Study on the Integrity of the Clean Development Mechanism (CDM)

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The views expressed in this report represent the views of the authors and not necessarily those of the European Commission.

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1 Introduction

This is the final report for the Study on the Integrity of the Clean Development Mechanism (CDM) (hereafter, the 'Project') carried out under contract for the European Commission. The report is submitted by AEA, the project lead from a consortium also involving the Stockholm Environmental Institute (SEI), the Centre for European Policy Studies (CEPS) and CO2logic (hereafter, the Consortium).

The project provides a comprehensive appraisal of the strengths and shortcomings of the CDM and develops practical reform options covering measures that could be taken by (a) the UN within the CDM process (referred to within this report as supply side measures), (b) those that could be taken by the EU regarding the use of CDM credits within the EU ETS (referred to as demand) side as well as examining (c) the potential for alternative mechanisms. The work takes into account recent developments at the UN-level, the EU international position and EU domestic policy.

Under Task 1 of the project the consortium delivered 7 distinct briefing papers plus a synthesis paper analysing merits and shortcomings of the current CDM system and outlining major reform options and alternative mechanisms brought forward in the expert literature. One of the briefing papers assesses aspects relating to JI Track 1 projects to date to identify shortcomings and potential improvements for that mechanism.

Task 2 focussed on the assessment of these reform options and the development of recommendations for the Commission on:

a. How the EU could promote change through the UN FCCC process for standardised approaches (thus a focus on the supply side);
b. What the EU could do unilaterally (thus on demand side) to leverage change in the CDM, with a focus on the CDM hydro sector, and;
c. How sectoral crediting mechanisms could overcome some of the concerns with the CDM and what the EU could do to promote progress on this front.

Results and outputs of Task 1 and Task 2 are included in this report, with the briefing papers and results from the stakeholder consultations included in Annexes 1 and 2 respectively.

1.1 Context of the study

The Clean Development Mechanism is currently at a crossroads. As the main instrument for generating greenhouse gas offset credits under the Kyoto Protocol, the CDM was designed to meet two primary objectives: to help developing countries achieve sustainable development; and to help developed countries meet their Kyoto Protocol targets (see section 3.3). As the first commitment period of the Kyoto Protocol is set to expire at the end of 2012, there remains uncertainty about the future of the CDM. At the same time, the EU plans to allow continued, though restricted, use of CDM credits post-2012 within the EU ETS and the Effort Sharing Decision, and potentially other emissions trading systems may adopt a similar approach. Numerous stakeholders are calling for specific CDM reforms to increase the effectiveness of the mechanism in the future. Indeed, the Cancun Agreements specify general directions for improving the CDM under the Kyoto Protocol track.[1]

The Executive Board (EB) and the Meeting of the Parties to the Kyoto Protocol (CMP) have taken to heart many of the long-standing criticisms of the CDM and have undertaken recent initiatives to address many of the perceived shortcomings, and move towards specific reforms, as described in the synthesis of Task 1 (in Section 3 of this report) and the underlying briefing papers. For instance, the number and expertise UNFCCC Secretariat staff devoted to CDM have increased substantially. Also, following the directives in the Cancun Agreements, the EB and Secretariat have begun preparatory

[1] Decision -/CMP.6, http://unfccc.int/files/meetings/cop_16/conference_documents/application/pdf/20101204_cop16_cmp_guidance_cdm.pdf

work to develop standardised baselines, and are holding workshops[2] to examine alternative approaches to the assessment of additionality and how this is demonstrated, yet another of the vexing challenges to the integrity of the CDM.

At the same time, such improvements may not be sufficient to address the concerns identified to date. The Cancún Agreements also acknowledge the scientific understanding about the importance of limiting the global temperature rise to within two degree Celsius from pre-industrial levels. Taking into account the rapidly increasing pace and share of GHG emissions from emerging economies, as well as the continued and historically high emissions of developed countries, a post-2012 international agreement will need to ensure enhanced actions by all parties. Doing so may require more dramatic changes to the role and function of the CDM, as well as the development of new market and non-market mechanisms with greater capability of delivering emission reductions effectively and efficiently at the scale required. However, such changes may not come easily due to resistance from some developing countries, market actors and Annex 1 parties.

In early October of this year the EB announced that it is planning to undertake a wide-ranging review of the CDM, with a view to retooling it to become the key instrument for financing low-carbon development in developing countries after 2012. Martin Hession, chairman of the EB said in an interview with Carbon Finance “that the review, to be launched in Durban next month, would be comprehensive, with a programme of stakeholder dialogues”. The outcome is “expected to inform Board decisions and recommendations to Parties to the Kyoto Protocol in 2012”, the CDM Secretariat said[3].

The EU is in a unique position to influence the direction of the CDM and the development of alternative or complementary mechanisms. Since the EU buys the majority of CERs, EU policy positions can carry particular weight with CDM authorities and the CDM market. Like other parties to the UNFCCC, the EU can seek and support reforms via the UNFCCC process. Or the EU can also choose to take domestic actions, such as restricting the use of certain project types, as it has recently done in the case of CERs from industrial gas projects after 2012, and in the provisions within Article 11a of the revised EU ETS Directive to limit the use of CERs from projects registered post 2012 to those originating from least developed countries. By providing the EU with research on outstanding CDM issues, the present study can assist the EU in its further deliberations, negotiations and decisions.

1.2 Objectives of the study

This study is an important piece of work for the European Commission. The opportunity for reform of the CDM at the present time is significant, and there is great potential to address the concerns of stakeholders and ensure long term effectiveness of the mechanism.

The objectives of the project were to develop an in-depth understanding on the current CDM system (its merits and shortcomings) and options for reform as well as potential alternative mechanisms and their impact. The project aims to:

- Assess merits and shortcomings of the CDM as it currently stands;
- Inform action at UN (supply-side) and EU (demand-side) level to further improve governance, effectiveness, efficiency, regional distribution and contribution to sustainable development and technology transfer of the CDM, and drive a transition away from project-based crediting in advanced Developing Countries (DCs) towards sectoral mechanisms and global policies;
- Provide a practical focus on large hydro and energy intensive sector (e.g. steel, cement, and aluminium) projects, including the evidence base relating to alleged concerns about additionality, competitiveness and carbon leakage and options for applying use restrictions under Article 11.1(9) of the EU ETS directive, and;
- Provide a scoping study on JI track 1 projects, including a review of additionality issues.

[2] Scheduled for the June 2011.
[3] http://www.carbon-financeonline.com/index.cfm?section=lead&action=view&id=13977&linkref=cnews

1.3 Purpose of the final report

The purpose of this report is to:

- Present the overall methodology for this study including our approach to expert interviews (section 2);
- Present the results of Task 1, seven distinct briefing papers focusing on merits and key concerns with the current CDM system and discussing potential reform options to overcome these shortcomings, plus an initial scoping study on JI Track 1 projects (Section 3 and Annex1);
- Assess possible reform options for the current CDM system, including standardised approaches to additionality and baseline setting, demand side options with specific illustration of their use for the hydro sector and the introduction of sectoral crediting mechanisms; and provide suggestions to the European Commission on the next steps that it might take (Section 4).

This final report is the last of four formal deliverables due under this project, the others being:

- An inception report which was delivered on 31 January 2011;
- An interim report which was delivered on 6 June 2011;
- A draft final report which was delivered on 8 September 2011.

2 Summary of study approach and methodology

2.1 Overall approach

This study comprised the following major tasks:

Task 0 comprised the kick-off meeting and inception report to ensure complete understanding and agreement between the project team and the Commission on the scope and tasks for the project. The inception report included primary sources / references and identified major interview partners listed under Task 1.

Task 1 involved a literature review, research and targeted stakeholder interviews to establish and elaborate on the merits and shortcomings of the CDM and the reform options offered by the expert community. The analysis was presented in the form of briefing papers on each of the issues identified and a synthesis paper summarising key results. Templates / outlines for the briefing papers were agreed at the start of the project and a draft for each briefing paper was shared with the Commission for comments.

Task 2 assessed reform proposals identified in the literature focusing on standardised baseline approaches (supply side), demand side options with a focus on their potential application for the hydro sector and the introduction of sectoral crediting mechanisms. Based on this assessment the consortium developed suggestions for the European Commission on potential next steps for developing these reforms further.

Task 3 comprised the delivery of inception, interim and draft final/final report and the participation in meetings with the client.

2.2 Key arrangements for the implementation of key tasks

2.2.1 Task 1

Activities under Task 1 provided a thorough review of the current status of literature and expert views on the merits and shortcomings of the CDM and first insights into reform proposals to overcome the concerns. The main output from this task is a series of briefing papers. These are intended to provide a concise and objective evaluation of each of the key issues, and the potential options for reform. To ensure quality, and in recognition of the important nature of this project, the briefing papers have undergone internal peer-review.

The briefing papers developed under Task 1 cover the following topics, agreed with the Commission during the kick-off meeting. They are attached to this report as annex (see Annex 1). Leading and contributing consortium partners for each briefing paper are indicated in brackets:

1. Baseline setting and additionality testing (CO2logic)
2. CDM Governance (AEA)
3. Competitiveness distortion and carbon leakage (CEPS/SEI)
4. Technology transfer through the CDM (AEA)
5. Sustainable development and social equity (Co2logic)
6. Political lock-in (CO2logic, CEPS)
7. JI-Track 1 (CEPS)

A synthesis paper (SEI) was prepared to summarise key findings in a result oriented way.

The briefing papers are intended to inform future steps that could be undertaken by the EC to support action at the EU and UN levels (both CMP and CDM EB). They provide in-depth and detailed analysis on the issues listed above and include a high-level assessment of solutions suggested in the literature, both on the supply and the demand side.

The analytical approach and depth of research for each of the briefing papers outlined above varies: Given the limited time for delivering the briefing papers and the Commission's interest in competitiveness distortion and carbon leakage in selected energy intensive sectors we have conducted in-depth primary research and data analysis for this paper. This makes the paper qualitatively distinct from other papers which are primarily focusing on the review of existing literature and data.

2.2.2 Task 2

On request of the Consortium the Commission prioritised the following reform options as focus areas for Task 2 (in-depth assessment of reform options and recommendations):

Supply side reforms (SEI):

- Alternative ways to demonstrate and assess additionality and setting baselines, including the use of standardised baselines derived from sectoral benchmarks, penetration rates, positive/negative lists, etc.
- Use of discounts/multipliers/conservative crediting benchmarks

Demand/supply side reforms with a focus on the hydro-sector (AEA):

- Use of discounts and multipliers
- Positive / negative lists

New Mechanisms (CEPS):

- Sectoral crediting

The demand side section primarily focuses on hydro projects within the CDM and examines questions such as how different kinds of reforms can help to address the concerns expressed regarding large hydro projects. The focus on the hydro sector was to provide a reference example to illustrate how the reform options could be applied in practice. Whilst this leads to discussion and conclusions specific to the hydro sector the assessment of options has broader applicability.

Regarding sectoral crediting mechanisms, the focus is on how new approaches could address criticisms of the CDM in comparison to standardised baselines and other reform options for the CDM. Unlike demand and supply side options the assessment of sectoral mechanisms did not involve a wider consideration of strengths, weaknesses and key design elements, since the design options are many and varied.

To ensure a degree of comparability in the analysis, the various reform options were assessed against a set of criteria:

- Environmental effectiveness (scale of greenhouse gas reductions)
- Environmental integrity (net emissions benefit)
- Economic efficiency (cost effectiveness from an abatement cost perspective)
- Political (and market) feasibility (including simplicity)

Additional criteria were also considered and assessed where these were considered relevant:

- Market function and scale (scale of CERs, incentives for developers, market liquidity)
- Equity (including regional distribution)
- Simplicity

- Scalability (i.e. likelihood to advance international framework towards greater ambition and effectiveness over time)
- Technology transfer
- Transparency and predictability

Many of the proposed reforms are driven by a particular objective matching the above criteria (e.g. positive lists to improve regional distribution, or negative lists to improve environmental integrity).While evaluation against multiple criteria helps to avoid unintended consequences, each individual reform should not be expected to satisfy all criteria. Given the desk study nature of this analysis, and often limited empirical evidence, evaluation against criteria relied extensively on analyst judgment and stakeholder input.

The conclusions of Task 2 were mainly based on existing literature and the work undertaken by the Consortium under Task 1. They provide the EC with suggestions to further take forward discussions on the reform options. They are intended to indicate possible next steps for the EC rather than provide definitive findings whether or how any particular measure should be implemented. The focus was on those elements that have the most significant impact on the robust scalability of the CDM (i.e. systematic rather than institutional impacts).

2.3 Expert interviews

We took a coordinated approach in identifying, approaching, interviewing and recording experts and stakeholders:

- We have attempted to obtain a balanced view on contentious issues through the identification of experts from different organisations, levels, implementation stages and/or interest groups for these issues.
- We have coordinated our list of interviewees with all team members to insure that a single consortium member approached each contact to avoid duplication. The project manager has coordinated the information flow between partners (see interviewee list in Annex 2).
- Stakeholders were approached via email (and if necessary via phone) with the interview request, explaining the background of the study, listing key questions for the interview and attaching a support letter signed by the Commission.
- The majority of interviews were held via phone though an effort was made to meet experts in person whenever possible.
- Interviews lasted 1 hour maximum.
- If several experts were interviewed on a specific topic/concern we made sure that positions / answers were made comparable through a standardised set of questions.

The stakeholders we interviewed fell into the categories below:

- EC representative
- UN FCCC / EB representative
- DNA representative
- DOE representative
- CDM experts (independent)
- User of methodologies (e.g. compliance buyers, project developers, consultants)
- Wider interest groups (e.g. NGOs, trade associations, international organisations)

A final list of interviewees for task 1 and 2 is included in Annex 2 together with interview records for reference.

3 Outputs from Task 1: Merits and Shortcomings of the CDM

This section provides a synthesis of the briefing papers[4] developed under Task 1[5] around the broad theme of improving the integrity of the CDM. We have also provided the synthesis, together with the study context, as a standalone document in Annex1. In order that this section can provide a stand-alone synthesis of the main issues, we include again a brief introduction to the Task 1 briefing papers. These papers systematically review the main merits and shortcomings of the current CDM regime with respect to several specific issues, ranging from additionality to governance, and identify a series of options for addressing the identified shortcomings. AEA and partners drafted these papers for the European Commission as the first element of a three-part project to assist in its consideration how to engage on CDM issues going forward. This synthesis compiles and reviews the various options to address key CDM shortcomings identified in these Task 1 papers, and as such, sets the stage for the next part of this work (Task 2), which examined potential remedies in greater depth, including how alternative mechanisms such as sectoral crediting, could play an increasing role in global efforts to address climate change (Section 4).

3.1 Issues covered in the briefing papers

In 2010, the EC identified a series of issues that present specific concerns and opportunities for improvement in the CDM, as reflected in their call for proposals under this project. Through further consultation with EC staff, the team settled on six briefing paper topics related to the CDM with an additional paper providing a scoping analysis of JI Track 1 projects. Table 1 lists the 7 CDM-related topics and describes the key analysis questions that each paper addresses.

Table 1. Briefing paper topics and key analysis questions addressed

Paper topic	Key questions addressed
Baselines setting and additionality testing	Perhaps the most controversial element of the CDM, methods for additionality determination are viewed by various stakeholders as overly subjective, costly, unpredictable, unreliable, prone to gaming, counter-productive due to perverse incentives Baseline setting, which is closely related, has been subject to similar critiques. How well have additionality and baseline methods worked in practice, and if warranted, how can these criticisms be addressed through reform of the CDM or new mechanisms?
CDM Governance	A UN appointed Executive Board governs a multi-billion euro offset market, and EB decisions can have direct financial consequence in regions that EB members hail from. How well has the EB been able to govern this market and what steps can be taken to improve it?
Competitiveness distortion and carbon leakage	To what extent has the CDM provided incentives for industrial production to shift to developing countries (competitiveness concerns), and in so doing, has any such shift led to increasing global emissions (carbon leakage). In particular, is there any evidence of CDM-induced carbon leakage in the aluminium, cement, and steel sectors?
Technology transfer through the CDM	What are the current successes in and concerns about technology transfer (TT) through the CDM? What are the type and scale of technology transfer through the CDM to developing countries? What are the options for a reformed CDM and/or alternative mechanisms that could contribute to increased technology transfer?
Sustainable development through the CDM	To what extent has the CDM delivered on its objective to promote sustainable development in developing countries? What steps can be taken to advance this objective?
Political lock-in	This paper examines the resistance of various actors to far-reaching changes in the current CDM-dominated international carbon market, such as the potential transition to new mechanisms to support mitigation in developing countries. What are the factors that account for political lock-in? How can the incentives be changed, CDM reforms be structured, and new mechanisms designed to encourage developing country participation, and support from market actors?

[4] The briefing papers are included in Annex 1
[5] The scoping study on Track 1 JI is not covered here, since that study forms a standalone briefing paper and does not form part of the Task 2 work that follows this synthesis

To gain a deeper understanding of each of the questions noted in Table 1, the consortium reviewed current literature and consulted a wide range of prominent CDM stakeholders, including project developers, verifiers, researchers and officials. This process of review and consultation, including a feedback round for EU staff on the draft papers, led to the assessment of CDM merits, limitations, and reform options summarized in the following three sections.

Box 1. Definitions used for key concepts discussed in this paper and the briefing papers:

Additionality: The additionality requirement was introduced in the CDM to protect its environmental integrity. Additionality requires that "a valid offset project would not have happened anyway in the absence of the economic incentive created by the compliance obligation required by the cap-and-trade program". Tools and methodologies have been developed accordingly. These tools and methodologies have been improved under a "learning by doing" process since the beginnings of the CDM. However, important concerns remain, in particular in relation to the consistency of application and interpretation of those tools.

Technology Transfer: The IPCC defines Technology Transfer (TT) "as a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organisations (NGOs) and research/education institutions." However, neither IPCC nor UNFCCC explain clearly what might be an acceptable standard or type of low carbon technologies that are required to be transferred to the developing countries through the CDM for effective climate change mitigation. For the purpose of this study end-of-pipe TT is considered a less sustainable form of low carbon TT compared with measures that prevent the generation of GHG emissions in the first place, as explained within the TT briefing paper.[6]

Political Lock-in: Political lock-in is a term that refers to the disincentives for market participants, host countries, and other stakeholders have to transition from the current CDM system to more ambitious new market-based (or non-market) mechanisms. Political lock-in (i.e. a political dynamic which seeks a continuation of the current CDM-related system) exists in some developing countries, on the level of compliance buyers (i.e. Annex I Parties and capped installations) and project developers.

Scalability: Scalability is the ability of a mechanism to generate emissions reduction at a level that is sufficient to fundamentally change the energy mix of countries and contribute in significant ways to the financial flows needed to help developing countries mitigate emissions.[7]

Cost Effectiveness: Cost effectiveness means that the mechanism can achieve emissions reduction at a lower cost, or it can achieve scaled-up emissions reduction goal using the same resources (Green 2008).

Sustainable Development: The Marrakech Accords (UNFCCC, 2001) emphasise that it is the host country's prerogative to define whether a project contributes to sustainable development. In most countries this has meant that a governmental Designated National Authority (DNA) evaluates project documentation against a set of pre-defined criteria, which tend to encompass environmental, social and economic aspects of sustainability. Consequently, non-Annex I countries can define the sustainable development criteria for CDM projects in their country according to their own sovereign requirements.

3.2 Merits of the current CDM

In many respects, the CDM can be considered a resounding success. When the CDM was established under Article 12 of the Kyoto Protocol in 1997, it represented the first major crediting scheme for greenhouse gases the world had ever seen. In fact, until the advent of the CDM, experience with baseline-and-credit or "offset" systems had been largely in the areas of air pollutant control in North America and were very limited across most other environmental arenas. Nearly all

[6] Assumption developed through consultation with the EC staff: Thomas Bernheim, May 2011
[7] Definition developed through consultation with the EC Staff: Thomas Bernheim, May 2011

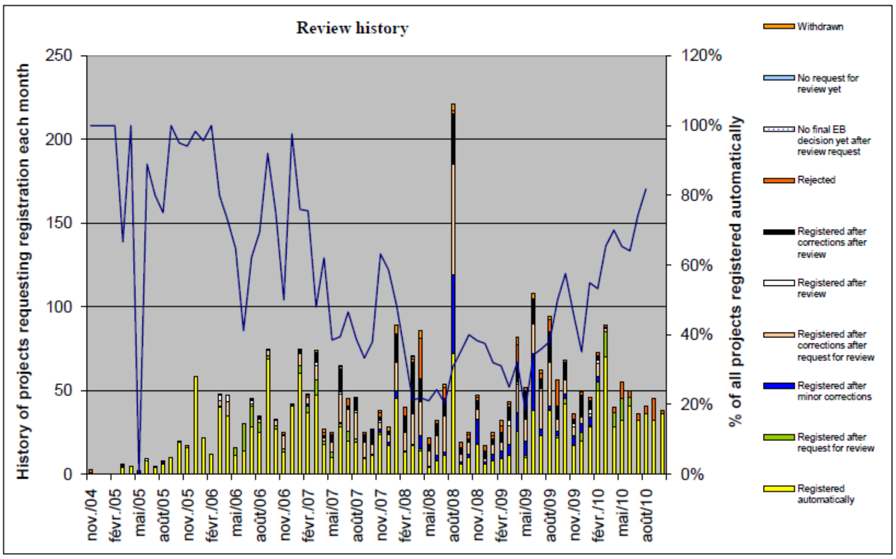
relevant learning had come from pilot projects through the UNFCCC Activities Implemented Jointly (AIJ) program. Until the CDM was introduced, the UN had never overseen the creation of a new commodity and management of a multi-billion dollar market. Yet, in the seven years since the registration of the first CDM project on 18 November 2004, the UN has registered over three thousand CDM projects, which are expected to yield nearly half a billion tCO2e in Certified Emission Reductions (CERs), representing considerable financial flows to developing countries (nearly 6 billion EUR from 2005-2009).[8] Roughly equivalent to 1% of global GHG emissions, this amount of CERs is greater than the annual emissions of large, individual EU countries such as Italy and France. In fact, the EU itself has been the major driver in the growth of the CDM market growth, accounting for almost 90% of CERs acquired to date (World Bank, 2010).

Stakeholders and observers have noted a number of benefits of the CDM, including:

- Positively influencing “the awareness and understanding about clean technologies, emission trading and future action for climate change both in the private and public sector” (Schneider, 2007);
- Helping to attract financing for clean energy development projects in developing countries;
- Enabling developing countries to gain first-hand experience and to enhance their local human capacity and institutions (e.g. DNAs) for managing and controlling GHG mitigation;
- Building significant carbon market infrastructure for project development, verifications, and finance services; and,
- Providing a unique laboratory in better understanding how to regulate and support carbon markets.

Illustrating the progress that can arise from a learning-by-doing process, albeit not as fast as many hoped, observers also pointed to recent improvements in CDM rules and procedures. For example, as shown in Figure 1, from 2007 to 2009, additionality requirements were strengthened resulting in a greater number of requests for reviews. Since then, there has been a reduction of the number of requests for review. Some view this outcome as a sign that additionality assessment is improving. (However, others might view this as more of a sign of the ability to adapt to changing EB requirements i.e. more wisely worded PDDs, rather than improvements in the quality of projects themselves.)

Figure 1. Evolution in the registration status of CDM projects



Source: UNEP Risø Centre (2011)

[8] UNFCCC, CDM Statistics, available on the Internet at < https://cdm.unfccc.int/Statistics/index.html> (last accessed on 6 May 2011); AGF, 2010, http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGF_reports/Work_Stream_8_%20Carbon%20markets.pdf

3.3 Limitations of the current CDM

Despite the apparent successes of the CDM, in general, stakeholders, literature, and the popular press tend more often to remark on the shortcomings, rather than the merits, of the instrument. To some extent, such critiques are to be expected given the unprecedented and learning-by-doing nature of the CDM. Yet, overall from sources the consortium has consulted, one gets the impression of a mechanism that has not delivered on its objectives as well as many had hoped. According to Article 12 of the Kyoto Protocol:

> “The purpose of the clean development mechanism shall be to assist Parties not included in Annex 1 in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex 1 in achieving compliance with their quantified emission limitation and reduction commitments under article 3”.

