Establishing additionality: fraud vulnerabilities in the clean development mechanism

ESTABLISHING ADDITIONALITY: FRAUD VULNERABILITIES IN THE CLEAN DEVELOPMENT MECHANISM

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Purpose: This study explores the Clean Development Mechanism (CDM) which creates carbon credits from emission abatement projects in developing economies. The purpose of this paper is to examine the operation of the CDM with specific reference to fraud vulnerabilities regarding the additionality of a project. An examination of the process of establishment, certification and verification of additionality (confirmation that emissions post-implementation of the CDM project are lower than those that would have occurred under the most plausible alternative scenario) is used to highlight the need for particular vigilance in respect to sustaining and improving the integrity of future market-based mechanisms post-Kyoto.

Design/methodology/approach: The study takes a case study approach, examining the CDM project cycle and associated key entities.

Findings: The study posits that the processes associated with establishing and verifying additionality of a project are potentially key areas of systemic weakness that must be addressed. This case study explores the design features of the CDM that may afford greater opportunities for fraudulent or deceptive practices.

Originality/value: The CDM takes a project-by-project approach to establishment, verification and certification of additionality. Whilst conceptually this design may be appropriate from an operational perspective, it potentially provides opportunities for fraudulent outcomes. The individualised approach is, by its very nature, highly resource-intensive and inherently difficult to verify.

Keywords: Clean Development Mechanism, Additionality, Fraud

Classification: Case Study

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1. Introduction

The United Nations (UN) (2009) has reported that each year around 30 billion tonnes of carbon dioxide (CO_2) is emitted into the atmosphere globally[1]. Notwithstanding the drafting of the Copenhagen Accord at the United Nations Climate Change Conference (COP15) in December 2009, the most meaningful and sustained policy response to climate change remains the Kyoto Protocol (Protocol)[2]. At the time of writing, we are mid-way through the binding target goals set by the Protocol for the five year period 2008 through 2012. As such, it is timely to review the market-based tenets of the Protocol, with this study specifically considering the Clean Development Mechanism (CDM). Since the registration of the first CDM project in November 2004, the 2,000th offset project was registered in January 2010, with in excess of 365 million Certified Emission Reductions (CERs) generated since commencement[3].

In recent years, the CDM, and particularly the generation and efficacy of CERs, has come under increased scrutiny. A number of studies (Repetto (2001), Wara (2006), Victor (2007), Wara and Victor (2008), Bauhr (2009), Chan (2009), Rajan (2009) among others) have critiqued some of the design principles of the CDM and highlighted the subsequent challenges that have resulted from its implementation. Of particular relevance to this paper is that debate regarding the establishment of additionality and associated verification processes. Additionality is the requirement that the greenhouse gas (GHG) emissions after implementation of a CDM project are less than those that would have occurred in the most plausible alternative scenario to the implementation of the project (see Chan (2009)). Wara and Victor (2008)

summarise the mood of the current debate, arguing that "*the CDM and other offset schemes are unable to determine reliably whether credits are issued for activities that would have happened anyway while also keeping transaction costs under control and assuring investor certainty* (p. 8)." It is our conjecture that the processes involved in the establishment and verification of the additionality of emission abatement projects is the key element within the CDM that may be susceptible to fraud and/or deception. These issues are examined in this paper for the purpose of identifying fraud vulnerabilities and specifically, to provide guidance as to how market-based mechanisms may be better designed in the post-Kyoto period, that is, beyond 2012.

2. What is the CDM?

The Clean Development Mechanism, defined in Article XII of the Protocol to the UNFCC, is critical in enlisting the participation of developing economies in emissions limitation and to assist in the reduction of compliance costs in developed economies, as well as to facilitate resource and technology transfers (see Repetto (2001)). Wara (2006) explains that the CDM is a project system which, by design, is complex in that the CDM is the first atmospheric pollutant trading program that covers multiple gases and allows conversion between them through the medium of a common currency, CERs[4]. The issuance of the CER, the tradable instrument transferable between parties, is the final step in a multi-layered process.

