



Carbon market risks and rewards: Firm perceptions of CDM investment decisions in Brazil and India

Nathan E. Hultman^{a,*}, Simone Pulver^b, Leticia Guimarães^a, Ranjit Deshmukh^c, Jennifer Kane^a

^a University of Maryland, School of Public Policy, 2101 Van Munching Hall, College Park, MD 20742, USA

^b University of California at Santa Barbara, Environmental Studies, 4001 Bren Hall, Santa Barbara, CA 93106, USA

^c Prayas Energy Group, Pune 411004, India

ARTICLE INFO

Article history:

Received 24 November 2009

Accepted 29 June 2010

Available online 14 August 2010

Keywords:

Clean development mechanism

Climate policy

Carbon markets

ABSTRACT

The carbon market experiences of Brazil and India represent policy success stories under several criteria. A careful evaluation, however, reveals challenges to market development that should be addressed in order to make the rollout of a post-2012 CDM more effective. We conducted firm-level interviews covering 82 CDM plants in the sugar and cement sectors in Brazil and India, focusing on how individual managers understood the potential benefits and risks of undertaking clean development mechanism (CDM) investments. Our results indicate that the CDM operates in a far more complex way in practice than that of simply adding a marginal increment to a project's internal rate of return. Our results indicate the following: first, although anticipated revenue played a central role in most managers' decisions to pursue CDM investments, there was no standard practice to account for financial benefits of CDM investments; second, some managers identified non-financial reputational factors as their primary motivation for pursuing CDM projects; and third, under fluctuating regulatory regimes with real immediate costs and uncertain CDM revenue, managers favored projects that often did not require carbon revenue to be viable. The post-2012 CDM architecture can benefit from incorporating these insights, and in particular reassess goals for strict additionality and mechanisms for achieving it.

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1. Introduction

Cutting global emissions that lead to climate change will be a paramount task in the 21st century. Limiting global average surface temperature increases to approximately 2 °C would entail global emissions cuts of at least 50–85% by 2050 (IPCC 2007); even an aggressive 50% reduction from 1990 levels would still carry a significant (12–45%) risk of exceeding this 2° threshold (Meinshausen et al. 2009). The resulting transition into a lower-carbon economy will require participation from all large emitters. In particular, emerging economies, as they invest in new energy supply technologies at a rapid rate, will be a decisive factor in realizing a low-carbon future. As such, policies to encourage low-carbon investment in these economies are an essential component of an effective global climate policy.

The current dominant global climate policy approach relies on carbon emissions trading, and it. It is almost an article of faith that carbon markets will, via the invisible hand, spur the diverse and creative applications of new and existing technologies that are hoped for in this low-carbon transition. Yet this deterministic

approach overlooks myriad cultural and institutional factors that can stymie, pervert, or enhance large-scale policy approaches. We have sought to address this gap by investigating firm responses to carbon markets in two major developing economies—Brazil and India.

Based on extensive interviews with firm managers, government representatives, and other experts, we discuss in this paper differences in firm perceptions of the Clean Development Mechanism (CDM) across two countries, Brazil and India, and two sectors, sugar and cement. We report here findings from a sample of firms in four categories (Brazil-sugar, Brazil-cement, India-sugar, India-cement) that chose to invest in low-carbon technologies and seek carbon credits through the CDM policy mechanism. We describe their assessment of potential risks and benefits before they undertook CDM projects and outline the diversity of approaches they used in estimating the benefits to their firms from participating in this ambitious global carbon market.

2. CDM as a policy tool to encourage low-carbon investment

Our research seeks to understand how international market-based environmental policies affect firm investment decisions in

* Corresponding author. Tel.: +1 301 405 3429

E-mail address: hultman@umd.edu (N.E. Hultman).

the real world—in diverse countries, industries, and across different firms with varying levels of technical training and interest in environmental performance. While the carbon market no doubt creates an effective overall incentive that will on average shift investments, the sheer scale of the proposed increase in carbon-pricing policies raises questions of how carbon trading and carbon markets will change firm behavior in different contexts. Our work is a first step in this direction.

Policy can influence firm behavior, though the specific pathways through which it does so are contingent on multiple factors within the firm's institutional and governance environment. Policies that seek to encourage low-carbon investments by firms include carbon markets (of which CDM is one manifestation), renewable energy portfolio standards, feed-in tariffs, and allowance trading markets, and each of these affects the framework for firm decisions differently. In this paper, we focus on firm responses to carbon markets, and in particular to CDM. Regulatory carbon markets originated with the 1997 Kyoto Protocol, and now such markets exist in several national and international contexts.¹ The CDM is the only existing regulatory mechanism for pricing carbon and other greenhouse gases in developing countries (Streck, 2004). Unlike allowance (cap-and-trade) systems, the CDM is a project-based system: credits are generated by individual projects that reduce emissions below a hypothetical business-as-usual baseline. For CDM, projects must be approved by a central regulator (the CDM Executive Board or EB) and then subjected to regular auditing and verification procedures. Upon completion of this complex legal application, credits are issued (Certified Emissions Reductions, CERs) that can subsequently be sold on international markets. Although the Kyoto Protocol spurs some demand, most of the buyers of CERs use them for compliance with the more legally binding EU Emissions Trading System (ETS), which has a provision allowing the use of certain CERs.