The key findings of the briefing papers with regard to the objectives of the CDM are summarised in the following table.

Table 2. Summary of the CDM limitations identified in the briefing papers

Topic	Key Findings
Baselines setting and additionality testing	As the most contested of the CDM issue, it comes as little surprise that numerous limitations have been identified. These include, among others: • Methods and guidance is often insufficient, or simply not followed, leading to subjectivity in interpretation and application (e.g. variations in baseline calculations using same methodology), and unpredictability; • Delays in the process and unpredictable outcomes of the review and registration process discourages investors; • Perceptions regarding the lack of transparency and inconsistency of EB decisions; • DOE verifications, particularly of additionality and baselines, are widely critiqued in terms of: inadequate rigour and transparency, conflicts of interest (due to direct selection and payment of DOEs by project participants), and lack of clear penalties for DOE misconduct; • The fundamental incentive for host countries and project participants to maximize the creation of CERs may bias toward less stringent baselines • Data requirements for baseline determination, as well as elements of the additionality tool (assessing common practice) can be costly or difficult to fulfil; • Difficulties in determining baselines for conditions of suppressed demand limit applicability, especially in LDCs • Unclear definition of several concepts (first-of-its kind, common practice, types of barrier.
Technology transfer through the CDM	The CDM has delivered only limited technology transfer benefits, concentrated within some countries and sectors. The CDM is failing to induce low carbon technology transfer to many CDM countries, such as, in Africa, and in many of the important sectors such as transport, thus missing out on large opportunities for emissions reduction. While contributing to some project level technology transfer, through aiming for cheap end-of-pipe[9] technologies, the CDM plays a very passive role in influencing overall policy changes to support transformation of energy systems in developing countries.
Sustainable development through the CDM	The inability of the CDM to effectively deliver on its sustainable development (SD) objective derives from: • Unclear definition of SD, non-ambitious criteria and poor criteria application; • Contradictions between claims and expectations (in the PDD) and actual conditions and future outcomes (as projects are implemented) • Absence of monitoring of sustainability criteria over the life of the project; • Insufficient stakeholder consultation; • Low potential for CERs in high sustainable development project types given the current mix of approved methodologies as well as low BAU emissions in less developed communities; • The lack of financial incentives for pursuing SD benefits.
Competitiveness distortion and carbon leakage	There is little evidence of significant cost or profit advantages or carbon leakage due to the CDM projects in steel, cement, and aluminium sectors. It finds limited financial incentive for increased production, as the CDM projects typical provide only small improvements in carbon intensity. Among these sectors, risk of carbon leakage may be greatest within/among non-Annex 1 countries for blended cement projects, an issue best, and perhaps already adequately, addressed through the CDM methodologies themselves.
Scalability and cost effectiveness of CDM projects	This paper reviews the growth of projects under the CDM and finds that despite recent reforms of the CDM by the CDM Executive Board (EB), the current CDM does not have the institutional capacity to significantly transform the energy systems of developing countries and generate sufficient financial flows for scaled up emissions reduction. From cost effectiveness perspective, while, the CDM has reduced the cost of compliance for Annex-1 countries the GHG reductions could have been achieved at a lower cost if “own-actions” were taken by developed and developing countries.

[9]The end-of-pipe technologies remove already formed contaminants from a stream of air, water, waste, product or similar and are normally implemented as a last stage of a process before the stream is disposed of or delivered. The end-of-pipe technologies do not prevent production of GHG emissions and are considered in this study as technologies with lower impact on emissions reduction. It is considered here as unsustainable technology for emissions reduction. The assumption has been developed in consultation with the EC expert Thomas Bernheim.

Topic	Key Findings
CDM Governance	Stakeholders are concerned about a perceived lack of transparent and consistent decisions, ineffective communications, EB conflicts of interest, and other issues; however, such concerns are not always backed by robust evidence. These concerns include : • Inefficiency in the EB decision making regarding project registration and the issuing of certified emissions reductions (CERs); • Lack of transparency and consistency in the EB and the DNA decision making; • Inadequate due process, including lack of appeal procedures for stakeholders and project participant; • Lack of standards for materiality; • Unsatisfactory performance of DOEs in their role as validators and verifiers; • Failure to control the negative impacts of some CDM projects on human rights and other harmful issues.
Political lock-in	Three main factors may drive resistance to change among some developing countries, Annex I Parties and capped installations (compliance buyers) and project developers: • the current generous approach to baseline setting; • the scale of economic rents; • the concentration of technical and institutional capacity within existing mechanisms.

As the paper on **sustainable development** makes clear, the CDM has generally failed to deliver on the very first objective, of ensuring and promoting sustainable development and social equity, for reasons noted in Table 2. Analysis of six large hydro and energy-intensive projects showed little contribution to sustainable development, echoing findings of the literature at large. Some project types, large hydro in particular, could in fact lead to negative outcomes; the current EU requirement to abide by the guidelines established by the World Commission on Dams, a measure designed to avoid such outcomes, is only voluntary. Nonetheless, by pointing to project types with positive contributions to sustainable development, the paper suggests the CDM retains the potential to deliver more strongly on one of its key objectives.

Achieving the overall climate objective ostensibly requires that each CER represents a real ton of emission reductions, since the CDM is an offset mechanism that allows corresponding emissions in developed countries. This net neutrality is only maintained if CER projects are demonstrably additional. The ability to deliver such a result depends heavily on having a reasonably effective way to achieve additionality on an aggregate basis, and to set a baseline such that the number of credits issued does not, in total, exceed actual reductions. However, given the counterfactual nature of offsets, it is exceedingly difficult to implement an accurate method for **additionality and baseline determination**. The methods for additionality determination and baseline setting are inherently policy and political choices. As summarized in Table 2, our briefing assessment finds that tools for additionality assessment and associated guidance are ambiguous, lack objective and transparent criteria, involve unclear definition of several concepts (e.g., “first-of-its kind” and “common practice”), and, even where clear, are often simply not followed. This situation leads to subjectivity in interpretation and application, and unpredictability in whether projects might be reviewed and rejected on the grounds of non-additionality. Furthermore, our assessment finds that CDM baseline methodologies, though fundamentally hypothetical, even where sound and balanced, are often subject to poor implementation. Many of these challenges reflect the fundamental difficulty of applying what can be considered an intention-based approach to additionality, which is reflected in the issues encountered with the additionality tool as described in Box 2.

Box 2. Issues with the current additionality tool

To better appreciate concerns with the CDM approach to additionality assessment it is important to note how they relate to the specific steps involved in applying the common additionality tool that applied to most project types. Under this tool, project proponent can choose between two basic methods: investment analysis or barrier analysis. If a project is deemed additional based on one or both of these methods, proponents still need to ensure that a project is not otherwise common practice.

Barrier analysis: Using barrier analysis, a proponent must show that their project faces realistic and credible barriers, how the project eliminates these barriers, and that there is at least one alternative scenario that does not face such barriers. However, analysis of sample of CDM projects showed that "43% … [did] not provide or mention evidence for the existence of the key barriers", even though it is a compulsory requirement in the procedures for the CDM (Schneider, 2007). The same study found that "71% of the small-scale projects and 39% of the large-scale projects that use the barrier analysis [did] not provide any explanation of how the CDM help[ed] to overcome or alleviate the identified barriers."

Investment analysis: Investment analysis involves demonstrating that a given project is not the most financially or economically attractive investment option through the application of a financial analysis tools (e.g. NPV, IRR, unit cost of service analysis). However, the guidance provided by the UNFCCC can be relatively ambiguous, or where clear, is often not respected. As a result, chosen parameters are often biased. The discount rate used in NPV analysis "is often chosen in an arbitrary fashion" (Michaelowa, 2007). Moreover, 29% of the 93 PDDs analysed in one study from registered projects do not provide enough information to make the calculation of the project performance reproducible and only 10% of them only include the result of the calculation without any details (Schneider, 2007).

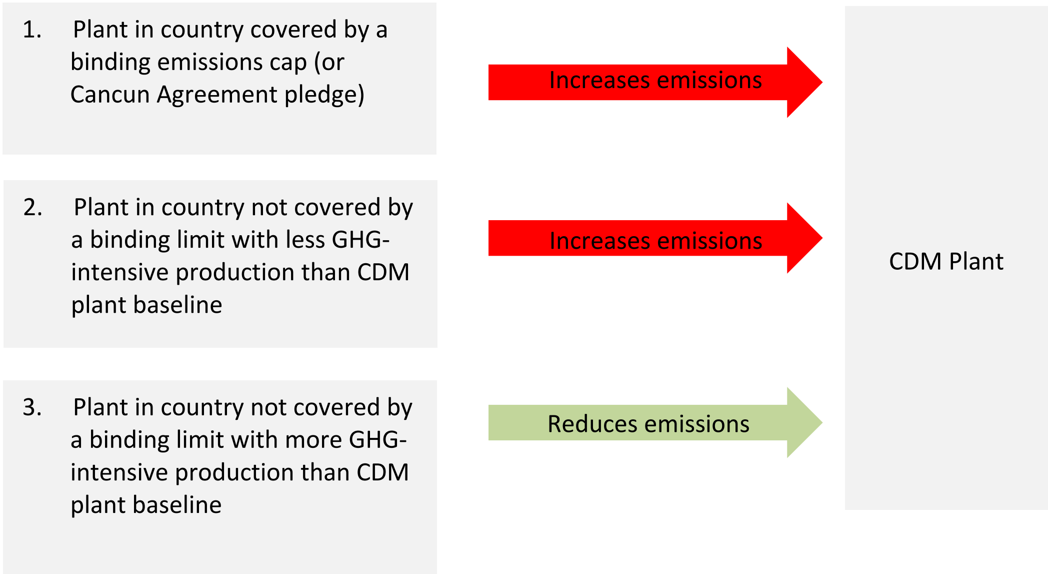
Common practice analysis. The common practice analysis is an analysis of the extent to which the proposed project type has already diffused in the relevant sector and region. Project developers face difficulties because they have no information about other activities in a given area (Hession, 2011). Guidance is often insufficient, and there is no common threshold technology definition or geographical area to define when a project activity should be considered as common practice.

The risk of **emissions leakage and competitiveness concerns** varies significantly among sectors and products, as a function of emissions intensity, the relative impact of carbon prices on production cost, the extent of international trade, and costs of international transport. Several studies have examined the extent of potential production shifts as the result of increased production costs imposed by the EU ETS and other forms of carbon regulation. However, so far, few studies have looked at how the incentives provided by existing emission reduction crediting programs such as the CDM, or prospective ones such as sectoral crediting, *might* alter relative production costs across regions, and thus lead to competitiveness concerns, related but distinct from those raised by the ETS.

The briefing paper examines possible pathways for GHG emissions leakage induced by the CDM in emissions-intensive industrial sectors, specifically iron and steel, aluminium, and cement. The CDM could lead to shifting of production activity if increased profits from CDM projects (where CDM revenues exceed the cost of the project) lead to increased production at CDM plants at the expense of production in non-CDM plants, as shown in Figure 2.

Figure 2. Effect on Global Emissions of a Shift in Production from non-CDM to CDM Plants

Two pathways of leakage exist: shift in production from a country with a binding emissions limit, such as Europe (pathway 1) or from a facility in a country without a binding limit that has less-GHG intensive production than the baseline emissions intensity of the "receiving" CDM plant (pathway 2).



The analysis conducted by the project team finds little evidence to suggest that the CDM has provided sufficient profit or production cost advantages to result in significant shifts in global aluminium, cement, or steel production, or any consequent leakage of emissions. This stands in contrast to findings in the case of CDM projects at adipic acid plants. In the case of adipic acid, CDM project activities reduce the emissions intensity of adipic acid production by 99% (rather reductions on the order of up to 20% in the case of aluminium, cement, and steel production.). While the CER revenue is on similar scale as production cost in the case of adipic acid, it is not in the case of energy-intensive production. Furthermore, it is not clear that CDM provides significant added *profits* to a shift in production away from countries with binding absolute emissions caps; this is the case for adipic acid, but is less clear in the case of aluminium, cement, and steel CDM projects.

Furthermore, literature review and interviews did not reveal any indication that emissions leakage is a risk in these sectors. However, little work has been done along these lines (for CDM projects). Concerns have been raised that crediting projects for increasing the use of clinker substitutes might lead to the reduced production of low-carbon cement elsewhere in a given country/region.[10] While not a global competitiveness issue per se, this situation suggests there may be some incidence of actual or potential future leakage among the sectors considered.

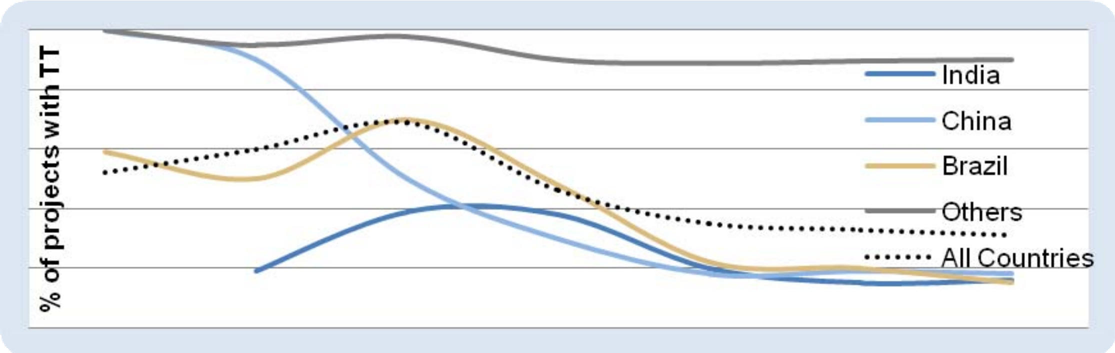
At the same time, the CDM or other offset mechanisms could – in theory – address competitiveness concerns by reducing the EUA price and therefore compliance costs. A number of ex-ante studies have identified that potential. To date, this question remains largely theoretical as EUAs prices are expected to remain low with the EU facing the 'challenge' of providing an 'adequate' carbon price that gives incentives to move to low-carbon technologies.

The briefing paper on **technology transfer** notes that the rate of transferring low carbon technologies (at least in terms of claims found in project documents) to the three major CDM host countries (India, China and Brazil) through the CDM has fallen over time, as illustrated in Figure 3. Moreover, the CDM supply side is characterised by large scale projects demonstrating greater concentration of technology

[10] This might be more of an issue with a new proposed standardized methodology for the cement sector (NM302) as proposed by the Cement Sustainability Institute.

transfer. However, these large scale projects (e.g. the Industrial Gas projects) show transfer of end-of-pipe technologies rather than import of advanced low carbon technologies to prevent production of GHGs. Also, bilateral/multilateral CDM projects have greater propensity for attracting technology transfer, but these projects are lower in number. 82% of the CDM pipeline projects are unilateral in nature. Unilateral projects (e.g. Cement projects in India) are less likely to involve sustainable forms of low carbon technology transfer. There are other high emissions sectors such as the transport sector which is bypassed by the CDM due to complex additionality and monitoring requirements. The power generation sector too have been to some extent bypassed by advanced low carbon technology transfer, because it has been locked into fossil fuel based infrastructure and subsidies in developing countries. Thus, the CDM, while contributing to sustainable technology transfer through some types of projects has been incapable of encouraging overall policy changes to support the transformation of energy systems in developing countries.

Figure 3. Trends in technology transfer by number of CDM projects (2004-2010)



Source: UNFCCC (2010)

While the other briefing papers touch on the limitations of CDM and offer potential remedies to explore, the paper on **political lock-in** delves into some fundamental reasons that explain why changes to CDM may be difficult to achieve. Political lock-in connotes the complex dynamic among actors heavily invested in the current CDM system, which, taken together, can create resistance to many potential changes within the CDM, and resistance to shifting to alternative mitigation crediting and finance mechanisms. At the same time that the CDM has enhanced participation of developing countries in the carbon market, and created valuable human capacity and resource in identifying and pursuing mitigation options, this inertia has the potential to undermine efforts to scale up global emission reductions.

3.4 Potential CDM reforms and new mechanisms

As the prior sections suggest, the list of CDM shortcomings is a long one. As we discuss in the following section, so too is the list of potential remedies to these concerns. We begin by discussing reforms to the CDM in its current form, as identified in the individual briefing papers. Since many of the same reform ideas are common across individual issues and briefing papers -- standardised baselines are noted as potential remedy for nearly every issue from sustainable development to technology transfer – we compile them into the summary illustrated in Table 3.[11] Since there is significant overlap among the reforms and mechanisms identified in the topic papers, we structure this review in terms of groups of reform options to explore. We then consider alternative or complementary mechanisms that might be needed to bring about cost-effective emission reductions and transformation of energy systems in developing countries at scale, while addressing some or all of the concerns that have plagued CDM (additionality, baselines, sustainability, technology transfer, and possibly, competitiveness).

[11] Note that this summary focussed on higher level reforms, and those mentioned in more than one briefing paper. This table should not be viewed as a substitute for the discussion of reforms found in each briefing paper.

3.4.1 CDM reforms

Few, if any, of the suggested remedies discussed here are new. Across the past decade, as shortcomings of the CDM have become clear, parties, stakeholders, and observers have put forward many reform concepts, as well as proposals for entirely new mechanisms. Some of these concepts, like more standardised baselines and additionality tests, have been discussed since the origin of the CDM. Standardised approaches, for example, have been pioneered in other GHG offset programs, and are now the focus of several UNFCCC and donor-funded initiatives.

Such approaches could be “evolutionary”, instilling confidence and increasing activity in the CDM by improving efficiencies, reducing transaction costs, and avoiding actual or perceived errors. For example, standardised approaches like replacing monitoring requirements with default values or streamlined additionality tests (e.g. performance standards) in sectors where non-additionality is less of a concern (e.g. manure management systems) would be of an evolutionary nature. Like procedures to improve governance (appeals processes or DOE selection), such reforms would not fundamentally change the nature of the CDM. Most of the reforms identified in the briefing papers, as summarized in Table 3, fall into the category of evolutionary changes.

In contrast, some reforms could be of a more “revolutionary” nature. The implementation of highly standardised baselines and additionality tests that target sectors such as steel or cement or project types such as, rural electrification or charcoal production, which have vast CER potential largely untapped by the CDM to date, could radically change the role of CDM with respect to technology, sustainable development, and other outcomes. Other reforms noted in Table 3 could also fall into the more revolutionary category, such as negative and positive lists or opening up eligibility to nuclear energy, carbon capture and storage, or reduced deforestation activities (more likely to occur through other mechanisms). However, whether revolutionary outcomes might unfold is exceedingly difficult to predict. In that regard, it is worth recalling that few observers predicted the dominance of industrial gas projects in the first decade of the CDM.

Table 3. Review of potential CDM reforms, issues addressed, and current status (not comprehensive)[12]

Potential Reforms	Issue	Status/Comments
Supply-side reforms (can be implemented by CDM authorities)		
Standardised baselines (intensity benchmarks, default or deemed values instead of measurements, and other performance and practice standards)	Nearly all	Called for in Cancun Agreements; EB/Secretariat and donor-funded work underway; some methods already relatively standardised. Can target underrepresented or LDC-specific project types for SD and TT. Conservative baselines may deliver net environmental benefit.
Standardised additionality tests (e.g. thresholds based on penetration rates, emission rates, tech or practice standards)	Additionality Scale	Used extensively in US-based offset programs; Easier to apply for less controversial categories. Could be merely evolutionary (to reduce transaction costs) or revolutionary (see text).
EB to select (and compensate) DOEs	Governance Additionality and Baselines	Seeks to address perceived conflicts of interest. Similar ideas emerged from accounting scandals of early 2000s.
Materiality[13] guidance for DOE verifications (enhance efficiency, consistency and predictability)	Governance Additionality and Baselines	Validation and Verification Manual has been an important milestone, along with improved standards for accreditation of DOEs.
Tailor methodology to project size and type	Additionality and Baselines	For example, mandatory investment analysis for large projects; greater standardisation for LDC-oriented and small projects
Clearer guidance materials and tools	Additionality and Baselines	Improvement in recent years with added Secretariat capabilities.
Expand eligibility (REDD+, CCS, nuclear)	Scale	REDD+ unlikely to be addressed via the CDM. CCS inclusion has been on SBSTA agenda for years.
Appeals procedure for EB decisions	Governance	Could be for project participants (to contest rejections) or observers (to contest registration or issuance)
Clearer guidance on role of ODA, other climate finance in determining additionality	Additionality and Baselines	Commonly referred to as "stacking", attribution of credit among multiple incentives is a thorny analytical as well as political issue.
Enhance communication and participation to enhance confidence and trust	Governance	Could include opening of closed sessions to observers or direct communication between the EB and project participants in relation to individual projects.
Increase Secretariat capacity (to address backlogs, peaks in registration and issuance case work)	Governance	Secretariat resources have been increasing over past decade, but may still be lacking.
Full-time, professionalized EB	Scale Governance	Relieving regulatory body of competing official government duties, and selection based on technical competencies could enhance efficiency and reduce perception of conflicts.
Reforms that can be implemented on either (or both) supply-side or demand-side (EU or Member States)		
Discounts and/or multipliers to decrease or increase rate at which CERs issued or used for compliance	Additionality TT SD	Can account for over-crediting or can lead to net emission reductions; can use to favour specific project attributes (TT/SD); substitute for additionality.
Positive/Negative Lists (including practice standards, use restrictions) Deeming a project type automatically additional or non-additional	Additionality Scale TT SD	The EU's various use restrictions are a form of "negative list". May be difficult to agree on (at least on supply/UN side) due to pressure from various parties; may need to consider local circumstances; harder to apply where additionality unclear.

[12] Other ideas not included here but noted in the briefing papers include, for example: common interpretation of sustainaible development, greater reliance on programs of activities, and further clarification in the application of the additionality tool.

[13] The proposed CDM draft standard on Materiality adopts the International Accounting Standards Board (IASB) definition: "information is material if its omission or misstatement could influence the economic decisions of users taken on the basis of the financial statements. Materiality depends on the size of the item or error judged in the particular circumstances of its omission or misstatement. Thus, materiality provides a threshold or cut-off point rather than being a primary qualitative characteristic which information must have if it is to be useful.

Potential Reforms	Issue	Status/Comments
Harmonization of CDM baselines and ETS allocation benchmarks (or regulatory standards)	Competitiveness/ leakage	Requires coordinated implementation on both supply and demand sides.

CDM reforms can be implemented either by the governing body and issuer of CERs (the COP/MOP, Executive Board, and UNFCCC Secretariat) or by the users of CERs (such as the European Commission or individual EU Member States). These classes of reforms can be referred to as supply-side and demand-side reforms, respectively. Not surprisingly, Table 3 shows that most reform concepts lie on the supply-side, where decisions are made on issues from project eligibility to baseline methodologies and governance rules and procedures. Indeed, many of the proposed reforms are of a more procedural, "evolutionary", nature, from clearer guidance for DOEs and project developers to more open governance bodies (EB) and resolution processes (appeals). As noted above, the more "revolutionary" changes could emerge from standardisation of methodologies, depending on the nature and extent of such efforts.

The other set of more "revolutionary" reforms are those that can be implemented either on the supply-side or demand-side. With a variety of intended purposes, from promoting sustainable development or technology transfer to accounting for non-additionality, discounts or multipliers can be applied on the number of CERs that can be issued or used for compliance (as compared with the ERs calculated by a given methodology). While debated for many years, such an approach is hard to get "right" (e.g. level of discount), and no entity that we are aware of has yet elected to use it. In contrast, positive and negative lists, which involve deeming a given project type automatically additional or ineligible, have been used to a limited, but powerful, extent. For example, the EU's CER use restriction on afforestation and reforestation credits, a form of "negative list", has contributed to the near absence of such credits on the market. Like discounts and multipliers, positive and negative lists are clear and simple tools, and because of their stark impacts, can be challenging to agree upon. Importantly, demand side restrictions would be applied at EU level whereas supply side restrictions would pose the challenge of requiring a broader consensus.

