



Communication

Carbon markets and low-carbon investment in emerging economies: A synthesis of parallel workshops in Brazil and India

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ABSTRACT

While policy experiments targeted at energy and innovation transitions have not been deployed consistently across all countries, market mechanisms such as carbon pricing have been tested over the past decade in disparate development contexts, and therefore provide some opportunities for analysis. This brief communication reports on two parallel workshops recently held in Sao Paulo, Brazil and New Delhi, India to address questions of how well these carbon pricing policies have worked in affecting corporate decisions to invest in low-carbon technology. Convening practitioners and scholars from multiple countries, the workshops elicited participants' perspectives on business investment decisions under international carbon markets in emerging economies across multiple energy-intensive sectors. We review the resulting perspectives on low-carbon policies and present guidance on a research agenda that could clarify how international and national policies could help encourage both energy transitions and energy innovations in emerging economies.

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1. Introduction

During the next quarter-century, over 95% of the growth in global greenhouse gas emissions is expected to occur in the non-OECD economies (United States Energy Information Administration, 2010). An effective global response to climate change will thus require emerging economies to reduce the emissions intensities of their economies and likely even their absolute levels of emissions; limiting global average surface temperature increases to approximately 2 °C would entail global emissions cuts of at least 50–85% by 2050 (IPCC, 2007). During this critical period, investment flows into the energy sectors of emerging economies are of particular importance. Energy investment in the largest emerging economies will constitute nearly 60% of the world total by 2030 – over \$10 trillion (International Energy Agency, 2003) – and will originate primarily in the private sector. Of equal importance, new ideas and engineering solutions

from emerging economies could, in responding to local necessities, provide new technological foundations for reducing global emissions. In such a world, no longer would we expect a unidirectional flow of innovation from advanced to emerging economies. Instead, a world where energy technologies arise and flow freely across development contexts would be one far more likely to achieve aggressive low-carbon energy transition goals.

While such a vision may be compelling, the challenges to an energy and innovation transition remain substantial, and the policies to influence it remain uncertain. Major obstacles are both technological and institutional. Agreement on future emissions hinges on what the large emitters of tomorrow can undertake with respect to their own energy, industrial, and transportation systems, and to a large degree this will depend on domestic technical capacity. Moreover, access to capital and markets and the engagement of entrepreneurial risk takers with technical experts must be facilitated. Any agenda that seeks to reduce global emissions should therefore seek to enhance and untether the process of investment and innovation in the emerging economies.

While policy experiments targeted at energy transitions and innovation have not been deployed consistently across all countries, market mechanisms such as carbon pricing have been tested over

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the past decade in disparate development contexts and therefore provide some opportunities for analysis. This brief communication reports on two parallel workshops¹ recently held in Sao Paulo, Brazil and New Delhi, India to address questions of how well these carbon pricing policies have worked in affecting corporate decisions to invest in low-carbon technology. Convening practitioners and scholars from multiple countries, the workshops elicited participants' perspectives on business investment decisions under international carbon markets in emerging economies across multiple energy-intensive sectors. We review the resulting perspectives on low-carbon policies and present guidance on a research agenda that could clarify how international and national policies might encourage both energy transitions and energy innovations in emerging economies.

2. Business perspectives on low-carbon policy

Several experiences emerged as necessary for building an effective low-carbon policy in both Brazil and India. One of the primary policy avenues has been establishing carbon markets such as the Clean Development Mechanism (CDM). Operational since 2004, the CDM allows projects in developing countries and emerging economies to be granted credits for emissions reductions. Such credits can then be sold in international markets, and have been used primarily to help European companies satisfy their requirements for emissions reductions under the EU's binding emissions trading system. Corporate motivations for participating in a low-carbon economy include earning carbon credits from the CDM or other carbon markets; achieving regulatory requirements in advance of legislation; and cost-reduction through energy savings, increased efficiency, and improved international competitiveness.

In both India and Brazil, it was found that carbon market consultancies were central to launching CDM. These actors played a vital role in disseminating information about CDM and in convincing firms to invest in an unfamiliar market. Project managers tended to be risk-averse in the face of an initially unfamiliar and subsequently unpredictable incentive structure embedded in the CDM process. For example, sudden changes in firm size classification midcourse resulted in unexpected financial losses for firms whose CDM projects were rejected under the new ruling. This deterred future participation.

