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World Development Vol. 35, No. 10, pp. 1684–1698, 2007

0305-750X/$ - see front matter

doi:10.1016/j.worlddev.2007.06.001

Promoting the "Development Dividend" of Climate Technology Transfer: Can Cross-sector Partnerships Help?

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Summary. — Future climate change policy in developing countries is likely to require both technology transfer and the achievement of a "development dividend." This paper analyzes how cross-sector partnerships between investors, municipalities, and citizens can enhance both technology transfer and local deliberation about development benefits. Adopting a political institutional approach, the paper compares examples of partnerships involving waste-to-energy investment in India, the Philippines, and Thailand to consider how more and less complex forms of contracting and deliberation may advance policy. Building partnerships that can reduce costs and increase local deliberation is an important complement to formal mechanisms such as the Clean Development Mechanism.

Key words — environmental governance, climate change policy, technology transfer, India, Philippines, Thailand

1. INTRODUCTION

In recent years, negotiators about climate change policy have used the term, "development dividend" to describe social and developmental benefits that accompany activities to reduce or sequester greenhouse gas emissions in developing countries. The term was inspired by concerns that some low-cost approaches to climate change mitigation in developing countries might fail to enhance, or even detract from, other aspects of sustainable development. One important possible application of the development dividend is in the transfer of technologies that can both reduce greenhouse gas emissions and contribute to local social and economic development.

To date, most discussions concerning the development dividend have focused on the implementation of the Clean Development Mechanism (CDM), which was established under the 1997 Kyoto Protocol to encourage climate-friendly investment in developing countries (Cosbey *et al.*, 2005). But achieving the development dividend has been difficult for various reasons. First, investors have feared that diversifying projects away from the cheaper forms of climate change mitigation may increase costs, especially if it means collaborating with local governments and communities to find broader development outcomes. Second, the meaning of the development dividend itself is uncertain, and often reflects the preferences of host governments or deliberative processes involving different stakeholders. And third, there is a shortage of finance or guidelines for investment projects that can combine low costs with deliberation. Greater research into overcoming these barriers may allow climate friendly investment to proceed quicker, and implement the development dividend. Moreover, this research may provide a useful guide to enhancing technology transfer alongside the incentives and ongoing reforms of formal policy mechanisms such as the CDM.

* Research for this paper was funded by the UK Economic and Social Research Council "Future Governance" program. Final revision accepted: November 27, 2006.

This paper contributes to this research by analyzing the role of cross-sector partnerships (CSPs) as a potential institutional design for implementing the development dividend. CSPs are collaborations between investors, state actors, and citizens (sometimes represented by NGOs) where different actors share in defining or carrying out the purposes of investment. They may also be called pro-poor public–private partnerships (Plummer, 2002), or the "mutual state" (Mayo & Moore, 2001), and may be considered part of the United Nation's Global Compact [1] as they involve greater involvement of businesses and other nonstate actors in implementing developmental policy (Ebrahimian & Gitonga, 2003; Otiso, 2003). CSPs may therefore allow the implementation of the development dividend by allowing investors to pass on some costly aspects of investment to other actors, and increasing the representation of local actors in the purposes and development benefits of investment.

To achieve this research, the paper analyzes case studies of CSPs involving investment in new, environmentally sound technologies (EST) in India, the Philippines, and Thailand. Using a political institutional approach, the paper focuses on the institutional and contractual arrangements that allow different investors and other stakeholders to reduce costs or increase local deliberation about the development benefits of investment (Meadowcroft, 1998; Weber, 1998). Four styles of CSP are analyzed, involving different levels of contractual complexity between stakeholders, and varying levels of deliberation about the purpose and development benefits of investment. As a common theme, each case study involves investment in waste-to-energy technologies, which have proven highly controversial, yet which potentially offer important environmental and developmental benefits by mitigating methane emissions or supporting livelihoods of poor people who recycle waste. The objective of the paper is to analyze how the different institutional designs of CSPs in each of these case studies have impacted upon the costs and deliberation about development benefits. Some of these case studies have been submitted under the CDM, but the aim of this paper is not to analyze the implementation of the CDM itself, but rather assess how different styles of CSP have impacted on technology transfer and the development dividend.

The paper starts by summarizing the dilemmas of climate technology transfer and the development dividend.

2. CLIMATE-TECHNOLOGY TRANSFER AND THE DEVELOPMENT DIVIDEND

The transfer of environmentally sound technologies (EST) to rapidly developing countries is now a widely recognized priority for global environmental policy, including combating anthropogenic climate change. Yet, technology transfer has proved difficult to achieve for various reasons. First, new technologies are not simply transferable without referring to commercial realities. For example, the statement of Agenda 21, signed in 1992, that technology transfer should proceed "...on favorable terms, including on concessional and preferential terms," [2] is now widely considered simplistic because it overlooks the fact that most EST is now privately owned, and that offering preferential terms might undermine the commercial imperatives underlying its development. Second, technology transfer cannot happen overnight, and requires long-term capacity building for maintenance, training, and cost-recovery, usually involving activities that investors see as too expensive or as the role of official development assistance (ODA). And third, it is now clear there is great variety in the environmental or developmental benefits of different types of EST in different contexts. For example, photovoltaics [3] have been considered environmentally friendly because they are a form of renewable energy that do not emit greenhouse gases during their use, but which consume energies during their manufacture. Biomass and biogas energies, however, emit some greenhouse gases during their use, but have been considered more appropriate for some poorer areas than photovoltaics because they can be more easily integrated with local practices that offer livelihoods, such as waste management and recycling. Consequently, technologies may vary in appropriateness between different contexts, and indeed the term, "climate technology transfer" is controversial because it may suggest that all technologies have similar climate benefits or are equally attractive (Forsyth, 1999; Heaton, Banks, & Ditz, 1994; IPCC, 2000; Martinot, Sinton, & Haddad, 1997; UNFCCC, 2003).