In fact, many of the proposed reforms, while addressing many of the briefing paper issues, involve concerns of their own. As the pros, cons and implementation challenges of many of these reform options are quite complex, and have been treated in depth in the literature, they are examined closely as a key element of Task 2 of this project. For example, multipliers, discounts, and negative lists implemented on the demand-side can risk market fragmentation, with negative impacts on efficiency of emissions trading systems. Standardised baselines, to the extent they achieve intended results of increasing CDM investment and project flow, can also be a double-edged sword. Through establishing the data collection and analysis involved in coming up with baseline values, they can ease the transition from the CDM to a sectoral or other mechanisms with broader coverage, and the "do-something" baselines and own mitigation contributions from developing countries that may come with them. At the same time, standardised baselines (and several of the other proposed reforms here) could increase engagement in, and attractiveness of the CDM, potentially creating even greater "lock-in" and resistance to transition to new mechanisms. This conundrum suggests that reform efforts should be undertaken carefully, with a keen eye to long-term consequences.

3.4.2 New mechanisms

New market and non-market mechanisms offer the potential to greatly increase the scale of emission reductions in developing countries, providing significant new carbon finance, particularly in sectors that have yet to be affected significantly by the CDM. They also have the promise to address the perverse incentives in the CDM that might inhibit domestic action via policies and measures in developing countries, despite CDM procedures to avoid this outcome (the E+/E- rules for baseline setting). In fact, they could directly support policies and measures, which is otherwise difficult to accomplish via the CDM.

The new market mechanisms most often discussed are sectoral crediting and, to a lesser extent, sectoral trading, the mechanics of which are described in Box 3 below. In addition, several parties and observers have suggested the concept of providing credit for Nationally Appropriate Mitigation

Actions (NAMAs), such as specific policies (e.g. energy efficiency standards), investments, or the implementation of new domestic emission trading systems in developing countries.

Table 4. How new market mechanisms might address issues discussed in the briefing papers

<table>
<tr><th>Mechanism</th><th>Additionality & Baselines</th><th>Tech Transfer</th><th>SD</th><th>Comp & Leakage</th><th>Governance</th><th>Scale</th><th>Cost-Effectiveness</th></tr>
<tr><td>Sectoral Crediting Mechanisms (SCM)</td><td rowspan="2">Replaces subjectivity & uncertainty of project-specific determination; with challenge of where to set the sectoral baseline</td><td rowspan="2">A technology-based mechanism with a focus on technology needs of developing countries might achieve greater results than a pure SCM</td><td rowspan="2">Less likely to be a dual objective, as in CDM</td><td>Could increase leakage risk in certain sectors leads to strong price signal</td><td rowspan="2">May require a new governance model</td><td rowspan="2">Potential for high abatement and own action (with “do something” baselines) is key selling point</td><td rowspan="2">Depends on extent of own action commitment, and how baseline is set. In theory, should lower transaction costs relative to CDM.</td></tr>
<tr><td>Sectoral Trading</td><td>Depends on allowance allocation approach</td></tr>
<tr><td>NAMA finance</td><td colspan="7">Opens up new possibilities, especially with capability to directly support policies and measures in the host country, but little discussions to date about how NAMA crediting might work.</td></tr>
</table>

While these mechanisms show promise in addressing many of the CDM issues as noted in Table 4, there are many unknowns regarding how these mechanisms might be designed and implemented. At present, unlike the case with CDM at its launch, there are no pilot programs akin to AIJ from which direct lessons can be drawn (though efforts underway such as the Partnership for Market Readiness and domestic market based policies such as India’s Perform-Achieve-Trade mechanism could provide such learning in the years to come). Among the key challenges for sectoral mechanisms, and likely NAMA crediting as well, are how to engage the private sector given the role of host country governments as recipients and intermediaries for offset credits generated. There are barriers in terms of technical capacity to implement new mechanisms in developing countries, governance and regulatory bodies to oversee them at an international level, and in many cases, the data needed to establish sectoral or NAMA baselines and monitoring, report, and verify (MRV) progress. Finally, one of the major challenges will be to overcome political resistance, as sectoral mechanisms are often viewed by developing countries as a slippery slope or back door to binding emissions commitments.

Further information on how sectoral crediting might work and the reform issues involved can be found in section 4.4.

4 Outputs from Task 2: Options for reform

4.1 Review of reform options identified in Task 1 and approach to Task 2

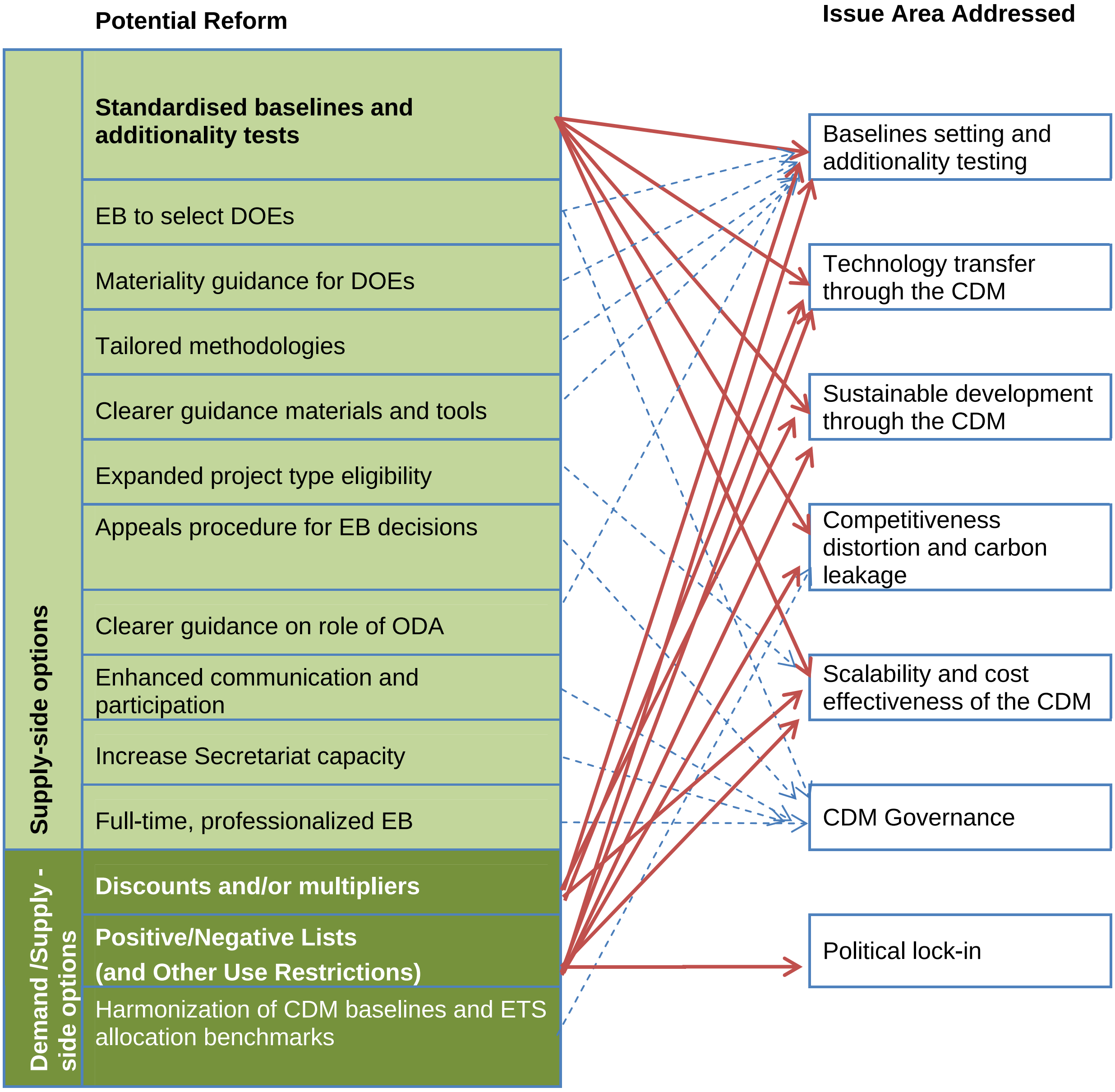
Task 1 work identified and analysed a series of key merits and shortcomings of the current CDM system, and identified a range of reform options that could potentially address these shortcomings. Figure 4 below maps these reform options to the key areas of concern that they could address. As the figure illustrates, the following three general reform options have the potential to address multiple concerns:

- Standardised baselines and additionality tests
- Discounts and/or multipliers
- Positive/Negative Lists (and other use restrictions)

Together, these three approaches could help to reduce concerns about subjectivity and systematic errors in baseline and additionality determination, spur greater technology transfer and sustainable development benefits, scale up investment in low-carbon technologies, and improve the cost-effectiveness of the mechanism as a whole. As a result of their broad scope and potential impact, and many outstanding questions related to their implications, these three reform options are the focus of Task 2.

Reform options do not stop there however. The EU is currently considering new mechanisms that can address the identified shortcomings of the reformed CDM and /or scale up emissions reductions, enhance technology transfer, improve economic efficiency and environmental integrity while at the same time overcoming barriers to implementation. A further option discussed below is the introduction of sectoral crediting mechanisms as an alternative approach to the CDM that could potentially tackle some of the shortcomings of the current CDM system as identified in Task 1.

Figure 4. Mapping of potential CDM reforms to key issues (solid arrows and bold indicate foci of Task 2)



4.1.1 Assessment methodology and criteria

For each of the CDM reform options that are the focus of Task 2, we describe the state of play, and review experience and lessons learned. We highlight key implementation challenges and identify the circumstances (regions, project types, local conditions) where each approach might be best or least suited. We also evaluate each of reform options against a series of core criteria, as follows:

- **Environmental integrity:** Does this reform approach improve environmental (GHG) outcomes relative to the existing CDM conditions and methodologies? Does it lead to a net environmental benefit (relative to the absence of the CDM)?
- **Economic efficiency:** What are the implications of this reform in terms of global abatement costs (for achieving a given emissions reduction)?
- **Environmental effectiveness / scale of greenhouse gas reductions**: Is this reform approach likely to (significantly) increase the overall scale of emission reductions achieved?

- **Political and technical feasibility and acceptability (including simplicity):** Does this reform approach stand a reasonable chance of being enacted? What are the likely objections and barriers?

Where relevant, we also touch on the implication of reform options in terms of the following additional attributes:

- CDM market function and scale (scale of CERs, incentives for developers, market liquidity):
- Regional distribution of CERs and other equity considerations
- Sustainability
- Long-term, strategic benefit (likelihood to advance international framework towards greater ambition and effectiveness over time)
- Transparency and predictability

It is important to note that many of the proposed reforms are driven by, or can be designed to address a particular criterion, e.g. positive lists can be designed specifically to improve regional distribution, or negative lists solely to improve environmental integrity. While evaluation against multiple criteria helps to avoid unintended consequences or identify co-benefits, each individual reform should not be expected to satisfy all criteria.

It is also important to note that given the desk study nature of this analysis, and often limited data availability, our assessment relies extensively on analyst judgment and stakeholder input.

In Section 4.2 that follows we examine the issues and options related to the application of standardised baselines, applied as a supply side measure. In the subsequent Section 4.3 we explore the options of negative lists and discounting in the context of their application as demand side measures. In that section we illustrate the important issues by examining the potential application of these approaches to hydro projects. The purposes for doing this are to highlight the key aspects to be taken account of in the development of these approaches and to explore the arguments for and against the additionality and sustainability of hydro projects, which are driving the current debate on whether such restrictions should be applied.

4.2 Supply-side CDM reform: Standardisation of baselines and additionality determination

Standardisation of baselines and additionality determination has become a major focus of the CDM administrators and the international community, especially in the past year. This section summarises the goals and intended benefits of greater standardisation and reviews experience to date with standardisation efforts. This provides context and appreciation of the challenges and potential limitations of this approach, including inadequate data availability and uncertain outcomes (in terms of both how markets will respond and the net effect on environmental integrity). We then turn to evaluation of specific standardisation approaches – emissions performance standards, market penetration assessments, default/deemed values, and positive/negative lists – at different levels of aggregation (project specific vs. sector-based). This evaluation is done against the criteria mentioned above and suggestions are made under what conditions each approach may be most appropriate (i.e. regions and sectors for which reform option might be more or less effective).

As noted in the Task 1 report, significant concerns with the CDM relate to the slow pace and lack of consistency in EB decision making, the lack of objectivity and uncertain environmental integrity of the additionality assessment, and unavailability of appropriate methodologies for underserved regions and sectors. To an extent these concerns are the product of the CDM's bottom-up methodology development process and the use of project-specific additionality tests and baseline determinations. Standardised approaches offer the potential to increase the efficiency and effectiveness of the CDM through greater predictability, reduce transaction costs, increase project flow, and improve environmental outcomes (Broekhoff 2007, Lazarus et al 2000).

4.2.1 Objectives (potential benefits) of standardised additionality and baseline methods

In general, greater standardisation aims to deliver some or all of the following benefits relative to project-specific methodologies and assessment [related evaluation criteria that would be enhanced are shown in brackets]:

- **reduced transaction costs and delays (once the standard is set)** for project developers by reducing the level of project-specific analysis and review needed for individual projects [environmental effectiveness],
- **lower uncertainties** for investors by increasing the predictability of project approval and crediting amounts, and as a result [economic efficiency],
- **increased project activity,** investment, and thus the intended gains of offsets (lower costs of meeting emission targets and sustainable development), as well as, [economic efficiency and environmental effectiveness]
- **increased activity in underrepresented sectors and regions**, to the extent that **standardisation** efforts target certain project types such as buildings, transportation, rural electrification, or traditional fuel use and extraction that have significant promise but have been difficult to address through the normal bottom-up CDM process (wherein developers take the risk of investing in methodology development with uncertain outcomes), [regional distribution, environmental effectiveness] and, finally,
- **improved environmental outcomes,** to the extent such approaches can reduce the incidence of non-additional projects, or leverage net emissions benefits by crediting enough emission reductions to incentivize project activities but issuing fewer CERs than the total reductions achieved (which is possible where abatement costs are well below the value of primary CERs contracted[14]), or by reducing the costs of meeting emission targets, enabling deeper targets in the future. [environmental integrity, economic efficiency, environmental effectiveness]

In practice, it may be difficult to achieve all of these objectives with any single standardised approach or methodology. In fact, there will likely be trade-offs among these objectives. For example, methodologies that open up activity in underrepresented regions and include provisions to deal with suppressed demand, e.g. for water purification or improved cook stoves, could lead to a net increase in global emissions. On the other hand, standardisation efforts in sectors that are already well represented in the CDM pipeline could achieve net decreases in global emissions through relatively stringent baselines.] While either of these outcomes – decreases or increases in global emissions – could occur even with new or revised project-specific methodologies (made more stringent or inclusive of suppressed demand), they are arguably far more likely to occur through standardised baseline efforts, which are aimed at more significant changes in methods and outcomes.

While it may be unreasonable to expect each standardised effort to achieve every objective, broad standardisation efforts across the CDM can aim for overall progress on each of the objectives noted above.

4.2.2 Standardised approaches

The variety of meanings associated with the term “standardisation” can be confusing. To clarify, Table 5 lays out five types of standardised additionality and baseline approaches, along with examples to illustrate their application. The first category shown is perhaps the most frequently used type of standardisation: factors, algorithms, and other features that are simplified and made common across methodologies. To this end, the EB Secretariat has in recent years developed a number of “tools” or modules, which are shared across methodologies. For example, a tool was developed to determine in a consistent way across methodologies and projects the greenhouse gas intensity of an electricity grid. Landfill methane capture, anaerobic digesters wind power projects or any project that displaces electricity from the grid can use this tool to determine the GHG intensity of the displaced electricity. Increasing consistency across methodologies can create a more level playing field among

[14] See, e.g., (Schneider 2009; Schneider, Michael Lazarus, and Kollmuss 2010).

project types and can simplify updating and revision processes, achieving some of the benefits noted above.

However, these partial forms of standardisation are not the "game changers" sought to dramatically increase project activity and achieve the objectives noted above. More significant changes are standardised approaches for determining the additionality of a project, such as positive and negative lists, use of performance standards (sometimes referred to as "benchmarks"), penetration rate thresholds, and deemed values (used in conjunction with one of the prior approaches). These approaches usually entail the development of standards that are specific to individual project types, but nonetheless bear some common features.

Table 5. Definitions of Types of Standardisation (adapted from Castro et al, 2011)

Term	Applies to:	Definition	Examples
Common criteria, methods, factors, and equations applicable across multiple methodologies	Additionality Baselines	Emission factors, default value, and estimation methods used to address common circumstances in a consistent fashion across multiple project types	• Common "Tools" used across methodologies, e.g. to calculate electricity emission factors or to emissions from methane flaring (approximately 20 now available)[15] • EB common guidance on investment analysis and benchmarking IRR calculations • Uncertainty discounts based on IPCC guidance (used in CDM)
Deemed or Default Values	Additionality Baselines	Used to calculate baseline and/or project emissions; only applicable to a specific project type	• Weighted average cost of capital by country • Energy use per light bulb • 5.5 litres of purified water per person per day (baseline, AMS.IV.V)
Positive / negative lists	Additionality	Usually a technology specific list that deems all projects of that technology additional. Underlying rationale can be project size, performance, market penetration, financial attractiveness or a combination of these.	• Specific project types (e.g. micro-scale projects) might be considered automatically eligible (no additionality assessment required)
Market penetration rate (activity standard)	Additionality	Market share of current product sales or cumulative market penetration rate (of existing stock) of a technology or practice	• Cumulative penetration rate: e.g. technology in use at 20% or less of all installations (e.g. methane recovery and combustion at landfills) as used in some US voluntary offset program methodologies (Climate Leaders and Climate Action Reserve)

[15] http://cdm.unfccc.int/Reference/tools/index.html

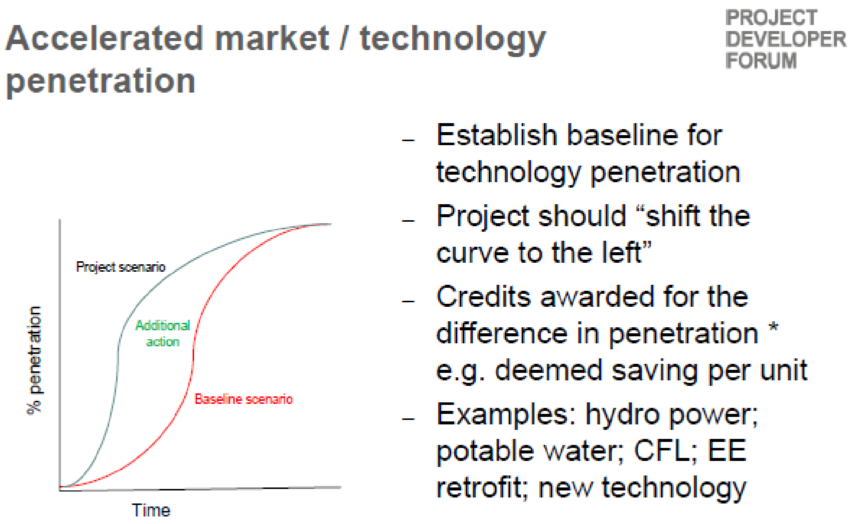
Term	Applies to:	Definition	Examples
			• Market share: e.g. blended cement is less than 5% of market in past 3 years (ACM0005)
Emissions performance standard (benchmark)	Additionality Baselines	Emission rate/intensity per unit of output, input, or throughput Applied to baseline and/or additionality determination	• Average of top 20% (energy use) performance: AM0070 (efficient refrigerators) uses for both baseline emissions and additionality assessment • Average emissions rate of top 15th percentile of coal power plants in country for baseline emissions only (ACM0013) • Cement production emission rate: 45th percentile for baseline emissions and 20th percentile for additionality, in tons of CO_2 per ton of cement (NM302)

Positive and negative lists are fairly straightforward approaches: projects would be deemed automatically eligible or ineligible, respectively, based on whether they are considered likely to be additional or non-additional, based on certain characteristics, such as low penetration rate, innovative technology and high emissions performance. Market or technology penetration rates thresholds represent a variant of this approach, providing another means to infer additionality. The notion is that emerging technologies with low but increasing penetration rates typically require some type of support, as might be provided through offsets markets, to compete effectively in the marketplace (Kartha, M. Lazarus, and LeFranc 2005). Penetration rates, as noted below have been used to infer additionality in many US offset programme methodologies and to a very limited extent for CDM (cogeneration and efficient refrigerator methodologies). While simple in principle, this approach can be stymied by the cost of collecting market data, and challenges in determining the appropriate metric (e.g. current market sales or market saturation), and in selecting an appropriate threshold whereby projects are no longer additional (and avoiding knife-edge effects in doing so). For example, such thresholds in use vary from 5% (AM0014, cogeneration is less than equal to 5% of installed thermal capacity in a country; ACM0005 for blended cement penetration) to 20% penetration (e.g. anaerobic digesters or landfill methane capture in CAR and Climate Leaders offset programmes). The market penetration rate approach is typically used to credit all projects that are among the early adopters ("first in"). Another approach would be to credit projects until a penetration rate is reached.[16] This could provide an incentive for accelerating the adoption of innovative technologies (e.g. electric cars, cloud computing, efficient cook stoves); in such cases, according to one market participant, it may make sense to have a much higher penetration rate threshold.[17]

Emissions performance standards or benchmarks are perhaps the most widely considered of standardised approaches, as they are referenced in the Marrakesh Accords (48c), and used in a handful of CDM project, as well as in the EU for allowance allocation to emission-intensive, trade-exposed industries. Figure 5 illustrates how performance standards can be used to determine emissions baselines and additionality for a hypothetical sector/project type.

[16]See presentation by Gareth Philips, Sindicatum Capital and Project Developers Forum, "Innovative Approaches to Additionality", http://cdm.unfccc.int/methodologies/Workshops/cdm_standards/s1_pdf.pdf
[17]Gareth Philips, private communication.

Figure 5. Depiction of Accelerated Penetration Approach (courtesy of Gareth Philips, Project Developers Forum)



Performance standards present a series of key decision points and challenges (Hayashi, Muller, Feige et al. 2010; Lazarus, Kartha, and Bernow 2000):

- **Aggregation**, i.e. whether to distinguish, within a sector (e.g. steel), among production processes and fuel (blast furnace, electric arc), products produced (rolled steel, bars), temporally (new, recently built, older vintages), spatially (country, region, global). This is perhaps the most significant challenge. Greater aggregation creates clearer signals for lower carbon activity, but can also create more free riders (non-additional, credited activity) as well as lost opportunities. For example, ACM0013 (clean coal methodology) includes a benchmark for power plants based on individual fossil fuels (e.g. crediting coal plants relative to other coal plant efficiencies) whereas ACM0002 (grid-connected renewables) creates a benchmark based on the broader, aggregate power sector. Under an ACM0002 benchmark, more efficient coal plants might often have an emissions rate that is too high to generate credits (lost opportunity). On the other hand, ACM0013 does not send as clear a signal for low-carbon activity as it provides incentives for coal plant construction, even if at a higher efficiency.
- **Stringency.** Stringency reflects where a performance standard is set on the continuum from average or 50th percentile performance (not stringent) to low carbon intensities relative to expected BAU activity (highly stringent). A more stringent standard will tend to reduce the number of non-additional projects and award fewer CER to allowed projects, and risk a greater number of lost opportunities. One option, as illustrated in Figure 6, is to use a more stringent performance threshold for additionality than for the crediting baseline. In general, stringency is a judgment call, as there are no established methods for determining optimal stringency levels.
- **Data requirements.** Performance standards, where derived from comparison to peers, i.e. benchmarking as opposed to a best available technology or other "deemed" standard, require relatively comprehensive and reliable data on the performance of the peer group. As described elsewhere, this requirement can be a significant cost and practical constraint on performance standard approaches.

Figure 6. Illustration of how performance standards work for additionality determination and baseline emissions (Adapted from Castro et al.