It has been concluded that while the CDM represents the largest market for carbon credits, the process of attaching, with certainty, an economic value to CERs is difficult (Chan (2009)). Member parties to the Protocol are set targets which require the limiting or reduction of GHG emissions. The CDM provides a way of transferring financial and technological resources to developing countries in exchange for

emissions reductions (Repetto (2001)). The CDM achieves this goal by certifying GHG emission-reduction credits generated by projects in developing economies that can be sold to emitting developed economies facing compliance under the Protocol (Wara (2006)). The CDM, and the associated generation of CERs, are an essential component (in the form of marketable securities) in the efficient and effective functioning of cap-and-trade markets. These markets, such as the European Union Emissions Trading Scheme, allow for price discovery to occur resulting in a market price for carbon. Integrity issues, real or perceived, resulting from the potential for fraud and/or deception in market-based mechanisms such as the CDM is of paramount importance to all stakeholders to ensure a meaningful, sustained response to the challenges of climate change is achieved.

2.1 The CDM Project Cycle

To understand the potential vulnerability points for fraud and/or deception that additionality and associated verification and certification processes can create we must begin with a foundational understanding of the CDM project cycle. It is also essential to clearly identify who are the key entities that constitute the stakeholders of such projects.

By way of a project cycle-based introduction, Wara (2006) and consulting firm Perspectives GmbH (2007) explain that the cycle commences with the project idea and the submission of a Project Design Document (PDD). The project idea is formally presented into the CDM project cycle by the preparation of a PDD that details baseline data and how future emission reductions will be real, additional and not induce leakage and outline the monitoring methodology for the project)[5]. The UN (2010) states that:

> "*… the projects must qualify through a rigorous and public registration and issuance process designed to ensure real, measurable and verifiable emission reductions that are additional to what would have occurred without the project. The mechanism is overseen by the CDM Executive Board, answerable ultimately to the countries that have ratified the Kyoto Protocol. In order to be considered for registration, a project must first be approved by the Designated National Authorities (DNA). Operational since the beginning of 2006, the mechanism has already registered more than 1,000 projects and is anticipated to produce CERs amounting to more than 2.7 billion tonnes of CO_2 equivalent in the first commitment period of the Kyoto Protocol, 2008–2012*."[6]

An understanding of the PDD is critical in informing many of the allegations of carbon fraud and market integrity issues currently being debated. The CDM-PDD Form (Version #3 - in effect as of 28 July 2006) reveals the type of information that is currently being collected[7]. It is argued later in this paper, that it is the information such as that captured in Section B of this form that may reveal fraud, or at the least, be vulnerable to distortion[8]. Section B of the PDD focuses on information relating to the process of establishing a baseline measure of emissions; detailing how emissions are to be lowered below that which would have occurred in absence of the project (i.e. additionality); and, the methodology and measurement approach that will be applied to the calculation of actual emission reductions (i.e. verification and certification processes).

In order to move the CDM project cycle forward, additional documentation confirming the DNA's (host country's) support of the project is required prior to validation by designated, independent entities and submission to the CDM Executive

Board (EB) (Wara (2006); Perspectives GmbH (2007)). If the CDM EB approves a project, it is then officially registered with the Climate Secretariat. After implementation and commissioning of the project, the project must be monitored at regular intervals. The project activity is to be confirmed by an independent certifier (termed Designated Operational Entity, DOE, and are accredited by the CDM EB) (Perspectives GmbH (2007)). At the conclusion of the CDM project cycle, CERs are issued to the CDM project participant by the CDM EB as per the UN Environment Program (UNEP) (2004) guidelines. The CDM EB retains up to two per cent of the CERs as a type of administration fee.

For completeness, Table 1 summarises the CDM project cycle into its seven key stages.