These problems have contributed to a lack of progress in technology transfer under formal mechanisms of the United Nations Framework Convention on Climate Change (UNFCCC). Between 1995 and 1997, a pilot phase for climate-friendly investment took place under the name of activities implemented jointly (AIJ). [4] This phase was criticized for failing to offer

greenhouse gas-reduction credits to investors. But some developing countries also criticized this phase because it tended to attract investment in land-use and forestry (the so-called "sinks") projects, which were considered of less developmental benefit than industrial technology. Similarly, some claimed AIJ focused too far on relatively low-cost (or "no-regrets") projects in countries that already received high-levels of foreign direct investment, leaving more costly projects to domestic governments or ODA (Reid & Goldemberg, 1997). Partly in response to these criticisms, in 1997, the Kyoto Protocol created the Clean Development Mechanism (CDM) as one of the three "flexible mechanisms" to help Annex I countries [5] achieve national greenhouse gas-reduction targets (the other mechanisms were Emissions trading and Joint implementation). [6] But unlike the other mechanisms, the CDM was limited to investment in non-Annex I (usually developing) countries, and stated that investment should contribute to "sustainable development" in general, rather than greenhouse gas mitigation alone. [7] This clause is now known as the CDM's "development dividend" (Cosbey *et al.*, 2005, p. 14; see also Selsky & Parker, 2005).

But the CDM has been criticized for failing to achieve either sufficient technology transfer or the development dividend. First, there has been persistent debate about the permissibility of different projects, and particularly the continued debate about "sinks" projects. During 1997–2001, some countries—notably the United States, Costa Rica, and Bolivia—argued that land-use and forestry projects should be included because they offer cheaper forms of climate change mitigation as well as some local benefits in developing countries. Against this, various opponents—notably the European Union, Brazil, India, and China—claimed that sinks projects offer unreliable rates of carbon sequestration and fail to address other concerns such as technology transfer; the creation of adaptive capacity in developing countries; or demands that industrialized countries should concentrate on reducing emissions in their own countries (Cullet & Kameri-Mbote, 1998). Some activists even suggested sinks projects should be called "CO_2lonialism" because they restricted local agricultural expansion for the sake of continued emissions in developed countries. [8] The 2001 Marrakech Accords eventually allowed host countries to determine which CDM projects were permissible, and specified a limit for sinks investment. [9] But controversies still exist about the baselines for sinks projects. Outside the CDM, the European Union has restricted trading of carbon credits based on afforestation or reforestation projects (IISD, 2006, p. 4).

Secondly, there is concern that the CDM is too costly and complex. The Marrakech Accords established an Adaptation Fund to help poor countries adapt to climate change, based on 2% of the value of certified emission reduction units under the CDM. Critics have feared that this may discourage investment by reducing overall profits on projects. Moreover, proposals for the CDM undergo various levels of deliberation, either by the CDM Executive Board, which is also responsible for establishing guidelines for acceptable projects; at national levels by Designated National Authorities, which are national rule makers for CDM projects; or publicly by inviting comments from various stakeholders when projects are proposed. [10] These deliberations and assessments of projects are claimed by some investors to add costs and complexity to CDM investment, and hence decrease interest in ensuring investment meets the requirements of the development dividend (Cosbey *et al.*, 2005; IISD, 2005a, 2005b). Indeed, some investors now prefer to use the so-called voluntary carbon units (VCUs) as an additional means of reducing emissions alongside the CDM, but which currently do not count toward emissions reduction targets (Taiyab, 2005). [11]

And thirdly, there is widespread concern that there is insufficient finance or guidelines for investment that may achieve the development dividend. For example, observers have noted that investors have, to date, shown more interest in projects that can enhance their association with low carbon rather than overall levels of sustainable development (IISD, 2005b, pp. 6–7). It has also been difficult to finance for projects addressing local development that can generate positive cash flows during loan lifetimes. This problem has particularly affected projects undertaken with local governments, such as upgrading local housing, which may offer the highest development dividends (IISD, 2006, p. 4). The role of ODA is also unclear. Under the Marrakech Accords, ODA cannot be used for CDM projects or for buying greenhouse gas credits, but some observers have proposed that ODA may combine with private investment to achieve the development dividend. [12] Consequently, some investors have called for a more quantified and transparent definition of the development dividend, which

may allow financiers to identify the value it adds to projects, and/or to allocate different aspects of projects between investors and aid agencies (IISD, 2005b, p. 7).

As a result of these problems, many observers have claimed that there has been little progress in implementing the development dividend. One commonly cited example is the use of the CDM for flaring methane gas from landfills in developing countries (Cosbey *et al.*, 2005, p. 21). Such projects mitigate climate change by dealing directly with important greenhouse gases (e.g., methane has a global warming potential 23 times the size of carbon dioxide: flaring methane effectively converts this gas to carbon dioxide). But these activities do not produce local developmental benefits such as energy supplies, employment, or industrial growth. Yet, there are also important questions about how these projects should address the development dividend. At present, most emphasis upon defining the development dividend with the CDM Executive Board or Designated National Authorities. Local citizens, however, may still have different perceptions of development benefits, and their understanding and participation in investment projects may be crucial to the success or failure of technology transfer. Consequently, adopting rigid definitions of the development dividend, at either national or international scales, may overlook how "development" itself is contested, and that implementing the development dividend needs to incorporate some local sensitivity and deliberation. For example, in the case of capturing landfill gas, different perceptions of development benefits may include using the gas for local heating or electricity generation, and/or the livelihood options possible through employing local people in waste management or generating electricity.

