioning of the market mechanism and the issuance of carbon credit assets. If the crediting threshold is demonstrated to be likely outside of the range of plausible BAU scenarios, the mechanism will deliver a net decrease and/or avoidance of emissions. The question of how much decrease/avoidance is achieved is related to the ambition of pledges from different countries, which is a separate debate to the question of the operation of the crediting mechanism.

Furthermore, there is a grey area between a "conservative BAU" and an "ambitious" crediting threshold. CDM baselines are informative on this point. Commentators have long pointed out that a baseline set for an offset project must find a balance between being environmentally stringent (i.e. a conservative estimate of BAU) and environmentally effective (i.e. not so stringent that no investments are made due to insufficient returns) (Lazarus *et al.*, 1999; Bosi and Ellis, 2005). Although generally specific to individual projects, all CDM emissions calculations are required to be conservative in their assumptions. The Marrakesh Accords state that CDM baselines should be established "in a transparent and conservative manner regarding the choice of approaches, assumptions, methodologies, parameters, data sources, key factors and additionality, and taking into account uncertainty" (UNFCCC, 2001).[13] If every assumption used in the calculation is deliberately conservative then it could be argued that the cumulative effect of those conservative assumptions means that many CDM baselines are already ambitious to some degree.

The way in which ambition is built into a crediting baseline will depend in part on the approach used to set the baseline. The two approaches of emissions projections and performance benchmarks are examined here. Both have political and technical aspects, and neither is an exact science.

Section 3.2.1 outlines the emissions projections approach and assesses how ambitious crediting baselines might be established in the context of developing country experience with modelling emissions

[13] The Executive Board has since made clarifications on what is meant by "conservative". EB 5, Annex, 3, paragraph 10(a) states: "In case of uncertainty regarding values of variables and parameters ... the resulting projection of the baseline does not lead to an overestimation of emission reductions attributable to the CDM project activity (that is, in the case of doubt, values that generate a lower baseline projection shall be used)." Further, EB 22, Annex 2, paragraph 11, clarifies: "When defining which emission sources should be considered in the project boundary, in the baseline scenario and in the calculation of leakage emissions, project participants should make conservative assumptions, for example the magnitude of emission sources omitted in the calculation of project emissions and leakage effects (if positive) should be equal to or less than the magnitude of emission sources omitted in the calculation of baseline emissions."

projections. Section 3.2.2 outlines the performance benchmarks approach and provides examples of how ambitious performance benchmarks could be developed for electricity generation, energy-intensive industry and other sources. Lessons learned from experience with existing crediting mechanisms are included.

3.2.1 Emissions projections approach and the relevance of national pledges

The process of developing emissions projections involves identifying a group of emitters and developing a storyline, based on a set of assumptions, that describes how emissions (or a related performance metric) from that group of emitters are expected to change over time. Many different sets of assumptions are possible, some more conservative than others.

Many developing countries already have created emissions projections at the national and/or sector level. In particular, several developing countries have proposed mitigation goals in terms of deviations from BAU emissions and some have also provided information on the national BAU baseline against which their pledges will be measured. Two examples of countries that have published their BAU baselines are Brazil and South Africa (see boxes 3 and 4). The new UNFCCC market mechanism will operate in the context of these pledges, and this could have important implications for the definition of crediting thresholds in developing countries with numerical mitigation goals of some kind. This section considers what impact this may have on deciding what constitutes an ambitious crediting threshold.

There is no requirement under existing UNFCCC provisions for developing countries to submit BAU emissions projections, and no internationally-agreed template or guidance on how assumptions should be selected and appraised. Therefore different countries have taken different approaches. Previous CCXG analysis highlighted how emissions modelling undertaken in some OECD countries generate very different estimates of both BAU projections and mitigation potentials. In the case of Mexico, for example, different models presented a 65% difference in BAU emissions for 2020 due to varying assumptions about economic and population growth, amongst other factors (Clapp *et al.*, 2009).

Box 3: National emissions projections in Brazil

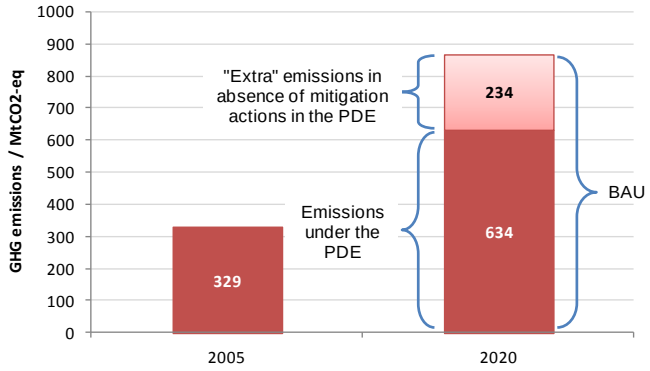
In 2009 Brazil announced its intention to reduce national GHG emissions by between 36.1 and 38.9% relative to BAU levels. The original submission to the Copenhagen Accord also included the emissions reductions expected from a small number of loosely-defined segments of the economy including reduced deforestation of different forest area types and other land-use change initiatives, improvements in energy efficiency, expansion of hydropower, biofuels and other renewable energy sources. In December 2010, a law was passed in Brazil that codified not only this reduction target but also the BAU baseline against which it will be measured.[14]

Although the majority of Brazilian emissions reductions are expected to come from forestry and land-use activities, modelling for emissions from energy use was undertaken as part of the Brazil 10-Year Energy Development Plan (PDE). The PDE (EPE, 2010, in Portuguese) includes growth assumptions that lead to a 111% increase in total energy consumption from 2005-2020 with overall economic growth of 101% over the same period. The PDE emissions projection also assumes that a number of mitigation measures will be implemented during this period, resulting in only a 93% increase in overall emissions from energy over the same period. However, the PDE projection is not used as the BAU baseline for the energy sector because implementation of the mitigation measures assumed under PDE is not considered to occur under "business as usual". Rather, the BAU baseline for total emissions in the energy sector is calculated by taking the PDE projection and adding back into it the emissions expected to occur in the absence of the mitigation actions included in the PDE (broadly, the future extra energy demand is expected to be met through fossil fuel combustion use rather than use of hydroelectricity, nuclear and biofuels). Figure 5 shows how the PDE projection represents a 27% decrease from BAU in 2020 (a 234 Mt decrease from a total of 868 Mt).

This BAU is for all energy-related emissions from fossil fuels, including power generation, industry, commercial/residential heating, agriculture and transport. Whilst in theory it would be possible to define a crediting threshold for emitters based on these broad segments of the economy (which come from Brazil's official national energy balance), in practice it is likely that smaller, more precisely defined groups of emitters will be required to create functional thresholds. The baseline law in itself may therefore be insufficient to directly inform top-down modelling of emitters for setting crediting thresholds, but it could still serve as an indication for appropriate ambition when assessing crediting thresholds set using performance benchmarks.

Furthermore, the law states explicitly that the CDM and other UNFCCC mechanisms may be used to help achieve the pledged reductions. This raises two questions. Firstly, if credits from mitigation actions are purchased as offsets and counted towards developed country emissions targets, this could be seen as double counting of emissions reductions towards both countries' goals (Prag *et al.*, 2011). Secondly, if credits are to be generated under the new market mechanism, a political question may arise as to what is an appropriate level of ambition, e.g. whether the crediting threshold should be aligned with the PDE projection or the BAU projection. This is likely to be a matter for international negotiation.

