4. Evolving to a Sector-Based Clean Development Mechanism

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Introduction

In examining the different options that may be available to shape future climate protection strategies, it is important to recognize the great deal of work that has gone into the current climate regime, based on the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Given the fact that the long-standing North-South dynamic will inevitably accompany any further development of the climate regime, it may be advisable to build on existing agreements and current architecture. Chapter 2 explores the default next step of the Protocol: legally binding caps for developing countries. This chapter presents another option for building on the Protocol. Instead of focusing on the commitments assumed by industrialized countries and raising the question of how to integrate developing countries, this chapter focuses on the current avenue for developing country participation, the Clean Development Mechanism (CDM), and explores its possible further evolution. In so doing, this chapter takes the Sustainable Development Policies and Measures (SD-PAMs) approach presented in Chapter 3 and explores its full insertion into the international carbon market through an enhanced CDM.

The Sectoral CDM (S-CDM) approach would maintain some basic elements of the current CDM, but would also allow for the development of CDM projects without pre-established limitations in terms of territorial coverage or enabling instruments (private and public policies and measures). S-CDM "projects" could be sectoral (e.g., electricity, transport, forestry), territorial (entire cities or regions), or a combination of these (such as transport and lighting in a particular city).

This chapter first recounts the evolution of the CDM and its current interpretation. It then presents the envisioned S-CDM, identifying the

similarities to the CDM and discussing the contrasting elements. After an examination of the strengths and weaknesses of the S-CDM approach, the chapter profiles a case study of a potential S-CDM project for Mexico City.

I. The Clean Development Mechanism

The CDM is the only flexibility mechanism in the Kyoto Protocol open to developing-country participation. It was established under Article 12 of the Kyoto Protocol and adopted by the Third Conference of the Parties (COP 3) in December 1997. The CDM has a double purpose: to assist developing countries in achieving sustainable development and to help industrialized countries cost-effectively reach the emission reduction commitments they assume under the Kyoto Protocol during the first budget period (2008–12).

Although the CDM was first defined in 1997, the idea is older than the Convention itself.[1] In 1991, Norway introduced the concept of "joint implementation" (JI) during the negotiations that resulted in the UNFCCC. Though termed the same as one of the three flexibility mechanisms later adopted under the Kyoto Protocol, Norway's proposal was broader in definition and constituted a generic term for emissions trading. The concept stemmed from the recognition that the costs of greenhouse gas (GHG) abatement activities vary significantly among countries, and global costs can be reduced if countries form partnerships in their GHG reduction efforts (Dixon 1999). This led to the inclusion of JI in the Climate Convention: "…[P]arties may *implement* such policies and measures *jointly* with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention[…]" (UNFCCC 1992, Article 4.2(a), emphasis added). Although the Article does not make explicit which countries are meant by "other Parties," the marked difference in abatement costs between industrialized and developing countries soon led to the conclusion that cost-effectiveness would best be served by implementing projects in developing countries or economies in transition.

During the negotiations leading up to COP 1 to the Convention in 1995, representatives of developing countries began to question the value of JI. Some saw it as an attempt by industrialized countries to buy their way out of reduction commitments, particularly if credits for JI projects were to be available before binding targets for domestic emission reductions were in place for the industrialized countries (a step that was not taken until the Kyoto Protocol was adopted). Critics feared that by using

JI projects to achieve low-cost GHG reductions in developing countries, industrialized countries could avoid investments at home and, in this manner, maintain their environmentally unsustainable economies. In addition, some developing countries were concerned that JI projects would exhaust their "cheap" reduction options, so that if emission reductions were to be established for developing countries at a later date, the targets could only be achieved at higher costs (Michaelowa and Dutschke 2000).

Costa Rica was the only developing country that embraced the concept and declared itself available for JI projects as early as 1994. During COP 1, Costa Rica garnered consensus in the G-77 and China group for a compromise proposal. Under a name variation suggested by Malaysia, the "Activities Implemented Jointly" (AIJ) program was established in 1995. A *pilot phase* was introduced to promote "learning by doing" and boost cooperative international efforts. As part of the compromise, no internationally tradable credits would be awarded during the pilot phase, which was to last until the end of the decade.