More generally, however, it is also clear that achieving technology transfer or development benefits need not rely on incentive-based mechanisms such as the CDM, but on longer term capacity building activities. The UNFCCC has engaged in various initiatives to increase technology development and dissemination through routes that are not connected to flexible mechanisms (such as the Expert Group on Technology Transfer, and Technology Information Clearing House). [13] In 2005, the United States, Australia, India, Japan, China, and South Korea also announced the Asia–Pacific Partnership on Clean Development and Climate to enhance climate technology transfer through international private investment as a parallel agreement to the Kyoto Protocol, unrelated to national targets and baselines. [14] Research into different institutional forms of investment may therefore reduce the costs, and increase deliberation about implementing the development dividend outside of the CDM.

This paper now presents such research by analyzing how different forms of cross-sector partnerships may enhance deliberation and lower costs of technology investment.

3. CAN CROSS-SECTOR PARTNERSHIPS HELP?

Cross-sector partnerships (CSPs) may be a way to reduce the costs of climate technology transfer and to increase local representation in establishing the development dividend.

CSPs are collaborations between actors from the different sectors of state, business, and community for public policy objectives (Otiso, 2003). They are also known as bi- or tri-sector partnerships depending on the participation of different sectors (Murphy & Bendell, 1997; Nelson, 2002). At one level, CSPs can comprise orthodox public–private partnerships, where governments may contract with a private-sector company in order to provide infrastructure or services more efficiently than the state. But increasingly, CSPs are being seen as a new and more flexible form of governance that combines the implementation of policy with added public consultation and deliberation (Ählström & Sjöström, 2005; Linder, 2000; Innes & Booher, 2003). In this sense, CSPs form part of the growing debate about "public policy partnerships" (Rosenau, 2000), the "mutual state" (Mayo & Moore, 2001), or "network" or "hybrid" governance (Hajer & Wagenaar, 2003; Selsky & Parker, 2005), which have been used to describe more flexible and locally governed policy arenas outside the historical remit of the state. In an environmental context, these approaches have been relevant to terms such as civic environmentalism (John, 2004), cooperative environmental governance (Glasbergen, 1998), or community-driven regulation (O' Rourke, 2004), which point to ways that orthodox state-led regulation can be replaced by collaboration and tasks sharing between state, business, and communities. Indeed, the Asia Foundation cited one Indonesian activist as saying, "By creating partnerships, we also are trying to encourage greater equality and to promote values such as social

Table 1. *Simplified classification of deliberative cross-sector partnerships (Source: the author)*

	Partnerships defined more in contractual terms		Partnerships defined more in discursive terms	
Type of partnership	Substitutive	Complementary	Shared	Consultative
Typical actors	Classic "public–private partnership": one partner is contracted to perform a role historically performed by the other	Parties collaborate by undertaking different, but complementary, economic roles, sometimes under contract to each other	Parties collaborate by undertaking similar or overlapping roles, in addition to roles that are separate	One partner consults another for advice, or to ensure public acceptance of new investment, usually without contracts
Example	State may contract with investor to provide environmental infrastructure to be transferred to state ownership after some years	Investor may supply electricity-generating technology, citizens may collect or segregate waste supply as fuel	Investor and citizens may both seek to benefit from waste recycling, although perhaps with different objectives	Investor may have regular meetings with citizens to build trust and gain information (often as Corporate Social Responsibility)
Typical assurance mechanisms	Clearly defined contract, such as Build–Operate–Transfer	Contracts between parties, assumption that parties gain from different roles	Contracts between parties, assumption that collaboration helps parties	Desire to avoid conflict, or damage to company reputation
Typical costs, or threats, to partnership	Failure of either party to satisfy contract	Collaboration may be seen as less important than individual roles of parties	Different objectives of collaborators may undermine shared activities	Consultation may be seen as "greenwash" or fail to build sufficient trust

justice . . ." (Wisnu Foundation in Asia Foundation, 2002, p. 59).

Yet, there are still important questions about the design and applicability of partnerships for public policy objectives such as climate technology transfer. In principle, CSPs imply the combination of two objectives of commercial success and local consultation. These give rise to various institutional forms of partnerships (see Table 1). Yet, can commercial success and local deliberation be achieved simultaneously? According to Table 1, partnerships may vary in contractual expectations and deliberative capacity for stakeholders to influence the nature and purpose of collaboration. Orthodox public–private partnerships are restricted to "substitutive" arrangements without deliberative content, whereas much discussion of business-community collaboration under corporate social responsibility has adopted the "consultative" approach with little commercial engagement between stakeholders. Successful partnerships for climate technology transfer require both contractual and deliberative components (i.e., "complementary" and "shared" arrangements), yet previous research has generally focused on only institutional designs for either contractual or deliberative success, rather than both. Moreover, some existing research has looked at CSPs in developing countries (e.g., Plummer, 2002), but not on making CSPs deliberative.

In terms of contractual arrangements, previous research in Europe and North America has suggested that the concepts of assurance mechanisms and transaction costs are fundamental to the partnership success (Jupp, 2000; Weber, 1998). Assurance mechanisms are formal or informal arrangements such as contracts or expectations that ensure each sector continues to collaborate within a partnership. Transaction costs are all costs of interaction, including financial cost, time, or conflicts. But previous experience of technology transfer has shown that assurance mechanisms may be costly to achieve in developing countries, especially where many collaborators with investors may be both local citizens and commercial suppliers to partnerships because they are potential employees or performers of other economic services in small businesses.