Figure 5: Emissions from Brazil's energy sector in 2005 and 2020



[14] Decree number 7390. Available in Portuguese at http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2010/Decreto/D7390.htm

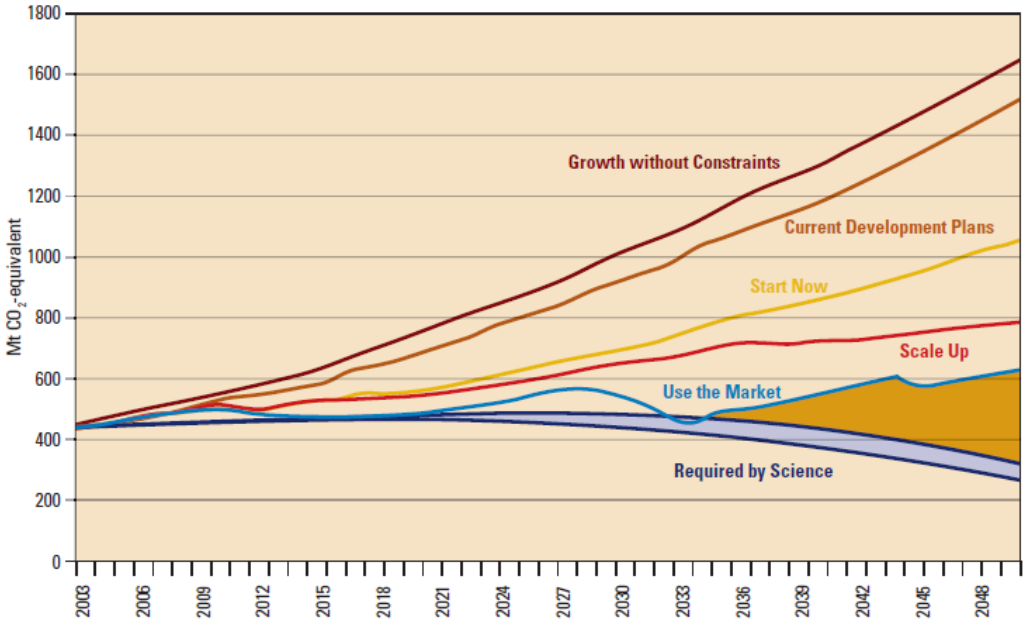
Box 4: Long-term Mitigation Scenarios in South Africa

At COP 15, South Africa pledged to reduce emissions by 34% below BAU levels by 2020 (and 42% below BAU by 2025), conditional on support in the form of finance, technology and capacity-building and on an ambitious, fair, effective and binding multilateral agreement. Although the pledge does not explicitly refer to a particular baseline scenario, the Energy Research Centre at the University of Cape Town has undertaken detailed modelling to produce scenarios for the development of emissions in South Africa (Winkler *et al.*, 2011). The Long Term Mitigation Scenarios (LTMS) project has compared various possible mitigation pathways to a reference projection known as "Growth Without Constraints" (GWC), which represents a continuation of growth trends without carbon-related or other constraints on growth. In the GWC projection, total emissions increase four-fold from 2003 to 2050 despite a 55% reduction in emissions per unit GDP over the same period. The main drivers are continued reliance on coal and a sharp increase in energy consumption per capita. The authors of the LTMS make clear that this is just one possible projection among many and it is not necessarily the most probable scenario.

In addition to the GWC projection, the other mitigation scenarios under the LTMS reflect different levels of ambition for the extent to which emissions will be reduced in South Africa. These range from the "Current Development Plans" projection (which includes government targets for energy efficiency and renewable energy up to 2015) to the "Required by Science" projection (which represents the trajectory required to contribute to global efforts to keep the global average increase in temperature to below 2°C) (see Figure 6).

The LTMS scenarios have not passed into law and are not explicitly linked to the country's mitigation actions under the UNFCCC. However, were South Africa to choose to participate in a new crediting mechanism, the combination of the LTMS baseline (or an updated version) and the stated reduction percentages in the UNFCCC pledge could inform the setting of specific crediting thresholds.

Figure 6: South Africa's Long Term Mitigation Scenarios



Source: South Africa Scenario Building Team, 2007

Other developing countries have expressed mitigation goals as a reduction in GHG emissions per unit of economic output, for either part or the whole of the economy. The level of ambition of such goals when it comes to specific segments of the economy or groups of emitters can be difficult to determine because the index is based on GDP, rather than a metric linked to production output of a particular segment of the economy. Nevertheless, mitigation goals expressed in this way could influence the setting of ambitious crediting thresholds. For example, once a group of emitters has been defined, a proxy for economic output could be used to assess by how much emissions in that group could increase taking into account the national emission intensity pledge. In some cases, production volume could be used as a proxy for GDP.

However, if different groups have highly varying historical and expected growth rates, both relative to each other and to national GDP, then it may be difficult to accurately state the required emissions limitation needed in each segment of the economy to contribute to the national pledge.

The examples in boxes 3 and 4 highlight how quantified pledges from developing countries may influence the calculation and international agreement of crediting baselines. Both examples use economic modelling to predict emissions growth in relevant segments of the economy and are therefore sensitive to key macroeconomic assumptions regarding variables such as GDP and population growth. The groups of emitters described in Section 3.1 are often at a finer level of detail than the results of the modelling used to construct these national baselines. Nevertheless, the level of ambition of these national pledges may inform the setting of crediting thresholds or be used to justify the threshold level chosen for a particular group of emitters, even if the crediting thresholds are expressed as performance benchmarks using indexed metrics.

Emissions projections such as those presented in national baseline scenarios also raise an important point about the implementation and outcomes of policy measures. Some mitigation actions explicitly or implicitly include policy actions to achieve the stated goals or targets. Many developing countries have initiated myriad policy measures, large and small, that have an impact on emissions reductions. Some of these are included in national baselines, others are not.

Furthermore, some national mitigation action pledges by developing countries refer explicitly to the use of CDM credits or units from new mechanisms as being excluded from consideration of the baseline scenario. On one hand this could be interpreted as indicating that the level of ambition for baselines under the new mechanism should be closer to a level represented by the BAU scenario rather than the pledged level of deviation from BAU. However, the issuance of credits in this case, which would therefore count towards both the mitigation goal of the host country and the mitigation target of the buyer country, could be seen as double counting of emissions reductions internationally (see Prag *et al.*, 2011). The influence that national mitigation pledges have on the "ambition" of crediting thresholds may therefore require further clarification and negotiation on a country-specific basis.

Assessing the direct impact of policy measures on emissions mitigation is notoriously complex. Bosi and Ellis (2005) considered policy-based crediting as an approach to awarding credits based only on the measurement of successful implementation of specific policy measures in developing countries. The analysis concluded that this would require extensive *ex post* monitoring and evaluation, and that in any case it is often very difficult to truly isolate the effects of a particular policy measure since many policy measures have overlapping boundaries and address multiple goals, of which climate change mitigation may be a co-benefit or even an accidental result.

The experience of dealing with domestic policy interactions under the CDM suggests that decision-making can become complex and unclear if considered on a case-by-case basis. Given the increasingly intricate webs of pre-existing, planned and sometimes overlapping policy measures in all countries, it could be useful if decisions are made early on at a high level regarding how domestic policy measures are to be treated when setting crediting thresholds.

3.2.2 Performance benchmarks approach

An alternative to the emissions projections approach to setting crediting baselines is to use ambitious performance benchmarks based on GHG-related indices. The calculation of the benchmark can be based on historical data and observations across a group of emitters, expected performance profiles of new process options or other factors. Benchmarks can be used to provide a crediting threshold that does not necessarily require the development of a counter-factual BAU scenario. This is particularly advantageous when reliable historical performance data is not available.

The index used to calculate a benchmark will depend on the group defined to calculate and apply the baseline. Benchmarks can be applied to a specific technology, process type or product, with many different

benchmarks calculated for different relatively narrow groups of emitters within a wider segment of the economy. Alternatively, benchmarks can be set for a broad group of emitters based on average performance information. These are sometimes known as single-technology and multi-technology benchmarks (CMIA, 2011). The following analysis considers different approaches to benchmark setting for power plants, energy intensive industrial facilities and other groups of emitters.