Between 1995 and 2000, several industrialized countries—in particular, the Scandinavian countries, the Netherlands, Switzerland, and the United States—actively supported the goals and principles of AIJ. They established national AIJ offices and invested in capacity-building activities (Dixon 1999). However, at COP 3 in 1997, the AIJ pilot phase was evaluated and found unsatisfactory. Only a small number of projects had been conducted, due to the lack of incentives in the form of emission reduction credits. Projects were geographically concentrated in Latin America and Eastern Europe and focused mainly on the renewable energy and forestry sectors (Grubb et al. 1999). Neither the distribution nor the mix of project types was considered representative. In addition, transaction costs were very high, and Parties could not come to a consensus on technical issues.

Nevertheless, the concept was not abandoned, but rather was transformed once again. In Kyoto, Brazil suggested the introduction of a penalty system that would subject industrialized countries to a fine if they failed to reach the proposed emission targets. Industrialized countries would have to pay fines in proportion to their degree of non-compliance. The fines would then be channeled into a "Clean Development Fund" and used to support GHG emission-mitigation projects in developing countries and adaptation measures in countries most adversely affected by climate change. Industrialized countries in general, and the United States in particular, were opposed to such a system. The Brazilians were encouraged to change their proposal to a non-punitive concept. The resulting "Clean Development Mechanism" would function as a market-based instrument

to channel sustainable development resources to developing countries. Industrialized countries could purchase emission reductions achieved by projects under the CDM to partially meet their reduction commitments. The proposal was backed by G-77 and China, and ultimately approved by the Conference of the Parties under Article 12 of the Protocol.

Designing the CDM was not an easy task. From 1997 to 2000, a wide array of stakeholders around the world developed proposals for the guidelines and modalities of the CDM. As the various proposals were widely discussed and carefully considered, convergence of opinions began to emerge. Agreement on the basic rules and regulations was eventually reached at COP 7 in November 2001. At that time, the first members of the CDM Executive Board were elected and the Board was tasked with writing the detailed rulebook for the CDM. Yet, the decision for a "prompt start" to the Mechanism led to the acceptance of CDM crediting as early as the beginning of the year 2000, and many CDM projects are being prepared as of 2002.

Over the next 10 years, developing countries will be experimenting with the CDM and learning about their mitigation potential. This learning can constitute an important building block for the further development of the climate regime in general, and for the CDM in particular.[2]

II. Sectoral CDM

In looking at ways to strengthen the climate protection regime, this chapter proposes an enhanced CDM as an evolutionary step through which developing countries can increase their participation in the regime.

Characteristics

Under the S-CDM, developing countries would be encouraged to develop regional, sectoral, sub-sectoral, or cross-sectoral projects that may be the result of specific sustainable development policies, measuring the attained reductions, and selling those on the international emission reduction market. Thus, a Sectoral CDM project could be the modernization of the entire cement industry in a country as a result of a government policy, and a cross-sectoral S-CDM project could be achieving a certain efficiency standard in all industrial motors as a result of new standard setting. Table 4.1 provides examples of various types of potential S-CDM projects. Like the SD-PAMs approach in Chapter 3, the S-CDM would involve national or local sustainable development policies. However, in contrast to SD-PAMs,

Table 4.1. Examples of Sectoral Clean Development Mechanism (S-CDM) Projects

Sectoral	Modernization of a country's cement industry
Sub-Sectoral	Conversion of all natural gas-fueled electricity generation plants to combined cycle
Cross-Sectoral	Combination of cleaner transportation and more efficient lighting in one city
Regional	Departure from the business-as-usual emission scenario in one city or other geographic region

the viability of S-CDM—like that of the CDM—is predicated on an explicit link to the international carbon market.

The S-CDM is thus not envisioned as an alternative to the CDM, but rather as a complementary option open to interested countries. S-CDM would build on the current CDM and would have to comply with most of the following existing CDM requirements and design elements:

- **Funding:** As in the CDM, emission reductions achieved through the S-CDM would be sold on the international market to industrialized country entities. In both cases the achievement of emission reductions is financed not by the developing country but rather by offset purchases on the part of an industrialized country entity. Financial institutions that recognize the monetary value of the offsets could fund the implementation. Once attained and certified, the emission reductions could be sold on the international market, becoming part of the project's income flow.
- **Sustainable development:** As in the CDM, the developing country would determine its own sustainable development priorities.
- **Project cycle:** S-CDM projects would undergo the same project cycle as the current CDM. Projects would have to be (1) designed by project participants, (2) approved by the designated national authority, (3) validated by a designated operational entity (third party) and registered by CDM Executive Board, (4) monitored by project participants, and (5) verified and recommended for certification. As a final step, the Executive Board would issue emission reduction certificates (UNFCCC 2002).
- **Additionality:** The Kyoto Protocol establishes that CDM projects may only count emission reductions that are "additional to what otherwise would have occurred in the absence of the certified project activity." As in the CDM, one important goal of an S-CDM project would be the

reduction of emissions or enhancement of absorption relative to a business-as-usual scenario.