Table 1 Summary of the CDM Project Cycle

Activity	Report and *Institution*
1. Project Design and Formation	PDD
2. National Approval	
	Operational Entity A
3. Validation and Registration	
4. Project Financing	*Investors*
	Monitoring report
5. Monitoring	*Operational Entity B*
6. Verification and Certification	Verification report/certification report/request for CERs
7. Issuance of CERs	*CDM EB/registry*

Source: UNEP (2002) and Perspectives GmbH (2007)

2.2 Key Entities in the CDM Project Cycle

In the previous section, the key milestones or gates in the CDM project cycle were presented. In concert with the CDM project cycle, the following discussion

explores the systemic concerns that have surfaced in recent years regarding the CDM. Whilst it is theoretically possible that fraud and/or deception may be perpetrated by any key entity groupings involved in the CDM[9] the focus of this paper is on the establishment of additionality (for a full description of all the roles and risks of key entities in the CDM project cycle see UNEP (2004)). In particular, the key entity grouping identified as the 'designated operational entity' (DOE) is of interest. The DOE is important given that is plays a central role in the validation, verification and certification of emission reductions resulting from projects (UNEP, 2004).

It is theoretically possible that fraud and/or deception may be perpetrated by any key entity groupings involved in the CDM[8]. However, given the focus of this paper on the establishment of additionality, the key entity grouping identified as the 'designated operational entity' (DOE) is of particular interest. The DOE is important given that is plays a central role in the validation and verification of emission reductions resulting from projects.

3. Systemic Challenges and the Spectre of Carbon Fraud

The CDM project cycles (and the key entities involved within it) are attempting to corral a myriad of atmospheric pollutants into a marketable security (CERs) tradable in a secondary market. Unlike tangible commodities (such as oil and gold), carbon is an intangible commodity. Until the introduction of the Protocol (and its associated market-based mechanisms, of which the CDM is one) carbon had few commercial applications, hence, it is a legislative mechanism that has formed the basis on which carbon accrues an economic value (Parker (2008)).

The UK Financial Services Authority Commodities Group (FSA) (2008) continue this theme, noting that the underlying (instrument) in the emissions market is

not a physical commodity but a de-materialised allowance certificate. A key challenge, as for all intangible commodities, is that by definition they are not a store of wealth, meaning in this case that the value of carbon is actually stored in the permit (CERs). Given the nature of intangible commodities and the politically-generated basis on which the CDM has been created and subsequently operated, it can be argued that there is a heightened need for consideration to be given to issues of compliance and regulation (FSA (2008)).

In this section, we focus on one of the key systemic issues in the CDM project cycle, the establishment of additionality and the issue of project verification and certification by DOEs. The UNEP (2004) identify that the types of risks associated with this stakeholder group include the accuracy of validation, verification and certification; accreditation processes and outcomes; and, compliance with the regulation and requirements of host countries. It is acknowledged that focus on the controversy surrounding additionality and DOE verification is not exhaustive; however it is our conjecture that this discussion provides important insights into the need for post-Kyoto market-based mechanisms to consider the expansion of regulatory oversight.

3.1 Additionality and Verification Processes

The UN Framework Convention on Climate Change (UNFCCC) (2006) defines additionality as follows, "*A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity* (3/CMP.1, Annex, paragraph 43)." Following the CDM project cycle, additionality (and its validation and certification) is the essential criteria that must be met for the

project (through the PDD) to be registered by the CDM EB. Under current arrangements, validation is confirmed by a DOE, and the validation report forms part of the larger PDD. The UNFCCC (2006) specifies that:

> "37. *The designated operational entity selected by the project participants to validate a project activity, being under a contractual arrangement with them, shall review the project design document and any supporting documentation to confirm that the following requirements have been met … (d) The project activity is expected to result in a reduction in anthropogenic emissions by sources of greenhouse gases that are additional to any that would occur in the absence of the proposed project activity, in accordance with paragraphs 43-52 below* (3/CMP.1, Annex, paragraph 37)."

The paragraphs 43 through 52 of the UNFCCC (2006) document set out the requirements relating to baselines, additionality, crediting periods and leakage[10].

It is important to note that the methodological issues related to the setting of the baseline (popularly termed 'business-as-usual' baseline or what would have occurred without the issuance of CERs) become paramount in establishing the case for additionality. The UNFCCC (2006) documentation states that "45. A baseline shall be established … (b) In a transparent and conservative manners regarding the choice of approaches, assumptions, methodologies, parameters, data sources, key factors and additionality, and taking into account uncertainty; (c) on a project specific basis (3/CMP.1, Annex, paragraph 45)."