It is also difficult to assume that CSPs will have the same deliberative impacts in developing countries as in developed countries. Writing about Europe, for example, Meadowcroft (1998, pp. 22–25) argued that cooperative environmental governance offers a structured framework for pluralist inputs into environmental policymaking; a mechanism for building a common or shared vision of a problem; flexibility between different contexts and locations; more stable and legitimate policy outcomes; the use of scientific and technical advice in a trusted manner; and policy learning by all stakeholders. Such optimistic outcomes may be unlikely in developing societies where poverty or cultural diversity may diversify deliberative capacity. Furthermore, Evans (1996) has also argued that public–private collaboration in developing countries may be undermined by "embeddedness," or the presence of individuals who are representatives of both state and society. Plus, as discussed about the development dividend, it is not always possible, nor even desirable, to achieve a single understanding of development problems that do not acknowledge local diversity. Indeed, research in developed-country cities has shown climate change policy is more likely to be accepted when it prioritizes local environmental or economic concerns such as energy efficiency, rather than anxieties about a "common" or "global" environment (Betsill & Bulkeley, 2004).

Consequently, successful CSPs for climate technology transfer need to achieve both low-cost collaboration between diverse parties, as well as build deliberative capacity to allow citizens to influence the objectives of investment. The following study assessed this topic by analyzing CSPs in Asia.

4. THE STUDY

Case studies of CSPs were studied in three rapidly-developing countries of Asia in order to draw lessons about the success of different kinds of partnership design. The analysis used a political institutional approach by focusing on the institutional arrangements created by different actors, and the implications of these on investment costs and public deliberation (e.g., Meadowcroft, 1998; Weber, 1998). The aim of the study was to assess how different styles of contractual and deliberation arrangements impacted on achieving climate technology transfer and the development dividend simultaneously. The chief question posed by the research was: What kind of institutional design of cross-sector partnership has led to the most successful technology transfer and locally acceptable development dividend? Related

questions were: Do more or less complex forms of contractual and deliberative arrangements help or hinder the achievement of the development dividend? How does the complexity of contracting and deliberation affect transaction costs of partnerships?

Table 2 summarizes the basis upon which the case studies were selected. The two key criteria under investigation were the complexity of contractual arrangements between investors and local actors such as local governments or citizens; and the complexity of deliberation about developmental impacts of investment. Two broad categories of "more" and "less" complex arrangements were used to select examples as there are no pre-existing quantitative classifications, and because the detailed nature of research meant that case studies could be categorized by assessing the nature of each case. In practice, the classification of contractual arrangements reflected how far partnerships involved a large single actor (such as a local government or municipality), or a diverse range of companies and citizen groups. The classification of local deliberation reflected whether debate focused on one development problem alone, or considered various potential development or environmental problems simultaneously. Table 3 gives more information about each case study.

The case studies were selected from India, the Philippines, and Thailand and focused on investment in technologies generating electricity from municipal or agricultural waste. The theme of waste-to-energy was selected because it encompasses many dilemmas of climate technology transfer and the development dividend. Waste is a growing health and planning problem in developing countries, and is relevant to global climate change because it usually emits methane, which can also be harnessed and used as a renewable energy. Yet, using waste to generate electricity is controversial because it is commonly associated mostly with simple incineration of municipal waste, which can produce dangerous ash and dioxins, and be uneconomic if it requires the addition of diesel in order to burn. More generally, some environmentalists see any form of waste-to-energy as legitimizing waste creation. Incineration of municipal waste has been excluded as an acceptable form of renewable energy under the UNFCCC, but incineration of agricultural waste (or biomass) is still permissible, as are other technologies. Pyrolysis is an anaerobic form of incineration occurring under pressure and at temperatures above 430 °C (800 °F), and is claimed to avoid toxic emissions. [15] Biomethanation (or anaerobic digestion) breaks down organic waste by using bacteria at far lower temperatures, and allows the capture of methane. Yet, unlike incineration or pyrolysis, biomethanation requires stringent segregation of organic and

Table 2. *Selection of case studies of cross-sector partnerships (Source: the author)*

Deliberation for development dividend	Contractual arrangements: *Less diverse contracts (Mainly involving government)*	*More diverse contracts (Mainly involving citizens)*
More diverse concerns	**Baguio, Philippines (biomethanation)**	**Ayala Alabang, Philippines (biomethanation)**
	Lucknow, India (biomethanation)	**Suphan Buri, Thailand* (rice-husk incineration)**
Less diverse concerns	**General Santos, Philippines (biomethanation)**	**Bulacan, Philippines (rice-husk incineration)**
	Thai Central Plains* (rice-husk incineration)	**Chennai, India (pyrolysis)**

* Suphan Buri is also in Thailand's central plains, but is listed as a separate case study because of its different circumstances.