- **Verifiability:** As in the CDM, emission reductions or absorptions need to be real, measurable, and verifiable. This demands the use of internationally recognized quantification methodologies and the existence of inventories and reliable projections.
- **No target:** As in the CDM, the S-CDM would operate without legally binding targets for developing countries. In a CDM project, a business-as-usual scenario is defined as the reference case, and emission reductions or absorptions actually generated by the project are measured with respect to that baseline. There is no prior agreement on a target emission level to be achieved, and the developing country can sell all the achieved emission reductions irrespective of its overall emission level. In that sense, the S-CDM does not operate as a "sectoral target" (Philibert and Pershing 2001), but rather as an enhanced CDM.

The S-CDM would build on the current CDM and incorporate many of its characteristics. However, three elements of the current CDM would clearly need to evolve for purposes of the S-CDM (Table 4.2).

Project boundary

While final decisions on what constitutes a project boundary under the CDM have not been made, there is a general assumption that the CDM will only consider single projects (or at most, the bundling of "like" projects). For the time being, the tendency is to prepare and present single projects.

The S-CDM would require a different concept of project boundary. An S-CDM project would have multiple components, not needing boundary definition around each component, but rather around the entire project. The boundary of a sectoral project (e.g., the cement industry) would be easier to determine, as it would include all cement production plants in the country or region. The boundary of a geographically based S-CDM project would be in principle the city or region to which the policies are directed. However, it is entirely possible that not all sectors in a city would be subject to emission reduction policies. For example, the government may choose to include public but not private transportation, or industrial but not residential uses of energy, and so forth. Furthermore, there is the challenge of transboundary emissions (e.g., vehicles traveling in and out of the city). The dispersed nature of mobile sources makes data collection

Table 4.2. Contrasting Elements of the Clean Development Mechanism (CDM) and the Sectoral Clean Development Mechanism (S-CDM)

	CDM	S-CDM
Boundary	Single project	Sector or region
Additionality	Investment in technology upgrade	Policies and measures
Baseline	Project-based	Multiple projects, sectoral or regional

both difficult and expensive (OECD/IEA 2001). Geographically based projects will require further conceptual and technical work on the concept of boundary.

Additionality

The establishment of additionality under the CDM has been the focus of intense debate. Typically, CDM projects introduce a cleaner or more efficient technology or practice. The impetus stems from the project owner's decision to upgrade a specific project with the introduction of state-of-the-art technology. The investment necessary for this GHG upgrade lends the CDM project its additionality.

One of the contentious issues under the CDM is whether a project implemented as a response to a national policy is additional. An example could be the recent switch to natural gas in the public transportation system in New Delhi. A stringent interpretation of additionality would render the investment for the conversion non-additional and thus not eligible for the CDM, reasoning that because the switch was mandated by the government, it would have occurred without CDM intervention.

This interpretation of additionality would not prevail under S-CDM, where such a project might be typical. Just as in the CDM, reduction activities under the S-CDM could be performed by private- or public-sector representatives, but the stimulus to implement the reduction or absorption project would typically arise precisely from a public-sector policy or measure (or even a private sector-led initiative) that pursues both economic development and environmental protection. For the S-CDM to work, sustainable development policies and measures would lead to, and in fact be the basis of, a project's additionality. Under the S-CDM, the expectation is to see many projects reflecting sectoral transformation, such

as the above-mentioned New Delhi transport example. The incentives provided by the S-CDM could help trigger these kinds of transformative policies in developing countries sooner rather than later.

Baseline

One of the most difficult issues in the CDM has been, and continues to be, the setting of the baseline—the level of GHG emissions that would have occurred without implementation of the project. During the Kyoto negotiations, developing countries insisted that the CDM be a project-based mechanism, with boundaries and baselines established on an individual project basis. Developing countries feared that multi-project or sectoral baselines could become the backdoor entry to national reduction commitments and were thus determined to keep the CDM clearly on a project-by-project basis. The CDM offers several options for the establishment of a baseline,[3] but all methodologies assume a single specific project.