Performance benchmarks for power generators

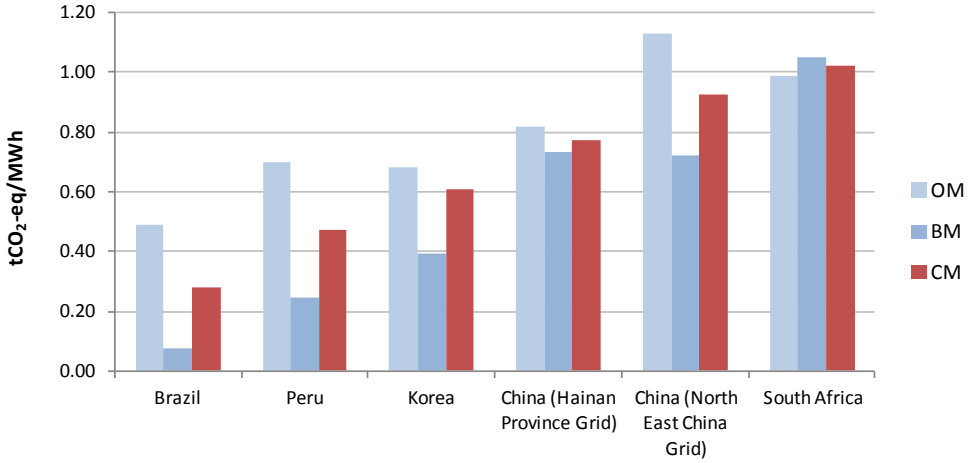
Power generators are unique because they produce a single, homogeneous product and represent a large proportion of overall emissions in many countries. However, applying a performance benchmark as a crediting baseline is not always straightforward because power generation technologies have widely differing emissions profiles (e.g. near zero for renewables and widely differing emissions between different fossil fuel combustion technologies). An example of a performance benchmark based on observed data is the calculation of grid emissions factors for CDM projects involving electricity generation projects. This has been used by a large number of projects in many different countries. Good data are available for electricity generation and fuel use in many countries, meaning that a benchmark can be set using observed data.

The calculation involves taking a weighted average of the operating margin (OM) and build margin (BM) of an electricity system to create a single figure for the combined margin (CM) (UNFCCC, 2011f). The methodology is largely unchanged from when it was first proposed by the CCXG (formerly the Annex I Expert Group; see Kartha and Lazarus, 2002). The OM is the emissions factor (in $kgCO_2e/kWh$) of all electricity generators connected to the power grid, and is used to estimate the effects that a new generating plant may have on the operation of existing plants. The BM is the emissions factor for a group of recently commissioned plants estimated to represent the most likely "next" plants to be built. The BM is used to estimate the effect that a CDM project may have on displacing or delaying the construction of subsequent plants.

The calculation is interesting for several reasons. Firstly, the methodology allows for four different approaches to estimating the value of OM (depending on data availability). This demonstrates that baseline values depend not only on assumptions used but also on quality of data. Secondly, the BM group is defined using arbitrary cut-offs that are then refined in order that the resulting figure be a "best guess" at the emissions factor of plants to be added. Thirdly, the level of the weighting of the average of the BM and OM is based on arbitrary but well-informed assumptions, the significance of which can be great if the BM and OM are quite different (see Figure 7). [15]

[15] The weighted average is used to estimate the effect that a CDM project would have on electricity generated by other plants during the crediting period. In the first years after commissioning, a CDM project is assumed to have no impact on the planning of new power plant construction because new additions take several years to plan, so the electricity displaced is calculated using OM. In the latter years of the crediting period, it is assumed that construction of new plants is affected by the project. A CM weighted average of 50:50 for each year of a 7 year crediting period can be interpreted as 100% OM for the first 3.5 years, 100% BM for the second. An average of 25:75 would mean OM for the first 1.75 years, BM for the remaining 5.25 years.

Figure 7: BM, OM and CM (50:50 average) for different power grids



Source: JBIC, 2011

Amatayakul *et al.* (2008) explores how the weighting of OM and BM might be used to create an ambitious crediting threshold for groups of power plants in some countries, based on the familiar and widely accepted CDM calculation. The concept was taken further in Amatayakul and Fenhann (2009). Here the anticipated growth rate of the power sector is used to influence the ratio of OM to BM to create an emissions benchmark that could potentially serve as a crediting baseline for electricity generators.

However, the reliability of the type of approach used in the BM calculation as a means to predict the emissions of ongoing construction of power plants has recently been implicitly called into question by the CDM Methodologies Panel (MP) (UNFCCC, 2011g). The methodology ACM0013 is designed to allow for crediting of fossil fuel fired power plants if they are more efficient than the prevailing technology for the same fossil fuel type in the same country. A crucial part of the methodology is the calculation of the emissions factor for the technology assumed to be the baseline scenario, i.e. what would have been built in the absence of the project. The methodology allows two approaches: (i) using investment analysis to identify the most likely type of plant to be built, and (ii) using data from a cohort of recently built plants. It is the second option that resembles the build margin calculation; in this case, the top 15% of performers amongst recent plant additions are considered (again, an arbitrary cut-off point).

The MP has noted some significant data discrepancies in baselines already calculated, as well as difficulties in verifying the sources of data used to calculate the sample group. Further, the report questions the "vintage" of data being used (i.e. the age of plants deemed to be "new additions") and uses data from BM calculations in both China and India to show that the thermal efficiency of new coal plants increased by over one percentage point in the period 2000-2010. Whilst this rate is likely to be exceptional due to a specific period of considerable growth and technology development in those countries, it nevertheless highlights that underlying emissions performance improvement (sometimes referred to as "autonomous technological development") is an important factor in making BAU trajectories difficult to estimate. Even when the output product is highly uniform, evolution of emissions performance is very specific to technical and geographical circumstances, further demonstrating the challenges of defining environmental ambition for a crediting threshold across a broad group of emitters.

Making a distinction between new and existing plants may help to simplify the designation of ambition. The IEA (2009) developed a model for a dynamic baseline for power plants which would apply only to new plants. This could be relevant in many emerging economies where power generation is growing rapidly. The baseline is a performance benchmark based on a weighted average of the emissions performance of all existing plants and the emissions factor of all new plants added since the scheme was implemented (IEA, 2009):

$$\text{Performance benchmark} = A \cdot P_{existing} + (1 - A)\, P_{new}$$

$P_{existing}$ = Performance of existing plants (CO_2-eq/MWh)
P_{new} = Performance of new plants (CO_2-eq/MWh)
A = Arbitrary weighting factor

This baseline methodology is designed so that it could be used even without complete data. All that is needed are aggregated data on the existing fleet of power generators and detailed performance data on those plants added since the start of the scheme or another defined base year. The level of ambition is then defined within the factor "A", which could be negotiated. The baseline is dynamic because it will consistently be forced downward by the addition of new plants which are likely to be better performers due to technology process improvements (regardless of climate policy). There is also an incentive for new plants to beat the baseline early in order to maximise crediting.

Product-based benchmarks in industry

Outside of power plants, performance benchmarks can be more difficult to develop because of the wide heterogeneity not only in emissions performance, but also in product types. Although no approved CDM methodologies use this approach, a benchmarking methodology was proposed (and subsequently rejected) for cement production, involving performance benchmarks calculated from an industry database.[16] Two benchmarks were proposed, one estimating BAU and one to serve as an additionality threshold. Both percentage points were set at informed but nonetheless arbitrary levels, again highlighting that the difference between a proposed rigorous CDM baseline and an ambitious crediting threshold is not clear-cut. Outside of the CDM, an example for how to tackle this is the development of product benchmarks for non-electricity emitters in the EU ETS. These are a form of multi-technology benchmark, grouped per product output.

