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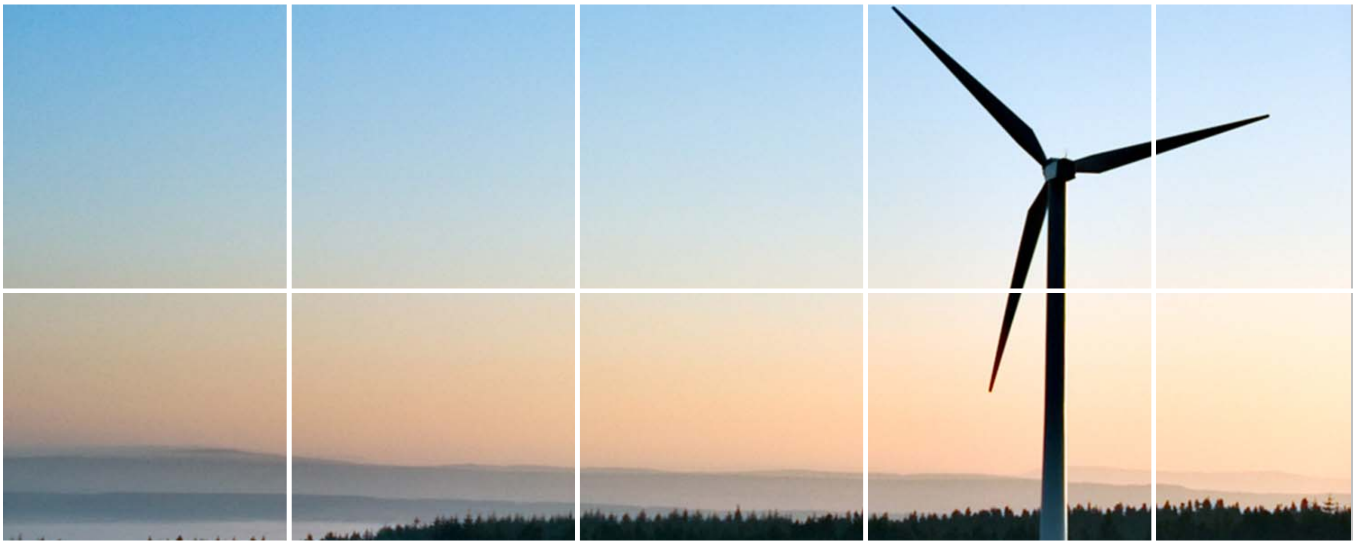

Briefing paper “Baseline Setting and Additionality Testing within the Clean Development Mechanism (CDM)”

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1 Summary of key findings

This briefing paper summarises the merits and shortcomings of the Clean Development Mechanism (CDM) in determining the setting of baselines and demonstrating additionality. The additionality requirement was introduced in the CDM to protect its environmental integrity. Tools and methodologies have been developed accordingly, which have been improved upon via a “learning by doing” process since its inception. However, important concerns remain regarding demonstrating additionality and setting baselines.

Recent assessments give an overview of the main shortcomings of the current additionality test, highlighting its subjectivity, unpredictability, lack of clarity in the guidance, loopholes in the role of the Designated Operational Entities (DOEs) and in the CDM Executive Board (EB) data gathering requirements. The current mechanism requires costly data collection which results in high bureaucratic costs. The counterfactual nature of baseline setting also leads to non-additional emissions reductions being included.

To address these concerns this paper notes that further clarity is needed in the guidelines for the use of tools and methodologies as well as in the delegation of tasks to the DOEs. A better understanding of how decisions are made by the CDM EB is also essential. This paper considers potential alternatives to the way that additionality is currently demonstrated and baselines are determined that could help resolve these issues. Examples include the use of positive/negative lists, benchmarks, default values, penetration rates and discounting approaches. The different approaches to reforming additionality and baseline testing include looking at standardised and project-by-project solutions. The paper also proposes adapted solutions which are dependent on project type, project size and geographical location.

2 Introduction

This briefing paper assesses the merits and shortcomings of additionality and baseline setting in the current CDM. It is structured along the following lines:

- Chapter 1 covers an introduction of the subject.
- Chapter 2 covers the main metrics for measuring and explaining the concerns. It also looks at the results of empirical research on CDM projects covering the issues of a) additionality checks i.e. investment analysis, barrier analysis and common practice analysis and b) Baseline setting.
- Chapter 3 covers the merits of the CDM and the capacity building it has achieved.
- Chapter 4 deals with the limitations of the CDM. This is divided into two sections. It firstly discusses the limitations of additionality which covers issues related to its subjectivity and unpredictability, the lack of guidance and objectivity, the contentious role of DOEs, the influence of outside parties on the CDM EB and the complexities of data collection. Secondly, it covers the limitations of baseline setting.
- Chapter 5 covers the current and proposed reforms. This discussion is divided into two sections; one on additionality and one on baseline setting. The section on additionality considers how the guidance can be clarified (consistency in investment analysis, barrier analysis and common practice analysis, small-scale barrier test), the role of DOEs and the CDM EB, potential alternatives to how additionality is currently demonstrated (positive/negative list, performance benchmark test, default values, penetration rates, discounting certified emission reductions (CERs)), prior considerations and several other considerations. The section on baseline setting looks at benchmarks, the use of default parameters, deemed or per-unit values.
- The final chapter provides concluding remarks.

The Article 12.5 (c) of the Kyoto Protocol introduces the concept of additionality in the CDM. It states that certified emission reductions (CERs) should be "additional to any that would occur in the absence of the certified project activity" (United Nations, 1998).

The literature usually describes two types of additionality: (1) financial additionality (also referred to as economic additionality) and (2) investment additionality. Financial additionality requires that "public funding for CDM projects from Parties in Annex I is not to result in the diversion of official development assistance and is to be separate from and not counted towards the financial obligations of Parties included in Annex I" Preamble of Decision 17/CP.7, UNFCCC 2001, p. 20. As financial additionality is subject to the least controversy, it will only be briefly considered in the section on reforms.

Investment additionality requires that "a valid offset project would not have happened anyway in the absence of the economic incentive" (Raymond, 2010). The demonstration of investment additionality consists of "comparing a project to its counterfactual, i.e. what would have happened in the absence of the CDM" (Shukla and Mondshine, 1999). The baseline corresponds to this counterfactual case (also called "business as usual" (BAU) scenario) so that only projects with lower emissions than the baseline are additional. Baseline setting is thus critical in terms of defining additionality as an overestimated baseline brings about the issuance of fake CERs (offsets related to non additional projects) (EPRI, 2008).

The section on investment analysis deals with investment analysis, barrier analysis (with an insight into "first-of-its-kind" and its impact on the common practice analysis) and common practice analysis. This briefing paper aims to report on the merits and shortcomings of the current method for testing additionality and determining baselines.

3 Main metrics for measuring/explaining the concerns over additionality and baseline setting

3.1 Additionality

3.1.1 Financial additionality

Financial additionality has caused less controversy than investment additionality. However, as reported by Streck (2010), “additionality of finance of contributions of developed countries to international climate funds has rarely been checked” (i.e. additional to ODA funding). Furthermore, the negotiations for a post-2012 climate agreement represent an opportunity to deal with the challenge of establishing of financial additionality. Indeed, clear criteria have never been defined to effectively “distinguish new budget allocations from the diversion of existing official development funds” (Streck, 2010).

3.1.2 Investment additionality

Regarding investment additionality, some stakeholders (e.g. Climate Action Network International, 2009a) point out a lack of additionality in a substantial proportion of CDM projects. Authors such as Hession (2011) argue that it is not possible to calculate the exact percentage of non additional projects because measuring additionality contains a degree of subjectivity. Others such as Schneider (2007) have estimated that “additionality is unlikely or questionable for roughly 40% of the registered projects”. As an example in the hydro sector, Haya (2007) states that the majority of projects in the CDM pipeline are non-additional, arguing that indicators such as internal rate of return (IRR) can easily be manipulated, every project has to overcome barriers, and common practice has been weakly defined. One can find a more in-depth analysis of the additionality of hydro projects in the Appendix. Surveys have shown that many project developers consider CERs as an extra source of income, rather than a decisive factor that makes a CDM project cost effective (CAN, 2009a).

In order to assess and measure additionality in the current system, the results of a survey[1] carried out by the Öko-Institut (Schneider, 2007) will be considered as well as a submission regarding best practice examples on the demonstration of additionality drafted by Michaelowa (2007). Both documents date from 2007, i.e. before the publication of the “*CDM validation and verification manual”* and the current version of the additionality tool. It is thus important to mention, as pointed out by one of the CDM EB members (2011) that the effectiveness of the system has improved since these reports were published (see below).

To set the context, it is important to consider the current methods used for testing additionality. Project developers can choose between an investment analysis, a barrier analysis or combining both. Afterwards, they need to check the credibility of their test(s) by conducting a common practice analysis unless the proposed project type has demonstrated that it is the first-of-its-kind.

3.1.3 Investment analysis

The investment analysis aims to determine that the activity of a proposed project is either not the most economically or financially attractive option or is not economically or financially feasible without

[1] The report’s findings are based on a systematic evaluation of 93 randomly chosen registered CDM projects.

revenues from CERs. It consists of a simple cost analysis, an investment comparison or a (financial) benchmark analysis.

Projects applying the investment analysis revealed many weaknesses (Schneider, 2007). In most cases, the guidance provided by the UNFCCC is not followed or poorly understood. As a result, the choice of the parameters to be used is often biased. For example, the same financial indicator can be calculated differently in several project design documents (PDDs). Similarly, the discount rate used in the investment analysis for the calculation of the financial indicator (e.g. net present value (NPV) or IRR) "is often chosen in an arbitrary fashion" (Michaelowa, 2007). Moreover, 29% of the 93 PDDs analysed from registered projects do not provide enough information to make the calculation of the project performance reproducible and 10% of them only included the result of the calculation without any details (Schneider, 2007). The lack of transparency and relevancy is also highlighted in many PDDs where the setting of financial benchmarks or assumptions is used to assess whether a project is additional (Schneider, 2007; Michaelowa, 2007). Finally, the quality of the sensitivity analysis and the inclusion of tax benefits often differ from one PDD to another as there is no clear guidance given in the CDM tools and methodologies (Schneider, 2007).

3.1.4 Barrier analysis

The barrier analysis is used to determine whether the activity of the proposed project faces barriers that prevent the implementation of this type of activity and do not prevent the implementation of at least one of the alternatives (investment barriers, technological barriers, barriers due to prevailing practice or others).

Projects which apply the barrier analysis also show "a number of serious weaknesses; in the barrier test itself, its application by project participants and the assessment by DOEs" (Schneider, 2007). Among these projects, "43% […] do 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). In other cases, project developers use very general statements as key barriers, such as "the project would go bankrupt without CERs" (Schneider, 2007). Furthermore, "71% of the small-scale projects and 39% of the large-scale projects that use the barrier analysis do not provide any explanation of how the CDM helps to overcome or alleviate the identified barriers" whereas many of the others just **give a very general justification of how the CERs help to overcome the barrier** (Schneider, 2007). In many cases, "the barriers are not credible, very subjective or have little relation to the project activity", e.g. "general financial risks" or "unwillingness of the management to invest" (Schneider, 2007). Finally, the study states that "only 6% of the validation reports contain a detailed and transparent assessment of each barrier" (Schneider, 2007).

3.1.5 Common practice analysis

The common practice analysis considers the extent to which the proposed project type has already diffused into the relevant sector and region. However, the methodology is controversial. Project developers face difficulties because they have no information about other projects (Hession, 2011). It lacks guidance and more specifically **does not provide a threshold to define when project activity should be considered as common practice** (Schneider, 2007). As a result, "only half of the projects assessed (49%) use independent external documentation for their analysis" (Schneider, 2007).