Forthcoming)

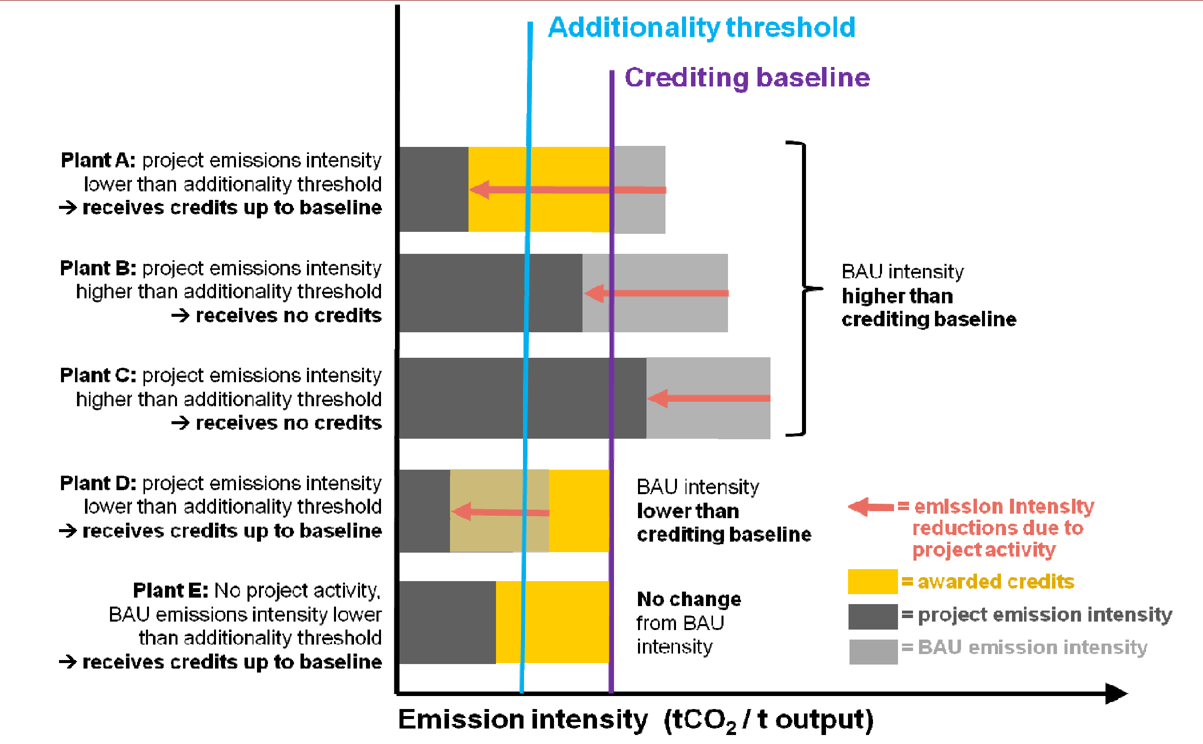


Figure 6 illustrates how performance standards for additionality and baseline determination would affect crediting a series of 5 hypothetical project activities (plants) in a given sector, where additionality and baseline emissions are determined based on common performance standards. These standards are set on the basis of emissions intensity, i.e. CO2 per unit output (or input). As shown here the additionality threshold is somewhat more conservative than the crediting baseline. The first four facilities are considering a project activity that would occur only as the result of CER generation (i.e. they are additional), reducing emissions intensity by the amount shown by the red arrow. This chart shows their emission intensities with (light grey) and without (dark grey) the incentives provided by an offset mechanism. Because plants A, B, and C have BAU emissions intensities that are higher than the crediting baseline, they all would receive fewer credits than the actual emission reductions their projects achieve. Plants B and C represent classic “lost opportunity” cases: even though these project activities might reduce emissions, they would not be deemed additional because their resulting emissions intensity would still be higher than the additionality threshold. Plant A would receive credits up to the crediting baseline. Plants D and E on the other hand would receive more credits than actual emissions reductions, because their BAU emissions intensity is lower than the crediting baseline. Plant E, is the classic “free rider” case, as it would receive credits without reducing emissions (relative to the BAU scenario). As this example illustrates, while performance standards credit only better performing facilities, are simple to apply with consequences that are easy to predict, they are still subject to potential additionality concerns as well as a risk of lost opportunities.

Finally, **deemed and default values** are designed to obviate the need for costly and uncertain project-specific measurement, monitoring, and verification. Deemed values typically refer to the estimation of the standard outcomes associated with the operation of specific technologies or practices, such as a presumption that each efficient light bulb saves X kWh per year, an electric vehicle will avoid the use of Y litres of petrol annually, or Z litres per capita of purified water will meet basic needs. Deemed values are particularly valuable for projects in the household, agricultural, and transport sectors where large numbers of smaller, individual devices or practices are implemented. They figure prominently for example in methodologies designed for LDCs and underserved sectors, such as water purification or rural electrification. Since they may involve sweeping assumptions with major implications for baseline emissions and CERs generated by a project, they tend to be quite conservatively estimated.

4.2.3 Experience with standardised methods

Before assessing their prospects and considering potential strategies for the EU to consider, it is important to put standardised approaches into some historical context. The standardised approaches laid out in are far from new concepts, and UN Parties, market participants, observers, and researchers have explored and advocated for them for many years, with limited success. While the UNFCCC process is more openly endorsing these methods, they face structural and procedural challenges as well as risks to environmental integrity and the evolution of new market mechanisms.

Ironically, as with the creation of the CDM, the U.S. government is also involved in the early push for standardised methods. In the late 1990s, the USEPA commissioned a number of studies that examined what were then described as "multi-project baselines" (Meyers et al. 2000; Lazarus et al. 1999; Sathaye et al. 2001; Lazarus, Kartha, and Bernow 2000; Winkler et al. 2002). These studies identified key design issues for standardisation – data availability, aggregation decisions, stringency determination, and updating procedures – as well as examining the implications of common vs. differentiated performance standards for baselines and additionality, issues that continue to bedevil standardisation efforts today. While one of the outcomes of this and related research was the establishment of the relatively standardised baseline methodology for electricity projects used by more CDM projects than any other methodology (ACM0002), in general this line of inquiry did not yield significant standardisation.

At this time, CDM modalities and procedures were still under development, and the role of standardised vs. project-specific methodology approaches was under negotiation. Codified in the Marrakesh Accords in 2001, the agreed rules represented something of a compromise, though ultimately favouring a project-specific approach and a bottom-up methodology development process. The bottom-up approach, whereby project proponents develop and submit proposed methodologies, offered the benefit of transferring the methodology development costs to project developers, and allowing the market to determine priorities for methodology establishment (where project proponents saw greatest opportunities). It also enabled a "case law" approach, whereby methodological approaches and rules could accrete in an incremental, "learning-by-doing", fashion. Since standardised approaches tend to require a more top-down approach with greater time and expense, there was limited incentive for project developers to take on the costs (data collection, analysis) and challenges of standardised approaches. In addition, at the time of the Marrakesh Accords, there were concerns that standardised represented a slippery slope to binding obligations for NAI countries. Furthermore, because they can create "lost opportunities" by design (see Table 5), standardised approaches might limit the scope and eligibility of potential projects. While the Accords maintained an option/guidance for performance standard approaches, stating that baselines could be based on the "average of similar plants, previous 5 years, in similar economic, performance is among the top *20*% of their category" (48c), until recently, only a handful of methodology proposals have invoked this approach. Overall, less than 10% of approved CDM methodologies to date have utilised one of the four standardised approaches highlighted in Table 5.

Meanwhile, other offset programmes, notably those based in the US, sought out and implemented relatively standardised approaches to baseline and additionality determination, in part based on the critiques of the bottom-up CDM experience. In particular, the Climate Action Reserve (CAR), Climate Leaders, and the Regional Greenhouse Gas Initiative have all relied heavily if not exclusively, on the standardised approaches to determine project additionality and establish emission baselines that are highlighted in Table 5. These programmes used a highly top-down design approach, with methodologies developed by the programme administrators themselves, though with considerable input from stakeholders, especially in the case of CAR. While their success at establishing performance standards is notable, it is also important to emphasize that these programmes have focused on a set of project types that might be considered easier to standardise (largely non-energy project types), and have not addressed sectors like electricity generation, for which concerns about non- additionality tend to be greatest. Nonetheless, the ability of these offset programmes to implement standardised baselines has provided yet another justification for greater pursuit of standardisation within the CDM.

4.2.4 Recent Initiatives on Standardisation

Within the CDM process, the push for greater standardisation has been building for some time, and has accelerated significantly in the past year, since the Copenhagen agreements (CMP5) tasked UNFCCC's Subsidiary Body on Scientific and Technical Advice (SBSTA) with recommending modalities and procedures for the development of standardised baselines that are "broadly applicable", and that "provide for a high level environmental integrity" and "take into account specific national circumstances".[18]

- In 2010, SBSTA solicited and received suggestions from numerous Parties, intergovernmental organizations and observer organizations on further use of standardised baselines under the CDM, and prepared a technical paper summarizing key issues and options.[19]
- At Cancun, the CMP6 agreed to a decision on the implementation of standardised baselines under the CDM, which created two tracks for methodology development:[20]
    - a bottom-up track whereby "project participants, as well as international industry project participants, as well as international industry organizations or admitted observer organizations through the host country designated national authority (DNA) may submit proposals for standardised baselines… for consideration by the EB"[21], and;
    - a top-down track, under which the EB is requested to "develop standardised baselines, as appropriate, in consultation with relevant DNAs, prioritizing methodologies that are applicable to LDCs, small island developing states (SIDS), Parties with 10 or fewer registered CDM project activities as of 31 December 2010 and underrepresented project activity types or regions, *inter alia*, for energy generation in isolate systems, transport and agriculture."[22]
- In June 2011, the UNFCCC held a CDM practitioners workshop that addressed innovative approaches to additionality and standardised baselines.[23]
- In July 2011, as part of its on-going standardisation work plan, the EB issued guidelines for the establishment of sector-specific standardised baselines.[24] These guidelines, which are not mandatory, address four types of projects for stationary sources: fuel and feedstock switch, technology switch, methane destruction, and methane formation avoidance. For the latter two categories, the guidelines essentially create a positive list for activities that are above and beyond enforced levels of any mandatory requirements. The guidelines take a very simple and sweeping approach to methane destruction, suggesting that all captured methane can be considered a baseline.[25] For the other categories of measures, which could encompass a wide range of non-transportation energy consuming or producing activities, the guidelines suggest a simplified emissions performance standard approach for both additionality demonstration and baseline emission factors. Particular fuels, feed stocks, or technologies would be put on positive list if they have lower carbon intensities than the technology used for aggregately producing X% output of given sector *and* are shown to be less commercially attractive. The latter economic test appears to offer an added safeguard to protect against instances where lower carbon intensities (e.g. imagine low-cost biomass residues in some instances) are likely to be used in any case. Otherwise, the guidelines leave options fairly open in terms of aggregation (though the suggested spatial level of country and groups of countries is indicated), stringency, updating and other key elements of performance standards. One market participant has expressed some dismay that this new approach to standardization appears to focus on improving existing approved methodologies

[18] Decision 2/CMP.5
[19] FCCC/TP/2010/4
[20] Decision 3/CMP.6
[21] p.1, Annex 8, EB 62 report.
[22] ibid
[23] http://cdm.unfccc.int/methodologies/Workshops/cdm_standards/index.html
[24] Annex 8, EB 62 report.
[25] While this approach is quite straightforward and similar to existing methodologies, it does not account for the fact that some project activities (e.g. manure digesters) might actually increase the amount of methane generated relative to BAU (e.g. field spreading).

rather than on incentivising development of methodologies appropriate to new sectors and regions.[26]

In addition, parallel to the UNFCCC process, several Parties have been doing work to develop standardised methodologies. In particular, the UK Department for International Development (DFID) has commissioned a project for piloting greater use of standardised approaches in the CDM that has resulted in three prospective standardised CDM methodologies suitable for application especially in LDCs and LICs: water purification, rural electrification, and charcoal production. Japan has also been working though IGES to develop a number of standardised approaches, for example, the based for a positive list for manure management projects in the Philippines based on farm size thresholds.

4.2.5 Assessment of Standardised Approaches

After many years of conceptual discussions and limited implementation, the prospects for standardised baselines to "take off" and deliver on promised benefits will be conditioned by a few key factors:

- **Availability of reliable, verifiable performance data remains a major barrier to the use of emissions performance standards and market penetration rates, especially outside the power sector.** The grid-connected power sector has been relatively easy to standardise, given relatively high availability of power plant data, limited number of facilities, limited concerns about proprietary data, and homogenous output (kWh).[27]). Concerns have been raised about potential bias in reported power plant fuel consumption (Michaelowa 2011), but relative to other sectors, such concerns are limited. There have been minor successes in developing benchmarks in some industrial sectors, largely due to partnerships with industry (Hayashi et al, 2010). However, data tend to be limited in several key countries – even the relatively well-developed Cement Sustainability Initiative database lacks coverage of China. Proprietary concerns regarding performance data can be high. Transparency can be a concern as well. For example, the industry consultant Solomon Associates extensive historical database has enabled benchmark development of the highly complicated chemical and petroleum sectors in the EU-ETS, but with compromised ability of programme administrators to verify the approaches. Nonetheless, with adequate funding, and accessing in-country research centres, it is possible that these constraints can be overcome.
- **Determination of baseline stringency will remain rather subjective and may prove difficult to agree upon.** The 2001 Marrakesh Accords stated that one method for baseline-setting in the CDM could be to set the baseline as the average emissions of similar project activities undertaken in the past five years and whose performance is among the top 20 percent in the category. Many methodologies in the CDM (including recent communications between the Methodologies Panel and CSI on NM0302) use this top-20% concept as the baseline determination, but one (ACM0013) uses top 15% instead. In the EU-ETS, benchmarks for allowance allocation are set at the average performance of the top 10% most efficient installations for producing a specific product. Detailed technical judgments on the appropriate levels of stringency have not been developed (Hayashi et al., 2010). The EB62 guidance document is notably silent on what values might be chosen as well as the rationale to be used.
- **The trade-off between highly aggregated and stratified performance standards will also be difficult to resolve on a technical basis.** Different degrees of aggregation send very different incentives. Performance standards can be aggregated across technology, process, spatial, and/or fuel type among other factors. In the CDM, the level of aggregation across these factors has appeared ad-hoc (Hayashi et al. 2010). In general, performance standards that are particular to technology, process, or fuel type improvements limit the (perhaps larger) opportunities for emissions reduction that result from switching technologies, processes, or fuel types. This limitation was a primary rationale for the EU-ETS to develop a "one product, one benchmark" concept (Ecofys et al., 2009) that did not differentiate benchmarks according

[26] Stephen Gray, CCC/CMIA
[27] Arguably there are important differences among power plants in plant availability and load following capability, i.e. the "quality" of kWh produced, nonetheless, electricity is far more homogenous, in general, that the output of most industrial or other sectors.

to these factors. Nevertheless, higher degrees of disaggregation may be appropriate in the CDM, where a performance standard that was not disaggregated by technology, process, location, or fuel would offer very little (if any) incentive for improvements in lower-performing facilities that could not exceed an additionality threshold or baseline. (The question here is whether the CDM should encourage all incremental changes or focus primarily on higher performing technologies and practices.) For this and other reasons, at least one key project developer perspective is that standardisation will need to be highly "stratified" (or disaggregated), and one commentator remarked to that extent, the focus on highly aggregate benchmarked methodologies as in CSI's cement proposal (NM302) may have done something of a disservice to the broader aims of standardisation.

- **Penetration rate and emission performance standard approaches may work only under certain conditions – relatively homogeneous products or services, adequate data availability – and be applicable for some project types.** As Table 6 suggests, some project types may be *more* conducive to these approaches due to these and other factors, however, the above challenges remain.

Table 6. Sectors and project types conducive to standardised approaches[28]

Approach	Conditions conducive to application	Examples of sectors and project types more conducive to approach
Positive lists	• No other revenues than CER • CERs fundamentally change economics • Reference technology that is common practice (e.g. > 80%) • Innovative technology facing barriers (cost, acceptance, etc.)	High GWP gas destruction or avoidance (adipic acid, nitric acid, HFC 23 destruction, SF6, etc.); Manure management (lagoons); Efficient lighting (incandescent light); Efficient charcoal production
Negative lists	• Common practice technologies • Where likelihood non-additionality is viewed as particularly high	Large-scale conventional power facilities
Market penetration rates	• Homogeneous product or services (tight or normal distribution of emissions intensities not necessarily required) • Where stimulation of emerging technologies is a desired objective • Data available on market shares or sales by technology or practice	Higher-efficiency technologies; small-scale renewable energy technologies; blended cement; natural gas cogeneration; landfill gas combustion; biogas; composting
Emissions performance standard	• Homogeneous product or services • Relatively tight or normal distribution of emissions intensity • Extensive data availability on emissions performance	Cement, steel, aluminium (PFC emissions), glass production; appliances (refrigerators), N2O, PFC, SF6, and HFCs; boilers, motors; tail gas CO2 recovery; electrical transformers
Default or Deemed Values	• Commonly used technologies with similar performance characteristics (e.g. light bulbs, vehicles) • High measurement costs	Small-scale projects or small, distributed (energy using) technologies

For these reasons, as attractive as it may seem for standardised approaches to be based on rigorous data-driven analyses, this will be difficult to achieve in practice. Data collection will be costly,

[28] This table is adapted from one originally developed by Lambert Schneider, UNFCCC Secretariat and further enhanced by Castro et al. (Forthcoming).

potentially in the millions of Euros per sector by one estimate[29]; proprietary concerns will hamper transparency for industrial sectors and regardless of data adequacy, tough judgement calls will remain. Judgment calls regarding aggregation across a given sector and region, and especially the stringency of market penetration and performance standards, on which the ultimate environmental and project activity outcomes depend, will be best served by an open process, wherein multiple stakeholder perspectives are considered, especially parties who do not have an interest in maximizing the generation of CERs for a given project activity. Given information asymmetry concerns, it will also be important to involve thorough review by independent sector experts, in much greater depth than the current CDM methodology "desk reviews".

In general, the administrative process by which standardised approaches will move forward is still somewhat unclear and a cause for some concern:

- **Capacity:** With the two tracks process currently envisioned, the EB and Secretariat will need to manage both internal top-down standardisation efforts, which as noted can be technically complex and costly, especially if using the data-intensive performance standard approaches laid out in the EB62 guidelines, and an external bottom-up submission process. Recognizing this capacity challenge, Hayashi et al (2010) suggested the establishment of a linked Standardised Approach Coordinator (agency) to manage the standardisation process, overseeing the work by entities (project developers, industrial organizations, or others) that develop standardised baselines for individual project types and countries, with ultimate approval of methodologies resting with the EB. Whether this is an appropriate way to proceed, plans should be made to ensure that the current standardisation initiatives do not encounter the same sort of delays that resulted from an undersized and overwhelmed infrastructure during the early years of CDM.
- **Objectivity and Balance:** While DNAs are a natural venue for the development of standardised methods that appropriately account for national circumstances, in general, they will share a common interest with project developers in maximizing the CERs awarded to a given project activity. This places the EB and Secretariat in the difficult position of being the watchdog for environmental integrity. While they already take on this role in the current system with methodologies submitted by project proponents, it is more difficult to envision the EB (and its panels) have the same sort of back-and-forth communications with DNAs. It is one thing to challenge, and occasionally reject, a project proponent's method. It may be far more difficult for the EB to fulfil its natural regulatory function when it requires debating the validity of a designated national authority's proposal. (The political nature of the decisions to be taken may call for a new composition of the Board with representatives from countries rather than members acting in their own capacity).
- **Consistency:** Consistent approaches to the stringency of standardised approaches will be important to create a level playing field among project types and regions. However, the current two-track submission process will not make it simple to achieve, unless the EB issues further guidelines that suggest how stringency should be estimated. For example, the EB could provide a range of generally acceptable percentiles for performance standards, along with criteria to be used in determining stringency values.[30] Alternatively the EB could issue credits with a different stringency of emission reductions that buyers could choose from depending on their political priorities.

4.2.6 Review of standardised approaches against criteria

For two principal reasons, it is not a simple task to assess standardised approaches against the standard criteria elaborated above. First, the devil is in the details: the implications of performance standards and penetration rate thresholds, for example, may depend completely on technical decisions related to stringency and aggregation. Second, even once those parameters are established, the outcomes in terms of project activity and environmental integrity are hard to predict.

[29] According to Hayashi et al. (2010), "a preliminary cost estimate of the development of a standardised approach covering 200 plants would be €1.2-4.5 million, assuming one-year monitoring for the data collection. If the data already exist, the cost would be €0.2-0.5 million."
[30] See terms Xa, Xb, Ya, and Yb in the EB62 Guidelines.

Experience with currently approved, standardised CDM methodologies illustrates these two points. The refrigerator methodology, AM0070, relies on performance standards but has yet to be used for a single project due to its apparent complexity, among other factors. In contrast, ACM0013, a performance standard based methodology for more efficient fossil fuel power plants is being used by numerous large coal plant projects, but has been critiqued by the Meth Panel and others due to concerns regarding the technical decisions underlying how the performance standard is calculated, and its potential for compromising environmental integrity. The critique rests on the fact that the performance standards used in ACM0013 rely on historical data on coal plants built 5-10 years before the project activities in question, and thus do not capture the natural improvement in coal plant efficiencies during that time. This lag issue is a general concern for standards based on historical data, especially for project types with large investment requirements and long construction times. However, ACM0013 may be somewhat unique in that credits are provided for relatively small percentage differences between project performance (e.g. 39% efficiency) and the baseline performance standard (e.g. 38% efficiency). Where small differences are involved, the impacts of error or systematic bias (signal-to-noise issues) are greatly magnified, in this case, to the detriment of environmental integrity. Such a situation is also more likely to occur where performance standards are highly disaggregated or “stratified”, one reason to err on the side of more aggregate standards.

These examples illustrate that standardised approaches (in this case performance standards) can have unintended or unanticipated consequences, and these consequences will often be more dependent upon technical decisions regarding specific parameters (vintage of data, percentile threshold for stringency, etc.) than on the choice of standardisation approach in general. With that caveat in mind, we now briefly evaluate each of the standardisation approaches with relation to the evaluation criteria described above. While we provide our judgment regarding whether a particular approach is likely to have a positive or negative impact, or is simply too uncertain to hazard an assessment, as noted above, the ultimate outcome depends on the details of how these approaches are implemented.

Table 7. Assessment of standardised approaches against criteria

Approach:	Environmental integrity	Economic efficiency	Political feasibility and acceptability	Other criteria
Positive listing	(+/-) Could be detrimental if applied to project types with potentially significant BAU activity, however, the overall impact will also depend on the baseline level applied: a stringent baseline combined with significant, additional activities might compensate. Again, the devil is in the details.	(+) If done well, i.e. targeting project types highly unlikely to occur under BAU conditions (without CDM), then economic efficiency should be improved.	(+) If done well, positive lists should be easy to approve; they send an exclusively positive signal, which few could object to, except if because of the positive list all other project types are prohibited.	Clearly spelling out the rationale for positive listing (for instance per the EB62 guidelines) will help with **transparency.** **Regional distribution** could also be enhanced, but only where currently additionality determination leads to uncertainty or costs sufficient to create a barrier to investment.
Negative listing	(+) negative listing is generally designed for this specific purpose, if targeting project types or conditions expected to have significant BAU activity.	(+) If done well, i.e. targeting project types *likely* to occur under BAU conditions, then economic efficiency should be improved, by reducing free riders and making actual target achievement more cost-effective.	(-) Negative lists create clear “losers” and regions with significant activity or potential in a given project type might be expected to oppose a negative listing.	Negative listing can be used to eliminate projects with significant **sustainability** or efficiency concerns. As with positive listing, clearly spelling out the rationale for a listing decision (with clear criteria and supporting arguments) will help with **transparency** and **ex-ante predictability.**
Market penetration rates and performance standards	(+/-) As noted above, the impacts are difficult to assess and depend on the balance of over-crediting,	(+, in theory…) The jury is still out, and will be for some time – will the scale of project activity increase in the	(+/-) Currently there is significant momentum and support for these approaches. However the more difficult	As with the other standardisation approaches, market penetration rates and performance

	under-crediting, and lost opportunities (which are more of an economic efficiency concern) that occur based on where standards are set. ACM0013 has been generally negative with respect to environmental integrity, but it is not reasonable to generalize from this experience.	sectors standardised? Will this lead to fewer or more lost opportunities? Furthermore, these approaches shift the cost burden away from project developers, but high data requirements may increase overall transaction costs relative to project-specific methodologies.	decisions have yet to be made regarding stringency and aggregation for many sectors. There will likely be limited obstacles to proceeding with standardisation in underrepresented regions and sectors. In well represented ones, there are incumbent interests that might resist standardisation efforts especially if they lean towards stringency.	standards can aim to target **regional distribution** concerns; however, given the data requirements, and the often poor data availability in LDCs, these methods may do less for underrepresented regions that, say, the use of deemed or default values.
Deemed or default values	(+/-) The outcome here depends on how such values are set. However, in general, these values are intended to be set on a conservative basis, leaning towards crediting fewer CERs for a given activity, as part of the trade-off in reducing uncertainty and measurement cost.	(+) Default/deemed values are likely to reduce overall transaction costs, and assuming they also offer an environmental benefit (per above), should offer efficiency benefits.	(+)	As with the other standardisation approaches, market penetration rates and performance standards can aim to target **regional distribution** concerns; however, given the data requirements, and the often poor data availability in LDCs, these methods may do less for underrepresented regions than, say, the use of deemed or default values

As shown here, the approach that appears closest to “triple-win” across the criteria are deemed and default values. However, such values can be developed only in some circumstances, and are not in themselves baseline approaches, but rather key elements of them. In general, each approach has a distinct niche, and only by judiciously applying a mix of them across a range of project types can all of these criteria be met.