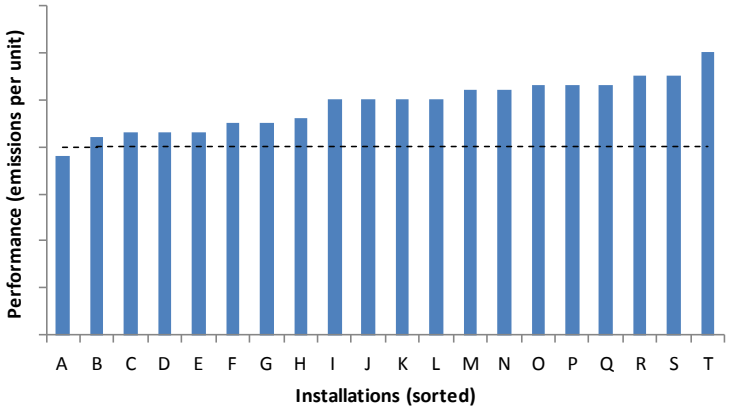
Case study: Free allocation to non-electricity segments of the economy in Phase III of the EU ETS

The product benchmarks developed for calculating free allocation to non-electricity generators in the EU ETS from 2013 offer insights into a possible means to determine a crediting threshold from product-based emissions performance benchmarks calculated using existing data. The EU ETS Directive states explicitly that if the EU signs agreements with third countries regarding supply of offsets, the product benchmarks could serve as a crediting threshold for the issuance of credits under such an agreement (European Commission, 2009).[17] The level of the product benchmarks was determined in consultation with industry and in most cases corresponds to the average of the top 10% best performing installations for that product using production data gathered in 2007-08 (Figure 8). This process also drew on experience gained during the first two phases of the EU ETS with data collection and reporting. Each product benchmark will remain fixed until 2020. The free allowance for an installation is determined by multiplying its historical production of each product (in tonnes) by the benchmark for that product.

[16] A summary of the methodology can be found at http://www.wbcsdcement.org/

[17] Article 11a, paragraph 6 states that an agreement between the EU and other countries to supply offsets may "provide for the use of credits from projects where the baseline used is below the level of free allocation under the measures referred to in Article 10a".

Figure 8: Determination of a product benchmark (for a hypothetical group of emission sources).



Source: Authors, adapted from European Commission (2011)

Note: The benchmark is set at the average of the top 10% performers within the group (in this example, installations A and B).

The EU product benchmarks illustrate that it is possible to use benchmarks in a capped environment. Each EU Member State will calculate the preliminary allowances for the installations in its territory and the EU-wide preliminary total is then checked to ensure that total allocation to non-power industries does not exceed the overall cap. In the event that over-allocation does occur, a "cross-sectoral correction factor" will be applied to reduce the free allowances allocated to each installation to ensure that the overall cap is not exceeded. In March 2012 it is not yet known whether the cross-sectoral correction factor will be used, because not all member states have submitted allocation plans. The level of ambition is defined by the overall cap, which from 2013-2020 will decrease by 1.74% per year from 2005 levels.

Since a crediting mechanism is likely to operate with the threshold expressed as an indexed (intensity) metric, the EU ETS model could provide a framework for developing performance benchmarks that could be applied under a voluntary crediting mechanism. Regardless of the actual numbers derived, the process sets a precedent for how to deal with a number of technical challenges faced when trying to determine emissions performance levels for energy-intensive sectors with complex industrial processes and outputs. For example, the process provides a clear methodology for allocating emissions from transfer of heat and waste gases which can greatly affect emissions performance.

Data availability and reliability could be a problem when applying a similar process in developing countries. The EU ETS benchmarks were developed using the relatively good data available in the EU following more than six years of operation of the EU ETS. In cases where data is more limited, the EU product benchmarks could potentially be used as a starting point for developing country-specific product-based benchmarks or for international comparison of locally-derived figures.

Principles for setting performance benchmarks in other segments of the economy

The EU ETS covers only energy-intensive activities and is limited in the most part to CO_2 emissions. Crediting thresholds based on performance benchmarks could also be created for non-energy intensive emitters, where the index for the benchmark may not be based on a physical product. Although performance benchmarks have traditionally been developed in industry to compare performance of individual sites or installations, benchmarks could also be developed to serve as a crediting threshold under a crediting mechanism applied to a large group of emitters or segment of the economy. One example for this is for capture rates of coal mine methane. Rather than measuring baselines and project emissions for specific technologies as has been the case under CDM, a single performance benchmark could be

established for the percentage of total methane captured at each mining complex. Such a benchmark could be established through a survey of existing mines and technology employed across a country or region. The benchmark could be set so that it rewards only performance that exceeds the current overall methane capture rates of most or all existing mines in the country or region, thus defining a level of ambition; statistical techniques could be used as a means of assurance that the performance benchmark surpasses most existing sites in the country. If data is poor or not available, the benchmark could be based on a sample of mines where data is available which is then extrapolated to further mines.

The calculation of a performance benchmark for a broad group of emitters requires sufficient information on the distribution of existing performance levels amongst the group to inform a decision about the cut-off point for the benchmark (i.e. what percentage of the existing best performers should be used to set the benchmark level). Table 2 shows how existing benchmarks used in GHG policy instruments vary widely in their chosen cut-off percentage level. For different activities, the distribution could be anything from a binary step change between two technologies where process options are very limited, to a smooth curve resembling a statistical normal distribution, where a large number of technology options and different operating efficiencies lead to a near continuous distribution of emissions performance.

Table 2: Examples of existing performance benchmark cut-off levels

Benchmark	**% performance level**
EU ETS benchmarking for free allocation to non-electricity generators	10%
US EPA Climate Leaders methodology for efficient transit buses (relative to US bus fleets in 2002)	10%
CDM methodology for crediting new, efficient fossil fuel power plants (ACM0013, currently suspended)	15%
General principle for CDM methodologies, as defined in Marrakesh Accords	20%
US EPA Climate Leaders methodology for efficient domestic boilers (relative to US boilers installed since 1990)	20%
Cement Sustainability Initiative CDM methodology benchmark (additionality threshold and baseline level respectively)	20%, 45/50%
RGGI methodology for energy efficiency improvements to residential buildings	20% below existing international standard
RGGI methodology for energy efficiency improvements to commercial buildings	30% below existing international standard

EU ETS product benchmarks use detailed historical data that provides a clear view of current performance. If comprehensive historical emissions data are not available for all emitters covered, an estimate of overall existing performance can be gained through survey techniques. If the sample size of a survey is statistically significant, a confidence interval can be calculated for the performance level that is expected to give strong assurance of exceeding that of most of the group.

In some segments of the economy with well-defined technology options, the performance benchmark can be set relative to a recognised best commercially available technology, other measure of best practice (nationally, regionally or globally) (Bode *et al.*, 2001; CMIA, 2011). However, these terms may be difficult to define as the notion of what is “best practice” or “commercially available” changes rapidly as technology costs and policy incentives evolve, and the mitigation effort represented by using this type of benchmark as a crediting threshold will vary between countries.

