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INDUSTRIAL DEVELOPMENT



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**AIR AND ATMOSPHERIC
POLLUTION**



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**AIR AND ATMOSPHERIC
POLLUTION**

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AND CLIMATE CHANGE



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AND CLIMATE CHANGE

**in Latin America and the Caribbean:
new policies, lessons, best practices
and opportunities for horizontal cooperation**



**in Latin America and the Caribbean:
new policies, lessons, best practices
and opportunities for horizontal cooperation**

**Energy, industrial development, air
and atmospheric pollution and
climate change in Latin America and
the Caribbean: new policies,
lessons, best practices and
opportunities for horizontal
cooperation**



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Abstract

This document, a contribution by ECLAC to the fifteenth session of the Commission on Sustainable Development, presents a review of the main challenges remaining in the Latin American and Caribbean region, as well as a number of efforts under way in the region's countries to progress towards more sustainable development.

For each of the selected subjects (energy, industrial development, air pollution/atmosphere and climate change) a brief analytical summary is provided, followed by proposals for innovative policies based both on best practices and on important experiments which have been conducted in the region. Emphasis is placed on the integrated and cross-cutting nature of the issues considered, on the need to deal with environmental matters from the broader viewpoint of sustainability, and on the importance that the governments of the region need to attach to the area of sustainable development, given that there are still numerous aspects that have yet to be tackled.

The objective of the present document is essentially to provide inputs and guidance for the discussion of policies aimed at speeding up the implementation of the recommendations put forward, to give impetus to actions in order to overcome the existing obstacles, and to draw conclusions from past activities and lessons learned in the region. The document should be seen as complementary to those submitted by each country to the Commission at its fifteenth session; it does not aim to cover fully the numerous efforts carried out by the countries in each of the four selected subject areas.

Introduction

This study represents a contribution from the Economic Commission for Latin America and the Caribbean (ECLAC), the United Nations Development Programme (UNDP), and the countries of Latin America and the Caribbean to the 15th Session of the Commission on Sustainable Development (CDS-15). It offers a brief summary of the main challenges facing the region in this area, describes the efforts that countries have made to move towards more sustainable development, and indicates some opportunities for reciprocal cooperation that could facilitate the adoption of measures for achieving sustainability. The study is based on a document prepared by ECLAC with contributions from various countries, which was presented at an expert workshop in September 2006, with logistical and financial support from the Government of Mexico and participation by the United Nations Environment Programme (UNEP). The policies and measures described in this study represent the viewpoint of all those involved, and the cooperation opportunities are those that the countries themselves identified during the meetings, except where a footnote cites an international agency as the source. A summary analysis of each of the selected issues is provided (energy, industrial development, air pollution and atmospheric problems, and climate change), followed by a description of innovative policies and measures, indicating some countries that have already applied them. For consultation purposes, and in order to give a regional perspective to the proposed measures, Chapter 6 groups possible areas of cooperation identified by the countries under the title "regional opportunities." These correspond to areas where the countries of Latin America and the Caribbean have experience to share, have been through similar processes, or face common needs, and where joint action would enhance the ability of governments to adopt suitable policies.

The final chapter of the study presents a list of the cases described by the countries of the region in a matrix prepared by the Secretariat of the United Nations Commission on Sustainable Development. For purposes of including in this document information on innovative policies, lessons learned and good practices recently implemented or still under discussion, we relied on the country presentations and discussion, but it must be recognized that many of them have not yet been evaluated as to their effectiveness.

The purpose of this paper, which focuses primarily on the period 2004-2007, is to survey the policies applied in the region and contribute some thoughts about national policy trends and the adoption of best practices and replicable models. It should be understood as a supplementary study to the one that each country will be presenting in the CDS 15, and not as a complete report on the many initiatives relating to the four topics mentioned.

While some of the opportunities for cooperation indicated in the study have yet to be implemented, they represent possible lines of action. Some of them make full sense only as regional initiatives, as it would be very difficult to identify and promote actions at the national level. This is the case with upgrading environmental legislation, or with reconciling environmental and competitiveness objectives in investment projects. It is hoped that this work will contribute to strengthening cooperative relations among the countries of Latin America and the Caribbean.

1. Regional tendencies in sustainable development

During the 1990s, Latin America and the Caribbean moved decisively to develop an institutional framework for environmental matters, including the necessary entities, legal rules and mechanisms. Nevertheless, progress has slowed since 2002, and renewed efforts are needed to upgrade environmental legislation and enforce existing provisions. There is also a need to improve the integration, consistency and coordination of sectoral and fiscal policies (ECLAC 2005). On this point, special attention should be drawn to the recent reforms in Argentina and Chile for strengthening the environmental framework: Argentina has created a Ministry of Environment and Sustainable Development under the Head of the Cabinet of Ministers, while Chile has given ministerial responsibilities to the President of the National Environment Commission (CONAMA), with the mandate to prepare an institutional proposal for replacing the now-voluntary inter-ministerial coordination arrangements.

The debate in the Commission on Sustainable Development (CDS 2006) on the issues of energy, industrial development, air and atmospheric pollution, and climate change highlighted the technological and organizational challenge inherent in current patterns of energy production and consumption and of urban land use and transportation. The responses to this challenge must encourage the adoption of cleaner technologies, providing suitable incentives to this end right from the investment evaluation stage. The cost of these technologies will also have to be sharply reduced, by using them on a mass scale or, in the case of national projects, promoting timely research and financing.