3.2 Baseline setting

The Kyoto Protocol explicitly makes mention of the CDM additionality requirement. However, no specification was made on the determination of a baseline. It was only later that the setting of baselines emerged as the way to calculate the amount of CERs to be issued for a particular project (Shukla and Mondshine, 1999). One is required to determine "what a potential offset seller would have done without the offset programme", i.e. the baseline (Raymond, 2010). An example of a baseline calculation for large hydro projects (ACM0002) can be found in Appendix 3. According to the Climate Action Network International (2009a), the lack of additionality "has its roots in the basic design of the mechanism, where **projects are evaluated against a hypothetical baseline** which cannot be observed".

The tools provided by the UNFCCC are designed to reduce the risks resulting from the above mentioned counterfactual data and require project developers to identify exact baseline scenarios. This step is designed to "ensure that the correct baseline scenario is included in the analysis and that alternatives that do not comply with relevant regulations are not considered" (Schneider, 2007). Nevertheless, in the study carried out in 2007, it is mentioned that "this step is not always implemented in practice" (Schneider, 2007).[2]

A consistent assessment and determination of a baseline is crucial since overestimated baselines can result in fake CERs being issued, leading to a reduced integrity for the whole CDM (Sugiyama and Michaelowa, 2001). It is also necessary as the notion of a hypothetical baseline introduces perverse incentives for project developers to keep it high in order to claim more CERs (CAN, 2009a).

In conclusion:

- There is strong evidence showing the weakness of investment analysis;
- Barrier analysis in the current CDM is criticised to provide information which is too general, lacks objectivity and robust supporting evidence;
- The common practice test is controversial especially due to the lack of a defined benchmark;
- Baseline setting is hypothetical and is often poorly implemented.

[2] In 2005 at the EB22 the following definition was developed "Clarifications on the Consideration of National and/or Sectoral Policies and Circumstances in Baseline Scenarios". "As a general principle, national and/or sectoral policies and circumstances are to be taken into account for (?) the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention.". More specific information can be found in the briefing sheet on political lock-in.

4 Review and assessment of the merits of the CDM

The CDM has positively influenced "the awareness and understanding about clean technologies, emission trading and future action for climate change both in the private and public sector" (Schneider, 2007). Some authors acknowledge that the CDM has introduced "**climate change as an issue to key stakeholders in developing countries**" (Schneider, 2007). A leading CDM policy advisory consultant (2011) noted in an interview that the CDM has attracted private sector finance for emissions reduction.

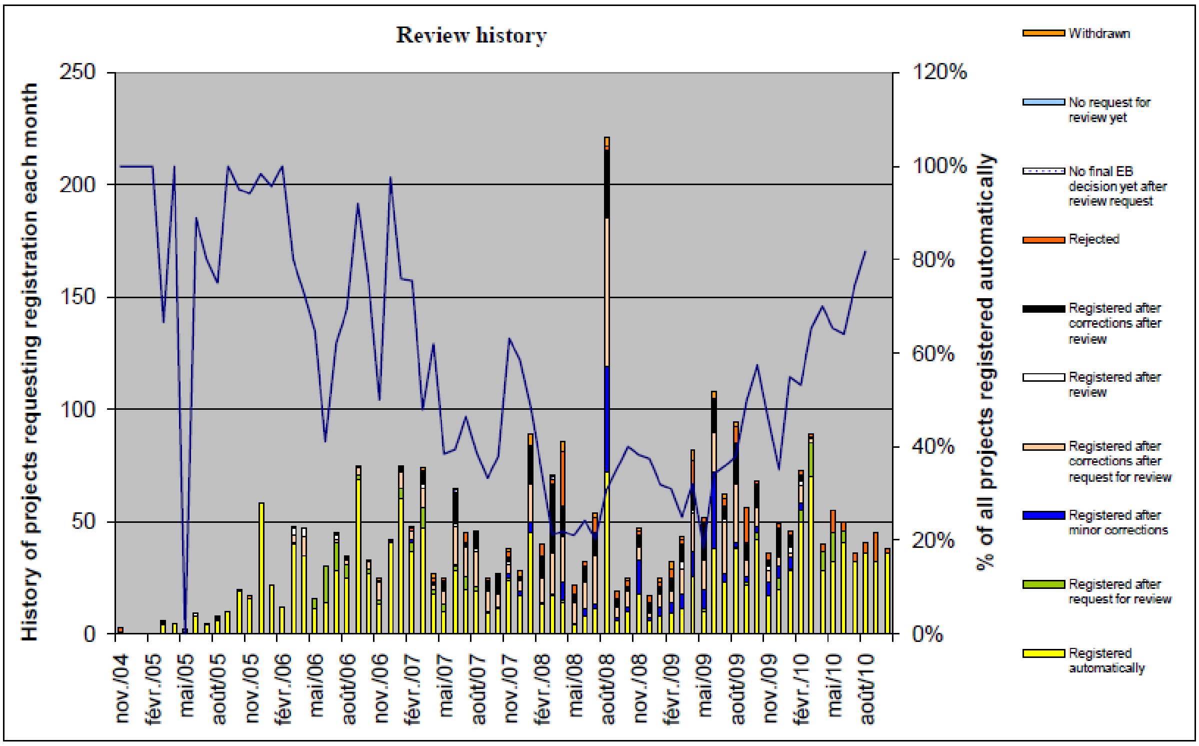
In the early days of the CDM, the **importance of applying additionality was supported by some developing countries** experienced in hosting AIJ projects (activities implemented jointly), e.g. Costa Rica, Mexico and Columbia (Greiner and Michaelowa, 2003). The need to protect environmental integrity was the main reason for introducing an additionality requirement in the CDM registration procedure (Raymond, 2010; Shukla and Mondshine, 1999). This has since been defined and introduced as an essential part of the PDD. As reported by Schneider (2007), "without additionality, the environmental integrity objective cannot be assured".

Two methodological tools[3] have been developed to guide project developers in demonstrating their project's additionality. They make the room for gaming narrower over time (CDM Executive Board member interview, 2011). More recently, many authors have pointed out the **recent steps of the CDM EB in strengthening the assessment of projects so as to better comply with its environmental integrity objective** (Streck, 2010; Schneider, 2007). Indeed, the CDM rules "have been developed and improved under the so-called 'learning by doing' process" (IGES, 2010). One of the most important improvements was highlighted in an interview with the CEO of a carbon asset management firm who is also a member of the CDM Executive board (2011): "the investment analysis is already clearer than a barrier analysis. The CDM has also built capacity and know-how in many developing countries."

Another positive aspect has been the setting up of the "registration and issuance team" by the CDM EB and the hiring of more dedicated CDM staff "to review project applications with a particular focus on the credibility of the additionality argument" (Streck, 2010). Moreover, a DOE Director (2011) pointed out during an interview that the **CDM authorities developed a mandatory guidance for DOEs**, the "*CDM Validation and Verification Manual"* which has been an important developmental milestone, as are the improved standards for accreditation of DOEs.

[3] Tool for the demonstration and assessment of additionality and the combined tool to identify the baseline scenario and demonstrate additionality.

Figure 1: Review history



Source: UNEP Risø Centre (2011)

The main motive for conducting a review is the issue of additionality (IGES, 2010). In Figure 1 above, the evolution of the number of requests for review over time can be observed. Before 2007, the vast majority of the projects were automatically registered. From 2007 to 2009, the number of requests for reviews substantially increased, corresponding to the strengthening of the additionality requirements. **Since the beginning of 2010, there has been a reduction in the number of requests for review**. That corresponds to the comments made by a CDM Executive Board member in an interview (2011). He finds that the number of requests for review decreased from circa 80% before 2008 to approximately 30% after 2008. The fact that a large majority of projects have been registered since the beginning of 2010 could be interpreted as evidence that the demonstration of additionality is improving.

As reported by Bloomgarden and Trexler (2008), “the fact that additionality testing is difficult doesn’t mean we can simply ignore it”. It is crucial to take into account all the pros as well as the cons of this system before defining a new or alternative CDM.

In conclusion:

- The CDM has helped to develop knowledge and attract financing for GHG abatement projects in developing countries;
- The concept of additionality was implemented to ensure environmental integrity with the support of several developing countries;
- The CDM has also helped building significant institutional structure for project approval processes and additionality testing;
- While additionality remains the main cause for reviews, more recently there has been a reduction in the number of request for reviews with more projects being registered automatically.

5 Review and assessment of the limitations of the CDM

5.1 Additionality

This section first focuses on disagreements over the general concept of additionality before moving on to analyse the current practice of additionality testing.

The critics of the concept of additionality point out the underlying contradictions and difficulties. According to Sugiyama and Michaelowa (2001), "the most cost-effective projects may be the least additional and strict project additionality would give perverse policy incentives". In other words, the most costly option (i.e. the lower IRR) is most likely to be additional and an investor will thus always be tempted to artificially raise project costs to demonstrate additionality. This makes it less likely that CERs reflect real and additional emission reductions. Moreover, Greiner and Michaelowa (2003) explain that the determination of investment additionality requires the use of economic parameters to assess the attractiveness of a project. They emphasise that "**there is no objective, universally applicable measure for economic attractiveness**" (Greiner and Michaelowa, 2003). It depends on several factors, such as the specific situation of the project, the perception of risk, the financing company-specific investing behaviour, strategic considerations of energy security etc. **The current investment analysis tool largely ignores these other factors**. As reported by Raymond (2010), "the potential causal link between the offset programme and the project is actually a red herring; what matters is whether offset policies are protecting reductions under the cap and encouraging the most desirable emissions reductions elsewhere". Indeed, additionality is only a means to reach the objectives of offset policies, not an objective per se (Raymond, 2010). Additionality "not only adds uncertainty to the CDM, but also adds high and unnecessary transaction costs that make the CDM less likely to affect decisions to go ahead with a project, especially for smaller projects" (CAN, 2009a). Finally, strict additionality rules, due to their complexity, "lower the competitiveness of the CDM […], thus diverting possible transfers from the developing world" (Greiner and Michaelowa, 2003). **When additionality testing is too complex, the risk is that it reduces the number of projects developed and registered** (Streck, 2010).

The following sections will look in greater detail at key problems with the current additionality requirement.

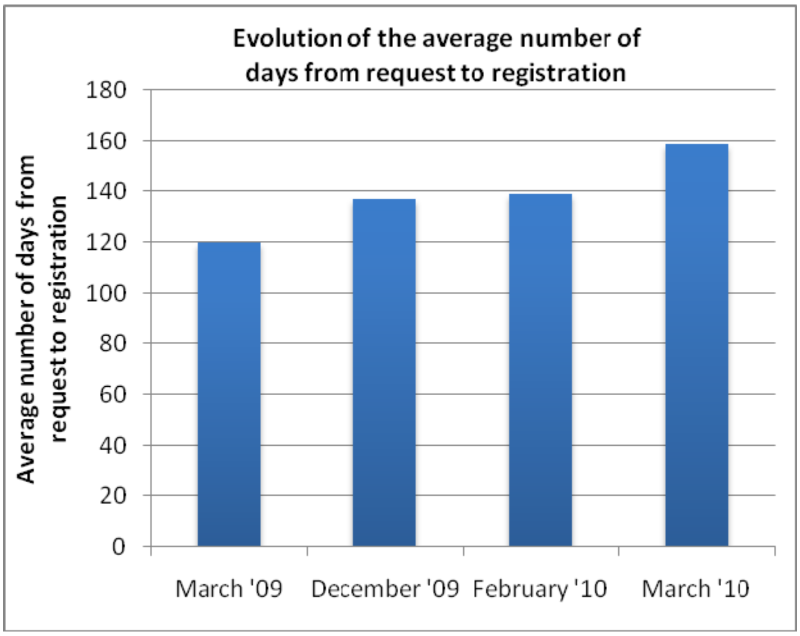
5.1.1 Subjectivity and unpredictability of the current additionality demonstration

The most challenging concern of the current additionality test is that "**the question as to whether a project would also be implemented without the CDM is hypothetical and counterfactual**; it can never be proven with absolute certainty" (Schneider, 2007). This represents a significant problem for DOEs because it is complex and uncertain to validate something that is counterfactual (as pointed out in the interviewed with a director at a leading DOE (2011).