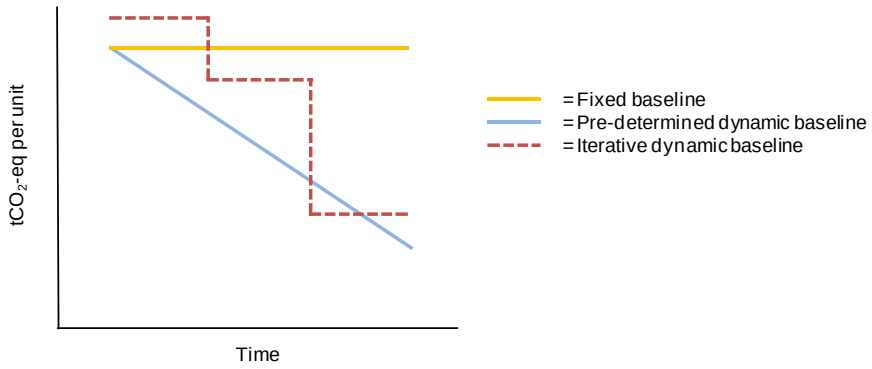
3.2.3 Dynamic versus fixed baselines

Another aspect influencing the level of ambition of baselines is whether they change with time, and if so, how. The concept of dynamic baselines has been discussed extensively in the baselines literature, particularly in the context of project-based mechanisms in the run-up to COP 7 in Marrakesh (Lazarus *et al.*, 1999; Lazarus *et al.*, 2000; Ellis and Bosi, 2000; OECD/IEA, 2000; Willems, 2001; Sathaye *et al.*, 2001). These studies highlight how, when considering the use of dynamic baselines, a balance needs to be struck between ensuring environmental integrity and providing predictability for investors. Lazarus *et al.* (2000) distinguished between *renewing* baselines for existing projects, and *revising* common baselines for new projects. Most project-based crediting mechanisms do not involve renewal of baselines during crediting periods, because of the resulting uncertainty of revenue for investors or owners. The question of when and how to revise standardised baselines to apply to new projects or investments, is however a topic of key relevance to the new market mechanism.

There are different ways in which baselines for groups of emitters under the new market mechanism could be "dynamic". They include the following three options (Figure 9):

- **Fixed baseline**: The baseline is fixed for each group of emitters for the duration of the crediting period. This would provide predictability for stakeholders but autonomous improvements in the performance of the group of emitters (if any) would not be captured. Under a group performance mechanism, where credits are issued based on the aggregate performance of the whole group each year relative to a baseline, a fixed baseline may be seen as insufficiently ambitious.
- **Pre-determined dynamic baseline**: The baseline changes with time in accordance with a pre-determined autonomous improvement function. This would provide predictability for investors and would take into account autonomous improvements in the performance of the group, although actual performance improvement could be better or worse than that predicted. The inherent level of environmental ambition of course also depends on the starting point chosen relative to existing performance and available technology options.
- **Iterative dynamic baseline**: The baseline is dynamic and is updated periodically based on actual performance. This takes into account the actual performance improvement of the group (including new additions) and would be expected to provide the highest level of environmental integrity. However, the level of the baseline for future years would not be known in advance and predictability would therefore be reduced for investors. This uncertainty could be mitigated to some extent by making clear at the outset when the baseline will be updated and on what basis.

Figure 9: Dynamic versus fixed baselines



Source: Authors

For pre-determined dynamic baselines calculated using the emissions projections approach, a challenge can arise if output or economic growth are significantly different to expected values. Though not a crediting

threshold, the cap for Phase III of the EU ETS was set using a pre-determined function (i.e. decreasing by 1.74% per year). However, due partly to the (unforeseen) financial crisis, emissions growth has been less strong than expected since 2008 and there is likely to be a surplus of permits to 2020 (Deutsche Bank, 2011). Pre-determined dynamic baselines based on performance benchmarks are less affected by unforeseen changes in output or economic performance. However, they can become out-of-date due to rapid technological changes.

Iterative dynamic baselines provide an opportunity to update the baseline periodically to take into account unforeseen changes in output, economic conditions or technological advances. It is important that the timeframe for these updates is clear for all stakeholders, particularly in the case of a credits-to-emitters approach where investment decisions depend on the ongoing visibility of the crediting baseline. The update can be used as a means to either increase or decrease the level of ambition of the baseline.

The IEA (2009) explored how iterative dynamic baselines could be developed for power plants. In the IEA proposal, the baseline is updated on a periodic (e.g. annual) basis using a weighted combination of the performance data from existing plants and latest additions. While performance data from both existing and new plants would be used to calculate the baseline, the baseline would only apply to new power plants under this approach. Over time the baseline would gradually become more stringent and the host countries' contribution to mitigation would become greater, while the volume of offsets generated by the group of emitters would become smaller.

4. Towards international recognition of crediting thresholds

The new market mechanism is to operate under the "guidance and authority of the COP" (by comparison, the CDM was "defined" under the KP as "subject to the authority and guidance of the [CMP] and be supervised by an executive board"). Baseline setting is not an exact science, since the level chosen for a baseline is a counter-factual and open to question. Therefore developing a process for adopting baselines that are acceptable to all Parties will not be straightforward.

For crediting thresholds used to calculate volumes of international GHG credits with monetary value, a clear process is required so that all stakeholders are aware of the valid approaches for setting thresholds, how such thresholds can be questioned and by whom. In the case of the CDM, methodologies and project baseline scenarios are usually put forward by project participants (often from the private sector) and the EB holds full authority for the approval of methodologies, project registrations and credit issuances. If the new market mechanism is based around the use of crediting thresholds defined for potentially large groups of emitters then the process may become more complex because of the need for government bodies to demonstrate that the proposed threshold is ambitious. The process could therefore be more political than setting baselines under the CDM and other existing offset schemes. The challenge will be to develop a process under the UNFCCC that is transparent and as objective as possible, resulting in crediting thresholds that are clear to all stakeholders.

The process for validation of crediting thresholds under the new market mechanism will need to reflect the purposes described in the Cancun principles, in particular those relating to stimulating mitigation across broad segments of the economy and delivering a net global decrease and/or avoidance of emissions. An effective process for recognising crediting thresholds for particular segments of the economy in particular countries would need to provide structure and guidance for each step of the threshold development process, whilst allowing countries flexibility in the precise methodologies that they use to define and present their crediting thresholds. The process could also include a system of checks and balances so that the integrity of a chosen crediting threshold is demonstrated using more than one approach.

An international recognition or approval procedure for crediting thresholds would ideally perform the following functions:

- Facilitate international recognition of nationally-selected crediting thresholds through transparent assessment of thresholds presented by countries (e.g. in different cases a threshold could use an international good practice benchmark or could use country-specific data; either might be appropriate but transparency of selection is important);
- Allow assessment of the environmental stringency of the crediting threshold against a range of plausible scenarios for how emissions trajectories might develop, whilst reflecting different national circumstances such as regulatory capability and national development goals;
- Minimise perverse incentives for stakeholders or governments to distort or inflate baselines, or to refrain from implementing mitigation policies;
- Provide a system of checks and balances regarding the appropriateness of the proposed crediting threshold, including the possibility to apply indicators internationally across countries; and
- Where applicable, ensure coherence between the proposed crediting threshold and the host country's mitigation goal, taking into account whether use of the new market mechanism is included or excluded from the mitigation goal.

Achieving these objectives will require a dedicated, internationally-agreed process and an effective balance between country flexibility and international rules to assure consistency and transparency between crediting thresholds in different countries. The overall structure of the process could comprise three stages as follows:

i. Guidelines or rules could be developed under the UNFCCC to guide countries in submitting proposed crediting thresholds ; significant country flexibility could be permitted, provided there is a means for cross-checking the appropriateness of suggested crediting thresholds;

ii. Countries could submit proposed crediting thresholds for defined groups of emitters according to the guidelines;

iii. Proposed thresholds could be analysed or reviewed internationally by a team of experts prior to recognition under the UNFCCC process, potentially as part of ICA. This step would be the most politically sensitive.