As previously discussed, DOEs are critical in their role as verifier and certifier, where:

> "62. … the designated operational entity contracted by the project participants to performance the verification shall make the monitoring report publicly

> available, and shall … (b) conduct on-site inspections, as appropriate, that may require, inter alia, a review of performance records, interviews with project participants and local stakeholders, collection of measurements, observation of established practices and testing of the accuracy of monitoring equipment."

The CDM takes a project-by-project approach to establishing additionality which as a conceptual design may be appropriate given the importance of having marketable CERs that are "true-to-label" (that is, one CER represents one metric tonne of carbon dioxide not emitted into the atmosphere)[11]. However, operationally the idiosyncratic approach is, by its very nature, highly resource intensive (requiring expensive, highly skilled labour and ancillary tools to conduct the testing) and inherently difficult to verify.

3.2 Evidence of Systemic Weakness

The preceding discussion, which reflected on the criteria for establishing additionality and subsequent verification and certification processes, allowed the identification of a number of specific areas that are proposed to be vulnerable to fraud and/or deception. This discussion begins with an examination of issues centred on establishing a baseline measure of emissions. The methodology and data used to meet the key criteria for additionality, that being that the project is additional to that which would have been conducted anyway, must be considered.

At its core, it has been noted that the concept of 'proving' additionality is not theoretically possible (Chan (2009)). How do you accurately calculate emission levels that would have occurred in the absence of a given project (US Government Accountability Office (GAO (2008))? The certainty with which conclusions can be drawn in respect to additional emission reductions is constrained and in essence,

hypothetical (GAO (2008)). Wara and Victor (2008) and others (eg. GAO (2008); Chan (2009)) seriously question whether the majority of projects registered through the CDM program are contributing to real reductions in emissions that would not have otherwise occurred. It has been calculated that approximately 40% of projects up to July 2007 would in fact have been implemented without the operation of the CDM (Schneider cited in Bauhr (2009)).

Another major area of controversy involves the issue of misaligned incentives. Wara and Victor (2008) outline a perverse outcome relating to the capture of trifluoromethane (HFC-23) which appears to have occurred following the introduction of CDM incentives. Wara and Victor (2008) demonstrate that sale of carbon credits generated from HFC-23 capture has become far more valuable than production of the refrigerant gas that leads to its creation in the first place. This lead Wara and Victor (2008) to conclude that "… *refrigerant manufacturers were transformed overnight by the CDM into ventures that generated large volumes of CERs, with a sideline in the manufacture of industrial gases* (p. 11)." Reflecting on the issue of misaligned incentives Lohmann (2009) forwards that the carbon market's ambitious programme of commodity formation "… *has had a number of ramifications – many of them unanticipated by its architects – that affect how or whether its original object can be achieved* (p. 168)."

Linked to these issues and related to the measurement of emissions, is the role of information transparency. Employing an approach that seeks to promote the transparency of information is designed to alleviate concerns of fraudulent or deceptive behaviour. The provision of both timely and accurate information regarding verification and certification processes is seen as a positive step in achieving trust and confidence in the system (Kruger & Egenhofer (2005)). The level

of transparency of information in respect to the CDM has been hailed as one area of success (Bauhr (2009)). A range of specific project information, including verification data is available to the public through the UNFCCC website.

Concurrence with the notion that appropriate levels of transparency of information about CDM projects and the subsequent insulation from the perpetration of deceptive or fraudulent acts that it provides necessitates consideration of the validity of the information itself. For instance, the regulator within the current CDM system, in most instances, relies on self-reported data. Given this, it is not enough to rely on simply the apparent transparency of information as sufficient insulation against fraudulent or deceptive behaviour. The regulator must have access to a system that is able to check self-report data and have sufficient powers to institute penalties against those who seek to falsify information (Kruger & Egenhofer (2005)).