Table 3. *Case studies*

Site	Technology	Partners	Main contractual arrangements	Main controversies	Status, 2006
India					
Chennai, Tamil Nadu	Pyrolysis, municipal waste	Austrailian investor, LGO, local NGOs	Contracts for waste collection, electricity, and employment for poor	Opposition to pyrolysis, worry about lost waste collection contracts, damage to livelihoods, and corruption of LGO	Application refused by local government 2004
Lucknow, Uttar Pradesh	Biomethanation, municipal waste	Asian investor, LGO, citizen NGOs	Contracts for waste collection, electricity, and employment for poor	Inclusion of waste pickers as poverty alleviation, security of waste supply	Waste collection contract failed in 2005; new contracts sought
Philippines					
Baguio, Luzon	Biomethanation, composting, municipal waste	US investor, LGO, national NGO, waste pickers	Contracts for waste collection, electricity, and employment for poor	Opposition to biomethanation, worry about lost composting and livelihoods	Some limited methane capture projects
Ayala Alabang, Luzon	Biomethanation, municipal waste	US investor, LGO, waste pickers, local NGO	Contracts for waste collection, electricity with both NGO and LGO	Inability to gain sufficient waste supply, concern about profiteering by company	Failed when LGO raised land rent
General Santos, Mindanao	Biomethanation of municipal and agricultural/fishing waste	US investor, LGO, waste pickers	Contracts for waste collection, electricity, and employment for poor	Inclusion of waste pickers as poverty alleviation, worry about selection of land for processing plant	Under construction
Bulacan, Luzon	Incineration of rice husks	US investor, rice farmers	Contracts for supply of rice husks, and sale of electricity	Security of supply for rice husks, financial security	Failed in 2001 because of insufficient husk supply
Thailand					
Suphan Buri, Central Plains	Incineration of rice husks	Thai investor, rice farmers	Contracts for supply of rice husks, and sale of electricity	Security of supply for rice husks, worry about corruption and pollution	Failed in 2001 because of lack of local support
Thailand: Central Plains[a]	Incineration of rice husks	Thai investor, rice farmers	Contracts for supply of rice husks, and sale of electricity	Security of supply fo rice husks, worry about pollution	Successfully implemented in 2001

[a] Provinces include: Pichit, Nakon Sawan, Ang Thong, Sing Buri, Nakon Pathom.

inorganic waste, which means it can be combined with recycling of inorganic waste and the provision of livelihoods to poor people engaged in "waste picking" or recycling. [16] Biomethanation also produces a residual sludge that can be used for compost.

India, the Philippines, and Thailand were selected because they are large, rapidly growing economies that have already received investment under the CDM. It was decided to group cases from three countries in this initial analysis in order to draw general conclusions about CSPs rather than rely on the particular context of any one country. India and the Philippines have recently passed national legislation that can assist in the segregation of waste, or replacement of incineration. [17] Both have strong civil society organizations that have contributed to these reforms, and who activate for better waste management and environmental policy. Indeed, in the Philippines, such reforms were influenced in part by the local office of the international NGO, Greenpeace. Thailand to date has no similar national laws, yet the government has passed a "small producer program" and "biomass program" to encourage the contribution of small electricity generators and biomass generation to the national grid. Research was based on a series of triangulated interviews between different sectors involved in CSPs, and newspaper and documentary research on location 2001–05. The case studies were selected to indicate examples of climate technology transfer that involved partnerships in ways that were considered controversial or newsworthy by NGOs or newspapers at the time. It is acknowledged, of course, that there are other examples of CSPs and waste-to-energy investment (e.g., see Deodhar & van den Akkar, 2005), and that cases are dynamic and change over time. Nonetheless, this study is the first in-depth empirical analysis of how CSPs can achieve commercial and deliberative functions, and the case studies show how different stakeholders changed behavior as a result of success or failure.

5. FINDINGS

The purpose of the study was to identify lessons for the institutional design of CSPs based on combining successful contractual arrangements for technology transfer, and deliberative capacity to achieve a locally acceptable "development dividend." The basic details of each case study are summarized in Table 3. The following sections now summarize some general findings from these examples for contracting (including assurance mechanisms), deliberation, and overall design of partnerships.

(a) *Contractual arrangements of partnerships*

Unsurprisingly, the case studies confirmed that assurance mechanisms and transaction costs are fundamental to the contractual success of partnerships. Yet, the examples selected here indicated far more complex styles of contracting than those discussed in examples relating to Europe or North America (e.g., John, 2004; Weber, 1998). Some case studies in the Philippines and Thailand required contracting (or seeking assurance mechanisms) with diverse citizens or small business units operated by citizens, which increased the fragility and transaction costs of collaboration.

For example, a comparison of similar investments in Central Thailand and Luzon of the Philippines revealed the importance of maximizing assurance mechanisms and minimizing transaction costs. In Bulacan, in the Philippine island of Luzon, the US multinational energy investor, Enron, sought to construct a large, $96 m 40 MW energy plant using rice husks in the years 2000–01. But this project failed because of the poor contractual arrangements made with the various rice farmers needed to supply husks. Enron had contracted with some 150 rice millers to gain its supply of fuel, and this number proved to be too many. The rice millers learned that Enron had no alternative supply of fuel, and consequently raised prices for husks. Under these conditions, the financiers withdrew their support.

This case contrasts with investment by a Thai company, AT Biopower, who built six 16 MW rice-husk power plants in the central plains of Thailand during 2000–04. In this case, the power plants were much smaller than Enron's, and contracts were made with just 20–30 rice millers per plant, and using just 10–15% of their total husk production, rather than 100% as in Bulacan. Moreover, the contracts with millers included fines if the millers did not supply their contracted amount, and bonuses if they achieved their target. These contractual arrangements meant that the assurance mechanisms were stronger, and transaction costs lower than in Bulacan.

