

# Navigating the global carbon market

## An analysis of the CDM's value chain and prevalent business models

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### ABSTRACT

From a slow start, the clean development mechanism (CDM) market has recently experienced enormous growth. However, the CDM market has been increasingly criticised, resulting in a lively debate about how to reform, complement, or replace it. In order to increase transparency and assist policy-makers in better understanding the current market, we depart from the traditional project-level perspective on CDM and analyse commercial activities by utilising data from UNEP Risoe's CDM Bazaar. To this end, we first establish a seven-step value chain by conducting a factor analysis on the commercial activities indicated in the Bazaar and, second, identify nine prevalent business models with a cluster analysis of all 495 participating organisations. Based on these analyses, we discuss potential impacts on the value chain of different policy scenarios that rely on carbon credits as incentive. We find that the importance of specific regulatory CDM know-how and general business activities such as finance varies strongly with the different policy scenarios. Our analysis serves to sensitise policy-makers and business about implications of different regulatory designs.

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### 1. Introduction

While industrialised countries are responsible for the bulk of historic and current GHG emissions, developing countries are greatly increasing their emissions, thus turning climate change mitigation into a global problem (IPCC, 2007). The clean development mechanism (CDM) is currently the only market mechanism aimed at triggering changes in the pattern of emission-intensive activities in emerging economies. It has delivered recognisable achievements. The CDM market is growing at double-digit rates and represented a market volume of €5.4 billion in 2007, which is assumed to have leveraged another €24 billion in additional investment for clean energy projects (Capoor and Ambrosi, 2008). In addition to transferring financial resources, the CDM also contributes to the transfer of cleaner technologies to developing countries (Schneider et al., 2008b). At the same time, however, the CDM has come under much scrutiny and is frequently criticised. The criticisms have centred around the CDM's high transaction costs (Michaelowa and Jotzo, 2005), the inherent difficulty of testing for additionality and achieving sustainable development (Holm Olsen, 2007; Schneider, 2007), and the lack of incentives for developing countries to take on binding emission reduction targets (Wara and Victor, 2008). Furthermore, even apart from these

criticisms, the above-mentioned CDM market volume still only represents a tenth of the investment flows needed for developing countries (UNFCCC, 2007a).

As a result, policy-makers the world over are debating options to reform, complement or replace the CDM in the context of a post-Kyoto climate regime. In any case, such a mechanism must “focus on the role of private-sector investments as they constitute the largest share of investment and financial flows” (UNFCCC, 2007a, p. 5). In order for policy-makers to enhance or redirect the emerging private-sector dynamics created by the CDM, it is crucial for them to have a solid understanding of the current market structure and how different regulatory designs might impact the market dynamics in the future. However, most analyses of the CDM to date have focused either on project-level analyses or on the technological and geographical distribution of the entire market. Only very few studies focus on the firm perspective (Lütken and Michaelowa, 2008; Schneider et al., 2008a) and strategic behaviour by market actors thus still remains rather opaque. Although there is a lot of publicly accessible information on regulatory decisions, project documentation, and even CER prices,<sup>1</sup> this data does not allow to easily assess the market structure including market activities other than those listed in the

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<sup>1</sup> Regulatory decisions are posted on the UNFCCC website, all project documentation is published in summarized form in UNEP Risoe's CDM pipeline, and prices for secondary certified emissions reductions are published by information providers such as Point Carbon and Reuters.

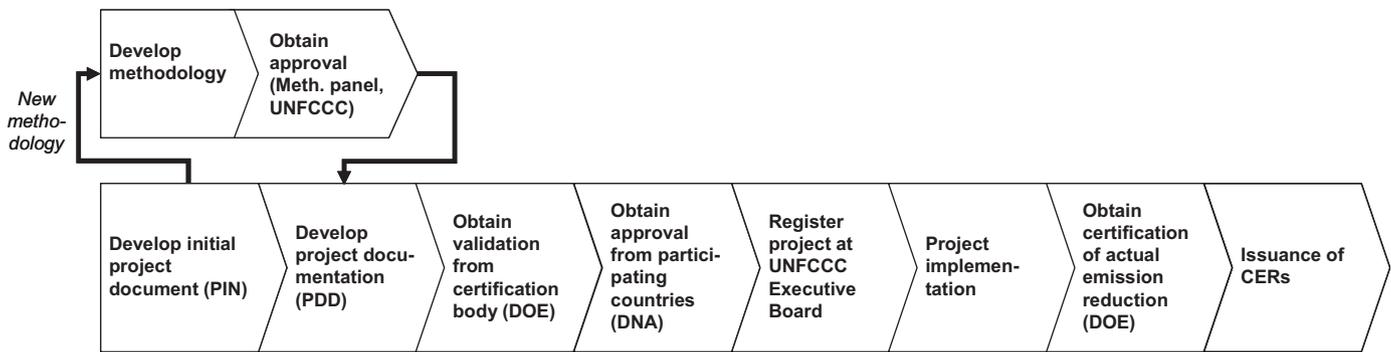


Fig. 1. CDM project cycle according to UNEP (2007).