One way to provide flexibility whilst retaining international structure would be to allow crediting thresholds to be set using either emissions projections or performance benchmarks, then cross-check them using the other method (if sufficient data is available). Although crediting thresholds are most likely to be established using performance benchmarks for broad groups of emitters, total emissions might also be used in some cases. Modelling of absolute emissions could be used as a means of comparing a proposed performance benchmark against alternative scenarios for factors such as rate of economic growth, changes in production, technology innovation and structural changes, as well as the impact of any proposed national mitigation goals. This could provide checks and balances to reinforce the credibility of proposed crediting thresholds.

4.1 Process and guidelines for countries submitting crediting thresholds

The first of the three broad process stages described above could comprise the following steps, with guidelines developed by UNFCCC for each stage. This example assumes that a performance benchmark is used to set the crediting threshold, with justification provided by cross-checking with emissions projections (the opposite could also be described):

- Define the boundary of the segments of the economy covered by the baseline. This first level of boundary setting could be based on internationally-recognised sectors, to help give clarity over broad coverage of the mechanism in different countries. The procedure could require justification of boundary choices, for example through reference to GHG Protocol sector definitions, common

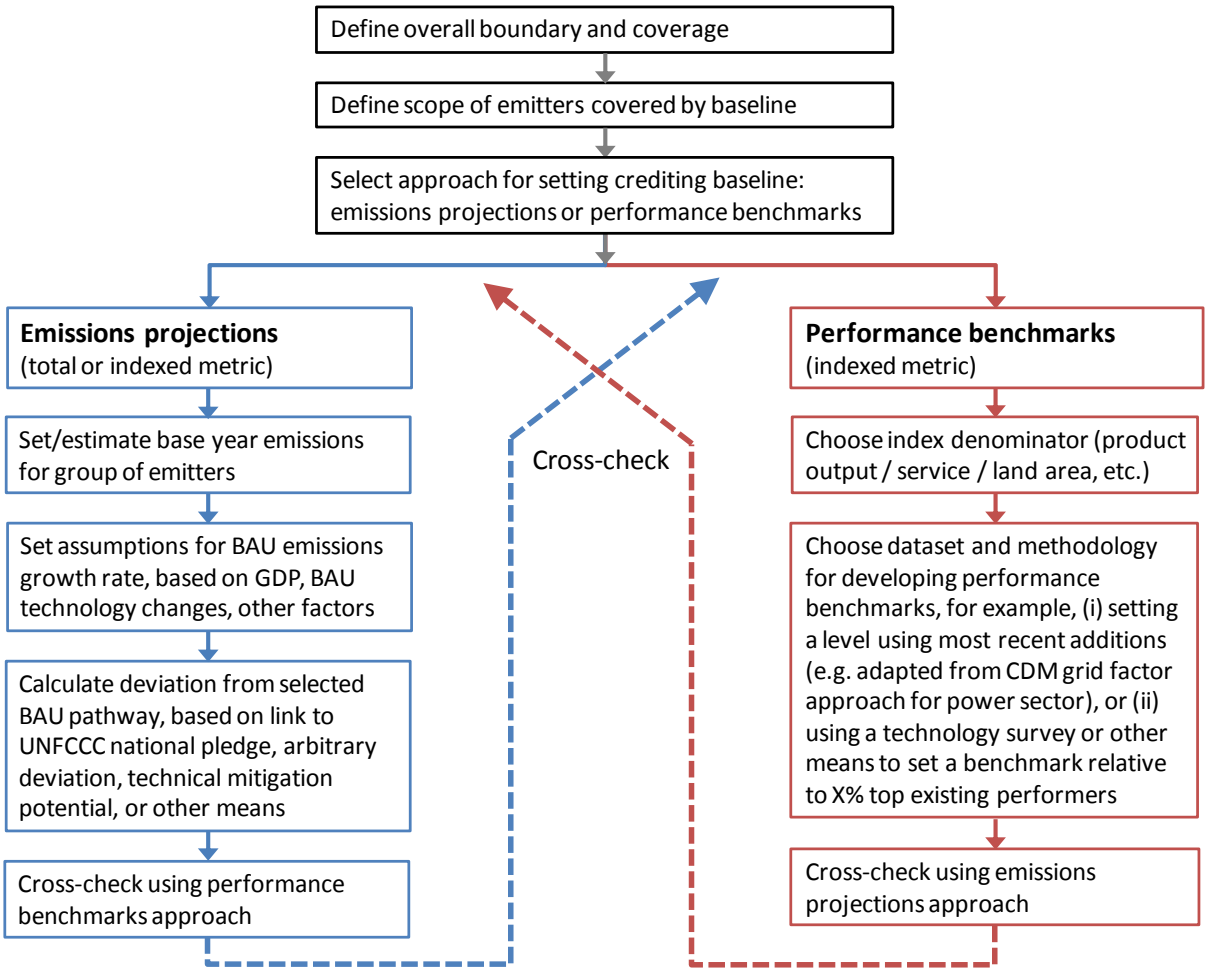
product definitions, or sectors already defined for application of standardised baselines under the CDM.

- Define the groups of emitters to be covered by crediting thresholds. This second level of boundary setting could involve increased flexibility for country- or sector-specific choices. These could be based on either a number of pre-defined options for scope, such as delineating new from existing plants or stratifying existing plants into separate groups by technology type, or could involve unique country-specific factors for delineating a certain group of emitters for inclusion under the crediting threshold.
- Choose the dataset and methodology for establishing performance benchmarks for groups of emitters. This could be the most complex and challenging of the steps to develop, because of the diversity of emitters and varying availability of data between different countries and segments of the economy. Countries could propose datasets based on a number of pre-described methodologies for establishing performance benchmarks using historical data, such as those described in Section 3, or they could develop a new approach if none are appropriate to the group of emitters and country in question.
- Decide how to treat relevant policy measures and other domestic and international factors affecting the expected development of emissions covered by the crediting threshold. This could include an explanation of why the impacts of currently planned or implemented domestic policy measures have been included or excluded from the crediting threshold. The analysis could also include an assessment of existing CDM projects operating in the relevant segments of the economy. Depending on the scope of emitters to be included, the presence of existing CDM projects is unlikely to have a large impact on the crediting threshold. However, it is still important that all existing projects are explicitly included in the crediting threshold. Once the threshold is established for inclusion in the new market mechanism, new CDM projects would not be permitted within the defined group of emitters.
- Choose a process for cross-checking the crediting threshold. This could involve country- and sector-specific modelling if available, or more generic modelling techniques if not.[18] This process could use the outputs from the modelling exercise to set national emissions baselines, such as the BAU scenarios against which UNFCCC mitigation goals are to be measured. The resulting crediting threshold could also be tested for coherence with any national mitigation goals.

The steps in this process can be represented in a simple flow chart (Figure 10), highlighting a potential cross-checking process of comparing calculated performance benchmarks against modelled emissions, and vice-versa. Comparing results between different approaches and against international performance benchmarks could help to avoid collusion or inflated baseline setting. If a calculated crediting threshold for a group of emitters in a particular country is less stringent than an international benchmark or a figure used in other countries, this would not necessarily mean that the calculated threshold is inappropriate. It could, however, provide input to any analysis or review of the overall assessment of appropriateness of the proposed threshold.

[18] For example, some countries might use a generic energy planning model such as the Long-range Energy Alternatives Planning system (LEAP) as an alternative to more detailed models such as MARKAL.

Figure 10: Flowchart for setting crediting thresholds



The CDM framework for Programme of Activity Design Documents (PoA-DDs) could be useful for designing the framework for such a process. PoA-DDs currently provide a structured template for participants to justify the programme based on country- and sector-specific factors. Such a system could be developed into a government-led proposal for a crediting threshold for a group of emitters in their country.