Similarly, in the Philippines, a smaller US investor [18] tried to establish a biomethanation power plant in the wealthy suburb of

Manila of Ayala Alabang in the late 1990s. The investor adopted relatively complex contracting arrangements by agreeing partnerships with a local NGO, the local government, and local waste pickers. According to the partnership, the NGO would supply waste from pigs and cows in the region, and the investor would use this to generate electricity. The local government agreed to buy the electricity, and allowed the investor to buy the entire supply of municipal waste in the locality, so that the company would gain both additional organic waste as well as profit from recycling inorganic waste. Waste pickers were hired to sort the waste into organic and inorganic streams. Unfortunately, this project failed for several reasons. Local landowners (including the municipality) increased the rent payable on the power plant's land because they believed the project was more profitable than it was. But in addition, it soon became clear that waste pickers were removing the most valuable sections of the inorganic waste before it reached the sorting plant. The company has since decided that it controlling inorganic as well as organic waste involves too many transaction costs. It now focuses on biomethanation, composting, and carbon credits as its main profits, and has left most recycling to local people.

The problem of supplying waste to power plants was also encountered in a larger investment in Lucknow, India. This project was one of the largest biomethanation plants using municipal waste in the world, aiming to produce 5 MW of power from 4 tons to 500 tons of municipal organic waste per day. The plant opened in 2003 following investment from an Asian-based consortium, with the deliberate intention of providing livelihoods for local waste pickers to collect waste and segregate organic and inorganic waste (an activity encouraged by the Uttar Pradesh local government). The investor also worked cooperatively with the NGO, Exnora, which specializes in community waste management, and trains waste pickers. In an interview, a representative of the company said "we don't want to upset the existing social system. Our main income comes from power, fertilizer and carbon credits. ...we are not...depriving people of livelihoods."

In principle, this project was potentially an excellent example of a CSP that produced both climate-friendly technology transfer and local development dividends. But unfortunately, this plant was forced to close in late 2004 because it could not secure a sufficient, regular supply of organic waste (Krishna, 2005). Although disappointing, this experience might provide lessons to future CSPs about the need to ensure that commercial contracts are successful before more developmental objectives are attempted. A more positive example may be the Philippines city of General Santos in the southern island of Mindanao. This city has a strong local government who have benefited from long-term government assistance to produce local economic development in the region, and by the proximity of tuna and fruit industries that produce regular supplies of organic waste. In this location, the combination of waste supply, and a local government friendly toward biomethanation and the employment of urban poor (including waste pickers) at the plant, has meant that a move toward biomethanation have been relatively unproblematic.

(b) *Deliberative capacity of partnerships*

Partnerships may be called deliberative when investment in climate technology transfer can proceed with an inclusive debate and local endorsements for its "development dividend." But this capacity is difficult to predict as it involves engaging with local perceptions about the meaning of development, or fears about specific technologies, many of which may not be shared by others. Deliberation may therefore refer more to the process of decision making, and the chance to make stakeholders feel listened to, rather than simply agreeing with local concerns, or selecting (and rejecting) specific technologies. But, the deliberation process can be assisted if investors and policymakers work to achieve consensus before the start of partnerships by providing information about technologies or development benefits.

Various case studies demonstrated the problems of local fears about new technologies and investment. In Suphan Buri, in Central Thailand, the same Thai investor described above encountered strong resistance to a rice-husk power plant because it was (falsely) linked to the political interests of a powerful local politician. In turn, opponents of the project then started rumors among local villagers that the generator would prevent rainfall, or even cause sterilization if people walked under power cables. The investor responded by withdrawing from this site, but continued to invest in other sites in the central plains of Thailand, and by providing careful public information about the technology.

Similarly, in the Philippines, research during 2001–04 revealed a surprising level of resistance to biomethanation from NGOs, including Greenpeace. Interviews with representatives of NGOs revealed that biomethanation was not understood and that they criticized it because it was another form of waste-to-energy. Some members of Greenpeace in the Philippines stated that they considered biomethanation (inaccurately) to be another form of incineration, and hence accepting this under climate change policy would undermine their previous legislative success in banning incineration of municipal waste. Moreover, representatives of two further NGOs focusing on waste collecting and recycling said they mistrusted biomethanation because it threatened historic forms of composting. One woman showed her mistrust of new technologies by saying: "...you do not have to use complicated methods in converting organic waste back to compost ... Philippinos have been converting waste to compost for many thousands of years now."

A similar concern was voiced in an attempted CSP in the Philippines involving a US investor, the local government, and waste pickers in Baguio, in northern Luzon. At this site, the investor had tried to install a biomethanation plant at the municipal waste dump. This plant offered potentially strong environmental and developmental benefits by reducing the amount of waste dumped in a watershed region, producing electricity from methane, and by hiring local waste pickers to work at the plant in duties such as segregating waste. But this scheme attracted resistance from the local office of a national NGO [19] because they considered the plant to be a threat to waste pickers livelihoods by denying them ownership of organic waste from which they can make compost by aerobic methods. Moreover, some waste pickers also voiced discontent because they feared the plant would deny their preference for having land tenure (rather than waged employment), and that the employment offered by the plant may involve too few people. In this case, the investor had tried to make the CSP deliberative by increasing ways for the waste pickers and other voices to be heard. But they found that the strong opposition from the NGO made it difficult to reach agreement with the waste pickers because the NGO claimed to speak on their behalf. This example therefore illustrated the complexity of trying to achieve deliberative CSPs, especially involving agreements with diverse actors with greater and lesser political strengths.

A further case study revealed that investors might also influence the deliberative capacity of partnerships by speaking on behalf of waste pickers. In Chennai, India, an Australian company sought to install pyrolysis technology for electricity generation. [20] As discussed, this technology decomposes unsegregated municipal waste, and indeed requires some proportion of materials such as paper and plastics to provide calorific value to the waste. Pyrolysis, therefore, offers fewer opportunities for waste pickers to gain livelihoods through segregating or recycling waste. Yet, the company representative argued that this created a more positive form of "development dividend" by saying it was better that it was unsanitary for waste pickers to perform these duties. Despite these arguments, this project was rejected by the Chennai government in 2004 because of fears about potential pollution from pyrolysis and financial concerns.