4.2.7 Conclusion and Potential Next Steps

In recent years, increasing standardisation of crediting methodologies has re-emerged as a key strategy for expanding the reach, efficiency, and effectiveness of the Mechanism. As noted here, however, there are fundamental technical as well as administrative challenges that still need to be addressed for standardised approaches to live up to their promise.

Nonetheless, there could be a “sweet spot” for standardisation to yield the many objectives described at the outset of this section, using a two-pronged focus. One prong would involve continued targeting of standardisation efforts to underrepresented sectors (households, agriculture, traditional industries such as charcoal production, transportation) and regions, consistent with the EU’s post-2012 focus on LDCs for new CDM project activity and with DFID’s piloting project. Relying heavily on deemed savings approaches (e.g. crediting for up to the equivalent of 5.5 litres of purified water per capita), rather than more data-intensive performance standard and market penetration approaches, such methodologies could be relatively easy to implement and send clear incentives to prospective project developers. (Of course, creating more certain expectations of CER generation far from guarantees that projects will follow in large numbers. Strong CER demand will still be required, as will the ability to overcome the fundamental, non-CDM related barriers that have hampered cookstove, electrification, and other development-oriented projects for decades.) While methodologies targeting these sectors and project types might not on their own deliver a “high level of environmental integrity”, in part because they are likely to address some level of “suppressed demand”, the other complementary “prong” could focus on establishing standardised baselines in well represented sectors and regions that are sufficiently stringent so as to generate net environmental benefits.

To this end, the EU may wish to consider the following strategies:

- Sponsor methodology development efforts, similar to DFID study, that focus on project types of particular relevance to EU objectives (LDCs), and can result in methodologies that are applicable at regional or global levels.
- Identify and partner with DNAs that share similar perspectives, to incorporate relevant national and regional circumstances, and submit developed methodologies.
- Support general data development efforts conducive to developing benchmarks as well as baselines for sectoral crediting mechanisms.
- Develop proposals and provide support for adequately staffed and balanced administrative support systems for reviewing and approving standardised approaches, especially those submitted by DNAs.
- Further develop new baseline and additionality mechanisms designed to promote innovation, near term investment while limiting the scale of risk to environmental integrity. For example, this could include an accelerated penetration approach similar to that put forward by the Project Developers Forum, the identification of suitable technologies (e.g. LED lighting, cook stoves, electric cars), and the introduction of procedures whereby the total number of CERs that can be issued is capped in order to avoid unexpected and unintended consequences. Such a cap could be increased should there be no such consequences and the need for carbon market support remains essential.

4.3 Demand side CDM reform options with focus on the hydro power sector

This section discusses the “demand-side” measures that the EU has implemented in the past or could implement in the future to influence the quality of the CERs from CDM projects used for compliance in the EU ETS. To date the EU has implemented some demand side measures such as:

- sustainability requirements for granting letters of approval to large hydro power projects;
- negative listing of A/R projects;
- enacting post-2012 use restrictions on CERs from industrial gas projects, and;
- enacting use restrictions on CERs from projects registered post-2012 from non-LDCs.

Each of these measures aims to achieve different goals and hence do not address all the issues that affect the integrity of the CDM.

As illustrated in Figure 4 and Table 3 earlier in this report, the use of negative listing and discounting represent key measures on the demand side to address additionality and sustainability issues of CDM projects. They could have broad application to many types of projects for which there are concerns relating to additionality and sustainability. Furthermore, through the careful definition of negative list qualification criteria, the construction of standards for project by project assessment or the determination of discount factors, it is possible to address concerns with specific project types.

Our demand side assessment focuses on negative lists and discounting. These approaches could of course have applicability to the supply side, as discussed earlier in this paper. By analogy, standardised baselines could have a role in the application of demand side project-by-project restrictions. However the issues related to the development of standardised baselines are discussed extensively in Section 4.2 and will hence not be covered for the demand side.

In this section, the demand side reform measures are assessed specifically for the hydro power sector. The purpose of doing so is two-fold. Firstly, by adopting a project type as an example we can explore the practical aspects relating to the use of negative lists, including the arguments for and against additionality testing and sustainability impacts, as well as the definition of the scope of projects that could be affected. Secondly, hydro projects within the CDM have come under increasing scrutiny and therefore, by using this as an example, we are able to make our analysis relevant to the current debate. The main criticism found in the literature is the claim that even if hydro projects pass the CDM additionality tests, in reality most large hydro power projects would have been implemented without the CDM revenue support, with the main focus of this criticism being projects in China and India. Furthermore, experts question the sustainability of large hydro projects under the CDM. This study reviews the arguments related to the additionality and sustainability of hydro power projects under the mechanism and assesses possible reform options.

4.3.1 Main concerns with large hydro dam projects under the CDM

Hydro power projects represent a growing share of registered CDM projects. It is now the most common technology in the framework of the CDM when measured against the number of registered projects. By June 2011, 30% of all registered projects were hydro projects. It is expected that approximately 331 million CERs will be issued from these projects by 2012 (or about 15% of the total amount of CERs expected to be issued by 2012). To put this in context, this cumulative hydro CER total to 2012 is equivalent to the annual GHG emissions of a country such as Spain.

The CDM guidelines define "large" hydro power projects as those that are 15MW and above. However, in this study, we take 20 MW as a threshold because the EU has taken this limit to harmonise the rules for granting letters of approval and the European Climate Exchange (ECX) has also used this as a cut-off to restrict trade of CERs. Moreover, most investors and market analysts define projects with 15MW power generation capacity as "small" projects[31].

Hydro power projects in the CDM have come under increasing scrutiny. There are two major concerns with large hydro dam projects:

1. The large hydro dam projects are argued to be non-additional (for example Schneider 2007, Bogner and Schneider 2011 and Haya 2010);

2. The large hydro dam projects are argued to be un-sustainable (for example Haya 2010).

Both criticisms listed above are heavily debated in the literature and in position papers published by non-profit organisations, policy think tanks, independent consultancies and industries. In the next sections we consider the arguments for and against these points in greater detail and examine their validity.

The debate on additionality of the CDM large hydro power projects

The arguments against and for the additionality of hydro power projects under the CDM are summarised in Table 8 below and elaborated on in the subsequent discussion.

[31]This view on definition is based on a discussion with Knut Vrålstad, Carbon finance manager from SN Power [Knut.Vralstad@snpower.com]. A literature review (IPCC 2011) also clearly shows that there is a large range of views on what is a small and or a large hydro project. For example, Bogner and Schneider (2011) in their study on China have categorised 50MW and above as "medium" and 250MW and above as "large" hydro projects.

Table 8. Additionality assessment issues in the CDM hydro power sector

Additionality tests	Views of the critics: The CDM integrity is jeopardised because it is based on additionality requirement which is inherently flawed	Views of the investors: CDM integrity can be improved through reform of additionality assessment and with additional checks
Barrier analysis:		
The barrier analysis is used to determine whether the proposed project activity faces barriers (investment barriers, technological barriers, barriers due to prevailing practice or others) that prevent the implementation of this type of proposed projects without the support of the CDM.	Haya (2009a) argues that many non-CDM large hydro projects have been built in China with the same barriers that are faced by the CDM hydro projects. The large hydro power technologies are matured and have been viable in China and India for many years and need no additional support.	Bloomgarden and Trexler/ Ecosecurities (2008) argue that additionality assessment are subjective and will always allow "some" non-additional hydro and other CDM projects to be free riders. Benchmarking might allow lesser number of non-additional projects to enter the pipeline.
Investment analysis:		
The investment analysis aims to determine that the proposed project activity is not economically or financially feasible without revenues from carbon credits. The test consists of a cost analysis, an investment comparison or a (financial) benchmark analysis.	Haya (2010) argues that the use of investment analysis is inappropriate for hydropower projects in India because "large hydropower developers are guaranteed a specified return on their equity investment making an Internal Rate of Return analysis meaningless". In China projects receive preferential loans from banks, making the hydro projects financially feasible.	The investors interviewed (Vrålstad, Knut, SN Power 2011) argue that the cost of hydro power projects depends on the design of the projects. For example, height of the dam head, design of the reservoir, use of new sustainable materials, design of the turbines, incur project specific cost. Thus, despite government support some hydro projects are not necessarily financially viable without CDM revenues.
Common practice test		
The common practice analysis is an analysis of the extent to which the proposed project type has already diffused in the relevant sector and region.	Schneider (2007) argues that medium and large hydro power projects are well diffused because these are centrally organised in China and India with the support of strong policies and five year plans (Bogner and Schneider 2011, Haya 2010).	
E+ /E- Rule for preparing baseline		
E + policy gives comparative advantage to more emissions intensive technologies or fuels. These policies can only be accounted for in establishing the baseline scenario if they were in place prior to the adoption of the Kyoto Protocol (11/12/1997). E – policy gives comparative advantage to less emissions intensive technologies or fuels. The impacts of these policies can be excluded in establishing a baseline scenario if they have been implemented since the adoption of the Marrakesh Accords (11/11/2001).	Vasa and Neuhoff (2011) and Morse and He (2010) argue that the E+/E- policy is equally challenging, as project developers can qualify for CDM projects even if the projects are already commercially viable under the current policy framework. In its 51st session, the EB decided to reject ten Chinese renewable energy projects because they could have been implemented without the CDM as a result of the historically (since 2001) highest feed-in tariff (He & Morse, 2010). The Chinese feed-in tariff had previously been decreased (E+ policy) by the National Development and Reform Commission, and the EB feared that the CDM was replacing the feed-in support.	Project Developers Forum (2009) argues that E+/E- policies do not reflect the real impact of the historic policies. A single hydro project might have received a high feed-in tariff or subsidies from the Government in the past but that could be a project several orders of magnitude different to the proposed CDM projects. Looking at the highest historic tariff or general historic domestic policies for the sector might not be relevant for specific CDM hydro projects. Also, the impact of historic tariffs and subsidies do not remain the same because of inflation. Moreover, some countries have a policy where CDM funds are channelled back to the Government, thus reducing the impact of the actual tariff that was initially provided by the Government. So the E+/E- policy needs clearer guidance and is not well developed.

As noted in Table 8, the authors who argue against the financing of hydro power projects under the CDM claim that all large hydro CDM projects in China and India are non-additional and should not be claiming CDM revenues (Schneider 2007, Bogner and Schneider 2011, Haya 2010).

Bogner and Schneider (2011) investigated whether or not the CDM played a key role in promoting hydro power (as well as gas and wind power) investments in China. They examined national government support for medium (50MW – 250MW) and large (>250MW) hydro power projects and concluded that this was a more important factor than the support delivered via the CDM for the development of the hydro power sector in the country. In particular, the paper argues that support policies such as the Renewable Energy Law and the Medium and Long Term Plan for Renewable Energy Development create favourable investment conditions and the fact that such a high proportion of new projects applied for CDM support suggests that they cannot all be additional. It provides further support for this view by providing data on the considerable growth in medium and large hydro power projects prior to the introduction of the CDM.

Morse and He (2010) also examine the question of the additionality of Chinese power projects, focusing on the wind sector. They argue more generally that IRR additionality tests are not well suited to state-controlled power pricing regimes in developing countries, where it is not possible to determine whether tariffs are manipulated to guarantee additionality, and that E+/E- policies are not suited to such complex embedded subsidies.

Both Bogner and Schneider (2011) and Morse and He (2010) highlight the dilemma between on the one hand including domestic subsidies and policies within the additionality test, and thereby creating a perverse incentive that discourages domestic policies that could jeopardise CDM revenues, and on the other hand crediting business-as-usual projects at the expense of the integrity of global emissions caps. Whilst Bogner and Schneider present this as an "unsolvable dilemma" focusing on the potential of new mechanisms to be more effective, Morse and He conclude that the issue should be confronted within the CDM framework.

In contrast to the above views questioning the additionality of large hydro project in general, many firms investing in hydro power projects argue that these critics ignore the specificities of hydro power projects, where the additionality very much depends on project-specific characteristics. They also regard the distinction between large and small scale projects in delivering different outcomes irrelevant with respect to their additionality. Each hydro dam project is built under different geographical conditions that more significantly affect the unit capital costs (USD/KWh) than the actual size of the project (IPCC 2011, pp. 27). Some of these costs cannot be met through the support of national subsidies or other financial loans and mechanisms in the host country. The CER revenues are therefore essential for making these projects viable.

The latest IPCC Special Report supports this view:

"Regardless, there is no immediate, direct link between installed capacity as a classification criterion and general properties common to all HPPs above or below that MW limit. Hydropower comes in manifold project types and is a highly site-specific technology, where each project is a tailor-made outcome for a particular location within a given river basin to meet specific needs for energy and water management services. While run-of-river facilities may tend to be smaller in size, for example, large numbers of small-scale storage hydropower stations are also in operation worldwide [without CDM revenues]. Similarly, while larger facilities will tend to have lower costs on a USD/KW basis due to economies of scale, that tendency will only hold on average" (IPCC 2011, pp. 16)

Based on this, interviewed investors claim that hydro dam project are to be assessed on a case by case basis. Judging all hydro projects in the same way would result in the rejection of many truly additional projects (Knut Vralstad, Carbon finance manager, SN Power, 2011).

An agreement between critics and investors exists on the point that the current additionality assessment is too subjective, and that the additionality tool is not robust enough to prevent non-additional hydro projects from being registered. Critics see this as a reason to stop crediting these projects altogether; For instance in an interview for this study, Barbara Haya stated that hydro projects or other renewable energy projects in emerging economies should be banned from the CDM and instead supported by climate finance mechanisms without the requirement of testing additionality

(Barbary Haya, Energy and Resources Group, University of California, 2011). In contrast, investors are keen that the CDM continues with the inclusion of hydro power projects with improved additionality assessments and additional checks in place, both on the supply and demand side of the mechanism.

The debate on the sustainability of hydro power projects

Observers point out that CDM hydro power projects often fail to deliver on local sustainable development, i.e. improving the social conditions in communities and not significantly altering the local ecosystem (interview with Anderson, J., WWF, March 2011). There are several reasons why despite this failure, hydro projects continue to be registered under the CDM.

- There is lack of clarity in how sustainability is defined and assessed by the host country Designated National Authorities (DNA). Within the CDM, the adherence to sustainable development of individual projects is judged through a sovereign decision taken by the host parties and approved through a Letter of Approval (LoA) to the project developer. The problem consists in predominantly weak guidelines on how sustainability should be assessed, and there is little conclusive evidence that these requirements are met prior to the delivery of the LoA. In the PDDs studied for this project, no clear evidence was found that sustainable development is of significant importance in the validation or registration of these CDM projects. No CDM projects were rejected on the basis of sustainable development.
- The host country DNAs also fail to monitor sustainable development over time. Beyond the initial LoA, the DOE project validation and the CDM EB project registration play no role in ensuring that sustainable development criteria are enforced by the project developers after the projects are registered. There has been a lack in monitoring the criteria during ex ante and ex post validation. This might lead to environmental and social damage or even human rights violation that were unknown at the time of registration.
- There is often a trade-off between national development priorities and benefits for local communities. In our investigation we found that at local level large hydro projects tend to provide less sustainable development benefits than smaller projects. However, when considering sustainable development at a national level rather than a regional or local level, this notion does not necessarily hold.

The UNEP Risoe CDM Pipeline database distinguishes between three types of large hydro dam projects, which potentially have different impacts on sustainable development. The three categories are:

- **"Large hydro new dam" projects:** these are newly built hydro dams. Critics argue that these projects alter river flows, displace communities, have impact on biodiversity and fish stocks, and contribute to emissions through land use change. Some authors further argue (Schneider 2007 and Haya 2010) that these are non-additional as well, since the building of new dams is supported by long term Government policy goals and measures (especially in China and India).
- **"Large hydro existing dam" projects:** these are for refurbishing old reservoirs and plants with modern energy saving materials and technologies. Potential negative sustainable development impacts are therefore not directly caused by the CDM but the result of earlier investment decisions.
- **"Large run-of-the-river" projects:** These projects do not have permanent storages/reservoirs and do not or only marginally alter river flows (IPCC 2011, pp.33). The IPCC Special Report (2011) clarifies that although some of the run-of-the-river projects might have short term seasonal storage facilities to divert flows; these are usually small, seasonal and have very low environmental and social impacts.

Table 9 below presents the summary data for the sub-category of large hydro power projects under the CDM.

Table 9. Summary of Large (>20MW) Hydro Power Projects under the Clean Development Mechanism

Type of large hydro power projects (>20MW)	No. of projects/CDM UNEP database (July 2011)	Total issued KCERs *	Total expected KCER by 2012	Total expected KCER by 2020
Registered new dam / reservoir	158	18,116	106,508	382,472
Registered existing dam	22	1,087	14,666	60,163
Registered new dam / run of the river	206	15,769	113,603	399,626
Total registered large hydro power projects (>20MW)	386	34,972	234,777	842,261
In the pipeline new dam	100	0	46,764	282,103
In the pipeline existing dam	12	0	5,169	24,128
In the pipeline new dam/run of the river	185	0	63,526	532,726
Total in the pipeline large hydro power projects (>20MW)	297	0	115,459	838,957
Total large active hydro power projects (>20MW) (registered + in the pipeline)	683	34,972	350,236	1,681,218
Total Large Hydro projects (>15MW)	1676	45,449	441,194	2,014,958

Source: Prepared by the author on the basis of data available from the UNEP Risoe CDM pipeline database (July 2011) and the International River database of CDM hydro projects (July 2011).
*1KCER=1000 CERs
Note: "In the pipeline" projects include projects at "validation", "request registration" and "request review" stages. It does not include projects in the pipeline which have been under "withdrawn", "validation negative" or "rejected" categories.

Based on the above data on new dams, 41% of the registered large hydro projects (>20MW) are of concern. It is to be noted that this may be an underestimation because some of the projects under the "run-of-the-river" are likely to be "large new dam" projects as well. The PDDs do not always clearly state the project types, and whenever this is left open the CDM database categorises projects as "new dam/run-of-the-river". It is therefore safe to assume that more than 41% of the registered large hydro projects are "large hydro new dam projects" (>20MW), around 50% are the "large run-of-the-river projects" (>20MW) and the "large existing hydro dam" projects are insignificant (less than 0.5%) in the total number of large hydro power projects under the CDM.

However, like with respect to additionality, the debate remains open on whether the size of a hydro project is the most relevant criteria influencing its sustainable development impacts. According to the latest IPCC special report:

"one large-scale hydropower project of 2,000 MW located in a remote area of one river basin might have fewer negative impacts than the cumulative impacts of 400 5-MW hydropower projects in many river basins (Egré and Milewski, 2002). For that reason, even the cumulative relative environmental and social impacts of large versus small hydropower development remain unclear, and context dependent" (IPCC 2011, pp. 16).

Finally, besides criticism about their additionality and sustainability, there have also been concerns expressed about how hydro projects may violate human rights or bring harm to communities in the long run. CDM Watch therefore proposes to include a no-harm assessment as part of a sustainability assessment, which would have to be repeated in a post project registration stage (Interview with CDM Watch July 2011).

The World Commission on Dams (WCD)[32] and the International Hydropower Association (IHA) have been working with the EC and the UN to promote better sustainability assessment tools for assessing hydro projects from both supply and demand side. These proposals are discussed in the following section.

4.3.2 Approaches to address sustainability concerns over large hydro projects in the CDM to date

The European Commission has already taken demand-side actions to address concerns regarding additionality of certain project types, for example the ban as of 2013 on the use of CDM credits from industrial gas projects (HFCs and adipic N2Os)[33] in the EU ETS. So far, no such measures have been taken for CDM hydro power projects and EU action has been limited to tackling the sustainable development concerns. To promote sustainability in the hydro-sector the EU Linking Directive states in article 11.b (6) that:

"In the case of hydroelectric power production project activities with a generating capacity exceeding 20 MW, Member States shall, when approving such project activities, ensure that relevant international criteria and guidelines, including those contained in the World Commission on Dams November 2000 Report "Dams and Development A New Framework for Decision-Making", will be respected during the development of such project activities."

These guidelines are widely recognised as the Gold Standard of dam building, and it is assumed that CERs for use in the EU ETS from large hydro power projects must adhere to them. In April 2009 the EU Member States agreed on a harmonised approach to implement these guidelines whenever a Letter of Approval (LoA) is given to a large hydro dam project. As of July 2009 a LoA for a CDM project will only be granted to large hydro CDM projects if the project design documents are also accompanied by a report showing compliance with the harmonised guidelines[34]. From 1 July 2009, following a transition period (1 April – 1 July 2009), Member States voluntarily adopted harmonised guidelines and templates for the assessment of projects' compliance with Article 11b (6). However, only 12 CDM projects demonstrated compliance with the EU ETS Directive from July to November 2009 (Saili, 2010).

Since the harmonisation is voluntary, European Climate Exchange's (ECX) showed concern in June 2010 over the fact that it would not be possible to guarantee that all member states would abide by the new rules (International Rivers, 2010). Faced with these uncertainties, ECX, the world's leading market for trading carbon credits, renewed its ban on the trade of CERs from large hydro power projects.[35] Moreover, the hydro power industry has expressed concern about the delay that may arise if EU Member States were to follow WCD guidelines in the approval of the use of large hydro power project CERs (>20MW) in the EUETS. In particular, one criticism of the WCD guidelines is that its comprehensive framework and high standards, which also call for "free prior informed consent" (FPIC) of the indigenous people, make the decision making and approval process slow. The guidelines also require profound changes to the country level planning processes for implementing hydro power projects (Foran, 2009).

In response to the above, hydro power investors advocate the use of the Hydropower Sustainability Assessment Protocol (HSAP) developed by the International Hydropower Association (IHA) for approving CDM hydro project CERs for use in the EU ETS. The HSAP is a scoring system for hydro projects that can deliver sustainability assessments quicker than on basis of the WCD guidelines. Further discussion on the potential use of HSAP and WCD is presented in the following Section under

[32] The WCD is a multi-stakeholder commission that agrees on high social and environmental guidelines to be followed when constructing dams.
[33] Commission Regulation N° 550/2011 of 7 June 2011 on determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, certain restrictions applicable to the use of international credits from projects involving industrial gases. see:http://ec.europa.eu/clima/documentation/ets/docs/linking/draft_regulation_en.pdf
[34] See http://ec.europa.eu/clima/policies/ets/linking_ji-cdm_en.htm.
[35] GTZ (Apr 2010); CDM Highlight Newsletter; Issue No. 82; Available at: http://www.perspectives.cc/home/groups/7/Publications/en-climate-cdm-highlights-82.pdf

the subheading “Project by Project Use Restriction”. The following section examines further potential demand side reforms to address additionality and sustainability concerns regarding large hydro projects.

4.3.3 Demand-side reform options to address additionality and sustainability in hydro power projects

At least two complementary demand-side reforms could be considered to address some of the CDM hydro project concerns discussed in this paper.