The S-CDM would have to go beyond single project baselines. The GHG reductions resulting from S-CDM projects that are implemented in response to those policies and measures would have to be measured against an agreed baseline: the emission level or future trend prior to the adoption of the policy or measure within the boundary of the project, be that sectoral, regional, or both.

In some cases, the challenges of baseline setting are exacerbated relative to CDM; in others, the baseline definition is simplified. For example, in the case of a geographically based cross-sectoral project, multiple baselines would probably be necessary, one for each of the components in the project. Here the difficulties of a single project baseline are compounded. On the other hand, in the case of a simple sector-wide project, sector baselines might be easier to establish and monitor. Baselines covering a sector-wide project would also be less prone to leakage; in other words, the project would be able to account for instances in which emission *reductions* from one facility lead to emission *increases* in another.

Advantages

The enhancement of the CDM as an avenue for increased contribution of developing countries to global climate mitigation strategies has many advantages.

Environmental protection

The S-CDM could provide incentives for transforming entire sectors, thus helping to accelerate and deepen the decarbonization of developing country economies. It is unlikely that the current CDM would be able to promote this type of transformation. Current CDM investment is linked to specific projects and therefore is unlikely to promote broad policy changes, such as industrial strategy, more efficient transportation, or cleaner energy mix, as pointed out by Winkler et al. in Chapter 3. Under the S-CDM, the incentive of selling emission reductions at a significant scale may make viable some large, broad-based projects that otherwise would not be undertaken.

As the S-CDM is not based on national targets, it would avoid the moral hazard[4] of developing countries setting lenient targets in order to produce "tropical hot air." The complex procedural structure of the CDM, which would also apply to the S-CDM, is cumbersome and costly but has the advantage of ensuring real, measurable reductions. The S-CDM would help to phase in concrete sector- or region-wide mitigation activities. It is entirely possible that in the short term these activities could deliver more real reductions than if developing countries assumed inflated targets.

Multi-component S-CDM projects could enable GHG emission reductions to take place where costs are very high but the activity is particularly beneficial to national development. Each of the reduction activities included in a multi-component S-CDM project would have different reduction costs. An internal "clearinghouse" mechanism could discover the average reduction cost over the whole project. The single S-CDM project could then place all reductions on the market at market price. Thus, the cheaper reduction components of the project could cross-subsidize the more expensive ones. This kind of mechanism could enable projects that deliver additional, non-climate environmental and social benefits.

North-South equity

One of the key elements of further progress in the climate regime is, indisputably, the acceptance of deeper emission cuts on the part of industrialized countries. The S-CDM reinforces the principle of "common but differentiated responsibilities" by designating industrialized countries as leaders of the mitigation effort. Their future greater reduction commitments are precisely what would create the demand for the S-CDM, a demand that would have to be higher than the current demand for CDM. Thus, the

developing countries' increased levels of contribution to climate change mitigation would follow the level of effort of industrialized countries.

In Chapter 2, Depledge points out that under the default option in the Protocol, industrialized countries would likely be asked to take on costly emission reductions, while at the same time being expected to commit increased financial and technological aid for developing countries to meet their increased obligations to the climate regime. The S-CDM presents a win-win option. Industrialized countries are more likely to support a market-based flow of resources to developing countries than increased financial aid. And industrialized countries could assume deeper cuts, as the cost of those cuts would be reduced by the availability of offsets from the S-CDM.

Gradual capacity building

Developing countries need to strengthen their data-gathering and management capabilities. Even if it were politically feasible, it would be difficult in the near term to establish meaningful emission targets for developing countries because of data scarcity and economic uncertainty (see Chapter 5). The S-CDM encourages countries to build up reliable data, sector by sector. Over time, technical capacity, sectoral inventories, and nationwide data can be developed, making any type of future emission controls easier to monitor.

Cost-effectiveness

Currently, the identification, design, negotiation, monitoring, and certification of CDM projects involve high transaction costs. The aggregation or escalation of projects could reduce transaction costs and maximize domestic opportunities for cost-effective reductions. Broadening participation in the market improves the cost-effectiveness of the regime and the market itself.

Adaptation funding

Agreements on the CDM currently stipulate that 2 percent of the proceeds be invested in an Adaptation Fund. The Fund will help defray some of the costs of adaptation in those countries most vulnerable to climate change. If the adaptation share of proceeds in the CDM is held constant for the S-CDM, the higher volume of emission reductions could substantially enhance the funding available to the most at-risk countries.