If a separate process or set of guidelines is subsequently developed under the UNFCCC for formal recognition of national baseline scenarios (e.g. national BAU projections), this could be integrated with guidelines for crediting thresholds. This would help to make the submissions of crediting thresholds less burdensome on potential host countries, because information for emissions projections could perhaps be derived from information included in the emissions modelling used to set national baselines.

4.2 Process for international analysis or review of crediting thresholds

A key question is what governance structure would be put in place to provide international recognition of crediting thresholds proposed for groups of emitters in different countries. Any recognition process would need to be closely linked to other operational aspects of the new market mechanism, particularly the MRV of emissions during the crediting period and subsequent award or issuance of credits.

Previous analysis has discussed different models for international approval of policy-based crediting, highlighting that a key issue is whether a final decision is taken by a nominated committee (similar to the CDM EB) or whether individual proposals are agreed by all Parties at COP or similar level (Bosi and Ellis, 2005). Crediting thresholds put forward under a process similar to that described above would comprise detailed country- and sector-specific information which might prove difficult to manage in a multilateral

negotiation setting. It may therefore be more practical for an expert committee or board to be set up to oversee the international recognition of crediting baselines. In some ways, the introduction of standardised baselines in the CDM means that the CDM EB is already starting to make similar decisions to those that would be undertaken by this new body.[19]

The complexity and political nature of decision making under the new market mechanism may make the task of an elected panel challenging, particularly the need to assess whether crediting thresholds express an appropriate level of mitigation ambition on behalf of the host country. Any such committee or board would require significant resources with expert knowledge of particular countries in order to make a balanced assessment of the appropriateness of any particular crediting threshold. An expert analysis or review process could be beneficial and could possibly be included as part of the ICA process.

Double counting of emissions reductions could occur if a project is both registered under the CDM and covered by the new market mechanism. One way to mitigate this risk would be that once a crediting threshold has been recognised for a particular group of emitters in a country, no further CDM projects would be eligible for that group in that country. This could be enforced through the existing UNFCCC CDM institutions, with a checking procedure introduced to ensure that any new CDM project does not fall under a group of emitters included under a crediting threshold in the new market mechanism.

[19] Under current guidelines, environmental integrity of standardised baselines is assured by the EB deciding on key threshold percentage figures for selecting the standardised baseline technology and the emissions factor for the standardised baselines.

5. Conclusions

The COP 17 outcome does not specify whether the new market mechanism under the UNFCCC will operate as a crediting mechanism or whether it will involve trading of emissions permits. Baselines are a crucial aspect of any emissions-based market mechanism and similar issues apply whether the baseline is used to set a cap for a trading system or to set a crediting threshold for a crediting mechanism. If the new market mechanism operates as a crediting mechanism, domestic trading systems could nevertheless be implemented in developing countries in parallel with the crediting mechanism; the crediting threshold could act as the ETS cap in this case.

The new mechanism will operate under the UNFCCC in parallel to the CDM, which will continue under the second commitment period of the KP (though market analysts predict weak global demand for GHG credits at least until 2020). The principles agreed at COP 16 in Cancun for the new mechanism include that it should "stimulat[e] mitigation across broad segments of the economy" and achieve a "net global decrease and/or avoidance" of global GHG emissions. One approach to achieve the latter would be to use ambitious crediting thresholds which include a level of domestic mitigation action in the baseline. In this way, only mitigation actions achieved in excess of domestic mitigation efforts (financed unilaterally or by other means) would be issued with credits that can be purchased by developed countries to assist in meeting their emissions targets.

Recent developments in international climate negotiations may shape the design of the new mechanism. For example, quantitative mitigation goals proposed by developing countries may need to be taken into account when setting the level of ambition of crediting thresholds. The mechanism will also operate in the context of developed country commitments for international climate finance to support mitigation in developing countries. The relationship between the new market mechanism and other sources of finance for mitigation actions needs further clarification.

Crediting mechanisms can employ two possible approaches for calculating the number of credits due: (i) the individual performance approach, and (ii) the group performance approach. If the new market mechanism takes a group performance approach, with credits only awarded if aggregate emissions are below the crediting threshold, this would be a key distinction from the CDM and other existing offset protocols. In a group performance mechanism, a crediting threshold would be applied to all participating emitters in the group rather than only "good" performers. A group performance approach will generally result in fewer credits being issued than an individual performance approach, all else being equal. Group performance approaches may therefore promote more environmentally ambitious outcomes for a given crediting threshold level, but at the expense of weakened or more indirect investment incentives for "good" performers.

If the individual performance approach is used, credits are generally distributed using the credits-to-emitters approach (i.e. credits are allocated directly to emitters who achieve emissions reductions, as in existing crediting mechanisms). If the group performance approach is used, credits could either be allocated using the credits-to-emitters approach or the credits-to-government approach (i.e. credits accrue to a government body). The CDM has increasingly encountered problems in assessing additionality of project activities in cases where incentives are provided for the same activities by domestic policy measures in developing countries. A credits-to-government mechanism could avoid this problem whilst providing an incentive for further development of domestic mitigation policies in developing countries. However, this type of mechanism would require strong regulatory capacity in the host country, high confidence in the effectiveness of domestic policies and would need a transparent process for setting of crediting thresholds to avoid strategic delay of policy deployment.

Initiatives to develop standardised emissions baselines in existing crediting mechanisms could offer useful practical insights for how crediting thresholds can be applied to broader groups of emitters rather than individual projects. Using the term "group" of emitters rather than "sector" could help to avoid

preconceptions over what is included in an economic sector and avoid overlooking circumstances specific to a particular group of emitters in a particular country. The definition of groups of emitters could occur in two stages. First, the overall coverage could be defined using internationally-agreed definitions of sectors (e.g. as defined in the GHG Protocol) or national definitions. Second, a detailed scope or boundary could be defined, based on a range of specific factors. These could include categorisation by product outputs, process inputs, vintage/age and technological/process differences.

All emissions baselines comprise a set of assumptions regarding factors affecting emissions development. Defining and applying such assumptions is never a purely objective process and all baseline-setting exercises therefore have a political as well as technical aspect. The implications of this are particularly important when considering how to incorporate ambition into a crediting threshold. The process of setting (and potentially also analysing or reviewing) crediting thresholds will have both technical and political factors, and will require a robust institutional structure including clarity on the roles of national and international institutions.

Although it is difficult to estimate the expected effects of a particular mitigation policy, the question of whether an ambitious crediting threshold should include expected effects of planned or implemented policies needs to be clarified. Experience of dealing with domestic policy measures in the CDM suggests that, given the increasingly intricate web of pre-existing, planned and sometimes overlapping policy measures in all countries, it may be preferential for clarity on whether and how particular policy measures are to be included in the threshold to be provided early on in the process. In some ways, the introduction of standardised baselines in CDM means that the CDM EB is already starting to make decisions along these lines, for example by setting percentage cut-off points.

One way to set ambitious crediting thresholds is through an emissions projection approach, based on modelling of emissions for a particular group of emitters. The level of ambition for a crediting threshold could be influenced by national mitigation goals that could be expressed as deviations from a BAU trajectory. However, there is considerable uncertainty associated with any emissions projection, due to the large number of variables involved. Further, some developing countries are explicit that use of market mechanisms, including the new market mechanism, should assist them to meet part of their mitigation goal. If these emissions reductions are also credited and sold as offsets to other countries this could raise accounting issues as well as affect the level of overall ambition of the mechanism. There is also currently no international guidance on how national and sectoral emissions projections should be constructed or what assumptions should be used. Therefore the relevance of national pledges to the ambition of crediting thresholds may need to be negotiated on a case-by-case basis, drawing on information supplied under the international emerging MRV processes under the UNFCCC.