Such an "intention-based" approach has been widely criticised as it makes the assessment of additionality subjective (CAN, 2009a; Bloomgarden and Trexler, 2008; Streck, 2010). Indeed, the financial incentive in the form of CERs must be decisive in the investment decision making (Raymond, 2010). However, it is very complex to investigate individual investment motives of individual decision-makers in particular circumstances (Oppermann, 2011).

The current additionality validation and registration process is also uncertain (IGES, 2010; CAN, 2009a). The result effectively depends on the judgment of several entities (DOEs, CDM EB) (IGES, 2010). The final decision is thus unpredictable (Streck, 2010) and some consider that it is at times influenced by politics. **As a result, the quantities of issued CERs as well as delays of issuance of CERs are also unpredictable (Wara and Victor, 2008).** A senior figure at a CDM Policy Consultancy (2011) highlights that **such unpredictability is a key problem for attracting private finance.** He argues that the system should provide certainty at a far earlier stage.

Figure 2: Evolution of the average number of days from request to registration



Source: UNEP Risø Centre (2011) and project-by-project research

In the merits of the CDM, a recent fall of the number of requests for review undertaken by the CDM EB was observed. Nevertheless, on the graph above, it is noteworthy that the length of the review follows the opposite trend, i.e. that **the average number of days from request to registration has been increasing since 2009**. This explains why some are in favour starting the crediting period earlier, for example at the start of the validation period (Oppermann, 2011).

Two things have however evolved since the publication of data used in Figure 2 above, resulting in shorter time delays and more credits being supplied. Firstly, **the procedures for registration and**

issuance have been revised, indicating clear deadlines for each step in the process. The backlog has also been cleared. Together with fewer requests for review, **this has resulted in much shorter timelines for registration**. By contrast, the delays observed in the validation and verification by DOEs prior to the request for registration or issuance of CERs have not improved significantly. Secondly, projects that are registered without having gone through a review can earn CERs from the day a completed request for registration was submitted (EB 59).

5.1.2 Guidance on additionality demonstration

As discussed above, the guidance on additionality demonstration[4] has often not been applied correctly (Schneider, 2007). In other cases, the guidance is "not very well suited for assessing whether a project is additional or not" (Schneider, 2007). **The main drawbacks of the current tools are ambiguity, lack of objective and transparent criteria, unclear definition of several concepts (first-of-its kind, common practice, types of barrier…)**, assumptions that can hardly be verified etc. (Schneider, 2007; Streck, 2010). According to Schneider (2007), the current barrier analysis is "unlikely to result in a reasonable differentiation between additional and non-additional projects". To illustrate this, hydropower projects in China list a range of barriers, including difficult terrain, remote location, and low capacity. However Haya (2009a) claims that many hydro projects have been built in China with these same barriers whilst not benefitting from carbon revenues. Furthermore, the possibility for project developers to choose between the **investment comparison and the benchmark analysis leads to biased situations** (Michaelowa, 2007). For instance, the investment comparison would be preferred in the cases where the project's alternatives are highly profitable. Moreover, the current tools allow space for gaming of parameters, underestimation of revenues, overestimation of costs and exaggeration of barriers so as to reduce the attractiveness of the project (Michaelowa, 2005 and 2007). Furthermore, as reported by Michaelowa (2007), "several approved large-scale methodologies do not use the additionality tools or add elements to it" and "this is likely to lead to an inconsistent treatment of additionality between methodologies". Such differences mean that **a project could pass a methodology-specific version of the additionality even if it would have failed the common additionality test with the same project**, leading to an unequal playing field (Michaelowa, 2007). Finally, Haya (2010) claims that the use of investment analysis is inappropriate for hydropower projects in India for two reasons: "the development of hydropower is a government decision and large hydropower developers are guaranteed a specified return on their equity investment making an IRR analysis meaningless".

5.1.3 The role of DOEs

Another argument that has been put forward as a limitation is the poor performance of DOEs in the validation of additionality tests. The Climate Action Network International (2009a) mentions that verification is "of poor quality and lacks transparency". A study carried out by the Öko-Institut (Schneider, 2007) considers that "it is unclear to what extent DOEs question key assumptions on the demonstration of additionality" and points out that serious non-conformities have been highlighted during spot checks undertaken at three DOEs. To give an example, DOEs validate the barrier analysis of hydro projects in China if there is documented evidence that the stated barrier exists and that it is significant. Their assessment is based on the assumption "if it is feasible that the barrier could have prevented the project from going forward, not that there is a high likelihood that it actually did" (Haya, 2009b). To sum up, as reported by Michaelowa (2007), it seems that DOEs do not follow the rule according to which they "shall carefully assess and verify the reliability and creditability of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality" (UNFCCC, 2008). **These are potential conflicts of interest as DOEs are also paid by project participants**. Other parameters worsen the problem, such as the competition between DOEs and **the absence of punishment in case of misconduct** (Michaelowa,

[4] Tool for the demonstration and assessment of additionality and the combined tool to identify the baseline scenario and demonstrate additionality.

2007; Wara and Victor, 2008). It is interesting to note the number of accredited DOEs has increased over the last years which should contribute to increasing competition.

5.1.4 The role of the CDM EB

The CDM EB has also been criticised. Some argue that it is under “strong pressure from CDM investors to limit transaction costs and speed up approval” (Wara and Victor 2008). Streck (2010) compares additionality testing with an “an ‘arms race’ between the project proponents and the regulators” and points out the “CDM EB’s tendency to follow ‘fashions’ of rejecting certain project types without prior warning”. The President of a leading carbon finance firm and member of the CMIA interviewed for this study highlighted “(a)n unhelpful dynamic has evolved over the years between the EB and the DOEs (...) which lead to the implementation of an extremely strict conservative implementation of the guidelines and rules by the EB. This conservative approach is hindering the development of new and innovative approaches for data generation and baseline discovery. As a consequence, the non-mandatory Financial Analysis Guidelines[5] issued by the EB tend to be taken as mandatory by the DOEs and investment benchmarks tend to be unrealistic and quite generic / simplistic. To some extend that could even become misleading in some sectors (e.g. in the energy efficiency sector where returns can appear as too high). In such cases a barrier analysis is needed to prove additionality which is a difficult and somewhat subjective exercise. Realistic and reasonable assumptions are questioned and often not accepted.” Some argue instead that such decisions take place because the EB realises there are certain problem with a particular methodologies or because guidance has improved.

5.1.5 Data gathering requirements

The current approach to testing additionality requires disclosure of information that can be confidential, and governments and companies may not be willing to disclose this (Wara and Victor, 2008). Additionally, the gathering of such information as well as the uncertainty of the current additionality demonstration result in **high levels of transaction costs** (Wara and Victor, 2008; CAN, 2009a; Bloomgarden and Trexler, 2008). It should be noted that the main motive for conducting reviews is the additionality issue, with more than 50% of the reviews regarding clarification of investment analysis (IGES, 2010). According to the CEO of a carbon asset management firm interviewed (2011), this shows that the rules are not clear enough and that they should be clarified to further develop the CDM.

5.2 Baseline setting

The main problems identified in the determination of baselines are related to the counterfactual nature of the assessment.

Firstly, “both, the host country and the investor have an incentive to overstate the amount of emission reductions achieved by the CDM project as they can then enhance revenues” (Greiner and Michaelowa, 2003). This could lead to fake reductions that threaten the integrity of the Kyoto Protocol (Michaelowa, 2005).

Secondly, the calculation of baselines on a project-by-project basis involves significant data collection and information requirements (Michaelowa, 2005). It also requires choosing a method to make the calculation which can cause discrepancies. Due to the flexibility and the lack of clarity of the guidance, in some cases, **different baseline calculations may be used in projects applying the same methodology**, thereby increasing the subjectivity of the process. A project-by-project verification for the South African renewable energy project PDDs allowed us to confirm this.

Thirdly, some methodologies “currently underestimate the potential to reduce greenhouse gas (GHG) emissions from the power sector” (World Bank, 2010). This is particularly true in less developed

[5] The application of and tool can be mandatory if it is so indicated in the approved methodology for a specific project type.

countries where “emission baseline calculations do not take into account latent demand for energy that exists and are thus under-estimated, diminishing the potential for GHG reductions”. The Marrakesh Accords have recognised this issue of suppressed demand. They “explicitly allow for baselines to account for emissions above current levels due to specific circumstances of host parties”. Recently, guidelines were adopted how to deal with "suppressed demand" in methodologies (see Annex 6 of the report of the 62nd meeting of the CDM Executive Board).

Fourthly, the counterfactual nature of baselines considerably raises the transaction costs related to the development of a CDM project activity (Raymond, 2010).

Finally, over long crediting periods (three sets of seven year periods) baselines are unlikely to remain unchanged, which can result in the over-crediting. On the other hand one can also consider that projects often have a longer life time than the 21 years, and beyond this date they still reduce emissions but do not earn credits.

The limitations of baseline setting in regards to local incentives (E+/E-) and the specific case of China can be found in the separate briefing paper on Political Lock-in developed for this study.

In conclusion, criticism on the current methodologies for additionality testing and baseline setting includes:

- It is extremely difficult to define a universally applicable measure for economic attractiveness on a project-by-project basis;
- The system is too costly and laborious, and this obstructs the development of GHG abatement projects instead of supporting them;
- The counterfactual and subjective nature of the test makes it difficult to implement in practice;
- Significant project registration delays and unpredictable outcomes of the CDM discourages investors;
- The guidance tools on how to demonstrate additionality are ambiguous, lack objective and transparent criteria and involve unclear definition of several concepts (first-of-its kind, common practice, types of barrier…);
- Gaming is possible between investment comparison and the benchmark analysis;
- Variations of the concept of additionality in certain large-scale methodologies creates discrepancies;
- Verification by DOEs is often of questionable quality and may lack transparency and real criteria assessment;
- Conflict of interest for DOEs and lack of real punishment for any misconduct;
- Inconsistency of the CDM EB, need them to identify methodology issues and adapt their decisions accordingly;
- Overly complex and costly data gathering requirements and issues surrounding confidentiality;
- Different calculations can be included when setting the baseline using the same methodology;
- In the context of baseline setting the application of suppressed demand needs to be implemented.

6 Status of current and proposed reforms to address concerns over additionality and setting of baselines

6.1 Additionality

Financial additionality (also known as economic additionality) has been subject to less controversy than investment additionality. Oppermann (2011) explains that the principle according to which Official Development Assistance (ODA) should not be diverted, i.e. ODA should not be used to buy CERs, has become a well-established international practice. However, it seems that the way to deal with ODA in the underlying financing of a project is not always clear. Common practice is now to attach a letter from the relevant ODA donor to the PDD stating that the usage of ODA in the CDM project does not constitute a diversion of ODA. A good example of such practice is included in the PDD of the "Biogas Support Programme, Nepal" (BSP – Nepal). Hoogzaad (2011) points out that you can also deduct the actual market value of these CERs from your ODA reporting. The conclusion emerging from the interviews carried out in this study is that **the treatment of ODA in the CDM is vague and that clearer guidance is required on this issue**.

Regarding investment additionality, improvements to the guidance on additionality demonstration will first be considered, including investment analysis, barrier analysis along with first-of-its-kind, common practice analysis as well as small-scale barrier analysis. Furthermore, possible improvements in the role of Designated Operational Entities and the CDM Executive Board will be discussed. The paper then examines potential alternatives to the current additionality demonstration, including standardised approaches and discounting CERs as brought forward in the literature. Finally, prior consideration provisions will be discussed regarding the choice of an additionality test.