Compatibility with the Kyoto Protocol

S-CDM is compatible with the present Kyoto Protocol architecture and builds on developing countries' experience. The S-CDM approach could promote a learning process that gradually phases in the participation of developing countries in global climate change mitigation. It could become an important incentive for key developing countries, proportionate to and dependent on increased industrialized country efforts. It could be implemented without major alterations to the structure of the Protocol as it currently stands.

Challenges of Implementation

Despite its advantages, the S-CDM may not be technically feasible or politically viable. By going beyond the CDM, the S-CDM would require an amendment or expansion in the rules governing project boundary, baselines, and additionality in terms that have been discussed. The successful implementation of the S-CDM would have further requirements at both the national and international levels.

At the domestic level, there are two types of challenges to the implementation of the S-CDM.

Technical

Most developing countries are unprepared for the S-CDM, as they have yet to develop the technical capacity needed:

- They must have a functional Designated National Authority with the capability of providing rigorous emissions inventories and projections in order to develop sectoral baselines and monitor aggregated projects.
- Host countries will most likely require an internal "clearinghouse" mechanism, an institutional capacity not common in developing countries.
- Countries must have a reliable GHG accounting system. If S-CDM projects were adopted in a region or sector where an existing CDM individual project is already in operation, the GHG benefits from the single CDM project would have to be excluded from the larger S-CDM project in order to avoid double counting. A clear GHG accounting system is crucial to protecting the credibility of the CDM, and is particularly critical to the S-CDM.

Collaboration

To make some projects viable, domestic institutions not accustomed to collaborating on shared goals would have to develop cooperative strategies. An S-CDM project affecting several sectors in a city—cutting across a wide variety of activities and perhaps even requiring different policy decisions—requires the commitment and political will of a broad set of stakeholders in both the public and private sectors. In addition, the broader the reach of the project, the more important it is to include the participation of civil society in the decision-making process.

At the international level, the S-CDM may face opposition from various negotiation blocs for different reasons.

Developing countries

The CDM has been perceived by some developing countries as weakening the joint effort of industrialized countries to face their climate responsibility.[5] It follows that those same developing countries could perceive the S-CDM as an even greater loophole for industrialized country efforts. After all, the challenges associated with proving additionality in the CDM are not remedied in the S-CDM. The larger scale of the S-CDM raises the stakes of being wrong about the true additionality of a project.

Furthermore, only a few developing countries will have the capacity to design and implement S-CDM projects in the near future. Those countries might command the lion's share of tradable offsets, which otherwise might be distributed among a greater number of countries. This concentration of offsets could exacerbate the inequity between developing countries that receive CDM investment and those that do not, and might cause opposition on the part of those countries that see themselves as disadvantaged by the approach.

Industrialized countries

Industrialized countries might also oppose the S-CDM, since it may have to be concurrent with more stringent emission targets for them. In fact, the viability of the S-CDM may depend on an increased demand from industrialized countries for emission reduction offsets.[6] If industrialized countries remain at the emission limitation levels accepted under the Kyoto Protocol, there would be insufficient demand for a CDM with a supply potential larger than the current one.

Furthermore, this acceptance of deeper cuts on the part of industrialized countries would have to be accompanied by a continuation of the

exemption from legally binding targets for developing countries. Industrialized countries may oppose this. If the S-CDM produced a significant amount of emission reductions, industrialized countries would be using their resources to reach their own domestic reduction targets as well as to help developing countries achieve significant reductions. This arrangement flies in the face of the expectation held by some industrialized countries that developing countries, particularly the larger ones, should self-finance their contributions to global climate-change mitigation.

The strengths and weaknesses inherent in the S-CDM are evident in an effort being considered in Mexico City, based on interlinking cross-sectoral GHG mitigation options. If advanced, the effort might well be considered the first S-CDM experiment.

III. S-CDM in Mexico City: A Case Study

Air Pollution and Rising GHG Emissions

Despite some progress achieved in the closing years of the last century, air quality in Mexico City continues to be a major problem affecting the health of a growing population (currently 18 million people). In the late 1990s, the city developed and implemented "PROAIRE," an air-quality improvement program based on cleaner industry, cleaner transportation, urban zoning, and environmental restoration. The first phase of PROAIRE ended in 2000. Its results have been positive on the whole, but much remains to be tackled.