1. **A negative list** takes the approach of banning some or all large hydro project CERs from use for compliance by EU ETS entities. Such ban could apply to all CERs from hydro dam projects, only to those from a certain category (e.g. new plants, plants in countries with strong renewable policies, plants built after a certain date, a combination of these, etc.), or apply only on the basis of a "project-by-project" assessment against specific exclusion criteria. In line with the scope for this project we have focused our consideration of negative lists on their application within the EU ETS and not direct restrictions on Member State purchase.
2. **Discounting** obliges users to retire more than one large hydro CERs for each tonne of compliance obligation, under the presumption that some fraction of large hydro CERs are non-additional and do not represent real reductions. Similar to use restrictions, discounts can be applied to all or specific hydro power projects.

Both reforms are assessed in more detail below.

4.3.4 Full or partial aggregated negative lists

The following groups of aggregated negative list options are assessed:

Project type negative lists
- A credit purchase ban on large hydro **new dam projects** (>20MW)
- A credit purchase ban on **both large hydro retrofit and new dam projects** (>20MW).
- A credit purchase ban on **all three categories of large hydro projects** (>20MW), i.e. large new dam, large existing dam and large run of the river projects.

Country based negative lists
- A credit purchase ban on **all large hydro projects within certain countries** for which all such projects might be deemed non-additional (>20MW).
- A credit purchase ban on **all hydro projects from all countries except for LDC**.

Project by project negative lists
- A credit purchase ban for projects that fail to meet defines assessment criteria

Project type negative lists

For this study we have interviewed market analysts[36], project developers[37], and academics[38], asking them to develop a realistic picture of the potential scale of non-additional and non-sustainable CERs, and assess the possible market implications of a negative list.

In this section we consider the impact project type negative lists could have on the supply of CERs in comparison with the expected level of demand for those credits. It is important to note that this summary only represents one view, provided to the author by Deutsche Bank’s carbon team, on the likely future demand for and supply of credits and a broader view would need to take account of other

[36] AEA interviewed Isabelle Curien, Senior Carbon Market Analyst, Deutsche Bank: isabelle.curien@db.com
[37] AEA interviewed Knut Vrålstad, Carbon Finance Manager, SN Power: Knut.Vralstad@snpower.com
[38] AEA interviewed Barbara Haya, Berkley University.

estimates. Table 10 shows an estimate of demand for CERs under scenarios of EU 20% and 30% reduction targets.[39]

Table 10. Estimated Offset Demand until 2020 (million tCO2e) by Deutsche Bank (2010)[40]

	EUETS Quota of CDM/JI credits over 2008-2020 (including aviation)	Total EUETS demand over 2008-2020 Phase 3 scope with shipping included from 2015	Max. realistic EU Government demand	Total EU Demand
EU wide 20% target	1,685	1,750	885	2,635
EU wide 30% target	2,580	2,800	1,060	3,860

In Table 10 the maximum demand for CERs/ERUs under an EU-wide 20% emission reduction scenario is estimated to be about 2.6 billion. Under a 30% scenario the estimated EU CERs/ERUs demand is about 3.8 billion. The current economic crisis has reduced significantly the potential demand for credits therefore it is the authors' view that whilst 2.6 billion CERs aligns with the maximum that will be legally allowed, there is no guarantee that all of it will be bought by compliance entities. These figures include demand by Governments, not automatically affected by the application of negative lists to the EU ETS.

Deutsche Bank further estimates the supply of CERs from CDM large hydro projects (>20MW), which we use to illustrate the potential size of the impact of EU ETS use restrictions. Table 11 shows supply data based on CER issuance for three categories of hydro projects (>20MW): large hydro new dam, large hydro new and retrofit, and all large hydro projects with and without dams. Of particular interest for this study is the number of CERs issued in the period 2013-2020 (the right-hand column).It is important to note that the below analysis looks at the dates at which CERs are issued, rather than relating the CERs to the dates the projects were registered. Therefore CERs issued in the period 2013 to 2020 from projects registered prior will be included in the right-hand column. The figures for a restriction based on projects registered pre 2013 would be lower.

Table 11. Deutsche Bank estimates of CER issuance from three categories of hydro power projects which are under scrutiny for non-additionality and unsustainable characteristics

	CERs issued up to end 2012 (million tCO2e)	CERs issued up to end 2020 (million tCO2e)	CERs issued between 2013-2020 (non-eligible if CERs issued from CP1 projects are the only usable CERs in the EUETS)(million tCO2e)
Large new hydro dam projects (>20MW)	53	302	249
Large hydro project (new dam and retrofit) (>20MW)	57	338	282
All large hydro projects (with and without dams, >20MW)	115	654	539

Note: Please see definition of each type of large hydro dam on page 42.

[39]AEA is grateful for the contribution of Deutsche Bank (DB) Carbon Analyst Isabelle Curien for providing analysis that we have represented in the tables in this section. The figures derive from DB models that generate regular market updates on CER demand and supply. The interview with DB regarding this analysis was conducted on 26th of July 2011.
[40] Refer to Deutsche Bank 2010 for underlying assumptions

The table suggests that if a full ban is introduced as of 2013, 539 million less hydro power CERs (expected to be issued by 2020 for projects registered post 2012) would be available for use in the EU ETS. Of this total, 282 million CERs from "large hydro dam (new dam and retrofit)" projects would be made unavailable for use in the EU ETS and of those 249 million CERs would be made unavailable from "large hydro new dam" projects. We assume here that no ban would be introduced prior to 2013. As noted above, under a restriction based on the date at which projects are registered (rather than CERs issued) there would be fewer non-eligible CERs.

Based on the analysis above, 82% of CERs from all types of large hydro projects issued before the end of 2020 are expected to come from projects registered in the post 2012 period. A ban post 2012 under article 11.a(9) of the EU ETS Directive could therefore be very effective in limiting the environmental damage from non-additional CERs. Depending on the market price, it would also result in significantly foregone earnings for project owners.

Using the preceding analysis Table 12 below shows the supply of eligible CERS under differing large hydro use restriction scenarios. It assumes that government demand is met from other (non-hydro) CERs, that all post 2012 HFC-23 and N2O are excluded, but that all other CERs are eligible for use in EU ETS.

Table 12. Balance of EU ETS demand for and supply of CERs to 2020 (million tCO2e)

		Supply of CERs to EU ETS (assuming Government requirements are met)			
	Total EU ETS demand over 2008-2020 Phase 3 scope with shipping included from 2015	No hydro restriction	Large hydro new dam restriction	Large hydro new and existing dam restriction	All large hydro restriction
EU wide 20% target	1,800	2,600	2,300	2,000	1,500
EU wide 30% target	2,800	2,400	2,100	1,900	1,300

Using the figures in Table 12 we estimate that under the status quo, there could be an oversupply of CERs, and a substantial oversupply could continue to remain with restrictions on the use of new and existing hydro dams. If all large hydro were to be excluded (i.e. run-of-river projects also excluded) or if there were a move to an EU-wide 30% target (irrespective of hydro negative lists) then the balance could tip and there would be an excess of demand for CERs from the EU ETS. This result remains irrespective of whether shipping is included in the EU ETS.

An important caveat in this analysis is that it does not account for the expected supply of JI Emission Reduction Units (ERUs) up to the end of 2012 and that governments can and probably will also make use of Assigned Amount Units (AAUs).

Implicit in the above analysis is also that primary CERs costs remain below the EU ETS price, such that secondary CERs can remain attractive to EU ETS operators. Consequently the demand for CERs is dictated by the limits on their use within the EU ETS Directive. If available CERs fell short of that level of demand (because of negative lists for example), then additional and more costly abatement would be required from within the EU ETS. This could drive up the EUA price, with some resulting movement in the secondary CER price, and greater rents for developers of permitted project types.

The Table 12 estimates above for supply and demand of CERs do not present the full picture as the figures are based on currently projected supply of projects. A shortfall in CERs resulting from the application of negative lists may be partially compensated by additional eligible projects becoming viable (since the costs of earning these credits would be lower than the alternative EU ETS internal abatement) or supply from new market mechanisms established internationally or through bilateral agreements. We suggest further analysis of the impact of restrictions on the use of hydro CERs within the EU ETS taking all factors into account, if this option is to be considered.

Country-based negative lists

We have also looked into the option of **banning CERs from large hydro projects from certain countries** where strong policy objectives and measures are already in place for the hydro power sector and, therefore, additionality of CDM hydro projects is questionable. However, this option would be politically challenging to implement, and it could raise questions of consistency if other renewable energy projects supported by the CDM in these countries are not treated in the same way.

The last option in the list concerns **banning credit purchase from all hydro projects from all countries except Least Developed Countries (LDCs)** where there are significant financial and institutional barrier in implementing renewable energy projects for emissions reduction. This would align with the idea that the CDM should cater to LDCs while new market mechanisms should cover sectors in countries with a stronger capacity to implement sector-wide policies. In the absence of a future international or bilateral climate agreements, the existing EU legislation provides that credits from new projects registered after 2012 can only be used in the EU ETS or by Member States if the projects are located in Least Developed Countries. Of course, LDC projects might remain unsustainable (and even non-additional) if sustainability assessment tools on the supply or demand-side are not further improved. To reduce these risks further, a complementary disaggregated assessment at project level should be considered.

Project-by project use restrictions

Rather than using partial or aggregate negative lists, investors are keen that an additional check is introduced from the demand-side to prevent CERs from non-additional and unsustainable hydro projects to enter the EU ETS market. By contrast with the aggregated negative list restriction, a project-by-project approach would involve the determination of each project's eligibility for use within the EU ETS according to a standardised assessment approach. Here we outline some of the approaches currently promoted for project by project assessment of sustainability. There is extensive discussion on the approaches to standardised baselines for the determination of additionality within Section 4.1 of this report.

The International Hydropower Association (IHA) has already developed a Hydropower Sustainability Assessment Protocol (HSAP) which is on trial by some of the investors engaged in CDM hydro projects in India, Philippines and elsewhere. In 2007, the Hydropower Sustainability Assessment Forum (HSAF) was set up, composed of representatives and stakeholders from governments (including EU Member States) in order to provide the carbon market with a workable tool for the assessment of the sustainability impacts of large hydro projects. The Hydropower Sustainability Assessment Protocol, a comprehensive tool to assess the sustainability of hydropower projects globally, was launched in June 2011 at the International Hydropower Association (IHA) 2011 World Congress on Advancing Sustainable Hydropower. The tool offers a method to assess performance in approximately twenty vital aspects of the sustainability of hydropower facilities, depending on the stage of the assessment. These topics cover social, economic, environmental and technical aspects and include downstream flow regimes, indigenous peoples, biodiversity, infrastructure, safety, resettlement, water quality, and economic viability41. In an interview with the author, a hydro power investor (Vrålstad, Knut, SN Power 2011) proposed that, as a measure to ensure a better assessment of the hydropower projects under the CDM, the protocol (HSAP) be accepted as an alternative to the current Harmonised Compliance Report. However, there are also some critical voices against the use of HSAP as discussed in the following paragraph.

According to International Rivers[42], the IHA's HSAP has involved "little civil society participation" and "dam affected people and southern civil society networks have not been part of the negotiation" (International Rivers 2009). Wenban-Smith (2010) has produced a detailed comparative study of HSAP, WCD Guidelines, World Bank's Safeguard Policies, IFC Performance Standards and Equator

[41] Available at: http://www.ihacongress.org/News/NewsHolder/Global-tool-to-advance-the-sustainability-of-hydro
[42] Available at: http://www.internationalrivers.org/node/4764

Bank's Equator Principles. This study highlights the main gap in the HSAP as that it takes a 'no minimum performance threshold' approach, and in consequence does not incorporate explicit binding commitments to comply with defined performance, threshold standards or obligations (Wenban-Smith 2010). International Rivers argues on similar grounds and also states that "rights cannot be evaluated on a graded spectrum or scored from one to five: they are either respected or they are not (International Rivers, 2009). The latest version of the IHA protocol (2011) acknowledges that respecting the consent of indigenous peoples is "proven best practice" for hydropower projects. However, it does not define any minimum requirements that projects have to meet to be considered acceptable (International Rivers, July 2011[43]).

International Rivers considers the World Commission on Dams (WCD) guidelines as the clearest framework for protecting rights, allocating risks and evaluating dam projects. In April 2009 the EU Member States agreed on a harmonised approach to implement voluntarily these WCD guidelines whenever a Letter of Approval (LoA) is given to a large hydro dam project. Though these voluntary standards are non-binding, Member States do have a legal obligation to comply with the requirements laid down in the Linking Directive. The value of utilising HSAP as a sustainability assessment tool in addition to the WCD guidelines for approving hydro power projects from the demand side is not clear. Some literature (for example Foran, 2009) suggests that quickening the approval process is one of the main reasons for advocating the use of HSAP. The adoption of additional project-based checks such as HSAP at the demand side would involve additional administrative costs to be borne by the EU, project developers or secondary CER purchasers.

Review of use restriction options against criteria

Table 13 below reviews the advantages and disadvantages of the (partially) aggregated and disaggregated approaches for limiting use of credits for hydro projects.

Table 13. Impacts of the use restriction options reviewed against criteria

Approach	Environmental integrity	Economic efficiency	Political feasibility	Market acceptability	Other criteria
Aggregated negative list approach	(+) Very effective in preventing non-additional hydro power projects entering the CDM pipeline for registration and the EU ETS market (-) A blanket ban on certain categories of hydro projects would mean that the CDM will lose the opportunity of emissions reduction through some truly additional hydro .projects.	(-) A blanket ban could have greater market implications and may result in foregone opportunities for cost-effective additional credits	(-) It is expected that there will be support from NGOs and project developers in other project types, but opposition from host countries (depending on the type of restriction), hydro project developers and some compliance buyers. (+/-)The political support will also depend on availability of alternative options, such as sectoral crediting or trading and on overall market impacts.	(-) Market support for this approach is lower than for project-by-project restrictions.	(+) This approach will also encourage the hydro sector as a whole to levitate towards sectoral or other mechanisms allowing the transition to new mechanisms more acceptable.
Project-by-Project approach	(+) It can impact on the type of hydro projects entering the CDM pipeline for registration and the EU ETS market. Thus might solve the sustainability concerns through	(-) It will require a costly double project-by-project assessment, above the one already performed by the DOEs and the EB.	(+/-) Additional checks would be welcomed by some, but may also lead to criticism for unnecessarily increasing administrative costs and causing market	(+) Market support for this approach is high relative to negative lists, but complaints about fragmentation and additional delays and costs for issuance would remain.	

[43] Available at: http://www.commondreams.org/view/2011/07/13-8; More available at: http://www.internationalrivers.org/am/social-and-environmental-standards/civil-society-statement-launch-hydropower-sustainability-assessme

	the implementation of improved sustainability assessment tool. (-)The demand side additionality assessment tool might have the same issues that are faced by the EB. The critics point out that project-based additionality requirements are always based on subjectivity and are inherently flawed. At project-level it is difficult to factor in the impact of broader policy objectives on additionality.		fragmentation.		

There seems to be a clear trade-off between the administrative simplicity and overall effectiveness of an aggregate negative list, and it's political and market acceptability. While the table shows that the project-by-project approach is more acceptable for host countries and investors, the aggregated negative list approach has the potential to deliver greater environmental benefit if implemented on a basis of clearly defined criteria. The choice between the two will ultimately depend on the significance attached to the arguments for or against an overall ban and the availability of complementary methods for checking individual projects. If sustainable development is a real concern and the evidence on the significance of the amount of non-additional projects accumulates, an aggregated approach could be justified to safeguard the environmental merits of the EU ETS. If, on the contrary, the additionality and sustainability problems of hydro power projects are considered to be small and rather exceptions to the rule, a case-specific approach with additional checks may be more appropriate. We have noted in this study that the additionality issues are not necessarily specific to hydro power projects and remain an issue with other renewable energy projects categories as well. Therefore, any consideration by the Commission for use restriction of CERs in the EUETS would need to be based on a full review of other categories of renewable energy projects under the CDM as well.

4.3.5 Discounting

Discounting emission reductions implies that only a fraction of the emission reductions achieved by a CDM project can be used in the carbon market, thereby providing a net global GHG emission reduction (Butzengeiger-Geyer et al. 2010). Demand side discounting in the hydro power sector would allow the users only to use a fraction of their total CERs sourced from hydro projects for compliance purposes. For example, a 25% discount factor with a 3:1 compliance to cancellation ratio would mean that a user would need to transfer an additional CER to a cancellation account for using 3 CERs for compliance[44]. Such differentiated discounting options for project types have been proposed by Chung (2007), Schneider (2009) and in the negotiations under the AWG-KP. It has also been proposed to introduce multiplication factors larger than one in order to further favour some project types.

[44]In the existing literature on the CDM, discount factors have been defined as the percentage of emission reductions that is not credited. For example, a 30% discount factor would imply that only 70% of the verified emission reductions are issued as CERs (Butzengeiger-Geyer et al. 2010).

The criteria for applying discount factors for types of hydro projects

The main challenge of allocating discounting factors to hydro projects is to establish the criteria for deciding the discount factors for each type of projects. The following tables show some examples of discount factor development by experts such as Schneider and Öko-Institut researchers. In this study, three types of discounting approaches (Butzeingeiger-Geyer, 2010) have been included as examples to demonstrate the difficulties in applying discounts to hydro projects.

In Table 14 discount factors for additionality have been derived by Schneider (Butzeingeiger-Geyer, 2010) who grouped the CDM projects into three categories:

1. projects without economic benefits other than CERs,
2. projects with economic benefits other than CERs and considerable CER impact, and
3. projects with other economic benefits than CERs and a small CER impact.

Following this approach, problematic large hydro new dam projects might fall into the A3 category with 50% discount factor.

Table 14. Discount factors for additionality

Additionality category	Description	Examples	Discount factor
A1	Projects without economic benefits other than CERs	HFC-23, N2O, CH4 destruction	5%
A2	Projects with economic benefits other than CERs and considerable CER impact	Recovery and utilization of CH4	30%
A3	Projects with other economic benefits than CERs and small CER impact	Renewable energy, energy efficiency, fuel switch	50%

Source: Derived from Schneider (2007)

One of the problems with this option is how to assess the economic benefits of the A1, A2, A3 category of hydro projects beyond what is already being done under the additionality assessments. The assessment for categorising projects under different discount groups do not get beyond the problem of case-by-case additionally assessments.

The Öko-Institut also developed discount factors based on sustainability effects as shown in Table 15 where large hydro projects with medium sustainability impact might fall into the S2 category with 30% discount factor. This method does not take additionality concerns into account.

Table 15. Discount factors for sustainability effects

Sustainability category	Description	Examples	Discount factor
S1	High SD impact	Gold standard projects	0%
S2	Medium SD impact	Non gold standard renewable energy projects, Supply side energy efficiency,	33%

S3	Low SD impact	Industry gas projects	66%

Source: Öko-Institut

In**Error! Reference source not found.** Table 16 the Öko-Institut has combined discount factors from the earlier two tables. Here the combined discount factors are derived by multiplying the discount factors for additionality and sustainability. Following this approach, discount factors for hydro projects may vary between 50% - 83% (A3-S1, A3-S2, A3 S3). This example is provided for illustrative purposes. Different criteria or discount factors could be used to differentiate among project types.

Table 16. Combined discount factors for additionality and sustainability

Combined category	Additionality	Sustainable development	Combined discount factor
A1 - S1	Projects without economic benefits other than CERs	High SD impact	5%
A1 - S2	Projects without economic benefits other than CERs	Medium SD impact	37%
A1 - S3	Projects without economic benefits other than CERs	Low SD impact	68%
A2 - S1	Projects with economic benefits other than CERs and considerable CER impact	High SD impact	30%
A2 - S2	Projects with economic benefits other than CERs and considerable CER impact	Medium SD impact	53%
A2 - S3	Projects with economic benefits other than CERs and considerable CER impact	Low SD impact	77%
A3 - S1	Projects with other economic benefits than CERs and small CER impact	High SD impact	50%
A3 - S2	Projects with other economic benefits than CERs and small CER impact	Medium SD impact	67%
A3 - S3	Projects with other economic benefits than CERs and small CER impact	Low SD impact	83%

Source: Öko-Institut

Since the literature on CDM hydro projects (Bogner and Schneider 2011 & Haya 2010) strongly criticised large projects in China and India as leading countries in receiving CDM revenues for non-additional hydro project, it might be an option to add the element of country factors to the combined additionality and sustainability factors discussed above. Each non-Annex I country could have an own discount factor, linking it to the level of development or emissions in the country. The stronger its economy and/or the larger its emissions, the stricter the discount factor would be for the country. Michaelowa (2008) provides an example of how country discount factors could work. The multi-factor discounting methods can get into more and more complex level, if necessary. However, the main problems of applying discounts are:

- While the categories of projects (A1-A3 and or S1-S3 and country groups) could be based on some multi-factor measurable criteria, it is difficult to agree with the countries and the industry as to why some projects should have 50% and the others 63% or 72% discount factors for additionality, sustainability or country categorisation. In the three tables above, it is not clear how the allocated discount factors for additionality and sustainability categories have been decided. Quite often it is arbitrary or based on ratios which do not necessarily bring out the non-additional character of the respective project. The discount factors used for offsets in the USA (e.g. used in RGGI, Waxman-Marky-Bill for land use change and forest projects) are also based on largely qualitative judgements. This is the greatest weakness of the discount factor option.
- Discount factors could make truly additional hydro projects non-viable. Large non-additional hydro projects which have other sources of financing could continue to be in the CDM market even if demand side measures make the CER revenues low for these projects. In other words, discounting might not restrict the entry of the non-additional projects.
- For individual Member States or EU installations, it will be costly to set up such a unilateral assessment process and it will be difficult to harmonise decisions on discount factor updates and assessment of individual projects for applying the discount factor. The EU as a demand side assessor will have to be involved in an extensive data research and discount factor updating exercise if this option is to be implemented.

Review of the discounting option against criteria

Table 17 below reviews the advantages and disadvantages of using demand-side discounts for purchasing CERs from different types of Hydro projects from different countries.

Table 17. Advantages and disadvantages of the discounting options reviewed against criteria

Approach	Environmental integrity	Economic efficiency	Political feasibility	Market acceptability	Other criteria
Discounting options for CDM hydro projects	(+/-) In reality, this option is not fully restricting the supply of CERs from non-additional projects; neither is it improving additionality assessments except for making non-additional projects more costly. Moreover, the problem is that the projects which are additional large hydro projects will not be viable with limited demand for their CERs, while truly non-additional hydro projects which have other strong revenue sources will still continue to be under the CDM selling CERs to the buyers because they would afford to survive in the market. This means that demand side discounting can actually be disadvantageous for truly additional large hydro	(+/-) If done well, i.e. targeting project types *likely* to occur under BAU conditions, then economic efficiency should be improved, by reducing free riders and making actual target achievement more cost-effective. Using high discount factor for the use of large hydro new dam CERs reduces the supply of credits to the carbon market, thereby increasing the costs of large hydro projects CERs but on the other hand makes other types of CERs more attractive in the market. The compliance cost therefore might not be affected by this measure if discounting and multipliers are applied for all sorts of Hydro projects.	(-) A variation of the discount factor between project types would imply that some project types are politically favoured over others. This requires political agreement about the parameters defining what a "good project" is which is difficult to achieve.	(-) The market investors will find this option leading to uncertainty and unpredictable outcomes since demand-side option will mean that it will exert ex post judgement on projects rather than at a stage when projects are entering the pipeline.	Discounting and multiplier will allow some large hydro projects unattractive and some other types of hydro projects attractive (run of the river) for investment. It will also enable net emissions in host countries from large hydro projects. Therefore, the measure will not limit the scope for scalability.

	projects especially in middle income countries.				

4.3.6 Potential next steps for demand side reforms

Significant concerns over the additionality and sustainability of certain types of CER from CDM projects is driving considerations to implement further restrictions on the use within EU ETS of credits from such projects. These restrictions could include discounts, negative lists or additional project-by-project restrictions. Importantly, large hydro projects are the greatest area of interest because the additionality and sustainability of these projects has been questioned, especially for emerging economies such as China and India where they are well supported by long term domestic government policies.