6.1.1 Guidance on additionality demonstration

For the "*tool for the demonstration and assessment of additionality*" and the "*combined tool to identify the baseline scenario and demonstrate additionality*", one possible improvement suggested consists in making these mandatory by revising all the methodologies that only apply to part of these tools (Michaelowa, 2007; Streck, 2010). **The methodological tools also need to provide clearer guidance and the different steps need to be defined more clearly** (Streck, 2010; Michaelowa, 2007). Others suggest the **guidance on demonstrating additionality for small-scale projects should be improved** (Schneider, 2007). This section will include suggested improvement possibilities for the current tools. Many believe such improvements could certainly enhance the usability, the consistency and the objectivity of the current additionality demonstration.

Investment analysis

The improvements in investment analysis should ensure a more consistent application of the guidelines by project participants. All of the proposed measures are intended to reach this objective. First of all, the guidance should be improved to ensure the suitability of the input values and the references to be used to calculate such values (IGES, 2010). **The method to choose the financial indicator should be clarified.** Michaelowa (2007) suggests that the first choice should be IRR as it allows comparing alternatives of different output levels. He insists that **equity IRR calculated is the most appropriate parameter for the investment analysis** provided that there is no limitation of IRR by the host country regulation (Michaelowa, 2007). In that case, unit cost of service should be chosen as different alternatives could have the same IRR (Michaelowa, 2007). The NPV should only be allowed in cases where the alternatives have exactly the same output, and the only cases for which cost-benefit ratio should be used are public projects including externalities (Michaelowa, 2007). All financial calculations, including equity IRR, should “include the full lifetime of the project and its alternatives, at a minimum the full crediting period chosen for the project” (Michaelowa, 2007). Michaelowa also proposes that “**the discount rate used for conversion of future costs and revenues in the investment test should be the average of the one-year benchmark interbank rate** and low-risk government bond rate with a lifetime similar to the project of the most liquid government bond market denominated in the currency which is used for the majority of the project investment” (ibid). The tools should also provide clear guidance on the sensitivity analysis to be carried out, including the variable parameters, the extent to which they should vary and how the results should be used (Schneider, 2007). Finally, the **investment analysis should become mandatory for large-scale projects** as the credibility of using barrier analysis for such investments can be questioned (ibid).

Regarding the investment comparison test, it is crucial to select realistic alternatives (Michaelowa, 2007). To achieve that, project developers should ideally consider their own recent investments (in the last five years) or, if they have never made a comparable investment, publicly available data from comparable investments (ibid). If there is no comparable investment or no publicly available data related to such investment, a benchmark analysis should be carried out instead of the investment comparison test (ibid).

Regarding the benchmark analysis, the benchmark “should be a financial product […] with a lifetime comparable to that of the project” (e.g. a government bond). Failing this it should include, “publicly available rates of return of commercial investments with a similar risk structure and lifetime as the project” (ibid). The notion of benchmark will be detailed further in the section on standardisation.

Barrier analysis

The barrier analysis should include a consistent justification of objective barriers. It should also exclude subjective and company-specific barriers in order to become more credible (Schneider, 2007). Thus, Michaelowa (2007) recommends using comparable indicators and **providing an external justification for the existence of a prohibitive barrier**. For example, the justification of an investment barrier should require “written proof from the three largest commercial banks in the host country and one international commercial bank that they are not willing to provide a loan or other financing to the project despite its high IRR” as well as a letter “with a detailed explanation why they became interested in funding the project under CDM” (Michaelowa, 2007). Similarly, “the barrier regarding non-availability of skilled labour requires proof that no education/training institution in the host country provides the needed skill and that no expatriate workers with these qualifications could reasonably be hired in that host country due to security reasons” (Michaelowa, 2007). The requirements for the justification of a barrier should also be strengthened for other barriers, such as the ones relating to technology failure risk and the lack of infrastructure. However, it is important to mention that such justifications increase the administrative burden of the demonstration of additionality. Furthermore, many authors and stakeholders highlight that it is essential to simplify the process especially for projects in less developed countries. Lastly, the “**barrier claiming non-availability of the technology in the region should be deleted**” as any technology could be installed anywhere in the world provided that the investor is willing to pay enough money (Michaelowa, 2007).

Common practice analysis

In the common practice analysis, the definition of each technology should be as broad as possible (Michaelowa, 2007). Some experts also propose that **other existing CDM projects should be taken into account in the common practice analysis after a certain period of time or after a number of CDM projects have been implemented** (Schneider, 2007). Finally, there should be clear guidance on the geographical scope for the comparison.

<u>*Small-scale barrier test*</u>

As mentioned in the tool *"non-binding best practice examples to demonstrate additionality for small-scale project activities"*, a barrier analysis has to be carried out for small-scale projects (UNFCCC, 2007). However, if the project developer decides to demonstrate the existence of an investment barrier, he might choose to go through an investment analysis as it would be the case for a large-scale project.

The small-scale barrier test could be reformed so as to include more detailed requirements as well as external justification of the information it includes wherever possible. The small-scale project technological barrier should also include a test that demonstrates that less technologically advanced alternatives are more financially attractive than the project (Michaelowa, 2007). The definitions and the examples of the proposed barriers should be reworked to give project developers a clear view of what they need to demonstrate (Michaelowa, 2007). Different views can be expressed about testing for additionality of small-scale projects. On the one hand, some would be in favour of more precise guidance for small-scale projects, **even arguing that the investment analysis should become mandatory**. Others, such as a Senior Consultant interviewed form at a leading CDM Policy Advisory entity (2011) interviewed for this study, would prefer to leave it up to the project developers to demonstrate the additionality of their project, claiming that more guidance would not make it clearer or fairer.

6.1.2 The role of DOEs and the CDM EB

This section will consider the role of DOEs and the EB to ensure consistent application of the above tests. Many believe that it is crucial for the CDM to tackle its deficiencies regarding the stringency of the regulatory review. The DOE Director interviewed (2011) pointed out the fact that **DOEs need clear rules to assess the additionality of projects**, as it is very difficult to assess something that is counterfactual without clear criteria. Further guidance for DOEs on verification and validation is required to promote quality and consistency in verification and validation reports, despite the publication of the "*CDM Validation and Verification Manual"* in 2008. The Climate Action Network International (2009b) also suggests "**requiring DOEs to duly consider public comments submitted** to DOEs". It could even be interesting to have "all parameters used in the investment test […] checked by a local expert for this type of project" (Michaelowa, 2007). The clarification of the DOE's functions as well as data checks carried out by external specialists would ensure more consistency, more applicability and more objectivity in the demonstration of additionality.

Some suggest that the liability of DOEs should be strengthened. Wara and Victor (2008) and a university professor (2011) interviewed for this study highlight the "**need to shift payment for third party verification services from project developers to the CDM EB** itself or to some other truly independent verification scheme". They argue that this would allow the CDM EB "to align their incentives so that [the DOEs] perform as expected" instead of second guessing the verifiers, as it is doing through the current supplementary reviews (Wara and Victor 2008). Michaelowa (2007) puts forward the idea of a random allocation of DOEs to projects by the CDM to guarantee independence in judgment. He also points out that "DOEs should bear all costs of request for review and review procedures for projects they have validated" and that each "review of a project should automatically lead to a spot check of the DOE that validated the project, which should bear all costs of that spot check" (Michaelowa, 2007). Finally, some stakeholders are in favour of introducing an automatic suspension of the DOE in the case of fraudulent or incompetent action when a project is rejected (ibid). All these measures involve sanctions for DOEs that fail to accomplish their tasks.

6.1.3 Potential alternatives to the current additionality demonstration

As reported by Raymond (2010) and many others, it is also possible to go "'beyond additionality' to focus on other factors that are more important to the creation of fair, practical and environmentally effective offset credits". Indeed, as more objective criteria are necessary, Schneider (2007) points out the importance of avoiding "looking too much into the particular motivation of the project developer, as this is highly subjective, but rather assessing the market environment and current practice regarding the proposed project type". Several authors and interviewees highlight that there is no perfect additionality test as particular problems are associated with all the possible methods (Bloomgarden and Trexler, 2008; Streck, 2010). As a result, the determination of additionality requirements always involves choosing "a balance between the number of acceptable free-riders and the lost opportunities of CDM projects" (Schneider, 2007). The transaction costs, the institutional and technical capacity and the host country resources are some of the main criteria for selecting baselines and approaches to additionality (Shukla and Mondshine, 1999).

Many authors suggest the use of standardised approaches to improve the current system (Streck, 2010; IETA, 2009; Raymond, 2010 etc.). In this section, the following standardised approaches to demonstrate additionality[6] will be discussed as well as a multiplier mechanism:

- Positive/negative list;
- Performance benchmark test;
- Default values;
- Penetration rates;
- Discounting CERs.

As reported by Streck (2010) once agreed and tested standardised methods are considered "less controversial in their implementation than project specific testing methods". They also have "the advantage of streamlining the process and increasing transparency". In addition to that, they considerably reduce development costs and data requirements, thereby simplifying the project development process and easing access for potential stakeholders (IETA, 2009). Furthermore, standardised approaches will increase the predictability of the CDM process and thus its commercial attractiveness (IETA, 2009). Nevertheless, they are less flexible and do not allow specific conditions to be taken into account (Streck, 2010). Some standardised approaches are not appropriate for all technology types (IETA, 2009). Lastly, the offset programme authority has to bear costs of collecting data (EPRI, 2008). As standardisation is concerned, it is essential to mention the importance of choosing conservative values as thresholds, default values etc. (Streck, 2010). It should also be remembered that setting standards is a dynamic process which will need to take place over time.

Positive/negative list

A positive list "consists of specific project types of a specific size" and allows proving additionality by categories of project features (IGES, 2010). All the projects that meet the eligibility criteria are automatically considered as additional so that project developers do not have to demonstrate their additionality. Two types of positive lists can be distinguished (CAN, 2009a). The first type would be complementary to the current project-by-project additionality testing whereas the second type would replace the current approach. The latter would thus limit the scope of the CDM to certain project types (Schneider, 2007). This concept of criteria establishing positive additionality "is easy to implement and, if applied conservatively, less prone to continuous controversy than the project-by-project additionality testing" (Streck, 2010). **Furthermore, it simplifies the test and reduces uncertainty (IGES, 2010a).** However, some claim the selection of project types seems nearly unworkable in practice (CAN, 2009a). It is "extremely controversial and subject to intense pressure from both private industry and the parties" (ibid). Moreover, it is also difficult to define the list as it becomes "necessary to consider the specific circumstances of the technology, the country and the sector" (Schneider, 2007). Finally, the detractors assert that this type of system cannot handle project types including "significant numbers of both additional and non additional projects" (CAN, 2009a).

[6] The standardisation of baseline determination will be considered in a later section.

Similarly, a negative list includes project types that are automatically deemed none additional and are thus excluded from the CDM. According to the Climate Action Network International (2009a), this system is “useful to ensure the CDM avoids subsidising the worst project types” provided it is complementary to other fundamental reforms.

Performance benchmark test
This approach “would allow for a **single benchmark to apply to multiple projects using the same technology or implementing the same activity**, thereby eliminating the need for detailed project-specific additionality determination” (EPRI, 2008). Benchmark systems are becoming “increasingly popular because it often makes the additionality determination more objective and policy-based” (Bloomgarden and Trexler, 2008). Some argue that they could “do a better job protecting environmental integrity” than a project-by-project approach (Raymond, 2010). It also brings about continuous improvements in emission reduction calculations as benchmarks are designed to increase over time (IETA, 2009). Provided that they are officially approved by governments and the industry sector, this system could considerably streamline the exisiting registration procedure. The main challenge of using benchmarks is that “they require detailed data from the relevant industry”, which are either not always publicly available or have never been gathered, particularly in non-Annex I countries (Schneider, 2007) and the least developed countries.