The metropolitan area is a major source of GHG emissions. Annual CO_2 emissions in the Federal District of Mexico, which encompasses much of greater metropolitan Mexico City, amount to about 51 million tons (mt) of CO_2, higher than that of many countries. Projections suggest an increase to 56 mtCO_2 by 2005 and to 63 mtCO_2 by 2010, a growth rate of about 10 percent between 2000 and 2005 and of 23.5 percent over the decade. In all future scenarios—high, medium, and low growth—the metropolitan area expects large increases in the number of inhabitants which, in turn, will raise both energy consumption and CO_2 emissions. The sectoral trends for the next decade show intensified energy use, especially in transportation but also in the industrial and residential sectors.[7]

The capital area represents a large share of Mexico's national totals in both emissions and energy use. The metropolitan area consumes 13 percent of all fossil fuels in Mexico and 17.3 percent of all electricity.[8] The increase in sectoral activity, especially in transportation, is expected to

overwhelm the air quality measures undertaken under PROAIRE as well as lead to rising GHG emissions. Despite progress, the policy approach followed so far clearly has to be strengthened. The S-CDM could help provide the financial impetus to strengthen policies and achieve local and global benefits.

Some initial steps are already being considered. As noted above, the first phase of air quality improvements (PROAIRE) was completed in 2000. In preparation for a second phase of the air quality improvement program, the Government of the Federal District (GDF) has also begun to develop a climate change strategy and, in so doing, has shown openness to the S-CDM approach. Under the leadership of Claudia Sheinbaum,[9] the Secretariat of the Environment of the Federal District is well aware of climate change-related issues and of the synergies between GHG mitigation, pollution prevention, and control of urban sprawl. In August 1999, the GDF publicly recognized the need to mitigate climate change on various fronts. In 2000, the new administration established the goal of developing a climate change strategy.[10] Specifically, the GDF has already commissioned studies focusing on specific sectors that could have important emission reduction potentials with local, regional, and global benefits.

The S-CDM Project

From the actions taken thus far, several aspects of the project are already clear:

- First, the potential S-CDM project would have the Federal District as its geographical boundary and would seek to reduce the rapid future emission level rise expected in the District over the next decade.
- Second, these future emission projections would constitute the project's baseline, against which additionality would be assessed. While there would be no fixed emission target, any decrease in expected growth, through the implementation of specific policies and measures across several sectors, would constitute the creditable emission reductions. This benefit would be quantified, monitored, and verified for purposes of the S-CDM.
- Third, the project would capture the positive synergistic effects of policies and measures in support of the S-CDM project undertaken by the GDF. This makes the project different from the simple sum of mitigation actions that might be undertaken by individual sources. Without the S-CDM, a comprehensive, citywide strategy that includes climate change mitigation may be neither feasible nor attractive.

- Fourth, the project would create a local clearinghouse to facilitate reduction of individual efforts within and across sectors.

To advance the possibility of such a project, several concrete steps are being taken. The first important step is developing an inventory of GHGs. The current inventory encompasses the entire urban area within the Valley of México (which is larger than the Federal District). Urban sprawl has caused the metropolitan area to grow beyond the Federal District into the surrounding states of México and Hidalgo. The GDF, however, is responsible for the Federal District only. To have a baseline restricted to the Federal District, the inventory is now being adjusted to identify the share of emissions within the greater metropolitan area that corresponds to the Federal District. Within that geographical boundary, the current emissions from each sector are also being determined.

The second step being implemented is a series of pilot projects. These include an initiative to test fuel cell-powered buses for public transportation (presently in its initial stage) with the aim of introducing this technology more broadly. Other initiatives include the pilot use of solar water heaters, introduction of efficient lighting on a massive scale, testing of electric vehicles, and a carbon sequestration project in the south of the Federal District. However, these efforts are for learning purposes only. They are disjointed and are not achieving their full potential. The GDF is considering an array of measures to integrate the various efforts into a comprehensive mitigation strategy, which could become a coherent plan for a potential S-CDM project.

The potential S-CDM project might encompass simultaneous action in seven sectors within the Federal District: energy efficiency in public and private buildings, industry, new housing, transport, public services, waste management, and reforestation.