There are, however, differing views on whether large hydro projects in these (and other) countries are inherently non-additional because of the evolving energy policy context in these countries, or whether in fact the true picture is more complex and projects can only be assessed on an individual level, recognising specific circumstances. The former suggests a blanket ban by project type for use of CERs in EU ETS whereas the latter would imply an additional project specific assessment of the eligibility of credits to be used in the system. There appears a consensus that the current additionally assessment and E+/E- rules introduce too many subjective elements, but whether an evolution of the existing additionality approach or a negative list option is preferred depends on the overarching objectives of the EU.

As noted by many experts (Barbara Haya, CDM Watch, and others), the CDM’s integrity is affected largely by the weak and unclear design of the additionality assessment tool and requirements. If policy makers want to maintain the CDM as a means for emissions reduction in developing countries there is a clear need for improvement of these instruments. If, on the other hand, there is a will to move away from the CDM towards the introduction of more effective new market mechanisms, it could be considered to remove large hydro power projects and the likes from the CDM, with a possible exception of Least Developed Countries (LDC).

The sustainability of large hydro projects is in question because of the lack of clarity in the CDM guidelines on the definition of sustainability together with inconsistent or lacking emphasis on compliance criteria for sustainability throughout the registration and validation processes. The project specific nature of sustainability issues casts doubt on a generic approach which distinguishes between “large” and “small” projects. The requirement to meet WCD guidelines for use of large hydro CERs in the EU ETS should enforce quality standards, but the voluntary nature of harmonised guidelines for implementing this approach implies that concerns over inconsistency remain.

In this paper use restriction options have been considered as (a) aggregated (general use) negative lists in which projects are excluded by type and (b) project-by-project use restrictions in which project-by-project additionality and sustainability assessments are required to determine eligibility. In the absence of a more developed consensus that all large hydro projects are non-additional or non-sustainable, the project-by-project approach would be more politically acceptable, but this approach would require improvements to address the subjective nature of current assessment methods and would incur additional administrative costs for projects.

Discounting approaches have many of the sensitivities of use restrictions. Approaches have been proposed in which projects are classified according to their additionality, but this in itself requires either blanket assumptions on the additionality of project types or the retention of a project-by-project additionality assessment. Likewise, the treatment of sustainability in deriving discount factors could either be aggregated or project specific. In a similar way to use restrictions, discounts could involve country specific treatment of project types. The fundamental difference is that in a discounting regime there remains an EU ETS demand for CERs that might otherwise be excluded under negative lists. The size of this demand depends on the willingness of EU ETS operators to bear the additional cost of purchasing CERs that must be discounted, and this may limit the approach (i.e. a high level of discounting reduces demand for a project type considerably with similar effects to a negative list). Also, implicit in the discounting approach is that a reduced level of demand remains for CERs from projects of questionable additionality or sustainability credentials, so it may be seen as an unsatisfactory solution to these issues.

In summary, the most significant barrier to the application of negative lists is the lack of a broad consensus on the inherent non-additionality or non-sustainability of certain project types. Additional EU project-by-project assessments could offer an alternative for restrictions on grounds of additionality, sustainability or both, but the key consideration will be whether it is possible to determine a robust standardised approach that identifies unsustainable or non-additional projects. Discounting options raise many of the same challenges as negative lists and the more complex nature of this approach and concerns over political and market acceptability described in this paper suggest this is a less favourable option.

We make the following suggestions to support the European Commission in taking forward its work on future CER use restrictions:

Improved arrangements on the supply side could lessen the need for demand side restrictions. In this context the following steps could be considered:

- Continue to pursue further clarity on the definition of sustainability within the CDM validation and registration process
- Continue to improve the guidelines for additionality testing and the development of alternative methodologies (e.g. standardised baselines and additionality tests).
- Continue to engage with the EU Member States in understanding the practicalities of using the WCD guidelines and the causes of any delays in the approval process for the use of hydro power project CERs in the EU ETS.
- Continue to engage with IHA on the potential for improved stakeholder participation in refining the HSAP and for assessing the comparative advantage and disadvantage of using the HSAP over the current harmonised guidelines for approving CDM hydro power project CERs from the demand side.
- Develop approaches for minimum thresholds for sustainability.
- Engage with DNAs to develop measures to further support the assessment of sustainability, including guidance and tools.
- Develop options for ex-post validation of sustainable development at project level, and the role of DNAs, DOEs and the EB in this process. Consider proposals for including the introduction of harm assessments as proposed by CDM Watch.
- Work closely with Member States towards full adoption of harmonised guidelines and templates for assessment of compliance with Article 11b (6) of the Linking Directive.

Potential next steps for the Commission more closely related to the development of demand side measures are:

- Examine further the hydro project size and criteria selection that could be applied in the determination of negative lists, preferably with reference to case studies and the factors which affect the additionality case and sustainability impacts.
- Carry out a more sophisticated market assessment to determine the impact of negative lists on the supply of CERs in relation to demand from the EU ETS.
- Further examine domestic support mechanisms as preparation for country specific negative lists or discounts. In particular, develop approaches for the interpretation of the E+/E- rule in defining negative lists and discounts.
- With a given assumption that the CDM has some inherent design problems, assess what alternative mechanisms and / or financial accelerators (private, public, international) without additionality requirement could support the hydro sector in the absence of the CDM, especially in low and middle income countries where there are still opportunities for large hydro projects. EU restriction should not in principle jeopardise clean energy projects and therefore the assessment proposed here might offer a clearer idea for the EU on the potential requirement for support to certain kinds of clean energy technologies in different types of countries.

4.4 New market mechanisms: the example of sectoral crediting

New market mechanisms including Sectoral Crediting have been proposed to deal with problems arising from the operation of the current project-based CDM. This section will describe to what extent a sectoral crediting mechanisms can be designed to perform better than the CDM in terms of key criteria identified in Section 1.1; i.e. environmental effectiveness and integrity, economic efficiency and political feasibility. Additional criteria identified in Task 1, such as technology transfer, governance and technical feasibility are also tested although because of the still hypothetical character of sectoral crediting, remarks remain generic. The exception is scalability, where a more profound assessment can be made. The section will finish with an outline of possible solutions to the identified challenges, including concrete process-oriented recommendations, some of which are based on the lessons learned from the CDM.

4.4.1 Sectoral crediting: how it works

A sectoral crediting mechanism (SCM) is a baseline-and-credit scheme rewarding GHG emission reductions from a covered sector against a pre-determined threshold possibly below business as usual (BAU) levels. Under a SCM a crediting baseline (or also called a crediting threshold[45]), is set well below BAU emissions. This guarantees that credits are only granted if a covered sector has undertaken mitigation below business-as-usual. The nature of the baseline or threshold can vary; it can be expressed as an absolute emissions limit, as an emissions or energy efficiency intensity target, or by non-GHG parameters such as a (clean) technology penetration rate.

This threshold in most instances would be a so-called “no-lose” target. Overachievement would be credited while non-achievement would not be penalized. For example, emission reductions achieved beyond the baseline are credited but failure to meet it would not lead to a penalty.

An important design element – to date still open – is the crediting itself. Credits emanating from a SCM could be issued either to the government hosting a SCM or to companies that participate in a SCM programme. If the government is credited, it might ‘redistribute’ credits to companies, raising all kind of technical, equity or subsidy issues. A SCM programme will also need to find answer to the question on whether only the host government can sell credits into other carbon markets or the private sector can do so as well.

In addition, a SCM mechanism, as any other mechanism, will need to deal with a big number of further design elements including sector and gases coverage or MRV rules (e.g.. Aasrud et al, 2009, Baron et al, 2009 or IETA 2010). These design elements are however generic, i.e. relevant for all crediting or trading mechanisms and will therefore not be covered in detail. However, we will analyse how to deal with the transition from the CDM.

4.4.2 SCM merits and challenges in terms of key criteria as compared to the CDM

Scaling up of greenhouse gas reductions

The possibly biggest merit of the SCM is the greater scope for scaling up emission reductions. The SCM has the potential of achieving a significantly higher environmental effectiveness than that of the current CDM.

- The coverage of entire sectors rather than projects naturally brings the opportunity for potential emission **reductions in all installations** and ensures that increases in emissions by some installations, which might offset the abatement by others, are accounted for;

[45] Credits are only awarded if emissions are equal or less than the crediting ‘baseline’ or ‘threshold’. Both terms,“baseline’ and ‘threshold’ are used interchangeably.

- The **coverage of sectors so far untapped** by the CDM further increases the overall mitigation potential of the new mechanism. For example, the Task 1 briefing paper on Technology Transfer (p.20) identifies transport as one of these untapped sectors. Moreover, in the power generation sector carbon capture and storage (CCS) and nuclear energy were excluded from the CDM until recently, and could benefit from the greater potential scope under the SCM (Baron and Aasrud 2009).
- **Own mitigation action** by developing countries until the crediting threshold is reached might never or at least later take place in the absence of the incentive for crediting reductions beyond that level. The element of domestic action is also key for enhancing environmental integrity and economic efficiency, as discussed below.

By expanding the scope of emission reductions beyond the project level, the SCM circumvents the additionality testing inherent to the current CDM and affects the generation of carbon finance and the transfer of mitigation technologies. These effects are discussed in relation to the remaining criteria below.

Technology transfer

The greater potential for **sector-wide transfer of transformational technologies** for emission reductions is an argument in favour of the SCM. The technology transfer briefing paper (p.20) suggests that SCM give developing countries greater freedom on technology choices than the CDM currently does. The SCM can scale up technology transfer thereby enabling structural change and anchor new and low carbon technology within a developing country. Technology transfer involves more than the technology only; successful technology transfer requires a favourable investment climate conducive to the deployment of new and advanced low-carbon technologies. The SCM will most likely support large-scale technology transfer while potentially creating an incentive to import and adapt new technologies (Baron and Aasrud 2009).

Governance

The **governance** and institutional setup of SCMs has not been debated in detail, which could be a disadvantage compared to the CDM because it **may take much time and political negotiation** to set up the relevant bodies and procedures. For example, a key question would be whether the sectoral mechanism should be subject to verification by auditors accredited internationally, nationally, or locally. A related question would be whether such requirement should be set by UN decisions or national legislations. There may be a case where domestic project-based or other types of crediting mechanisms are set up in addition. As the briefing paper on Governance points out from the CDM experience, the validation of PDDs by DOEs is one of the most crucial steps in the governance of the CDM, hence the importance of clear validation standards, procedures and guidelines, and strict standards for accreditation of DOEs. The approval of the Validation and Verification Manual in 2008 and the adoption of the Accreditation Standard in 2009 were essential in ceasing misunderstandings between the EB and DOEs regarding the application and interpretation of CDM standards, guidelines and procedures. One of the most critical areas will be how to assess, i.e. monitor, report and verify emissions reductions.

Economic efficiency

The enhanced scale of SCM in comparison with CDM would bring about greater generation of **carbon finance for financing mitigation below BAU and adaptation** in developing countries. Larger volume of credits could also reduce transaction costs (Baron and Aasrud, 2009).

In contrast to the CDM, the SCM avoids having to deal with the interaction between domestic support policies and measures and the reductions generated through the carbon market, as the sum (below the threshold) of all reductions – whether they were caused by policies or by the carbon market incentive – will be credited. In this way SCM avoids the perverse incentive to domestic action in host countries that are inherent in the CDM. This issue is with more relevance to the additionality testing and is therefore explored in greater detail in the section below.

Environmental integrity/effectiveness

It is primarily the level of the crediting threshold, or in other words the ambition of the crediting baseline, that will determine SCM's environmental outcome. SCM's scope for sector-wide emission reductions avoids the need for project-level additionality testing and thereby eliminates the concerns for the environmental integrity of individual CDM projects. In general, the performance of a whole sector rather than that of individual activities is assessed. Setting the threshold below BAU as to ensure environmental integrity is however subject to technical and political feasibility challenges that are discussed in the next section.

The SCM has the potential to address perverse incentives in the CDM that might inhibit domestic action in host developing countries despite the preventive procedures including the E+/E- rules.[46] E+/E- may well avoid the perverse incentive not to implement domestic mitigation policies, but they may also result in crediting BAU domestic activities. Morse and He (2010) argue that additionality is inherently influenced by domestic policy in the host country and therefore question how the CDM can through its E+/E- guidelines separate the impact of domestic regulations and policies from that of international carbon finance[47].

As the briefing paper on Political Lock-in has showed, an important element in the controversy over the additionality of hydro and wind power CDM projects, especially in China, relates to the interpretation of the E+/E- guidelines (see Briefing paper on baseline setting and additionality testing; He & Morse 2010; Morse & He 2010; Baron et al. 2009; Vasa &Neuhoff 2011). The guidelines have been applied to Chinese hydro- and wind power projects where reductions in feed-in tariffs for renewable energy were deemed by the Board to constitute an E+ policy and a substitution away from domestic subsidies to subsidies through the CDM. Consequently, the Board ignored these lower tariffs and instead used the historically highest tariff in the region to assess the additionality of these hydro and wind projects.

A SCM avoids the question of the interaction with domestic policies and the whole additionality testing. What could have been disregarded as E- policies under the CDM will be accounted for by setting baselines below BAU emissions. Amatayakul and Fenhann (2009), however, point out that even when a host country accepts an ambitious baseline, the type of the baseline, e.g. absolute or indexed, and additional design features, such as how emitters are rewarded or sanctioned, play a role in passing the incentives on to the individual businesses in the electricity sector example.

Political and technical feasibility and acceptability (including simplicity)

Flexibility in the methods of setting baselines together with simplicity of design in certain aspects is the main advantage of SCM over the CDM. Major challenges to its political and technical feasibility emerge when it comes to determining the detailed nature and rules for the baselines and for other elements, as well as providing reliable data and capacity for SCM's implementation.

On the one hand, the SCM reduces red tape compared to the CDM through the non-requirement of additionality tests and thus provides for greater simplicity in design. Another advantage of SCM is its flexibility in setting baselines. These can be set in terms of absolute emission levels, such as sectoral caps, in terms of indexed (relative) baselines, such as performance standards and benchmarks, or in terms of technology penetration rates.

[46]E+ guidelines foresee that national or sectoral policies and regulations that give comparative advantages to more emissions-intensive technologies or fuels (i.e. increase baseline emissions) should be discarded when setting the project baseline and assessing additionality if they were put in place after the adoption of the Kyoto Protocol (11/12/1997). The rationale for this is to prevent Host Parties adopting policies which create artificial baseline scenarios for proposed CDM project activities.E- guidelines foresee that policies and regulations where the comparative advantage is in favour of less emissions-intensive technologies or fuels, can be ignored if they have been implemented after the adoption of the Marrakesh Accords (11/11/2001). The rationale for this is to ensure that the CDM does not create a perverse incentive for Host Parties not to introduce policies which would contribute to emission reductions.see the briefing paper on baseline setting and additionality testing.

[47] For example, Baron et al. (2009) show an example of Pakistan introducing a policy to support small renewable energy projects (wind and small hydro) with possibility for independent power producers developing renewable projects to be credited with certified emission reductions (CERs). This policy is mentioned as an example of linking CDM revenues to the promotion of renewable energy.

On the other hand, this should not belittle the technical as well as political difficulties for selecting a baseline and then for assessing credits including MRV.

Relative, i.e. intensity-based crediting baselines tend to be more acceptable to industry as well as fast growing (emerging) economies as they are seen less as a constraint to capacity growth as absolute targets. Intensity-based targets are considered to suit developing economies particularly well, where economic growth projections are particularly difficult. The downside is the uncertainty in the environmental outcome. (see Egenhofer and Fujiwara, 2009). Nevertheless, environmental outcomes, as mentioned above, depend on the stringency of the target rather than the form of the target (e.g. see Bradley et al., 2007). A tough relative target can yield higher reductions than a weak absolute target. As an example of a relative target Amatayakul and Fenhann (2009) consider a sector crediting mechanism based on a power plant emission intensity standard (gCO_2/kWh), which can result in significant emission reductions and ensures environmental integrity as long as it is set below the BAU (see section 4.4).

Alternatively, a baseline can be defined as a level or rate of technology penetration. For example, a technology penetration baseline for wind power generation can be defined as the actual power generation from wind power plants (i.e. GWh), the installed wind power capacity (GWe) or the share of wind power in total power generation (as percentage). Credits can be generated from the difference between the *ex-ante* established penetration level (e.g. targeted MWh of wind power generation) and the monitored technology penetration (e.g. actual MWh of wind power generation) multiplied by a GHG emission factor (EF) (Schneider &Cames 2009). Technology penetration baselines in particular could be used in a sub-sector where the host developing country envisages measures to promote specific technologies (Schneider &Cames 2009). The strong link between technology penetration baselines and domestic policies and measures to promote a particular technology in the SCM could be a potential answer to the hydro and wind additionality controversy under the CDM. However, Schneider &Cames (2009) also note two disadvantages of technology penetration baselines: the difficulty to assess the BAU rate of technology penetration and the emission factor in sectors where several technologies are applied.

'No lose' targets can enhance political acceptability by the host country. They do however not address the risk of a not sufficiently stringent baseline.

There are a number of barriers to the successful and timely implementation of SCM. The Task 1 briefing papers on Scalability and on Political Lock-in (see Annex 1) outline the key outstanding needs and concrete ideas to make new market mechanisms work. Some of these needs for baseline-setting and crediting are highlighted below:

- **The rules for determining the sectoral baseline** would have to be negotiated and agreed on an international level, which is politically difficult to achieve. The challenge is also to what extent a host country can accept a crediting threshold or target below BAU emissions. Schneider et al. (2009) have concerns that some countries may inflate their baselines to achieve credits through lower efforts. There are ways around this issue, for example, by using historical values as a reference and crediting anything going beyond, but this would not work in sectors where GHG intensities already decline over time.

- **Significant capacity for emissions inventory and monitoring, reporting and verification (MRV) needs to be in place** (Helme et al. 2009). The scope of SCM is generally limited to the sectors where emission reductions can be easily monitored, reported and verified. On the one hand, the implementation requirements in terms of institutional capacity would favour its development in 'highly structured industries', usually capital intensive ones, and in countries with higher degrees of industrial governance (Hampton et al., 2008). Other sectors with diffused sources and actions, such as transport, buildings and appliances, may not be able to meet the rigorous MRV requirement for crediting emission reductions, although GHG protocols to serve as proxies can be developed. If the baselines are stringent enough, there is a guarantee that reductions are achieved, even if uncertainty remains. On the other hand, many developing countries do not have the technical capacity for robust accounting systems and require considerable capacity building on top of the existing CDM support structure (see e.g. Fujiwara et al. 2010). More specifically, the host country's inability to set up meaningful benchmarks has been one of the main barriers to implementing widespread use of sectoral benchmarking methodology for CDM projects. There are however countries that already have established DNAs and ongoing experience approving CDM projects, as well as countries that have already begun to implement domestic sectoral policies or NAMAs (Hampton et al., 2008). They should be considered to be at the higher end of the learning curve.

- The **data needs** can be regarded as one of the most important technical barriers to the fast implementation of new market mechanisms in developing countries (see our Task 1 Synthesis briefing paper, p.13). Data availability, reliability and comparability and major challenges to the participating countries. For example, Fujiwara et al. (2010) point out the lack of available and accessible data, especially plant specific data and above all cost data; and lack of consistency in the current circumstances and data-collection capabilities among countries and sectors, particularly in relation to sector characterisation under measurement protocols. The SCM will require developing countries' ability i) to set the boundary of the sector or sub-sector (including sector characterization), ii) to collect data, iii) forecast emissions projections, using conservative emission assumptions, and iv) to monitor, report, and verify (MRV) emissions and activity data for the relevant sectors and its installations.

- **How to guarantee credits for over-performing companies under the SCMs.** Under the SCM the entire sector's performance can be credited but individual performance of a participating company cannot. From an investor perspective there is need for incentives and rewards for proactive entities that are delivering beyond the baseline and equally for assistance to entities that are not meeting the baseline and failing to deliver. Consequently it is important to set in place the right mix of policies that incentivise entities for mitigation actions and address the lack of other entities' actions.

- **Risk of excessive supply of credits under the SCMs**. The value of credits depends on the carbon price, which itself depends among other on the scarcity of allowances, expressed as demand. In carbon markets demand is determined by the level of ambition for emissions reductions in internationally negotiated commitments or, as currently seems the case, domestic caps such as those in Annex I countries under the Kyoto Protocol or the EU Emissions Trading System. Therefore, an increase in the supply for example through credits under a SCM needs to be balanced by an increase in demand under the ETS or the other carbon markets the credits can be sold to. Otherwise, the carbon price and incentives to reduce emissions would be eroded.

4.4.3 Overcoming SCM challenges.

Ambitious baselines below BAU

More ambitious crediting baselines are one possible solution to the risk of excessive supply of credits under the SCMs. If this does not happen, the alternative is to increase demand among compliance buyers. This would mean more stringent commitments by developed countries or their respective emissions trading programmes.

A SCM mechanism might be more acceptable if an intensity target was chosen. This does not necessarily compromise the environmental outcome. Amatayakul and Fenhann (2009) show that reductions by a relative baseline will be secured as long as the system is designed in such a way that the incentives to reduce are properly passed on to the businesses in the sector. Setting the threshold below the BAU emissions intensity level and excluding some project types that are already common in each country from gaining credits could help improve and ensure the environmental integrity of the mechanism. The authors' estimates show that in the baseline scenario (absence of a SCM and crediting threshold) the total CO_2 emissions from power generation in the seven countries studied are expected to double between 2005 and 2020 (from 3,500MtCO_2 to 7,800MtCO2). In the ambitious scenario the total average emission reduction in the seven countries would however amount to 480MtCO_2/year (Amatayakul and Fenhann 2009).

In response to the political challenge of setting crediting thresholds below BAU emissions developing countries could be incentivized by the "no-lose" nature of the targets and of course the prospect of additional and scaled-up revenues for host countries relative to the CDM. The incentive to participate will also significantly increase if demand for the traditional CDM is limited. Another driver for improving the political acceptability of SCMs on behalf of developing countries would be provision of access to low-carbon technologies. This is because host countries need to set effective policies and measures in place to move away from the BAU baselines. Low-carbon technologies tend to be specific to sectors: some sectors have proprietary technologies, however most do not. Some sectors may have more incentives to make transition from the CDM to a scaled-up mechanism than others. Some may be better prepared to move faster than others. Full and effective implementation of a Technology Mechanism supported by a Climate Technology Centre and Network[48] could help developing countries assess the technology potential for their mitigation actions and reflect the assessment on baseline setting.

Institutional capacity

Established CDM governance and institutional systems, structures and procedures, such as accreditation standards, verification rules or methodologies for calculating emission reductions, may be of use to transpose directly to the SCM for speedy implementation of the new mechanism (see e.g. Baron and Ellis 2006). This is especially important if accompanying domestic mechanisms with the relevant institutions, project-based or otherwise, are going to be set up in a way that requires transparency and international coordination.

The CDM experience is helpful in two more aspects, as outlined in the Task 1 briefing paper on Political Lock-in. First, setting of standardised baselines (also called multi-project baselines) within the CDM process could be an initial step in preparation for a sectoral baseline. Accurate historic emissions data or at least the capacity to forecast emissions fairly accurately are a precondition for setting standardised baselines. Standardised baseline setting could be supported by independent technical institutions or even be driven by the private sector as currently seen under the CDM.

Sectoral benchmarking has been proposed as a CDM methodology for the cement sector by the World Business Council for Sustainable Development (WBCSD) Cement Sustainability Initiative (CSI). The methodology uses benchmarks based on the carbon intensity per cement or clinker tone in a given region and is used to calculate baseline scenario emissions and demonstrate additionality (Fujiwara 2009). The reference data is based on the local and global performance indicators, sourced from the CSI Cement Industry Database under the Getting Numbers Right (GNR) initiative and is consistent with the Cement CO_2 Protocol. The environmental integrity of the project is enhanced due to the dynamic nature of the baseline, adjusted for business-as-usual improvements (Egenhofer&Georgiev 2010). However, the methodology has been rejected due to unresolved leakage issues. This experience nevertheless shows how the CDM could lay the foundation for implementation of sectoral mechanisms, especially baseline setting, MRV and most importantly data collection.