To give an example, performance standards have been introduced by the Climate Leaders Programme, a voluntary GHG emission reduction program developed by the US Environmental Protection Agency (US EPA) (EPRI, 2008). These standards include performance benchmarks to determine additionality and baselines for quantifying emission reductions. Several types of performance benchmark have been determined, e.g. emission rates, technology standards or common practice standards. They are all “set at a level of performance that, with respect to emission reductions or removals, or technologies or practices, is significantly better than average compared with similar recently undertaken practices or activities in a relevant geographic area” (EPRI, 2008). The performance benchmarks are based on an analysis of public data on “recent, similar activities in the relevant sector in a specific geographic area” (EPRI, 2008). For instance, “the benchmark may be set at the top 25th percentile of performance, or the top 10th percentile” and it is “periodically updated to ensure continuous performance improvements, and to reflect changes in regulations, market trends and technology developments” (EPRI, 2008). This example confirms the applicability of performance standards to varying project types, and the benefits this creates in terms of accuracy and lower verification costs compared to the project-specific approach (EPRI, 2008).

Default values
This standardised approach involves using **conservative default values instead of actual measurements**. As in the literature read the notion of benchmark and default value is often confused, we will make a clear distinction between the two. We consider that a default value is used when calculating a baseline or a financial indicator (in the case of additionality testing). Whilst a benchmark gives a standardised figure which is used as the reference level. Both approaches have the advantage of reducing the possibilities for manipulation and for gaming parameters. For additionality testing, conservative default values could be set when it is too complex for project developers to carry out the required project by project measurements. Ideally, these default values should be “regularly updated and made publicly available from the host country of CDM projects” (IGES, 2010).

Penetration rates
Standardised barrier tests also present an opportunity “for projects types where the entire additionality determination cannot be standardised” (IETA, 2009). The most frequent example consists in assessing a market penetration rate to determine whether or not the project qualifies as “first-of-its-kind” (IETA, 2009). **To determine consistent penetration rates, some specific guidance could be introduced to clearly define the types of technology to be taken into account** as well as to specify “ which technologies the project should be compared with” (Schneider, 2007).

Similarly, quantitative penetration rates could be used "to determine when a project activity is common practice" so as to reduce the subjectivity of the results of this test (Schneider, 2007). This could be done geographically, by technology type or by sector. Such penetration rates should be accompanied by clear guidance to determine the type of projects and the geographical zone to be taken into account in the common practice test. The question of the inclusion of existing CDM projects in such a test would also have to be clarified.

To conclude this section about additionality standardisation, it is interesting to note that standardised approaches are not new and have already been applied in at least one methodology (IGES, 2010; IETA, 2009). Until now, project-by-project additionality testing rather than benchmarking has been established as "much more up-front work is required to determine the benchmarks in the first place" (Bloomgarden and Trexler, 2008). However over the last few years significant data gathering has taken place and standardisation may represent the next step. This would allow CDM projects to benefit from the numerous advantages of standardised testing in terms of cost reductions, objectivity, applicability, usability and consistency. The CDM EB has been requested by the meeting of the parties to the Kyoto Protocol (CMP) to investigate standardised baselines and these concepts are being explored under the EB and the CDM Methodology Panel (CDM Meth Panel).

Discounting CERs
Another possible approach to improve the current additionality test is to use a multiplication factors to decrease the quantity of CERs issued for specific project types, also known as "CER discounting". The idea is to calculate the probability that a project category is additional and to have the percentage of issued CERs scaled accordingly (Sugiyama and Michaelowa, 2001). This method has two main advantages. Firstly, it makes it "more likely that CERs represent real emissions reductions, and further, that the CDM moves beyond being a zero-sum game to making real reductions" (CAN, 2009a). Secondly, "the problem of a certain share of non-additional projects in the CDM would be addressed on an aggregated level by weighting a credit from a baseline-project crediting system lower than an emission permit in a cap-and-trade system" (Schneider, 2007). Unfortunately, it is also very complex to implement as it requires assessing the percentage of non additional CERs being issued for all types of projects and arduous political negotiations to fix discounting rates (Castro and Michaelowa, 2010; CAN, 2009a). In addition, it could unnecessarily penalise "truly additional projects which are already difficult to implement" (CAN, 2009a). As pointed out in an interview with a Doctor specialized in the carbon markets from a leading University (2011) discounting is not really credible as a projects can only be considered as additional or not, but not half-additional. In many ways the level at which a standardised benchmark is set and the severity of this benchmark also results in a type of discount rate. For further details about the different types of discounting, see Kollmuss, Lazarus and Smith (2010).

6.1.4 Prior consideration provisions

It was suggested by Schneider (2007) that "projects can only request registration if the project has started no earlier than one year before" because that could reduce the use of back-dating, which has been frequently reported. Since then, the current *"guidelines on the demonstration and assessment of prior consideration of the CDM"* have been adopted and clarified (EB 41, 48, 49) but there is still some confusion

6.1.5 Other considerations

The choice of a new method to assess the additionality of CDM projects could include different approaches. The objective of simplifying the CDM procedure should be kept in mind when making this choice: the scope of each additionality approach should be precise enough to safeguard the integrity of the CDM, but be flexible enough to ensure its feasibility. The differentiation could be based on project types, project sizes, geographical distinction or a combination of these examples.

Distinctions between project types could be considered with the application of a standardised method for one project category and a project-by-project approach for another project category. **Some propose to apply a project-by-project approach for large-scale projects and to use a standardised approach for small-scale projects, including benchmarks or a positive list for least developed countries**. This is very relevant when considering that “some of the (validation) documentation requested is simply not adapted to reality in some host countries, such as in least developed countries” (World Bank, 2010). As an example, the Community-focused Micro-Scale Scheme (developed by the Gold Standard) has decided that “eligible project activities are deemed additional, without any further requirements to demonstrate additionality” (World Bank, 2010). As mentioned in an interview with a member of the Team of the Environment Department Carbon Finance at the World Bank (2011), there is now a certain tendency for the CDM EB to allow some standardisation in micro-scale activities in the adopted procedures and in the adopted guidelines. The World Bank (2010) has similarly suggested introducing “automatic additionality for small-scale renewable energy and energy efficiency projects”, as is already the case for certain small-scale renewable energy (up to 5MW and subject to other conditions) and energy efficiency projects (up to 20GWh/year and subject to other conditions). Lastly, a geographical distinction could be considered; applying different additionality approaches for the same technology in different countries, if the technology is more developed in one country than another. It could also allow differentiation between less developed countries and developed countries, e.g. by applying standardised methods for projects developed in less developed countries. During an interview the CEO of a carbon asset management firm who is also a member of the CDM Executive Board Methodology Panel of the UNFCCC (2011) stated that “it is less problematic to have some free-riders if we apply a more straightforward approach in such countries”. Indeed, any accepted project would still be useful in terms of technology transfer and sustainable development.

A new approach for additionality will depend on how decision makers see the CDM in the future and will be the result of a political decisions. Some are in favour of a larger CDM market whereas others claim that “the CDM should be concentrated on a smaller and more manageable number of larger projects” (Wara and Victor, 2008). The current public position of the EU is that the CDM should be geared towards less developed countries while other more advanced developing countries graduate towards sectoral mechanisms that they would combine with their own policies. More information about the different Party’s positions can be found in the briefing paper on Political Lock-in. The objectives of the future CDM have to be clearly defined before considering any reform of the additionality test.

Finally, it is important to mention that most new approaches are not easy to implement as they require political decisions to decide who will set standard values (benchmarks, default values, positive lists…) and how they should be set. Most interviewees highlighted that this will be a challenge as the CDM EB may not have access to all the necessary data whereas the authorities in the different countries would not be objective enough in to objectively determine such values.

The reform of the CDM involves finding a realistic balance between lowering the transaction cost for additionality testing whilst ensuring equitable geographic distribution and uptake opportunity.

Additionality reforms

- Financial additionality requires clearer guidance from the CDM EB in regards to the use of ODA in CDM projects;
- The Mandatory use of tools for the demonstration of additionality should be considered in all CDM methodologies and further guidance should be given for small-scale projects;
- Clarifications should be given for investment analysis to ensure the suitability of input values, fair selection of financial indicators, the choice of discount rates and the choice between IRR,

NPV

- Project developers should provide external justification for the existence of a prohibitive barriers.
- The barrier claiming non availability should be proscribed
- Common practice analysis should be subject to a benchmark whereby other CDM projects should be taken into account above a certain level;
- The obligation to use investment analysis for small-scale projects could be considered;
- Further clarification of the DOE's function as well as data checks on their work carried out by external specialists;
- Certain parties suggested shifting the remuneration of DOE from the project developer to the CDM EB proposed
- Alternative additionality tests were suggested such as: positive list, performance benchmark test, default values, penetration rates, discounting CERs;
- Simplification of the current mechanism should be kept in mind;
- Different additionality rules for different categories of projects, classed by project size and country development status.

6.2 Baseline setting

This section focuses on reforms for baseline determination. Until now, "international negotiations have rarely defined guidelines for the establishment of reference scenarios" (Streck, 2010). It would be interesting to "build on current CDM EB efforts and the very rich body of methodology experience to develop practical and simplified methodologies that strike a balance between providing a reasonable assurance of their conservativeness and maintaining incentives to develop CDM projects" (World Bank, 2010). **Before considering reforms regarding baseline setting, it is noteworthy to mention that most of the approaches developed here below have already been used in some of the approved CDM methodologies**, as was the case for additionality demonstration (World Bank, 2010).

Standardisation of baselines is now included in the work programme of both the EB and the CDM Meth Panel. Some examples of existing standardised baseline initiative (IGES 2010b):

- Switch from non-renewable biomass for thermal applications by the user (AMS-I.E.): In March 2010, EB53 revised the methodology into version 2, and default efficiency factors for baseline cooking scenarios were introduced;
- Energy efficiency measures in thermal applications of non-renewable biomass (AMS-II.G.): In December 2009, EB51 revised the methodology into version 2, and default efficiency factors for baseline cook stoves were introduced;
- Demand-side activities for efficient lighting technologies (AMS-II.J.): In May 2009, EB47 revised the methodology into version 3, and fixed average daily utilisation hours of CFL (3.5hrs/day) were introduced.

The choice of one particular method represents a trade-off between transaction costs, error margin and transparency. On the one hand, standardised baselines "will impose the least transaction costs to individual projects but may result in relatively large errors in determining true GHG reductions" (Shukla and Mondshine, 1999). On the other hand, project-by-project baseline determination "will produce very accurate estimates of GHG reductions, but may add significant costs to the project and may invite significant government review, thereby slowing the approval process down" (Shukla and Mondshine, 1999). The optimisation point of such a trade-off falls somewhere between these two extremes, this justifies why most proposed approaches include partial standardisation. The streamlining of CDM validation procedures could effectively be "facilitated by moving to ambitious yet realistic baseline standardisation wherever possible, along with clear and objective additionality" (World Bank, 2010). It is noteworthy that standardised baselines involve significant subjectivity when setting the values for the baseline (as it depends on political decisions) but allow for far more project validation objectivity once the standard is set and applied. In this section, benchmarks, default parameters, deemed or per-unit values and discounted approaches. Afterwards, other considerations will be discussed.

Benchmarks
The use of "emissions intensity benchmarks" were proposed by K. Carnahan (IETA, 2009). Two methods were proposed the first one consists in **combining baseline setting and additionality demonstration** "for project and program activities for which the business-as-usual GHG intensity per unit of production can be established", including cement and aluminium production (IETA, 2009). The second one sets "**baseline emission levels in combination with a standardised additionality test based on a binary benchmark or positive list**", as could be used for renewable energy power plants (IETA, 2009). Other benchmarks types could be used for other methodologies with the same advantages. The experienced gained by the EU ETS in benchmarks for free allocation should be used to inspire the implementation of these concepts.