PDDs. While such analyses are mostly offered as proprietary services by specialized firms, there are few analyses available in the public domain.<sup>2</sup> Therefore, our aim is to increase the market's transparency by analysing two research questions that correspond to two important dimensions of the market. First, we investigate which activities constitute a holistic value chain of the CDM market, i.e., we also include activities that go beyond the requirements of the regulatory process. Second, we examine which types of actors cover which value chain steps in order to shed light on prevalent business models. These analyses form the basis for sensitising both policy-makers and the private sector to possible effects of different post-Kyoto scenarios on the dynamics of the private sector's engagement in mitigation efforts in developing countries.

The paper begins with a short review of the CDM and related corporate activities (Section 2), and a presentation of our data and methodology (Section 3). Next, Sections 4 and 5 present results on the value chain and prevalent business models. Finally, Section 6 discusses the possible impacts of different post-Kyoto regimes on the value chain and resulting market dynamics.

## 2. A short review of the CDM and related corporate activities

Most of the existing research on CDM takes a project-level approach and focuses on the CDM-project cycle (Fig. 1). This project cycle describes the activities necessary to register a project and generate certified emission reductions (CERs) (UNEP, 2007).

Project proponents have to apply or develop a methodology for measuring emission reductions, prepare the Project Design Document (PDD), and monitor project activity. Regulatory institutions such as the host country's designated national authority (DNA) and the UNFCCC (specifically the CDM Executive Board (CDM EB)) as well as the private sector's designated operational entities (DOEs) acting on the CDM EB's behalf have to approve the project initially. Later, the DOEs periodically verify emission reductions before the CDM EB decides on issuing certified emission reductions (CERs). However, this schematic illustration suffers from several weaknesses, as it does not include all complementary activities undertaken up until the point a CER is used for compliance purposes. Furthermore, the project cycle as depicted above does not shed light on which individual actors participate in how many and which of these activities. As a

consequence, market dynamics remain unclear, as indicated in a recent large survey in which only 12% of respondents considered the CDM market to be mature (Point Carbon, 2008).

While the notion of a CDM value chain has been explored conceptually very early (Janssen and Kaegi, 1999; Springer, 2000), several empirical efforts have recently been made to better reveal the structure of the market and the identity of its participants. First, the CDM pipeline, a database administered by UNEP (2008b), describes only the nature of all buyers mentioned in PDDs by assigning them to certain actor groups. However, while some groups are sufficiently abstract and include many actors, the CDM pipeline's categorisation also includes highly specialised groups, and the resulting 60 different groups do little to improve oversight. Furthermore, the methodology used to assign buyers to the groups is not revealed. Second, Capoor and Ambrosi (2008) used the World Bank's accumulated market know-how to assign actors to various value chain steps. However, their analysis emphasises the financial sector in developed countries and sheds little light on the diverse activities in developing countries. In addition, the analysis is not based on public data and is not explained in detail. Third, a study by UNEP (2007) describes in greater detail various business models and actors' activities within the CDM, but is relatively abstract in nature and does not detail the actual distribution of these actors along dimensions such as geographical region. In summary, the literature lacks a holistic and empirical analysis grounded in publicly available data that covers the entire value chain and all associated actors. However, such an analysis is necessary to evaluate the possible effects of different post-Kyoto policies on the market.

## 3. Data and method

### 3.1. Data

For our analysis of corporate activity within the CDM, we chose the public database "CDM Bazaar" administered by UNEP Risoe and the UNFCCC because it is the largest publicly available dataset on both developed and developing country actors and their respective fields of activity in the market. It was established in September 2007 with the goal of facilitating the exchange of information among CDM participants (UNEP, 2008a). The CDM Bazaar is an online database administered by UNEP that allows a systematic description of the activities of organisations active in the CDM. It is important to note that the CDM bazaar and the reported activities are based on self-declaration by the organisations. Their profile is published on the website by submitting a buyer, seller, or service provider profile or a combination thereof. For each profile, a firm can submit additional data on project

<sup>2</sup> Besides the UNEP Risoe pipeline database which we used for triangulation of our data source we could only find a limited amount of other fully publicly available reports which describe the market structure and its players. An example for a proprietary study that analyses a certain set of carbon market companies can be found under [http://www.verdantix.com/index.cfm/papers/Products.Details/product\\_id/19/green-quadrant-cdm-project-developers/](http://www.verdantix.com/index.cfm/papers/Products.Details/product_id/19/green-quadrant-cdm-project-developers/).

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