1. **Energy efficiency in buildings.** The aim would be to increase the energy efficiency in hotels, hospitals, and other large buildings. Studies show that measures such as insulation, motion-sensor lighting, and efficient water heaters could produce a reduction in energy consumption equivalent to 25.2 megawatts of installed capacity (Government of Mexico 2001).
2. **Industry.** Industrial production in the Federal District contributes to air pollution, but not significantly (relative to transport). However, on days when the health index for air quality reaches emergency levels, industry is forced to shut down. Industry has expressed its willingness

to improve its emission performance and buy the right to continue production processes, through payments for other mitigation efforts, such as reforestation. This willingness to pay opens the possibility of synergizing two sectors in a broad S-CDM project.

3. **New housing.** The GDF is planning to build 10,000 new low-cost homes per year and to remodel 15,000 homes annually. Each home could save 5,000 tons of CO_2 per year through the elimination of liquefied petroleum gas leaks and the installation of solar water heaters. Furthermore, homes are planned with efficient lighting and efficient water pumping. The incremental cost of these new homes has impeded implementation of the planned upgrade.
4. **Transportation.** The Federal District has 105,000 taxis and 21,000 buses. Each taxi emits 75 kilograms of CO_2 per day; each bus emits 230 kilograms of CO_2 per day. The GDF is planning to promote the retirement of old taxis and buses with a subsidy per vehicle replaced. The new vehicles would be more fuel-efficient (in the case of gasoline- or diesel-powered vehicles) and/or feature the use of an alternative fuel, namely natural gas. CO_2 emissions could be lowered by 31 percent in taxis and by 85 percent in buses. In addition, consideration is being given to the introduction of management measures, such as exclusive lanes for public transport and non-motorized vehicles and feeding systems for high-density public transport.
5. **Public services.** General areas of potential emission reductions have been identified, including electricity generation and distribution, water pumping, and wastewater treatment. No specific policies or activities have yet been identified.
6. **Solid waste management.** Both the quantity and the composition of the city's solid waste lend themselves to the possibility of recovering methane emissions for energy generation. Potential is being considered.
7. **Reforestation.** There are a variety of opportunities for reforestation, particularly in the rural southern parts of the Federal District.

These actions incorporate two of the S-CDM challenges: boundary definition and technical capacity to define multi-sectoral baselines. Fortunately, Mexico has already developed much of this capacity, which is not the case in all developing countries. The baseline for the Federal District would need to be grounded in the behavior of each sector and would be contractually binding under the S-CDM project. To verify additionality, actions undertaken in the past would have to be measured and discounted.

Offsets would be only issued *ex post* and in an amount equivalent to the departure from the business-as-usual curve minus the already initiated activities. The reductions resulting from the S-CDM project could also be measured as improved intensity (emissions per unit of local GDP) or as a decrease in the Federal District's rate of emissions growth, depending on the availability of data gathered from additional technical analysis.

Another area for future consideration is the sharing of offsets by project participants. Sharing would need to take place according to predetermined criteria, and the GDF would need to play a central role. The GDF could also use other means (besides offsets) to compensate implementation costs or to provide incentives for emission reductions under the S-CDM project.

The Role of Public Policies and Measures

As a part of an S-CDM project and in pursuit of the implementation of a comprehensive climate change policy, the GDF could establish a range of incentives linked to improved emission performance. Some of these policies and measures could be applicable to specific CDM projects, and others may be generic to the S-CDM approach, but many could gain versatility and reach by being included in the S-CDM approach. Most of them would have impacts on other air pollutants and could be implemented with the double purpose of lowering GHG emissions and improving air quality.

Changes in fuel pricing policies, fiscal incentives (on cars, investments, and so forth), and changes in traffic management policies are a few of the policies and measures possible under an S-CDM project in the Federal District. The GDF Secretariat of Economics has recently considered tax discounts to stimulate desirable environmental behaviors. Another measure that could be considered is establishing a cap on conventional air pollutants or fossil fuel consumption within the Federal District air basin.

The potential S-CDM project in the Federal District harmonizes national and global needs. From the national perspective, urban air quality is a priority. However, previously considered or temporarily implemented policies have not been sufficient to sustain improved air quality and increased health conditions. A well-integrated set of climate change policies, which are important from the global perspective, could catalyze air quality improvement and raise the urban standard of living, if their implementation is at least partially funded by the sale of achieved GHG reductions.