Default parameters
The principle of using default parameters in baseline setting (IGES, 2010a) is the same as in the additionality demonstration. These default values "help streamline the process of gathering the necessary data for the determination of emission reductions" (IETA, 2009). They are usually "**based on actual existing measurement data of similar, but not identical, conditions**" (IETA, 2009). A good example is included in the AMS-II.G where a default efficiency value (10 or 20%) may be used for the efficiency of the baseline scenario.

Grid Emission Factors (GEF) are an example of default value to be calculated using a standardised algorithm. They are published or approved by governmental or national authorities. Such figures "substantially reduces the time and cost for those involved in the proposed CDM projects" as well as the number of requests for review (IGES, 2010). The publication of official GEF also represents a clear incentive to develop a project in a country rather than another (Sutter, 2011). However, the historical grid-connected energy supply is not the most appropriate measure in less developed countries. Consequently, CDM methodologies should be adjusted to reflect the real energy demand in these countries, i.e. to include the unmet energy demand that is not reflected in the GEF (World Bank, 2010). This would "lead to a more realistic (higher) emission baseline" that "could help stimulate interest in energy projects, not only on the supply side, but also on the demand side" (World Bank, 2010).

Deemed or per-unit values
The use of deemed or per-unit values for certain types of projects allows project participants "to **multiply a conservative estimate of the average emission savings of a given unit by the number of those units involved in the project activity**, rather than carry out an extensive and costly monitoring plan" (IETA, 2009). It is well suited for projects like "solar lamps, high efficiency cook stoves and high efficiency light bulbs" (IETA, 2009).

Discounted approach
The discounted approach discussed in the reforms of additionality could be used in baseline calculations "to compensate for the uncertainty related to establishing baselines" (Castro and Michaelowa, 2010).

Other considerations
When considering standardising baseline setting, defining the geographical scope for each standard applied is a crucial point. Indeed, standardised baselines "may differ across regions or countries based on local resources or capacity" (Shukla and Mondshine, 1999). Some argue that "national circumstances should be considered" or propose that baselines be "applied at country or sub-regional level" (IGES, 2010a). **Japan and the European Union agree that the development of standardised baselines should be prioritized for countries with fewer than 10 registered CDM projects**

(IGES, 2010a). That could encourage an improvement of regional distribution (IGES, 2010a). The choice between a static or a dynamic baseline also needs to be carefully considered. The latter will require defining from the outset when and how the baseline should evolve as “certainty about the baseline is the critical element” (Shukla and Mondshine, 1999). Standardised baselines can provide “a straightforward means to demonstrate additionality” (IGES, 2010a). However, a “hybrid approach with multiple baseline options […] based on the nature of the project” will also need to be considered as one rule cannot be applied to all project types (Shukla and Mondshine, 1999). That way, a project-specific approach could still be used in large power sector projects for example because transaction costs only represents a small share of their total costs whereas a standardised method could be used for smaller projects. Sectoral mechanisms could help overcome many of the barriers related to project by project CDM validation.

Whatever solution is selected, it will be important to make the most of “the experience and lessons learnt from the CDM methodologies on how to determine emission baselines” (World Bank, 2010). In addition, it will be useful to work in collaboration with all the CDM stakeholders “to ensure that methodologies and particularly monitoring requirements build on and are consistent with existing industry/sector practices, standards and/or reporting guidelines and are tailored to contexts on the ground” (World Bank, 2010). It is also crucial to “better engage and develop capacity with host country representatives” (World Bank, 2010). DNAs can effectively facilitate the establishment of standardised baselines and indicators “by organizing information related baseline and additionality which is acceptable to the EB” and their involvement is necessary (IGES, 2010a). This will contribute to better local policy making and more integrity in the use of carbon finance as an important mechanism for financing local mitigation action according to one interviewee’s opinion who is President of a leading Carbon Finance firm and member of the CMIA (2011). This should also ensure data availability, compatibility with practical realities as well as appropriate level of aggregation for baselines setting (World Bank, 2010). Finally, all the details of the review processes should be clear at the outset so as to “enhance predictability for methodology revisions” (World Bank, 2010).

It is also interesting to consider the possibility of combining standardised baselines and automatic additionality “for activities meeting clear criteria and/or implemented in clearly specified geographic regions and under other circumstances”, following the model set by the approved methodology for energy-efficient refrigerators (AM0070) (World Bank, 2010).

In conclusion, we can observe that standardised baseline setting would considerably streamline the CDM process without reducing the environmental integrity of the system. It would also simplify the procedure, increase transparency and reduce costs, thereby increasing the attractiveness of the CDM.

Baseline reforms

- Many of the proposed baseline standardisation approaches are already found in existing methodologies and function efficiently;
- The optimisation point between the trade-off in reforms concerning standardised baseline falls somewhere between the two extremes of complexity and integrity;
- Several approaches to benchmarks depending on project types a) combining baseline setting and additionality demonstration b) baseline emissions levels in combination with a standardised additionality test based on a binary benchmark or positive list; c) other baseline setting methods;
- Using deemed or per-unit values to multiply a conservative estimate of the average emission savings;
- Default parameters based on actual existing measurement data of similar, but not identical, conditions could be used to set these default values;
- A Discounting approach can also be considered in Baseline standardisation;
- Baseline setting could be subject to different rules for different geographic regions depending on their development status and their project development capacity;

7 Conclusion

Since the additionality requirement was introduced into the CDM, it has considerably evolved with a constant objective of improving its environmental integrity. Nevertheless, there are still many critics in regards to the subjectivity of the additionality calculation. Different parties claim that there are still a number of none additional projects being validated and issuing CER and that the very nature of the additionality test is a perverse policy incentive. After examining a sample of registered projects several authors concluded that the investment analysis and the barrier analysis test do not provide the required environmental integrity. The cause has been linked to CDM tests and tools not being followed accurately, the complexity of gathering data, the need for further clarity on the application of certain tests and the lack of rigorous verification by the DOEs. Similar queries were raised concerning baseline setting and how such hypothetical calculation could give credible results. However it is made clear that the CDM EB has already begun addressing many of these questions and has provided clearer guidance for the DOE. The positive role the CDM has played in scaling up carbon abatement initiatives as well as understanding and awareness is praised. Further positive aspects such as faster validation and the constant improvement in the application of the additionality tests and baseline calculations are also highlighted.

The literature suggests different types of reforms and alternatives to the current additionality and baseline tests, including clearer guidance, reinforcing DOE compliance with their tasks, positive/negative lists, benchmarks, default values and other new mechanisms. Variations in project technologies and project sizes mean that different systems for additionality and baseline testing need to be applied for different cases. The scarcity of data in certain regions of the world and the lack of capacity to gather data in these regions means that the same rules cannot be applied to different countries.
It is noteworthy that standardisation for baseline setting and additionality demonstration was advised by numerous stakeholders in the interviews and publications[7]. Some advise a mixture of standardisation combined with a continuation of the current project by project system. The experience gained from CDM methodologies that already use standardisation need to be used to facilitate the application of these new methods. The principle established in these functioning examples should be extended to other methodologies. Whilst standardised additionality tests and standardised baseline calculations or a combination of both are the most popular mechanism others such as positive lists are considered more appropriate for countries where there are few CDM projects or where certain technology types are scarce. Discounting is also considered but seen as more controversial. In more developed countries the report suggests that sectoral crediting mechanisms provide a better solution as they also help encourage local action in combination with the carbon crediting. Any modifications to the existing CDM will have to be carried out in a way that ensures that the environmental integrity of the system is preserved and improved. This will involve making complex decisions with political implications due to the differentiation that will be made between project types, classes and geographical location. However this will have the advantage of improving and simplifying the costly validation procedure once these new rules are in place

[7] More information on the Party's positions can be found in the briefing paper on political lock-in.

8 Appendix

8.1 References

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- Interview with a member of the team of the Environment / Carbon Finance Department (World Bank), 17/03/2011
- Interview with a Director of Service and Technologies at one of the leading DOE firms, 23/03/2011
- Interview with the President of a leading carbon finance firm who is also a member of the CMIA 22/09/2011

8.2 Example of baseline calculation

Consolidated baseline methodology for grid-connected electricity generation from renewable sources (ACM0002), pp. 7-10.

Baseline emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \quad \textbf{(1)}$$

Where:

BE_y = Baseline emissions in year *y* (tCO_2/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. These cases are described next:

(a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{(2)}$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

(b) Retrofit or replacement of an existing renewable energy power plant

If the project activity is the retrofit or replacement of an existing grid-connected renewable power plant, the baseline scenario is the continuation of the operation of the existing plant. The methodology uses historical electricity generation data to determine the electricity generation by the existing plant in the baseline scenario, assuming that the historical situation observed prior to the implementation of the project activity would continue.

The power generation of renewable energy projects can vary significantly from year to year, due to natural variations in the availability of the renewable source (e.g. varying rainfall, wind speed or solar radiation). The use of few historical years to establish the baseline electricity generation can therefore involve a significant uncertainty. The methodology addresses this uncertainty by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed during the historical period rather than the effects of the project activity.[8]

$EG_{PJ,y}$ is calculated as follows:

$$EG_{PJ,y} = EG_{facility,y} - (EG_{historical} + \sigma_{historical})$$; until $DATE_{BaselineRetrofit}$ **(3)**

and

$$EG_{PJ,y} = 0$$; on/after $DATE_{BaselineRetrofit}$ **(4)**

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
$EG_{historical}$	=	Annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh/yr)
$\sigma_{historical}$	=	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh/yr)
$DATE_{BaselineRetrofit}$	=	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)
$EG_{historical}$	=	Annual average of historical net electricity generation, delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity. To determine $EG_{historical}$, project participants may choose between two historical periods. This allows some flexibility: the use of the longer time period may result in a lower standard deviation and the use of the shorter period may allow a better reflection of the (technical) circumstances observed during the more recent years.

Project participants may choose among the following two time spans of historical data to determine $EG_{historical}$:

(a) The five last calendar years prior to the implementation of the project activity; or

(b) The time period from the calendar year following $DATE_{hist}$, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least five calendar years, where $DATE_{hist}$ is latest point in time between:
   (i) The commercial commissioning of the plant/unit;
   (ii) If applicable: the last capacity addition to the plant/unit; or
   (iii) If applicable: the last retrofit of the plant/unit.

<u>(c) Capacity addition to an existing renewable energy power plant</u>

In the case of hydro or geothermal power plants, the addition of a new power plant or unit may significantly affect the electricity generated by the existing plant(s) or unit(s). For example, a new hydro turbine installed at an existing dam may affect the power generation by the existing turbines. Therefore, the same approach as for retrofits and replacements is used for hydro power plants and geothermal power plants.

In the case of wind, solar, wave or tidal power plants, it is assumed that the addition of new capacity does not significantly affect the electricity generated by existing plant(s) or unit(s).[9] In this case, the electricity fed into the grid by the added power plant(s) or unit(s) could be directly metered and used to determine $EG_{PJ,y}$.

[8] As an alternative approach for hydropower plants, the baseline electricity generation could be established as a function of the water availability. In this case, the baseline electricity generation would be established ex-post based on the water availability monitored during the crediting period. Project participants are encouraged to consider such approaches and submit the related request for a revision to this methodology.

[9] In this case of wind power capacity additions, some shadow effects can occur but are not accounted under this methodology.

If the project activity is a capacity addition, project participants may use one of the following two options to determine $EG_{PJ,y}$:

Option 1: Use the approach applied to retrofits and replacements above. $EG_{facility,y}$ corresponds to the total electricity generation of the existing plant(s) or unit(s) and the added plant(s) or unit(s). A separate metering of electricity fed into the grid by the added plant(s) or unit(s) is not necessary under this option. This option may be applied to all renewable power projects.