National government support also plays a central role and explains some of the variation in CDM participation by firms in Brazil versus India. Brazil contributed to developing the CDM system, and many Brazilian policymakers continue with this sense of ownership. When CDM started, there was little pre-existing knowledge, and it was "a learning by doing" context. Brazil's early lead in CDM was restricted to some degree by a centralized domestic regulatory process that by many accounts discouraged some initiatives. India was a second-stage leader in CDM, following Brazil's initial expansion with a rapid build-out of consultancies and projects from about 2006 onward. Unlike Brazil, India's domestic regulatory procedures were fairly open, leaving the primary responsibility of vetting projects to the international body in charge of the CDM (Benecke, 2009). Most CDM projects registered in India are small-scale renewable energy and energy efficiency projects. They are developed unilaterally by local stakeholders without the direct involvement of

Annex I countries. This is attributed to the entrepreneurship of private investors, in combination with the success of capacity-building activities by both international agencies and national authorities that encouraged local project developers to be proactive in engaging the CDM for business purposes.

Finally, national energy, technology, and information contexts also influenced the level and degree of business interest. For example, in Brazil and India, CDM has facilitated the emergence of new forms of energy generation, such as the sale of surplus electricity from bagasse cogeneration. This technology was eligible for financing under the CDM, motivating its widespread adoption by both Brazilian and Indian sugar mills. On the other hand, project managers tended to be risk-averse in the face of the unpredictable incentive structure embedded in the CDM process. For example, unexpected changes in firm size classifications resulted in financial losses for firms whose CDM projects were rejected under new rules. This deterred future participation.

Workshop participants outlined several circumstances in which the low-carbon investment could become more attractive for the private sector. While some comments were not surprising – for example, streamlining regulatory procedures and reducing transaction costs – other elements were perhaps less expected, such as a perception that domestic consumers' preferences have shifted to become more insistent on sustainable and even low-carbon practices. Individual corporate leaders in several industries are focused on demonstrating leadership in sustainability. Not only do such efforts occur within their own domestic peer group but, more aggressively, with their multinational counterparts. Corporate motivations included earning carbon credits on the CDM or other carbon markets, achieving regulatory requirements in advance of legislation, cost reduction through energy savings, and improved international competitiveness.

3. Energy investment under evolving policy architectures

Due to the uncertainty surrounding international climate policy, national and regional policies have gained importance in policy discussions. An area highlighted by workshop participants is the ability of *international* carbon policies to establish or influence institutional capacity in *domestic* contexts. For example, international policy has been mirrored by GHG regulatory initiatives at the national and sub-national levels. For example, Brazil mandated a unilateral commitment to reduce emissions by 36.1–38.9% in 2009. In addition to the national policy, 9 of 26 Brazilian states have already established climate policies and 6 others have bills in progress. India is pioneering performance-based trading systems under its National Action Plan on Climate Change with the objective of creating a market-based mechanism involving trading of energy savings certificates. This initiative is expected to facilitate an annual fuel savings in excess of 23 million tons of oil equivalent, avoid a cumulative electricity capacity addition of 19 GW, and reduce CO₂ emissions by 98 million metric tons per year by 2015.

Public policies at the federal, state, and local levels bring incentives to mitigate GHG with specific mechanisms related to carbon markets, financial and economic incentive mechanisms, credit and financing facilities, incentives arising from different tax rates, exemptions, compensation through fees, incentives to the development, dissemination of technologies, etc. However, these domestic initiatives are not an easy solution to the climate challenge. The effective implementation of these policies are contingent upon how governments will lead the implementation of the actions contained in the laws and especially how they will monitor compliance with emission reduction targets and enforce

¹ "International Conference on Carbon Markets in Emerging Economies," Institute for Advanced Studies, University of São Paulo, Brazil, 22 November 2010; and "International Workshop on The Private Sector and Climate Change: Opportunities and Challenges in Emerging Economies," Observer Research Foundation, New Delhi, India, 17–18 January 2011.

the punitive sanctions applicable. There has been significant opposition from the private sector due to uncertainties in the financing of compliance targets and concerns that the regulation may be biased in favor of certain sectors and with unfair subsidies.