Even more fundamentally, potential vulnerability within the operation of the CDM exists as a result of the scientific credibility of the methodologies used to establish baseline measures which lead to project certification and similarly, the scientific credibility used to verify additionality (Chan (2009)). As such, it may be concluded that simply touting transparency of information as an answer to the opportunities or incentives to engage in fraudulent behaviours is not an easy or simple fix to the problem (Bauhr (2009)).

A further area of interest centres on the selection, role and responsibilities of DOE's. The problem of information asymmetry surrounding the establishment of additionality and the erosion of the integrity of the CDM project cycle has been the focus of international attention in recent times. While Kollmuss, Zink and Polycarp (2008) importantly note that to minimise conflicts of interest, the CDM legislates that the validating DOE cannot also conduct project verification. However, one strand of

literature continues to raise concerns relating to the potentially conflicted position of many of the largest DOEs leading to insufficient policing of the CDM project cycle and audit irregularities. Bachram (2004) raises an important red-flag for DOEs, arguing that some "*are acting as both accountants for and consultants to polluting firms, and as verifiers of emission reduction projects* (p. 4)." In fact, in recent years the UN has suspended two of the largest clean-energy auditor DOEs (and has subsequently lifted these suspensions) over concerns relating audit irregularities and the efficacy of the vetting process of CDM projects[12]. Schneider (2007) suggests that DOEs are operating in a highly competitive market for verification services and, "*prices are dropping and are allowing DOEs to only work for a very limited amount of time on each project* (p. 5)." Schneider (2007) goes further, arguing that this problem is compounded by the CDM EB lacking sufficient resources to provide more appropriate oversight of DOEs.

In respect to the broader emissions trading markets, Kruger and Egenhofer (2005) note the essential requirement of ensuring that verifiers, in particular, are appropriately qualified. Whilst it has been proposed at the European Union level that consistency in accreditation is important, it has been concluded that the requirements of 'competence' for verifiers is still requires considerable refinement (Kruger & Egenhofer (2005)). An overriding issue that must be addressed relates to achieving consistency in certification, measurement and verification regulation via a system of accreditation and/or directly through governmental authority and regulation (see Lazarowicz (2009)).

An essential step in minimising or at the least, limiting the opportunities for fraud, corruption and/or deception must surely involve ensuring that verifiers and certifiers are independent assessors (Chan (2009)). Surely, allowing consultants or

project developers to verify projects is neither an ideal approach (Chan (2009)) nor regulatory best practice. The financial auditing literature stresses the importance of a red-flag based methodology in the fight against fraud (see Krambia-Kapardis (2001)). This system of fraud detection may also prove potentially valuable in CDM governance.

It is interesting to note that this is a similar debate that is raging in the hedge fund literature, with the idiosyncratic or 'black box' approach to investment management in these funds requiring the development of a bespoke benchmark to evaluate the skill (or otherwise) of the manager[13]. To continue this theme, issues of independent verification and the rise of hedge fund fraud (particularly the Bernard L. Madoff ponzi scheme scandal) have been front page news in recent years (Drew and Drew (2010)). We are living in an era where case studies regarding the integrity (or lack thereof) in financial markets abound and it is essential for post-Kyoto market-based mechanisms to incorporate these lessons from recent history into their future design philosophy.

4. Concluding Comments

The debate about climate change, global warming and emissions is often centred on issues relating to environmental validity and integrity. Intimately linked to this debate should be issues of operational compliance. Without a system, in this case we have discussed the CDM, that is able to enact effective and robust strategies for monitoring, verification and reporting of emissions, offsets and targets, meeting the environmental objectives of emissions trading is less likely (Kruger & Egenhofer, (2005)). A flawed CDM system could in fact undermine the very purpose of the

system itself, that is, an overall net decrease in emissions (GAO (2008)). As summarised by Bauhr (2009), p.12),

> "*… since credits are used as offsets, non-authentic credits mean a net-increase in emissions. In other words, as the emissions reductions that are certified can be bought and used to offset emissions in developed countries, total emissions will increase if the system fails to determine that the CDM project is indeed additional*".