The CDM has expanded rapidly. To date, the CDM has supported over 4700 projects in over 70 countries. In 2008, CDM projects accounted for 389 million tonnes of CO₂-equivalent reductions,² which is approximately 84% of the global total for project-based markets,³ and 8% of the total for all carbon markets (the EU ETS represents the largest single market, with over 94%). The 2008 CDM market volume was valued at approximately \$6.5 billion, out of a total carbon market volume of \$126 billion, again dominated (~73%) by the EU ETS (Capoor and Ambrosi, 2008). The projects currently registered, awaiting validation, and requesting registration are expected to generate over 2.9 billion tonnes of CO₂ equivalent reductions in the period 2008–2012 (J. Fennhann, CDM Pipeline 01 May 2009). Although the Kyoto Protocol expires in 2012, the CDM is expected to continue operations beyond that date, and existing projects are expected to realize a further 3.4 billion tonnes of CO₂e reductions in the period 2013–2020.

Despite its success at stimulating a large number of projects across many sectors, the CDM has well-recognized flaws (Mathy et al., 2001; Streck, 2004; Wilkins, 2002). Since its inception, competing perspectives on the purpose of the CDM have pushed its rules in different directions—some emphasizing the CDM's mission to enhance sustainability (Hultman et al., 2009a), others

arguing that success comes with stimulating carbon markets to find low-cost mitigation opportunities in diverse countries (Wara, 2007). Moreover, as with any project-based system, the CDM is subject to two linked philosophical challenges usually referred to as “baselines” and “additionality”: in order to be awarded credits for investing in low-carbon technology, the project developer must demonstrate that the emissions from the project are lower than they would have been in absence of the project. While this counterfactual comparison seems superficially benign and straightforward, a large dose judgment must be administered in setting the counterfactual baseline. In addition, the project developer must demonstrate that the project would not have occurred without the additional inducement of CER revenues. In other words, the project must be shown to be “additional” (Begg and Horst, 2004; Bernow et al., 2001; Bode and Michaelowa, 2003). Those favoring a very robust CDM with clear additionality will tend to favor rules that are highly restrictive and conservative. Those who view the CDM's goal as the encouragement of clean energy projects in developing countries, or those who wish to see capacity building in technological expertise and carbon finance, may prefer to favor solid projects whose additionality may or may not be hard to prove definitively. Related problems in CDM arise from the asymmetric information between the project developer and the regulator (Fischer, 2005), possibly unequal exchange of public environmental quality to benefit small groups of investors (Bachram, 2004; Bumpus and Liverman, 2008; Lohmann, 2006; Pearson, 2007), and the CDM's failure to generate sustainable development outcomes alongside carbon credits (Ellis et al., 2007; Hultman et al., 2009a; Boyd et al., 2009). Finally, the CDM has been criticized for its unwieldy and opaque bureaucratic structure (Jotzo and Michaelowa, 2002; Krey, 2005; Michaelowa and Jotzo, 2005; Zhao and Michaelowa, 2006).

Our research assesses the CDM from the viewpoint of the firms meant to participate in developing-country carbon markets. The investment perspective on the CDM, and carbon markets more generally, is a small but growing area of investigation. One approach has been to investigate the risk characteristics of carbon markets from the perspectives of external investors. In this case, one can study how a carbon project developer might best deploy capital to maximize returns while minimizing investment risks stemming from host country politics or project performance (Böhringer et al., 2007; Hultman, 2006; Oleschak and Springer, 2007), or how an actor might optimally aggregate carbon assets in a portfolio (Hultman, 2006; Laurikka and Springer, 2003; Matsuhashi et al., 2004; Pulver, 2007; Springer, 2002, 2003; Subak, 2003). Another approach follows the political engagement of investors and businesses in climate policy negotiations and carbon market creation (Levy and Egan, 1998; Begg et al., 2005; Engels, 2006; Vormedal, 2008; Pulver, 2002). A third approach examines the investment effects of international policy as mediated by a particular country's politics and institutions (Shukla et al., 2004; Borges da Cunha et al., 2007; Schroeder, 2009).

Our research extends the investment perspective on the CDM by analyzing the decisionmaking of individual developing-country firms. Many (if not all) environmentally related firm decisions are not simple acts of charity but rather are grounded in expectations of future benefits that will accrue to the firm. Some decisions, such as green marketing or donations to an environmental “good cause”, must be evaluated primarily as expenditures that *may* realize benefits in terms of increased and higher-margin customer base, streamlined relationships with regulators, or motivation of personnel. Other decisions, however, may allocate capital to new projects that will realize financial as well as environmental benefits. Decisions to invest in renewable energy constitute one such case. A basic approach to such capital expenditures assesses their net present value under different

¹ The EU ETS and the Annex-I trading of the Kyoto Protocol are the best-known allowance trading systems, but similar systems are also operational in Australia (New South Wales) and the Northeast US (the Regional Greenhouse Gas Initiative). Other programs are being developed for Japan, the Western US, and most recently has been discussed at the US Federal level.

² On the primary CDM market, secondary market transactions were higher magnitude but they do not represent new supply.

³ Includes CDM, joint implementation (part of the Kyoto Protocol mechanisms) and voluntary markets which are not used for regulatory compliance.

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