IV. Conclusions

The S-CDM represents a natural evolution of the current climate regime. It would allow developing countries to make serious contributions to the global mitigation efforts without having to take on emission targets. Like the current CDM, S-CDM would offer developing countries the opportunity to pursue GHG-reducing activities with a financial incentive provided by industrialized countries, through either *ex ante* investment or the purchase of resulting tradable offsets. From the perspective of developing countries, other approaches to their increased participation in the climate regime (such as absolute reductions, growth targets, or intensity targets) may appear as a step backward since they call for a reduction-absorption effort funded by domestic resources. From that perspective, S-CDM would maintain the "polluter pays" principle of the CDM, while significantly expanding its scope for emission reductions.

Chapter 2 refers to the "virtues of simplicity and familiarity, which are at a premium in the climate change regime." This points to the potential of the S-CDM, which clearly builds on the learning process of developing countries and obviates the need to introduce a new concept or a new logic into the carefully crafted architecture of the existing regime. Should the architecture be revised in the future, the S-CDM will have served as a bridge toward more demanding approaches and will have given developing countries the opportunity to gain significant mitigation experience.

Some developing countries (Mexico and others that are like-minded) would like to see the S-CDM be a natural enhancement of CDM allowed during the Kyoto Protocol's first commitment period. In principle, this could be possible if the Executive Board does not make decisions that would explicitly impede regional, sectoral, or cross-sectoral projects. If, on the one hand, the COP does not restrict the scale, aggregation, or boundaries of projects in the CDM, the whole idea of proposing a sectoral CDM may be a non-issue. If, on the other hand, the COP decides to explicitly allow CDM projects in which emission reduction offsets result from a set of policies and measures, and not just from a specific technological improvement or infrastructure investment, S-CDM would not be a negotiation point but rather a policy to be fostered by developing countries when designing and operating CDM projects.

However, in the past, when faced with choices on issues such as supplementarity, nuclear energy, and sinks, the COP has shown a clear tendency toward cautious approaches.[11] Therefore, it is likely that the CDM Executive Board will lean toward a narrow (less controversial) definition

of project boundary and baseline setting for the first commitment period. Even if the S-CDM is not adopted for the first commitment period, it should still be considered as an option for the future. A number of other future options, including some discussed in this volume (e.g., SD-PAMs) are compatible with the S-CDM. A country that has an emission limitation target could even host an S-CDM project, in the same way that an Annex I country can now host a JI project. Generally, the S-CDM could serve as a valuable transitional mechanism toward future increased participation of developing countries in the global climate change regime.

Notes

1. Portions of this section are adapted from Figueres (2002).
2. The Kyoto Protocol clearly distinguishes the CDM from the other two flexibility mechanisms. Under the Protocol, the term "joint implementation" refers exclusively to the project-based mechanism under which Annex I countries can trade resulting emission reduction units among themselves. These countries also have access to "emissions trading," the buying and selling of emission allowances among themselves. The CDM is the only Kyoto mechanism that involves developing countries.
3. In the CDM, project participants establish the baseline in accordance with internationally approved methodologies. According to the Marrakesh Accords, the baseline can be derived from any of three approaches: existing actual or historical emissions, emissions from a technology that represents an economically attractive investment, or the average emissions of similar project activities undertaken in the previous 5 years under similar circumstances and whose performance is among the top 20 percent of its category.
4. In economics, the term "moral hazard" refers to the effect of certain types of insurance systems in causing a divergence between the private costs of a particular action and the social costs of that action (Pearce 1986).
5. It is important to keep in mind that the reductions or absorptions have benefited the Earth's atmosphere regardless of where they occur. If they are achieved in developing countries, they also contribute to the mitigation of global warming. In this sense, the loophole argument is a subordinate one to the distribution of the effort and not to the outcome of humankind's loading of the atmosphere.
6. There is something of a circular causality in the regime as presently structured. The CDM is the one market instrument that achieves reductions outside of Annex I boundaries, and therefore the only one that, if successful and scalable, could facilitate more decisive efforts among the Annex I countries.
7. Secretariat of the Environment of the Government of the Federal District, personal communication.
8. Secretariat of the Environment of the Government of the Federal District, personal communication.

9. The Secretary of the Environment of Mexico Federal District, previously a member of the Engineering Institute of the National Autonomous University, is a well-known author on energy and climate change issues.
10. Secretariat of the Environment of the Government of the Federal District, personal communication.
11. One clear exception is the fast track of small-scale CDM projects, where the Executive Board is issuing streamlined procedures including sectoral baselines. Experience with these sectoral baselines could serve as a platform for a gradual move toward the S-CDM.