One of the many lessons from the Global Financial Crisis (GFC) was that the heady mix of leverage, complexity and under-supervision had the ability to bring the global financial architecture to its knees. The breathtaking speed at which financial markets developed collateralised debt obligations (CDOs) backed by sub-prime mortgages over the last five years highlights the almost insatiable desire for financial innovation. This provides both an opportunity and potential risk for market-based mechanisms for carbon moving forward. Financial markets will seek to fulfil a risk transfer function, allowing carbon-related risks to be transferred between agents with different risk preferences. In fact, some commentators are suggesting that with the potential rise of cap-and-trade systems, the carbon market globally may top U.S.$3 trillion by 2020 (as compared to the estimated size of annual trade in the global oil market today at U.S.$2 trillion)[14].

These types of projections require the conversation to be moved from the systemic weakness within the CDM, to a much broader perspective. It is vital for all stakeholders to take the lessons regarding system-wide risk from the GFC and apply them to the current carbon-offset debate. The integrity of the carbon market will continue to be eroded by the real, or perceived, weaknesses in the process which enables the establishment of additionality that underwrites the CERs issued from the

CDM. The centrality of DOEs and the efficacy of their verification and certification deliberations is a necessary condition for the future viability of the CDM. It is perhaps timely for future research efforts to be dedicated to the development of fraud detection systems for the CDM and broader carbon offset market, with a particular emphasis on bespoke baseline data and more coordinated approaches to quantitative and qualitative screening of the claims of additionality as part of a broader system of fraud identification.

Notes

1. The UN (2009) outlines that CO_2 emission sources include emissions from the energy industry, from transport, from fuel combustion in industry, services, households, etc. and industrial processes, such as the production of cement.
2. The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. The Protocol has 178 member parties to date, with Australia signing on 3 December 2007.
3. The first CDM project was registered on 18 November 2004, with the 1,000th project registered on 14 April 2008. The Climate Change Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) anticipates that more than 2.9 million CERS will be generated in the first commitment period of the Protocol. For further details see: http://unfccc.int/files/pressreleases/application/pdf/press_release_cdm_passes_2000th_registered_project.pdf
4. The UN Environment Program (2002) confirms that the CDM includes projects in the following sectors: end-use energy efficiency improvements; supply-side energy efficiency improvements, renewable energy, fuel switching, agriculture (reduction of CH_4 and $N2_0$ emissions); industrial processes (CO_2 from cement etc., HFCs, PFCs, SF_6); and, sink projects (only afforestation and reforestation).
5. Wara (2006) explains that real emissions reductions are ones that are monitored to insure that they actually occur. Additional emissions reductions are ones that are in addition to any that would have occurred absent of the CDM subsidy. Leakage of emissions occurs when emissions reductions that would have occurred within a project absent of the CDM subsidy instead occur outside it because of the subsidy.
6. This quote is taken direct from the UNFCCC's CDM homepage, available at: http://cdm.unfccc.int/about/index.html
7. A full version of the CDM-PDD Form (Version #3 - in effect as of 28 July 2006) is available at: http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/index.html
8. In addition, the information regarding public funding (Annexure 2) may also be susceptible to fraud or, at the least, distortion. However, we leave this discussion to future researchers.
9. International concern regarding the operation of the CDM has led the UN, the WTO and a number of supranational organisations to issue guidelines in an attempt to stamp out corruption in this (and other) areas.
10. See note #5 for Wara's (2006) definitions.
11. A unit of CER is equal to one metric tonne of carbon dioxide equivalent, resulting from a CDM project, which may be used by Annex I countries towards meeting their binding emission reductions and limitation commitments under the Kyoto Protocol, for further discussion, see: http://www.carbon.com.pk/certified_emission_reductions.htm
12. For further discussion on these high profile cases see: http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article6832259.ece
13. The issue of hedge fund regulation and transparency is considered by Bianchi and Drew (2010).
14. A study by Point Carbon, a European consultancy and analyst service in global power and carbon markets, estimates that the world carbon market could be worth $3.1 trillion dollars by 2020, see http://www.triplepundit.com/2008/05/carbon-point-study-estimates-global-carbon-market-could-top-3-trillion-by-2020/

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