Option 2: For wind, solar, wave or tidal power plant(s) or unit(s), the following approach can be used provided that the electricity fed into the grid by the added power plant(s) or unit(s) addition is separately metered:

$$EG_{PJ,y} = EG_{PJ\_Add,y} \quad \textbf{(5)}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{PJ\_Add,y}$	=	Quantity of net electricity generation supplied to the grid in year *y* by the project plant/unit that has been added under the project activity (MWh/yr)

Project participants should document in the CDM-PDD which option is applied.

Calculation of $DATE_{BaselineRetrofit}$

In order to estimate the point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity ($DATE_{BaselineRetrofit}$), project participants may take the following approaches into account:

(a) The typical average technical lifetime of the type equipment may be determined and documented, taking into account common practices in the sector and country, e.g. based on industry surveys, statistics, technical literature, etc.;

(b) The common practices of the responsible company regarding replacement/retrofitting schedules may be evaluated and documented, e.g. based on historical replacement/retrofitting records for similar equipment.

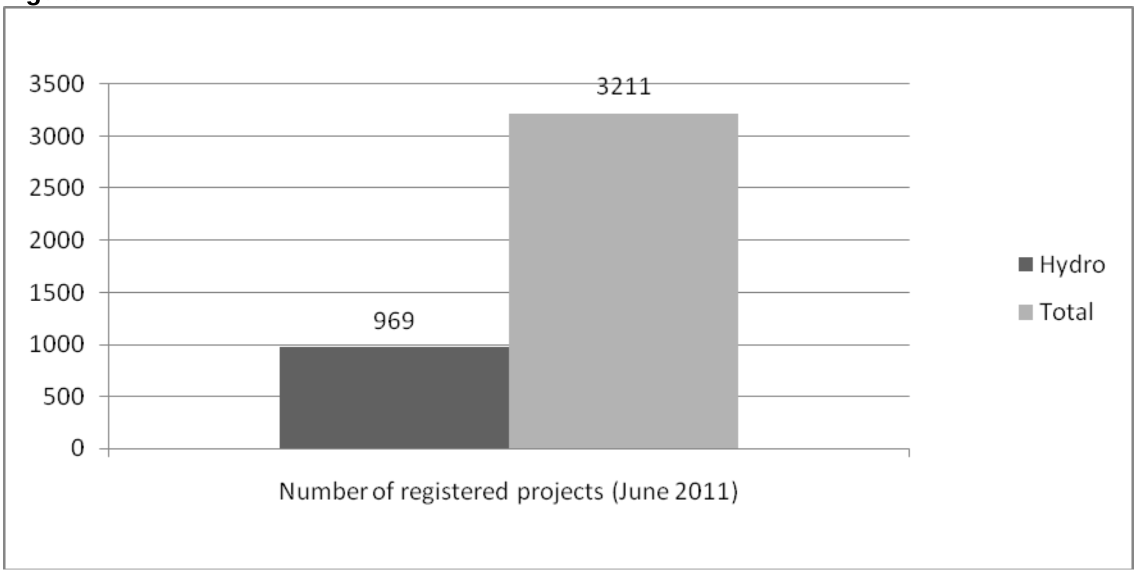
The point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity should be chosen in a conservative manner, i.e. if a range is identified, the earliest date should be chosen.

8.3 Further analysis on the additionality of CDM hydro projects

Why hydroprojects?

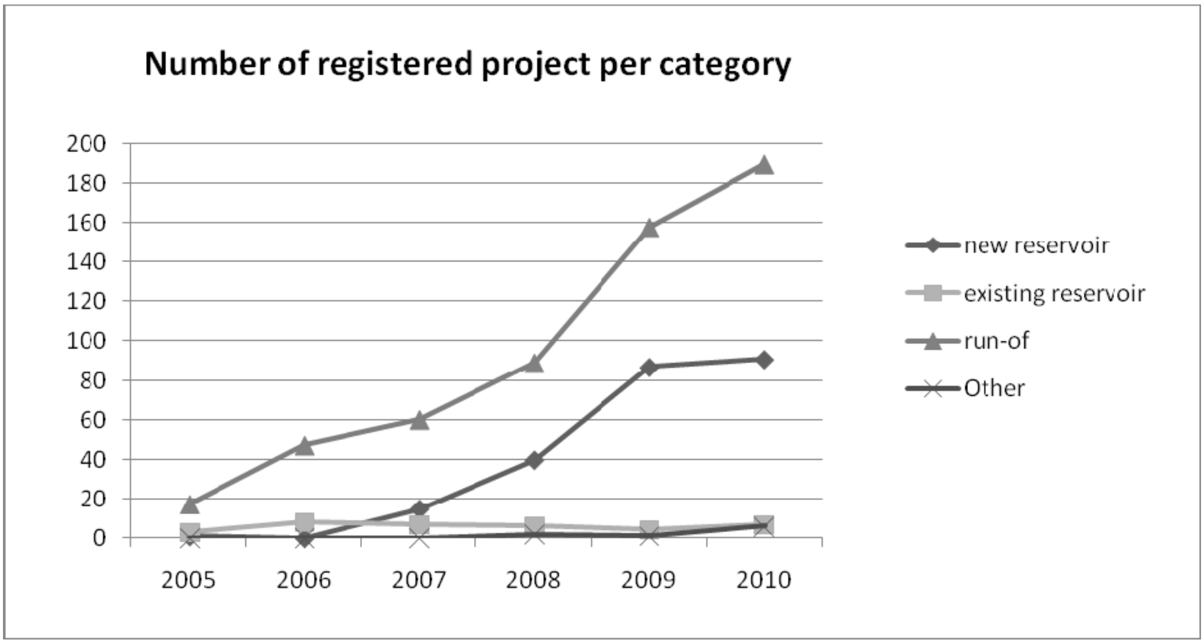
Hydro projects represent a growing share of the registered CDM projects and are now the most common technology in the CDM. In June 2011, 30% of all registered projects were hydro projects (see Figure 1 below).
Hydro projects are expected to issue 331 million CERs by 2012 (or 15% of the total amount of issued CERs by 2012). This amount of emission reductions is equivalent to the annual GHG of a country like Spain. By 2020 hydro CDM projects are expected to avoid 1,176 Mt CO2e (19% of the total expected CERs). By 2030 this figure nearly doubles to 2,102 MtCO2e (22% of all expected CERs).

Figure 1



Run of the river projects, which are mostly small scale projects, are the most frequent type of hydro project. However 91 hydro projects with new reservoirs were registered in 2010 (see Figure 2).

Figure 2



A majority of projects with an annual reduction of 100,000 CERs or more were registered in 2009 and 2010. Therefore not only are more hydro projects being registered but these projects also tend to be larger. The following graphs illustrate this trend. While the 21 projects registered in 2005 expected an average annual emission reduction of 30 ktCO2e, this average rose to 111ktCO2e for the 294 projects registered in 2010.

Figure 3

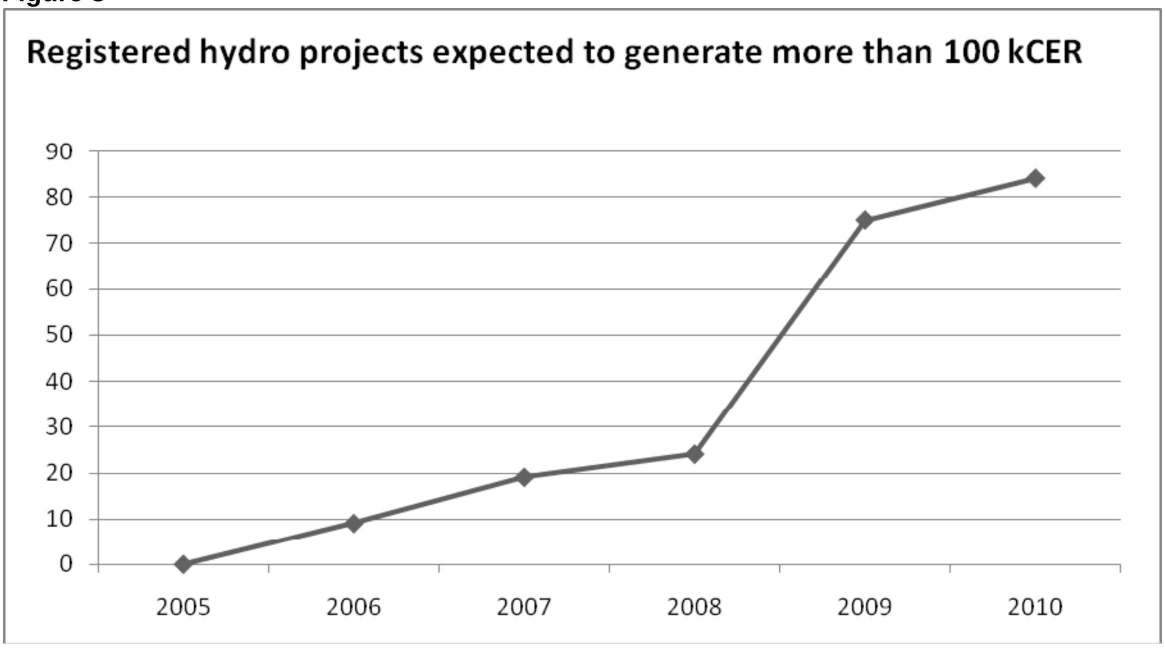
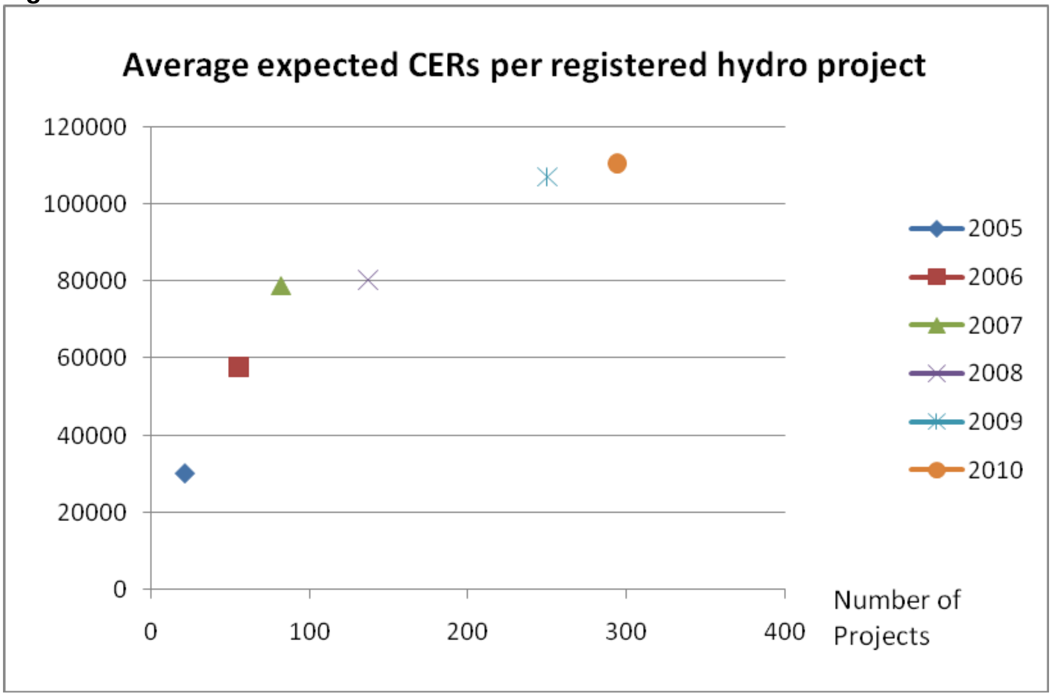
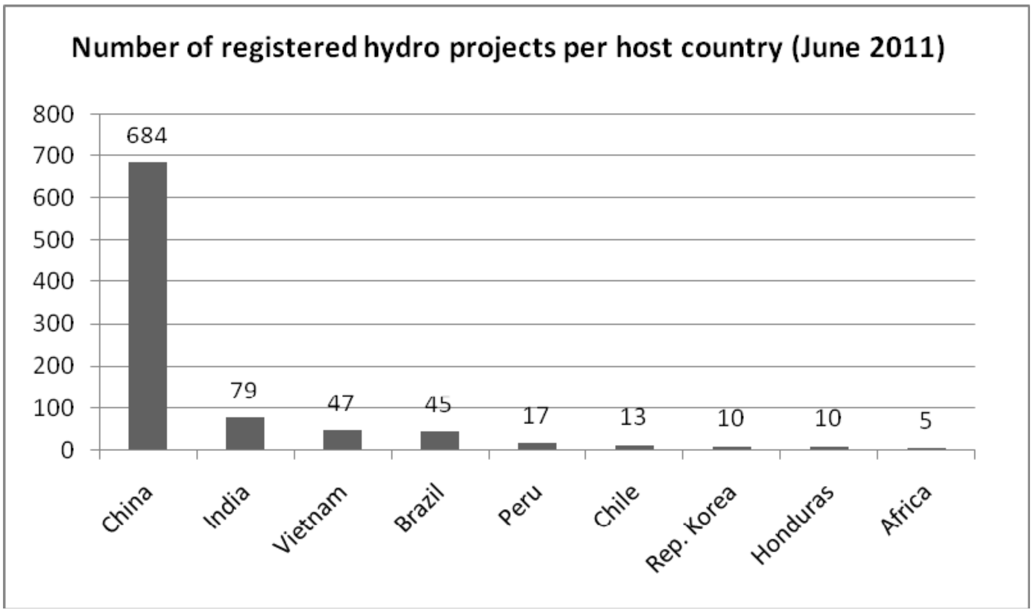