It is worthwhile to note that virtually all case studies were intended to qualify for the Clean Development Mechanism, yet climate change was usually not mentioned by investors when trying to establish partnerships with local governments and citizen groups.

(c) *Lessons for institutional designs of partnerships*

Earlier sections of this paper identified various forms of partnership based on how far they combine contracting and deliberation (Table 1), and how these forms may vary if either of these is more or less complex (Table 2). The analysis of case studies therefore can help answer whether more or less complex forms of contracting or deliberative arrangements may create the most successful combination of climate technology transfer and the "development dividend."

First, it is clear that deliberative cross-sector partnerships (CSPs)—as analyzed in this study—are fragile and can be undermined in both contractual and deliberative terms. This finding suggests that the partnerships with "less" rather than "more" complex contractual and deliberative arrangements are more likely to succeed. In turn, this finding also suggests that the "complementary" form of partnership described in Table 1 may be less complicated than the "shared" form because there is a clear separation of roles preformed by different actors, and it can be assumed that each actor performs the role most suited to their experience. For example, in the case studies involving

municipal waste, local NGOs and waste pickers can undertake recycling, and investors can specialize in electricity generation. Keeping roles separate focuses attention on the interface between roles, rather than risking additional conflict when different actors share roles.

Second, the deliberative success of partnerships is not necessarily controlled by the diversity between partners, but by how far investors can make their activities support local development concerns. Some case studies (such as at Lucknow and Ayala Alabang) revealed that investors were able to create CSPs that made different stakeholders feel listened to, but only for the project to fail because of insufficient assurance mechanisms. In other examples, however, it was also clear that local mistrust about new technologies was sufficient to undermine investment. (This occurred in certain locations with all technologies, including biomethanation, pyrolysis, or rice-husk incineration.) One implication may be to assume that ability for CSPs to create deliberative capacity will always be influenced by how far localities already have shared views about development objectives or the impacts of certain technologies. But the case studies also suggest that stakeholders can learn about development or technologies, and change their initial responses, as a result of discussion and information. For example, the Thai investor in rice-husk incineration was able to overcome the initial rejection of this technology at Suphan Buri by understanding the reasons for this misrepresentation there, and by providing careful information at new sites.

NGOs and government agencies may also help achieve agreement about new technologies. One potentially useful development is the emergence of the so-called "bridging" organizations that can help facilitate relationships between different partners (Michaelowa & Dutschke, 2000, p. 863). For example, in the Philippines, the nonprofit renewable energy consultancy, Preferred Energy Inc. performed a role in proving information about new technologies, or between local, national organizations and international investors. [21]

But the study also provided the surprising finding that some NGOs frequently opposed CSPs or new technologies. For example, Greenpeace confirmed they were opposed to the use of biomethanation in the Philippines on the grounds that all forms of waste-to-energy helped legitimize waste, and hence stood against the organization's longer-term objectives of a "waste-free-society." Moreover, some local activists confused biomethanation with incineration, and saw any discussion of waste-to-energy as a threat to Greenpeace's legislative success in banning incineration of municipal waste in the Philippines. [22] These views might be considered rather inflexible because—of all the waste-to-energy technologies discussed in the study—biomethanation has arguably the best potential to satisfy both local and global environmental and developmental objectives by capturing methane, supporting recycling, and providing employment for local citizens.

These dilemmas, nonetheless, illustrate three wider characteristics that have been observed elsewhere when combining local deliberative with global environmental policy. First, being "deliberative" does not mean that environmental policy has to be "populist:" deliberative discussion does not necessarily imply agreeing with local concerns, but rather in making them feel heard (see also John, 2004, p. 245; Meadowcroft, 1998, p. 22). Second, climate change policy is most likely to succeed locally when it is presented in terms that local people value most (Betsill & Bulkeley, 2004). And third, deliberative processes are, partly by definition, a learning process, and can take time to develop. The initial failures of some CSPs described in this study should not be taken as proof that they can never succeed, but rather as evidence of how and where improvements are needed.

6. CONCLUSION

Much discussion of implementing global climate change policy in developing countries will inevitably focus on the formal mechanisms of the Kyoto Protocol, and especially through the incentives offered by the Clean Development Mechanism (CDM). This paper, however, argues that achieving successful climate technology transfer and the development dividend will need additional research and capacity building in their own right. Cross-sector partnerships (CSPs) are a potential means to achieve the commercial needs of investors as well as allow deliberative space for other stakeholders to define development benefits.

This paper has assessed the potential role of CSPs as an institutional design for enhancing the "development dividend" from climate technology transfer. Its findings, however, are mixed. On one hand, the studies in India, the Philippines, and Thailand indicate that CSPs

have the potential to offset investors' costs and increase local deliberation about development benefits. This finding is significant because it suggests that seeking the development dividend may not actually discourage investment, but actually help investment take place more effectively. Moreover, the findings suggest investors may be wrong to seek a universal definition of the development dividend. Instead, a more inclusive and deliberative approach to defining development benefits may encourage local stakeholders to take on costly aspects of investment and accept new technologies favorably.