In many developing and emerging economies, international market-based mechanisms like the CDM have also been able to complement the role of national governments in establishing an institutional and financial framework for performance-based climate change mitigation activities. For example, the compliance carbon market under the Kyoto Protocol has provided experience and input for countries to negotiate on afforestation/reforestation activities. Voluntary carbon markets as well have led, directly and indirectly, to the development of carbon standards that allow a range of REDD+ activities. In addition, the technical expertise created in emerging countries was crucial to proposing new methodologies to the UNFCCC, thereby expanding the menu of possible projects allowable under the CDM. There was broad consensus in both workshops that CDM projects in Brazil and India have supported capacity building and the development of accounting and monitoring methodologies. Such expertise might be beneficial for the deployment of future frameworks to curb carbon emissions. Any future policy should be sensitive to these vital functions.

Such two-level policies present challenges for policymakers. First there are potential conflicts between the creation of national or sub-national laws with mandatory targets and existing international procedures, especially as they relate to the determination of additionality under the CDM. In recognition of both the international carbon market and the transnational nature of the climate problem, innovative efforts by emerging sub-national and national level regulators should be crafted to allow consistent use of the mechanisms across borders.

4. Prospects: research to enable building on the CDM

Both academic research and participant contributions from the carbon market workshops in Brazil and India underscore the need for clarity on policy frameworks. Regulatory governance structures were key elements of enabling capacity growth and new technological investment in both countries. While the first period of CDM is widely acknowledged to have been bureaucratic and cumbersome, it also demonstrated surprising strengths in capacity building and providing incentives for a large number of reasonable GHG-reducing projects. The CDM has clear limitations, and addressing them will require both enhancements to the existing CDM institutions and the expansion of policy instruments beyond the UNFCCC.

A new approach to international climate policy may require a revision of the distinction between Annex I and Non-Annex-I countries. Longstanding impasses on the questions of historical responsibilities have repeatedly obstructed potentially meaningful progress on the practical dimensions of encouraging innovation and implementation of the low-carbon transition in emerging economies. Differences among emerging economies and the coupling of their domestic markets with the global market present additional challenges. New proposals under the UNFCCC, such as the Technology Mechanism, and new parallel initiatives such as the Clean Energy Ministerial, provide opportunities for countries to investigate alternate possibilities for multilateral energy innovation. The workshops identified at least three dimensions of research that could enhance future policy in this area:

- First, while energy technology innovation has been studied extensively in developed countries, the application of insights to specific emerging economies is poorly understood. An improved, systematic understanding of past successes and failures in domestic energy technology innovation policy could illuminate

potential applications and challenges in the biggest emerging economies, such as China, India, Brazil, Indonesia, Mexico, and South Africa.

- Second, the massive challenge of necessary emissions reductions implies a need for international collaboration on energy technology innovation on a scale never before realized. However, the institutional and governance structures for such collaboration are not established. Indeed, many questions remain about funding, staffing, location, intellectual property, and the process of bringing innovations to market. Applying past lessons about institutions for innovation – both in national and international contexts – could enable better institutional structures in bilateral or multilateral environments to enhance and capitalize the innovative capacity of the emerging economies.
- Third, the international discussion on the proposed Technology Mechanism remains open to critical contributions. While some consensus appears to exist over a two-part Technology Mechanism, important obstacles remain. The exact remit of the proposed Climate Technology Centre and Network (CTCN) is not settled—for example, should it be a single location, virtual, or spread across several countries? What is the niche of the CTCN with respect to existing research infrastructure in universities, national laboratories, and the private sector? Who will provide funding for the CTCN and for what purposes? Similarly, questions remain about the mandate for the TEC. In imagining a new international institution, the challenge is to establish a structure that adds value beyond existing public and private initiatives. Complicating the picture are the widely divergent views on how to understand technology and how government – in this case international institutions – can most effectively encourage the development of new technologies.

Additional opportunities no doubt exist, but these three areas would provide a solid foundation upon which future policy might better inform the determinative low-carbon transition in the large emerging economies.

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