Figure 4



As is the case for other project technology classes, hydro CDMs are unevenly distributed among Non-Annex I countries. In June 2011, China (71% of registered hydro projects), India (8%), Vietnam and Brazil (5% each) account together for 90% of registered projects. Only 5 registered projects are located in Africa (or 0.5% of the total). The share of Chinese hydro projects increased in 2010 as only 21% (61 projects) of hydro projects registered this year were located outside of China (see Figure 5).

Figure 5



In China, the majority of large hydro projects nearing completion are now applying for CDM registration. Bogner and Schneider (2011) showed that, when the Three Gorges Dam is not taken into account, almost two thirds of additional capacity of hydro projects with a power capacity above 50 MW applied for CDM in 2007.

Additionality concerns with hydroprojects

According to Barbara Haya (2007) the majority of hydro projects in the CDM pipeline are non-additional as there has been no substantial increase in the number of hydros under construction compared to recent years when hydros did not receive any credits. According to her research hydropower is a mature technology with over a century of development and is already common practice wherever there are hydropower resources. More recent findings from Bogner and Schneider (2011) contradict the claims found in PDD that medium and large-scale hydropower face significant barriers, are financially unattractive are not common practice. Their conclusion is that it is likely that most projects in China would have been implemented in any case.

According to B. Haya (2007) indicators such as IRR can easily be manipulated. According to L. Schneider (2007), the current barrier analysis is "unlikely to result in a reasonable differentiation between additional and non-additional projects". To illustrate this, PDD for hydropower projects in China list a range of barriers, including difficult terrain, remote location and low capacity but B. Haya (2009) claims that many hydro projects have been built in China with these same barriers and did not benefit from carbon revenues.

Review of the additionality demonstration / investment analysis in hydro PDDs

In its 61st meeting the EB released a 4th version of its guidelines on the assessment of investment analysis (EB61, annex 13[10]). We have listed below some of the most important guidelines. This 4th version is particularly interesting as it provides default values for the investment analysis benchmark expected return on equity for different project categories in each host countries.

1) The period of assessment should not be limited to the proposed crediting period of the CDM project activity.
2) The fair value of any project activity assets at the end of the assessment period should be included as a cash inflow in the final year.
3) Project participants should supply spreadsheet versions of all investment analysis.
4) The cost of financing expenditures (i.e. loan repayments and interest) should not be included in the calculation of project IRR.
5) In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity (ROE) are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented.

In order to test if this new set of criteria for assessing investment analysis could help prevent projects with dubious additionality claims from being registered we analyzed three randomly selected (very) large scale Chinese projects and two randomly selected smaller hydro projects from other host parties. We analyzed the public information available both, in the PDD as well as in the investment analysis spreadsheets (see Table 1). We are aware that PDD are not the only source of information available and that gathering data uniquely from this source may present some limitations. Interviews with stakeholders and analysis of the EIA are two alternatives which might provide further evidence on specific project economics and project developer motivation. However this information is not easily accessible and is not always audited by an independent third party. For the five randomly selected projects the PDD was considered the best source of information available in the limited time available for this task.

[10] In July 2011 a 5th version was released with minor modifications.

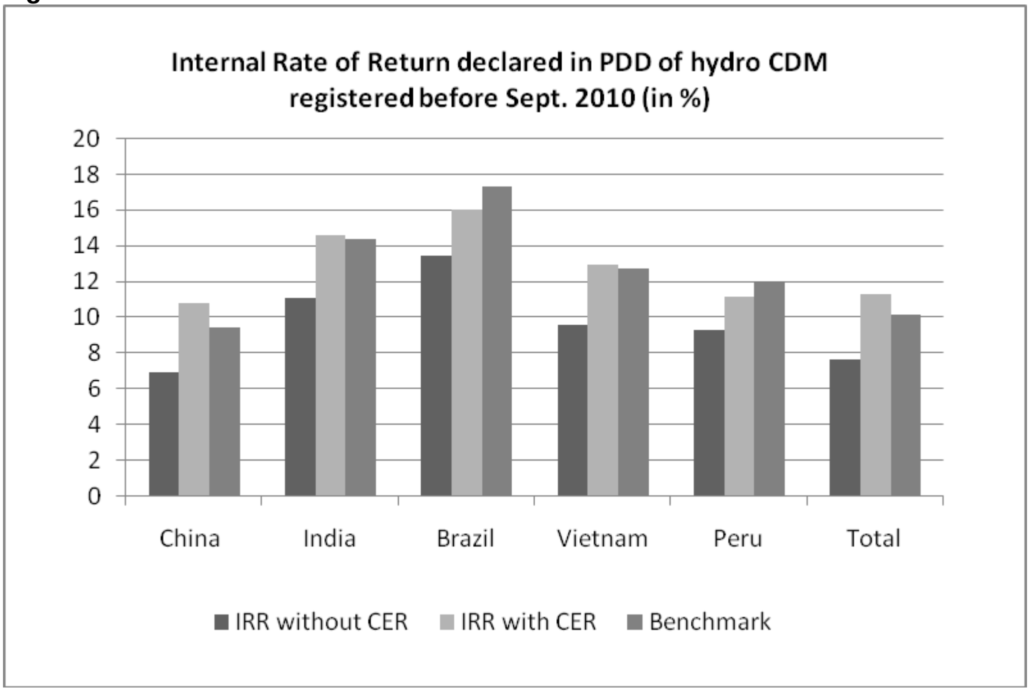
Table 1

Project name Host party / registration month	Expected CERs per year	Period	Fair Value	Spread-sheet	Exclude financing exp.	IRR without CER	IRR with CER	Benchmark
Longkou (4159) China / Feb. 2011	1,137 k	30 y*	Yes	Yes	Yes	6.59%	8.67%	8%
Shawan (4068) China/ Jan. 2011	1,776 k	30 y*	Yes	Yes	Yes	5.99%	8.06%	8%
Caojie (3524) China / Sept. 2010	1,512 k	32y*	Yes	Yes	Yes	6.8%	10%	8%
La Hieng 2 (3667) Vietnam / Oct. 2010 Small scale (15 MW)	38k	30y	Yes	Yes	Yes	6.86%	8.58%	8.09%
Bugoye (3017) Uganda / Jan. 2011	51k	No investment analysis (13 MW / small scale). Finance barrier.						
+ 5 years construction period								

Note that the prior consideration of the CDM project activity was documented in the 5 PDDs and was always given within six months of the project start date. However for the 3 Chinese projects, important decisions had been taken before the project developers considered the CDM option. For instance the EIA of Longkou project was approved in January 2005 while the proposal to develop the project as a CDM dates from April 2005. For Shawan the EIA was approved in September 2004 and the decision to apply for CDM was taken in March 2005. Caojie' EIA was approved in June 2004 and the CDM consideration only occurred in April 2005. On the contrary, a first version of the PDD of La Hieng 2 was already drafted in 2003, 5 years before the project obtained its EIA approval.
The IRR of the 4 projects with investment analysis, when excluding the CER revenues were always below the ROE default values proposed in the EB's guidelines on the assessment of investment analysis.

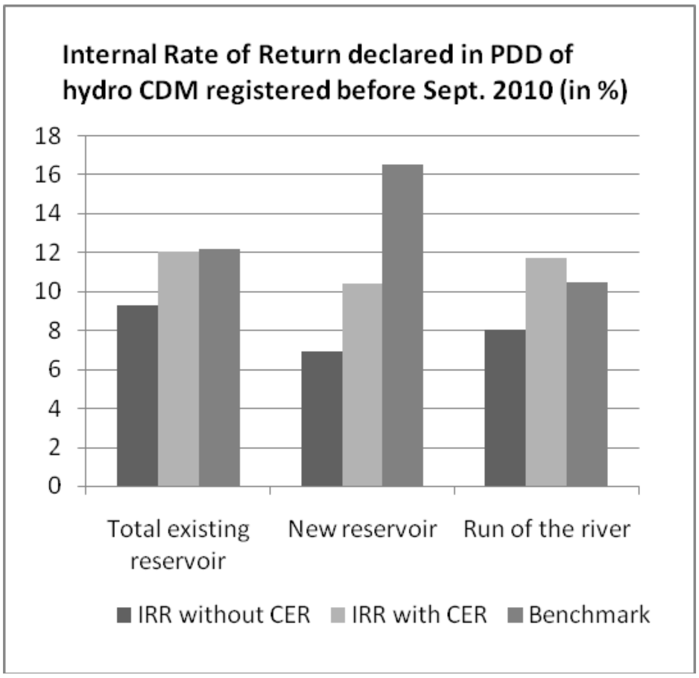
Based on IGES's database on investment analysis (last updated in September 2010) we sought to identify projects with extremely high IRR. On average, without taking CDM revenues into consideration, IRR in China, India, Vietnam and Peru were always well below the default values for energy projects (default values: 10.5% in China and 11.75% in Brazil, India, Peru and Vietnam). Only Brazilian hydro projects an average internal rate of return higher than the default values.
Given the low average IRRs mentioned in the PDD most Asian projects would be considered additional based on the information mentioned in their PDDs. Only certain South-American or African projects (some of them with IRR already above 20% without CDM revenues) might be considered none additional when applying the default values. Stricter investment analysis could therefore be detrimental in regards to improving the regional distribution of CDM hydro projects.

Figure 6



We also analyzed the IRR for the different types of hydro projects. We found that projects requiring new reservoirs tend to have lowest profitability levels. Therefore one should be aware that applying stricter investment analysis tests will not necessarily promote smaller/run of the river projects. Our analysis showed that expected IRR of smaller/run of the river projects are often higher than those of larger hydro projects with new reservoirs.

Figure 7



Conclusion

We can conclude that large hydro is not a project category that is easily addressed with standardized benchmark / investment additionality tests. Prior consideration and the history of the project also need to be scrutinized more carefully.

Options discussed in the main text above such as negative/positive list, standardized benchmarks may have a role to play in ensuring the quality of these types of projects. This would allow the EU to strengthen its leadership on climate change and expand the implementation of climate change commitments outside the EU.

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