But on the other hand, the case studies also suggest CSPs are fragile, and need greater reliability in both contractual and deliberative functions. The most common threat to partnerships comes from seeking commercial, contractual arrangements between diverse actors, often in locations where potential partners have important differences in political power and resources. Partnerships may also be undermined in deliberative terms by local mistrust of technologies and investing companies. Evidence therefore suggests partnerships should not be too complex in contractual arrangements. Investors should not seek to challenge local actors' views about development dividends too far, nor assume that global climate change will be considered more important than local concerns.

These findings may inform debates about climate change policy in both general and specific ways. Generally, observers have noted that implementing the development dividend should not engage in open-ended debates about sustainable development, especially when seeking national or international guidelines set by the CDM or Designated National Authorities (IISD, 2005a, p. 3). This paper, however, has argued that acknowledging the contested and deliberative nature of development benefits, and empowering local stakeholders to participate in defining the development dividend, may actually overcome barriers to implementing the development dividend.

More specifically, the case studies may also provide insights for more successful CSPs in the future. Investors and NGOs can overcome some of these challenges by influencing how new technologies are seen by local citizens, and by seeking greater consensus about development or technologies before the construction of partnerships. Greater discussion at a global level between NGOs and governmental bodies about technologies may help overcome local resistance to some forms of technology transfer. Similarly, providing contractual certainty for international investors willing to engage in CSPs may be a priority for national governments, development assistance, or the CDM's Adaptation Fund. Clearly, greater collaboration between investors and local stakeholders may reduce the costs of climate technology transfer and increase the development dividend. Understanding how collaborations can achieve these objectives is an important complement to ongoing debates about the incentives or procedures of formal policy mechanisms such as the CDM.

NOTES

1. The Global Compact was launched by the United Nations in 2000 as an international voluntary initiative to engage corporations in certain standards of human rights, labor rights, sustainable development, and corporate social responsibility.

2. Agenda 21, Chapter 34.

3. Photovoltaics are electronic panels that convert solar energy into electricity. They are relatively higher technology than the so-called "passive" solar panels, which usually capture solar energy to heat water.

4. AIJ took place between the first conference of the parties to the UNFCCC at Berlin in 1995, and the third conference at Kyoto in 1997.

5. Annex I countries have fixed targets for reducing greenhouse gas emissions under the UNFCCC. Non-Annex I countries are those without targets, and are generally composed of developing countries.

6. Emissions trading (ET) allows countries with fixed greenhouse gas reduction targets (Annex I countries) to trade permits to emit greenhouse gases as one way to achieve their reduction targets. Joint implementation (JI) is another way to achieve greenhouse gas reduction targets by allowing Annex I countries to invest in climate-friendly activities (such as carbon sequestration or energy efficiency) in the territories of other Annex I countries. The point of flexible mechanisms is to encourage climate change mitigation at the lowest cost and by increasing the geographical spread of locations where it can be achieved.

7. Article 12 of the Kyoto Protocol stated that the CDM should "assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the (Climate Change) Convention." Any greenhouse gas-abatement resulting from CDM investment should count against the investing country's target, or be sold as certified greenhouse gas reductions within the growing international carbon market. See http://www.unfccc.int.

8. In 2000 NGO activists, including from Greenpeace and the Rainforest Action Network, signed the "Mount Tamalpais Declaration" to oppose the use of the CDM for supporting plantations. In the mid 1990s, one African climate change negotiator famously told a meeting in Chatham House, London, "our countries are not toilets for your emissions!" The Uruguay-based NGO, World Rainforest Movement, publishes information on political opposition to industrial plantations: http://www.wrm.org.uy/.

9. See http://unfccc.int/cop7/accords_draft.pdf. The websites: www.cdmwatch.org and www.sinkswatch.org also provide informal monitoring of CDM investment.

10. For example, projects are proposed to the Designated National Authority, and are advertised for public comment, such as through the UNFCCC CDM Bazaar, or IISD Climate Internet list.

11. There are also important questions of additionality measuring the impacts of projects through baselines, which this paper cannot address.

12. A related concern is the role of the Global Environment Facility in governing the Adaptation Fund, which has been proposed and opposed by some Parties to the UNFCCC, and whether the Adaptation Fund should include long-term aspects of technological upgrading in developing countries.

13. See http://ttclear.unfccc.int/ttclear/jsp/ and http://unfccc.int/technology/items/2681.php.

14. Critics of this partnership claim may weaken the Kyoto Protocol, and may result in little progress unless it has targets.

15. All emissions from technologies, of course, rely to some extent on the existence and implementation of national or local environmental regulations.

16. The term, "waste pickers" usually refers to poor groups who live next to waste dumps earning livelihoods by collecting and selling recyclable materials. The term is highly variable, however, and some waste pickers may be more entrepreneurial by collecting waste directly from households, or own and operate recycling shops. In Chennai, the NGO, Exnora, refers to waste pickers as "street beautifiers" to indicate their positive impacts. See http://www.exnora.org/.

17. The Philippines passed a Clean Air Act (2000) that banned the incineration of municipal waste, and a Solid Waste Act (2001) that mandates the separation of organic and inorganic waste at the household level, and hence facilitates waste treatment. In India, the Municipal Solid Wastes (Management Handling) Rules (2000) similarly require waste segregation and recycling of recoverable resources.

18. Philippine Bio-Sciences ("PhilBIO") Inc.

19. The Jaime Ongpin Foundation was founded in 1980 to assist community development.

20. Energy developments limited (EDL).

21. http://www.pei.net.ph/.

22. The statements from Greenpeace were collected from interviews with the director of Greenpeace in Manila, and the activist focusing on waste and incineration, in Manila, 2001; also checked by email correspondence with the Southeast Asian liaison at Greenpeace headquarters in Amsterdam.

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