Data, MRV and technical capacity

Our Task 1briefing paper on Political Lock-in points out that capacity building requires upfront funding before financial flows are generated from the carbon market. Capacity building needs are estimated to cost around $5.1 billion (ECOFYS 2009 quoted in UN AGF 2010), which is a fraction of climate finance currently under consideration. Capacity building efforts in developing countries, especially those aimed at data collection and MRV could benefit from the proposed Green Climate Fund. The Fund supports projects, programmes, policies and other activities in developing country Parties using thematic funding windows[49]. Governments of Annex 1 Parties are expected to directly step in and provide concerted finance for the development of capacity to establish and operate sectoral mechanisms in non-Annex I Parties (Hampton et al., 2008).

In addition, there is a need for trust of markets – as well as in developed countries governments to ensure long lasting political support – in the capacity of developing countries to measure, report and verify emissions and how benchmarks are established (e.g. IETA, 2009). This might require support for data collection as well as development of sectoral benchmarks and MRV systems, at least for some developing countries. The WBCSD-CSI's GNR initiative shows how an industry sector can play a role in building a sectoral database to facilitate data collection and sharing among its member companies in the cement sector. Data collected through this and other initiatives, such as the Asia

[48]see B. Technology development and transfer, IV. Finance, technology and capacity-building of the Cancun Agreements, UNFCCC CP 2010)
[49] Decision1/CP16

Pacific Partnership on Clean Development and Climate (APP), can be used as the basis for developing MRV procedures for SCMs. Fujiwara et al. (2010) propose a number of steps to address the capacity gap in data issues by utilizing data and measurement methodologies from the industrial initiatives: assessing capacity for data collection; testing measurement protocols and the capacity to implement them; analysing the applicability of sectoral approaches; ensuring the collection of reliable data; gaining international acceptance of data-collection systems and measurement protocols; and last further improving the technical and institutional capacities for MRV.

Lastly, the scope of NAMAs or sectoral activities eligible for crediting could expand significantly without direct MRV. New market mechanism options can be designed to reward GHG emission reductions in the sectors that are not easily measurable, reportable, or verifiable and therefore fall outside the project-based CDM. Some of the early proposals for SD-PAMs or more recent submissions on NAMAs would be suitable to the sectors with diffused emissions, such as transport, buildings and appliances and enable to directly reward policies and measures. For instance, the Republic of Korea proposed a system involving 'success indicators' for NAMAs as a tool for indirect MRV. Examples of success indicators can include the percentage of energy-efficient appliances, average carbon intensity of the national or regional vehicle fleet etc (Republic of Korea's submission, UNFCCC AWGLCA 2011b). To ensure the environmental integrity the UN Advisory Group on climate change financing suggests that discounting of NAMA credits could be one way of dealing with uncertain actual abatement outcomes (UN AGF 2010).

4.4.4 Summary of assessment against criteria

There are a number of advantages associated with the SCM, as summarized in Table 18. The first relates to the scale of reductions. The coverage of entire sectors rather than projects brings the opportunity for potential emission reductions in all installations and more importantly, ensures that reductions in some installations are not off-set by increases in others. In addition, it allows for tapping in new sectors that have so far not been subject to CDM projects or only in a limited way. This study has identified transport in particular. Furthermore, the expectation of crediting might drive domestic mitigation much stronger than without SCM in order to reach the crediting threshold and thereby the crediting status earlier. It is well established that the SCM circumvents the additionality testing inherent to the current CDM.

Technology transfer is also positively affected; the SCM gives developing countries greater freedom on technology choices than the CDM currently does. Thereby the SCM can scale up technology transfer and enable structural change and anchor new and low carbon technology within a developing country.

While many of the governance issues are undecided, it is clear that the SCM implementation may take a lot of time until political negotiations on baseline setting or MRV are settled. Fundamental choices regarding institutions will need to be taken, notably whether they should be based on UN or national rules. One of the most critical areas will be how to assess, i.e. monitor, report and verify emissions reductions.

As a result of the greater scale, the SCM is expected to have lower transaction costs than the CDM. At the same time, the enhanced scale of SCM in comparison with CDM would bring about greater generation of carbon finance for financing mitigation below BAU and adaptation in developing countries. Finally, the SCM avoids having to deal with the interaction between domestic support policies and measures and the reductions generated through the carbon market, as the sum (below the threshold) of all reductions will be credited.

The environmental ambition is a function of (the level) of the crediting threshold. Since there are no crediting thresholds set at the moment, it is difficult to make a final assessment.

Flexibility in the methods of setting baselines together with simplicity of design in certain aspects is however an advantage of SCM over the CDM. The bigger scale of the SCM compared to the CDM also reduces red tape through the non-requirement of additionality tests and thus provides for greater simplicity in design.

Another advantage of SCM is its flexibility in setting baselines. These can be set in terms of absolute emission levels, such as sectoral caps, in terms of indexed (relative) baselines, such as performance standards and benchmarks, or in terms of technology penetration rates. On the other hand, one should not underestimate the technical as well as political difficulties for setting a baseline and then for assessing credits including MRV. Other challenges emerge when it comes to determining the detailed nature and rules for the baselines and for other elements, as well as providing reliable data and capacity for SCM's implementation.

'No lose' targets can enhance political acceptability by the host country. They do however not address the risk of an insufficiently stringent baseline.

Table 18. SCM Design options measured against criteria

SCM Design feature/option	Environmental effectiveness	Environmental integrity	Economic efficiency	Political and technical feasibility	Governance and technology transfer
Enhanced scope: - new untapped sectors - coverage of entire sectors - own mitigation action by developing countries	(+) Scaling up of emission reductions	(+) Circumvents additionality testing (+) addresses the perverse incentives under CDM (-) depends on ensuring the high ambition of the baseline	(+) Potentially higher generation of carbon finance (+) no need to deal with interaction between domestic action and carbon finance (+) Lower transaction cost	(+) Simplicity of design	(+) Sector-wide technology transfer
Inability to determine credit supply and demand in advance	(-) Potential excess of credits (-) Low price is a disincentive to deeper cuts		(-) Risk of carbon price collapse		
institutional set-up not complete				(-) Insufficient institutional capacity	(-) Prone to significant delays
Selecting type, ambition and rules of the baseline		(+) Overall integrity ensured if below BAU and incentives passed on to all industry participants		(-) High ambition may be politically unacceptable to host, while low may be unacceptable to the global community (+)Flexibility to fit national/sectoral circumstances (+) Can vary among countries, regions or sectors	(-) Demands for international negotiation, approval and transparency of governance structures
Intensity baseline	(-) No environmental certainty in constraining emission growth	(+) Overall integrity ensured if below BAU and incentives passed on to all industry participants	(+) Suit fast-developing economies (+) Avoid economic uncertainty in emission reductions	(-) High demand on data needs, technical and institutional capacity and MRV	
Absolute baseline	(+) Clear environmental outcome			(-) High demand on data needs, technical and institutional capacity and MRV	
Technology penetration standard	(-) Difficulty to assess the BAU rate of technology penetration (-) Difficulty to determine the emission factor in sectors where several technologies are applied	(-) Difficulty to determine the emission factor in sectors where several technologies are applied (+) Potential to address wind and hydro additionality controversy under CDM		(-) Difficulty to assess the BAU rate of technology penetration (-) Difficulty to determine the emission factor in sectors where several technologies are applied	(+) Can promote particular technologies

Capacity needs				(-) Insufficient technical and institutional capacity for MRV	
Data availability				(-) insufficient data for baseline setting and MRV	

We have identified a number of concrete barriers to the successful and timely implementation of SCM (see also Table 19):

- Negotiations of rules for determining the sectoral baseline at international level is most likely very difficult.
- There are concerns over inflated baselines to achieve credits through lower efforts.
- Significant capacity for emissions inventory and monitoring, reporting and verification (MRV) will be needed
- The data needs may yet amount to an un-surmountable technical barriers especially to a fast implementation of any new market mechanisms in developing countries
- The incentive for SCM will depend on the level of the carbon price, which is a function of demand and supply. Therefore, an increase in the supply for example through credits under a SCM needs to be balanced by an increase in demand under the ETS or the other carbon markets the credits can be sold to.

Table 19. SCM implementation challenges, ways forward and the role of CDM's experience

Criteria category	Challenges and Barriers	Possible ways to overcome them	How the CDM could help
Environmental effectiveness	Risk of inflated baselines to achieve credits through lower efforts	Intensity target defined in such a way that incentives to reduce remain intact; Ambitious baseline below the BAU, possibly combined with an exclusion of certain project or crediting types	Standardised baselines (multi-project baselines) as an initial step towards a sectoral baseline
Environmental integrity	Risk of excessive supply of credits is a disincentive for further emission reductions	More ambitious crediting baselines or more stringent commitments by developed countries	
Political feasibility	Tough negotiations of rules for determining the sectoral baseline at international level	"No-lose" nature of the targets; prospect of additional and scaled-up revenues; limit demand for the traditional CDM; technology support	
Technical feasibility	Significant capacity gap for emissions inventory and MRV Data needs may significantly slow down implementation		Accurate historic emissions data collection or at least the capacity to forecast emissions fairly accurately; benchmarking
Economic efficiency	Incentive for SCM will depend on the level of the carbon price i.e. a balanced demand and supply of credits.		
Governance, technology etc.	Institutions and governance capacity and structures, including for MRV		Employ established CDM governance and institutional systems, structures and procedures, e.g. accreditation standards, verification rules or methodologies

4.4.5 Overcoming the barriers to the SCM

The risk of excessive supply of credits under the SCMs can be addressed by either more ambitious crediting baselines or by more stringent commitments by developed countries or their respective emissions trading programmes. Finding a solution to this conundrum is a precondition for SCM to work.

A SCM mechanism might be more acceptable if an intensity target was chosen. Our analysis shows that this does not necessarily compromise the environmental outcome. The system can be defined in such a way that incentives to reduce emissions remain intact. The key is the ambitious baseline, possibly combined with an exclusion of certain project or crediting types.

In response to the political challenge of setting crediting thresholds below BAU emissions developing countries could be incentivized by the “no-lose” nature of the targets. The prospect of additional and scaled-up revenues for mitigation and adaptation for host countries relative to the CDM might also play in favour of SCM. The incentive to participate will also significantly increase if demand for the traditional CDM is limited. Progress on technology support potentially has also a positive effect on support for SCM.

The biggest barriers are most likely in the areas of governance, institutions and technical capacity and political acceptability.

Governance, institutions and technical capacity are critical

Established CDM governance and institutional systems, structures and procedures, such as accreditation standards, verification rules or methodologies for calculating emission reductions, may be of use to transpose directly to the SCM. The CDM experience would be helpful in two more aspects: First, setting of standardised baselines (also called multi-project baselines) within the CDM process could be an initial step in preparation for a sectoral baseline; Second, accurate historic emissions data or at least the capacity to forecast emissions fairly accurately are a precondition for setting standardised baselines. Standardised baseline setting could be supported by independent technical institutions or even be driven by the private sector as currently seen under the CDM. The CDM as well as past or ongoing benchmarking exercises such as under ETS allocation, World Business Council for Sustainable Development (WBCSD) Cement Sustainability Initiative (CSI) or the APP show that foundations for implementing sectoral mechanisms, especially baseline setting, MRV and most importantly data collection exist.

More generally, capacity building requires upfront funding before financial flows are generated from the carbon market and therefore should become an immediate priority. Capacity will also be a precondition, for generating trust of markets in the capacity of developing countries to measure, report and verify emissions and how benchmarks are established. This will require support for data collection as well as development of sectoral benchmarks and MRV systems, at least for some developing countries. The WBCSD-CSI’s GNR initiative shows how an industry sector can play a role in building a sectoral database to facilitate data collection and sharing among its member companies in the cement sector.

4.4.6 Potential next steps to ensure political acceptability

Although the SCM has a number of advantages compared to the CDM political acceptability is not certain. First, numerous technical, institutional and data challenges exists. We have argued that these are non-trivial but can be addressed with appropriate measures. Second, the SCM will only be attractive if national, regional or global carbon markets generate sufficient demand for credits. Whether a solution can be found remains uncertain at the moment. A third barrier is the fear of host countries to lose out from the benefits of the CDM. This can be addressed by making the case of the advantages of the SCM – compared to the CDM – as has been expressed above. While not all developing countries may see an advantage for switching to a SCM, for some the CDM may have outlived its utility. It is also clear that the EU and other Annex I countries will gradually restrict the CDM. Overall, the longer term future of the CDM is not ensured pending the outcome of international negotiations. The decisive issue of the SCM might well be the ‘negotiations’ of the crediting baseline or as we have also called it threshold. While the starting point for the EU is the benchmarks used for EU ETS allocation, they may not be acceptable for developing counties. On the other hand, inflated baselines will undermine the environmental outcome and will question the utility of SCM. This tension however offers space for bilateral or international negotiations that are highly technical and political at the same time.

The next steps could include the following:

- Set rules of setting baseline and identify capacity building needs consistent with the challenges outlined above, e.g. data collection, data consistency, data comparison, develop baselines that take account of historic emissions, with a focus on consistent approaches for the determination of BAU and specific treatment of domestic policies including rules on excluding certain project types. This should be done for absolute, relative and technology penetration targets. In the case of the latter, rules for conversion of technology penetration rates and GHG reductions need to be established.

- Develop capacity for Monitoring, reporting and verification (MRV)

- Collect data, develop transparent and consistent methodologies for data processing; build upon the CDM and past and existing initiatives such as the APP or the WBCSD/CSI.

- Start developing a blueprint for governance and institutional options to be discussed and brought forward bilaterally or within UN negotiations

- Take account of the interactions between supply and demand at national, regional and global level to ensure that demand for credits is guaranteed

- Accompany the proposal for a SCM with technology support policies and restrictions of the CDM where appropriate.

5 Conclusions

Task 1 work for this project identified and analysed a series of key merits and shortcomings of the current CDM system, and identified a range of reform options that could potentially address these shortcomings. Based on analysis under Task 1 we identified the following three general (supply and/or demand-side) reform options with major potential to address multiple concerns:

- Standardised baselines and additionality tests
- Discounts and/or multipliers
- Positive/Negative Lists (and Other Use Restrictions)

Together, these three approaches could help to reduce concerns about subjectivity and systematic errors in baseline and additionality determination, spur greater technology transfer and sustainable development benefits, scale up investment in low-carbon technologies, and improve the cost-effectiveness of the mechanism as a whole. As a result of their broad scope and potential impact, and many outstanding questions related to their implications, these three reform options have been the focus of Task 2.

Standardised approaches can be embedded in existing or new project-based CDM baseline and monitoring methodologies, or can be developed at a country level for an entire sector. In both cases, the standardised approaches must be adopted by the EB and are therefore by nature “supply-side” measures. The EU can nevertheless assist this process in many ways, including through its submissions and position papers to the UNFCCC or by developing concrete proposals for standardised approaches, much as the UK Department for International Development (DFID) is currently doing for project types with high sustainable development benefits and high relevance to low income and least developed countries. Still, ultimately, decisions to implement these approaches will rest with the EB.

In addition to supporting desired supply-side reforms, the EU and other CER buyers can take “demand-side” measures to spur changes. The EU has already implemented several such measures, from the added sustainability requirements for large hydro, negative listing of A/R projects to more recently enacting post-2012 use restrictions on CERs from industrial gas projects and projects registered post-2012 from non-LDCs. Negative listing and discounts/multipliers represent the key types of measures that can be undertaken on the “demand-side” While the same measures could conceivably be taken on the supply-side, the challenges in getting agreement on these measures – which tend to explicitly favour or disfavour certain project types or regions – with the CDM administrative and regulatory system are likely to be prohibitive.

These CDM reform options – standardisation, negative lists, and discounts/multipliers – offer the potential to increase the efficiency, effectiveness of the CDM through greater predictability (only for standardised baselines), reduced transaction costs, increased project flow, and improved environmental outcomes. Standardisation could also lead to a more equitable distribution of projects. However, these changes also present concerns of their own. Multipliers, discounts, and negative lists implemented on the demand-side increase market fragmentation with negative impacts on overall efficiency. Depending on how they are implemented, standardised baselines (as with other reforms) could also further increase engagement in, and attractiveness of the CDM, and result in even greater “lock-in” and resistance to transition to potentially more effective new market mechanisms. If done well, however, standardised baseline could also smooth such a transition by creating a more robust, agreed basis for setting baselines. Baselines will be required for most other market mechanisms under consideration, such as sectoral crediting. This suggests that reform efforts should be undertaken carefully, with a keen eye to long-term consequences.

Apart from seeking reform within the current CDM system, the EU and other international actors have been advocating new mechanisms for some time now that can address the identified shortcomings of the reformed CDM and increase emission reductions through enhanced “own action” by developing countries. Task 2 also introduced the concept of Sectoral Crediting Mechanism and discussed the mechanism's advantages and drawbacks in comparison to the CDM along the identified criteria.

Summary of suggested further actions

Based on our assessment of reform options against criteria in Task 2, we have listed reform options that can be pursued by the EU below.

Standardisation of baseline setting and additionality determination

From a **supply side perspective**, our report finds that there could be a **"sweet spot" for standardisation efforts** that could yield the many key objectives: reduced uncertainties and transaction costs and delays for project developers, increased project activity and investment in lower carbon technologies and practices, improved environmental outcomes, and increased activity in underrepresented sectors and regions. Standardisation efforts should continue for project types such as buildings, transportation, rural electrification, or traditional fuel use and extraction that have significant potential but have been difficult to address through the normal bottom-up CDM process. Because they are relatively easy to implement and send clear incentives to prospective project developers, deemed savings approaches may warrant more emphasis than data-intensive performance standard and market penetration approaches to standardisation. While methodologies targeting these sectors and project types might not on their own deliver a high level of environmental integrity (in part because they are likely to address some level of "suppressed demand") it will be important to focus in parallel on establishing standardised baselines in well represented sectors and regions that are sufficiently stringent so as to generate net environmental benefits.

Our report also suggests **some specific steps** that the EU can take, including to:

- Sponsor methodology development efforts, similar to DFID study, that focus on project types of particular relevance to EU objectives (LDCs), and can result in methodologies that are applicable at regional or global levels.
- Identify and partner with DNAs that share similar perspectives, to incorporate relevant national and regional circumstances, and submit developed methodologies.
- Support general data development efforts conducive to developing benchmarks as well as baselines for sectoral crediting mechanisms.
- Develop proposals and provide support for adequately staffed and balanced administrative support systems for reviewing and approving standardised approaches, especially those submitted by DNAs.
- Further develop new baseline and additionality mechanisms designed to promote innovation, near term investment while limiting the scale of risk to environmental integrity. For example, this could include an accelerated penetration approach, the identification of suitable technologies (e.g. LED lighting, cook stoves, electric cars), and the introduction of procedures whereby the total number of CERs that can be issued is capped in order to avoid unexpected and unintended consequences. Such a cap could be increased should there be no such consequences and the need for carbon market support remains essential.

Use restrictions on the demand side

From a **demand-side perspective** we have discussed various **options for use restrictions:** Aggregated negative lists present the most favourable option for reducing the entry of non-additional large hydro projects from emerging economies in the EU ETS. However, an assessment would be required to understand the market implication and how alternative mechanisms or financial accelerators (private, public or international) could support truly additional hydro projects in LDCs and middle income countries. Based on this assessment it would be easier to decide whether the restriction should be to ban large hydro projects from all countries except for LDCs or not. Reconsidering the size and criteria for defining a large hydro project is also required for making the aggregated negative list option workable. The political acceptability of such a move would increase if there are parallel proposals for alternative mechanisms and financial accelerators to support the hydro sector in developing countries. The market acceptability of this option will remain low under any circumstances as there will be some lost rent opportunities for big investors in the hydro sector.

Improved arrangements on the supply side could lessen the need for demand side restrictions. In this context the following steps should be considered:

- Continue to pursue further clarity on the definition of sustainability within the CDM validation and registration process
- Continue to improve the guidelines for additionality testing and the development of alternative (e.g. standardised baselines and additionality tests).
- Continue to engage with the EU Member States in understanding the practicalities of using the WCD guidelines and the causes of any delays in the approvals process for the use of hydro power project CERs in EU ETS.
- Continue to engage with IHA on the potential for improved stakeholder participation in refining the HSAP and for assessing the comparative advantage and disadvantage of using the HSAP over the current harmonised guidelines for approving CDM hydro power project CERs from the demand side.
- Develop approaches for minimum thresholds for sustainability.
- Engage with DNAs to develop measures to further support the assessment of sustainability, including guidance and tools.
- Develop options for ex-post validation of sustainable development at project level, and the role of NDAs, DOEs and EB in that process. Consider proposals for including the introduction of harm assessments as proposed by CDM Watch.
- Work closely with Member States towards full adoption of harmonised guidelines and templates for assessment of compliance with Article 11b (6) of the Linking Directive.

Potential next steps for the Commission more closely related to the development of demand side measures are:

- Examine further the hydro project size and criteria selection that could be applied in the determination of negative lists, preferably by reference to case studies and the factors which affect the additionality case and sustainability impacts.
- Carry out a more sophisticated market assessment to determine the impact of negative lists on the supply of CERs in relation to demand from EU ETS.
- Further examine domestic support mechanisms as preparation for country specific negative lists or discounts. In particular, develop approaches for the interpretation of the E+/E- rule in defining negative lists and discounts.
- With a given assumption that the CDM has some inherent design problems, assess what alternative mechanisms and or financial accelerators (private, public, international) without additionality requirement could support the hydro sector in the absence of the CDM, especially in low and middle income countries where there are still opportunities for large hydro projects. EU restriction should not in principle jeopardise clean energy projects and therefore the assessment proposed here might offer a clear idea for the EU on the potential requirement for support to certain kinds of clean energy technologies in different types of countries.

Sectoral crediting

The introduction of **new mechanisms, notably sectoral crediting** offer considerable scope to overcome some of the problems related to CDM while at the same time generates new issues. Advantages of sectoral crediting are the huge potential to scale up reductions for three different reasons (explained in the analysis) or the greater freedom of host countries to define longer-term technology choices. Mainly as a result of greater scale and the lack of additionality testing, the SCM is expected to have lower transaction costs than the CDM and therefore higher economic efficiency. This also offers the possibility for greater generation of carbon finance for financing mitigation below BAU and adaptation in developing countries. Efficiency is also enhanced because sectoral crediting avoids having to deal with the interaction between domestic support policies and measures and the reductions generated through the carbon market.

The environmental ambition is a function of (the level) of the crediting threshold. Since there are no crediting thresholds set at the moment, it is difficult to make a final assessment.

Barriers to implementation are related to political-lock-in, notably generous crediting under existing mechanisms. If not addressed in the process of baseline-setting, there is a risk of inflated baselines, which would undermine the environmental outcome.

Another important challenge is the need for institutional capacity, data and robust MRV provisions. Against this background the report recommends

- To gradually set rules for setting crediting baselines,
- Continue to develop capacity for Monitoring, reporting and verification (MRV),
- Collect data, develop transparent and consistent methodologies for data processing; build upon the CDM and past and existing initiatives,
- Start developing a blueprint for governance and institutional options to be discussed and brought forward bilaterally or within UN negotiations, and more generally,
- Identify capacity building needs consistent with the challenges outlined above

To overcome political lock in the report recommends to

- Accompany the proposal for a SCM with technology support policies
- and where appropriate restrictions of the CDM

In this context it is important to highlight that the attractiveness of sectoral crediting as any other mechanism depends on the effective demand for credits created by EU legislation and other domestic carbon markets.

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7 Annex 1: Final briefing papers on CDM Merits and Shortcomings

1. **Synthesis paper (SEI)**
2. **CDM Baselines setting and additionality testing (CO2logic)**
3. **CDM Governance (AEA)**
4. **Competitiveness distortion and carbon leakage (CEPS/SEI)**
5. **Technology Transfer through the CDM (AEA)**
6. **Sustainable Development and Social Equity through CDM**
7. **Political lock-in through the CDM (CO2logic, CEPS)**
8. **JI Track 1 (CEPS)**

Briefing papers are attached as a separate file to this report.

8 Annex 2: Stakeholder report

The stakeholder report, including a list of interviewees and interview notes is attached as a separate file to this report.

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