Setting crediting thresholds using performance benchmarks based on GHG-related indices can allow for a clear threshold level to be set without needing to first specify a precise BAU scenario. The calculation of electricity grid emissions factors in the CDM provides relevant experience for setting ambitious performance benchmarks in the power sector. The calculation of a "combined margin" emissions factor aims to emulate a BAU scenario, though as with many baseline calculations the methodology relies on informed yet somewhat arbitrary assumptions including how to calculate a weighted average of "build margin" (BM) and "operating margin" (OM). The implication of such assumptions can be significant; for example, BM and OM can differ by a factor of five in some cases. Although the build margin, representing the most recent additions to the power grid, might be considered an ambitious threshold, recent analysis suggests this may not necessarily be the case since it does not sufficiently take into account autonomous improvement in emissions performance due to new technology implementation by electricity generators. An alternative approach is for new electricity generating plant to be assessed against a dynamic baseline continually updated with data from the most recent plant additions.

The level of ambition of a performance benchmark can be set as the performance already achieved by a percentage of good performers in the group. Performance benchmarks used in current market mechanisms range from the top 45% of performers (e.g. the proposed Cement Sustainability Initiative benchmark) to

the top 10% (e.g. the EU ETS product benchmarks) (see Table 2). The process that was used to develop the EU ETS product benchmarks could serve as a model to guide development of performance benchmarks in other countries, although the availability of data on emissions and the distribution of emissions performance amongst covered emitters may be limited in some countries. If limited data are available, performance benchmarks could be initially constructed using survey data from a selection of key emitters within the group or by setting the performance level at an agreed discount to that expected of the best commercially available technology nationally or internationally.

Key questions for the use of crediting thresholds are whether an approval process is needed at a national and/or international level, and how assurance of environmental integrity and what constitutes an appropriate level of ambition can be handled. A process for recognition of crediting thresholds put forward by individual countries under the UNFCCC could comprise three broad steps:

i. Guidelines or rules could be developed under the UNFCCC to guide countries in establishing crediting thresholds; significant country flexibility could be permitted, provided there is a means for cross-checking the appropriateness of suggested crediting thresholds;

ii. Countries could submit proposed crediting thresholds for defined groups of emitters according to the guidelines; and

iii. Proposed thresholds could be analysed or reviewed internationally, e.g. by a board or by teams of experts (potentially as part of the ICA process) prior to recognition under the UNFCCC. This step could be the most politically sensitive.

Possible guidelines could allow crediting thresholds to be set using either an emissions projections or a performance benchmark approach. The subsequent process for international recognition could require that, whichever approach is chosen, the other approach also be used as a means of cross-checking the level of ambition of the crediting threshold (if sufficient data is available). The guidelines could be designed to link directly to any future guidelines or process on the development of emissions baselines at the sector or national level, whether this would be a full process or guidance on the selection of assumptions for key drivers of emissions. Such a process could be kick-started by pilot schemes designed for particular sectors, with a guaranteed buyer for credits. This could be similar to the model used in the early days of the carbon market, for example by the World Bank's Prototype Carbon Fund.

This paper highlights the complex and subjective nature of building ambition into crediting thresholds. Further work could focus on categorising approaches for deriving assumptions for key emissions drivers, which could inform future guidance on developing crediting thresholds (as well as national emissions projections). In addition, further analysis could be useful on the general governance structure of the new mechanism, including the process for recognising or validating crediting thresholds.

Annex: Standardised approaches under VCS and CAR

Performance benchmarks are currently being explored under the VCS as part of its work on standardised approaches to baselines and additionality. The aim of this work is to simplify the validation and verification of VCS projects and reduce transaction costs while maintaining environmental integrity. Consultations on how to further incorporate standardised approaches into the VCS requirements were held in 2011 and the updated requirements were published in February 2012 (VCS, 2012b; 2012c). Proposals for new VCS methodologies employing performance benchmarks as additionality thresholds and/or crediting baselines are currently being developed. These standardised approaches could act as stepping stones towards broader, modular approaches for some sectors and regions.

The performance benchmarks used in VCS methodologies may be defined in terms of GHG emissions per unit output (e.g. per tonne of clinker for cement-related projects), per unit input (e.g. per tonne of fertiliser per hectare for agriculture projects) or a sequestration metric (e.g. carbon sequestered per cubic metre of timber). A proxy for one of the metrics listed above may also be used, provided it is strongly correlated to the metric concerned. The VCS standard recognises that multiple benchmarks or correction factors may be needed for heterogeneous segments of the economy. It allows emitters to be grouped in terms of location (e.g. on brownfield vs. greenfield sites), scale, vintage, raw material quality, climatic conditions or other circumstances.

Since the level of the performance benchmark will vary depending on the mitigation activity and region in question, the guidance provided by the VCS standard focuses on the process rather than the level of the benchmark itself. The guidance requires the entity proposing the methodology to:

- provide a description of the technologies currently available for reducing emissions in the segment of the economy concerned and the current distribution of performances;
- provide an evaluation of the potential consequences of setting the performance benchmark too high or too low;
- include provisions for stakeholder consultations when setting the level of the benchmark.

Performance benchmarks under the VCS are to be tightened annually. The change in the level of the benchmark is to take into account improvements over time, either using performance data collected for the previous year or a pre-determined improvement factor in cases where such data is unavailable. The level of the benchmark cannot get less stringent from one year to the next. The performance benchmark for each individual project is generally fixed for the length of its crediting period.

Standardised approaches to assessing additionality and setting crediting baselines are also being explored by the CAR, a US-based offsets programme that generates tradable credits called Climate Reserve Tonnes (CRTs, or "carrots"). The CAR notes that such approaches often require significant upfront research and analysis, can only be applied to a limited geographical area and are not appropriate for all project types (CAR, 2011a).

Some existing CAR methodologies already take a partly standardised approach whereby an equation for the crediting baseline is provided that includes a combination of standardised variables and site-specific activity data. In the Mexico Landfill Project Protocol, for example, standardised values are provided for the global warming potential of methane, the soil bacteria oxidation factor and the discount factor for regulatory requirements (CAR, 2011b).

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Glossary

AGF	UN Secretary General High-level Advisory Group on Finance
Annex I	Annex to the UNFCCC listing developed countries
AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
AWG-LCA	Ad Hoc Working Group on Long-term Cooperative Action under the UNFCCC
BAU	Business-As-Usual
BM	Build Margin
CAR	Climate Action Reserve
CCXG	OECD/IEA Climate Change Expert Group
CDM	Clean Development Mechanism
CER	Certified Emission Reduction from CDM (also lCER - long-term CER, tCER - temporary CER)
CBM	Coal Bed Methane
CM	Combined Margin
CMM	Coal Mine Methane
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
COP	Conference of the Parties to the UNFCCC
CRT	Climate Reserve Tonne
EB	Executive Board (of the CDM)
ERU	Emission Reduction Unit (from JI projects)
ETS	Emissions Trading System
EU ETS	European Union Emissions Trading System
EUA	EU Allowance Unit
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWC	Growth Without Constraints
ICA	International Consultations and Analysis
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
JI	Joint Implementation
KP	Kyoto Protocol
LTMS	Long Term Mitigation Scenarios
MP	Methodologies Panel (of the CDM)
MRV	Measurable, Reportable and Verifiable
OM	Operating Margin
PAT	Perform, Achieve and Trade (India)
PDE	Energy Development Plan (Brazil)
PoA	Programme of Activities (under the CDM)
PoA-DD	Programme of Activity Design Documents
RGGI	Regional Greenhouse Gas Initiative
UNFCCC	United Nations Framework Convention on Climate Change
VAM	Ventilation Air Methane
VCS	Verified Carbon Standard
VER	Verified Emissions Reduction

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