Financial systems have not demonstrated much interest in seeking out activities that are both economically viable and environmentally desirable. Unless this issue can be resolved it will be difficult to make significant progress toward sustainability. Consequently, the three main sources of finance—government, private sector and international cooperation—should pool their efforts and harmonize their criteria in this respect.

2. The status of selected issues in the region

Following is a brief overview of the situation with the four topics analyzed in CDS 15 (energy, industrial development, air/atmospheric pollution, and climate change) in Latin America and the Caribbean, including the challenges posed, and some innovative practices that have been implemented. Given the close relationship among these topics in terms of economic, social, institutional and environmental considerations, we have attempted to examine them in an integrated manner, as called for in the decisions from the Commission's 11th session. It must be recognized that countries in the region differ significantly in their size, economy, vulnerability and degree of development, and this heterogeneity finds expression in different ways of addressing the four topics.

2.1 Energy

2.2.1 The situation in Latin America and the Caribbean: Energy intensity¹

Economists recognize that energy intensity normally tends to rise in the early stages of development, with the mechanization of agriculture and the creation of energy-intensive industries such as chemicals, cement, steel and pulp and paper. Once these processes are consolidated it stabilizes, and finally declines with the incorporation of better technologies, new knowledge about energy processing, consumption and yields, and the growing use of more efficient energy sources such as gas and hydroelectricity.

Over the period 1980-2004, the energy intensity index, which measures energy consumption per unit of Gross Domestic Product (GDP), showed virtually no change in Latin America and the Caribbean (Altomonte 2006).² From another perspective, it will be seen that economic growth and energy consumption rose in parallel, despite the incorporation of better technologies for industrial energy generation and consumption and the development of more efficient sources. This behaviour can be explained in part by the greater impact of transportation in the sectoral makeup of energy consumption: its share

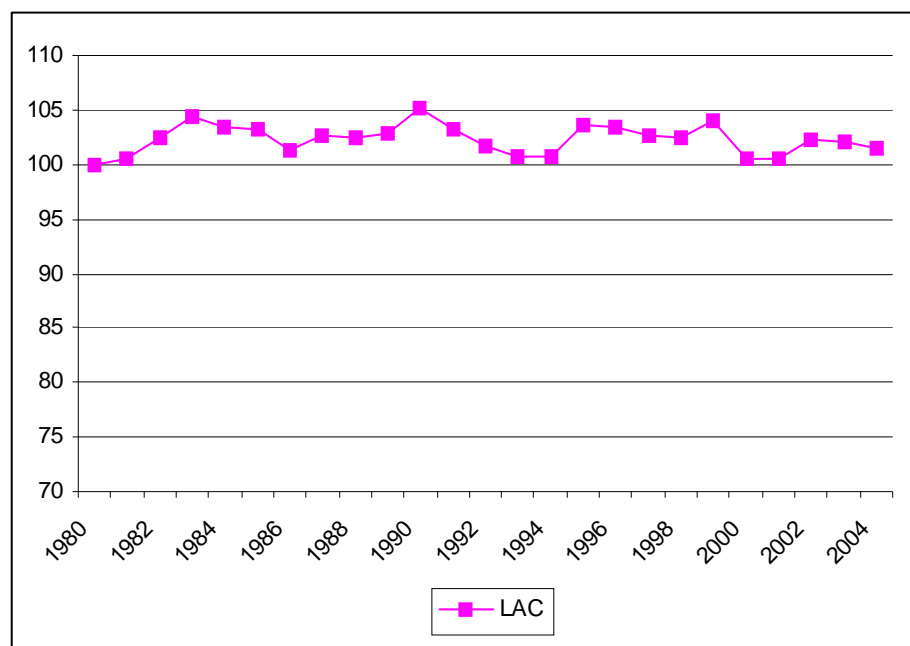
¹ Altomonte (2005)

² Over the same period, energy consumption per unit of GDP in OECD countries declined by some 23%.

rose from 27% of the total in the 1970s to 37% in 2004. The contribution of industry remained steady at 34%, and the household consumption share declined.

Nevertheless, the distribution of consumption by energy source served in part to mitigate the effects of this variation: lower-yielding sources such as biomass saw their share fall from 24% in 1980 to 14% in 2004, in favour of medium-yield sources such as hydrocarbons, and high-yield sources such as electricity, the share of which rose from 9% in 1980 to nearly 16% in 2004. The growth of installed capacity was based on thermal generation, which has increased the energy vulnerability of oil-importing countries, particularly in recent years, given the high price of oil on international markets, and also has adverse impacts on the environment, such as higher emissions of greenhouse gases (GHG) and local pollutants. The region is still not in a position to break the link between growth and energy intensity, with some rare exceptions at the national level.

FIGURE 1
ENERGY INTENSITY INDEX FOR LATIN AMERICA, 1980 = 100



Source: Altomonte, Hugo (2006), "Energía y desarrollo sustentable en América Latina: enfoques para la política energética", document presented at the first regional implementation Forum on Sustainable Development, Santiago, Chile, ECLAC, 19- 20 January 2006; Latin American Energy Organization (OLADE), Economic and Energy Information System (SIEE) and ECLAC, Statistical Yearbook for Latin America and the Caribbean, 2004 (LC/G.2264-P/B), Santiago, Chile. United Nations publication, Sales N° E/S.05.II.G.1.

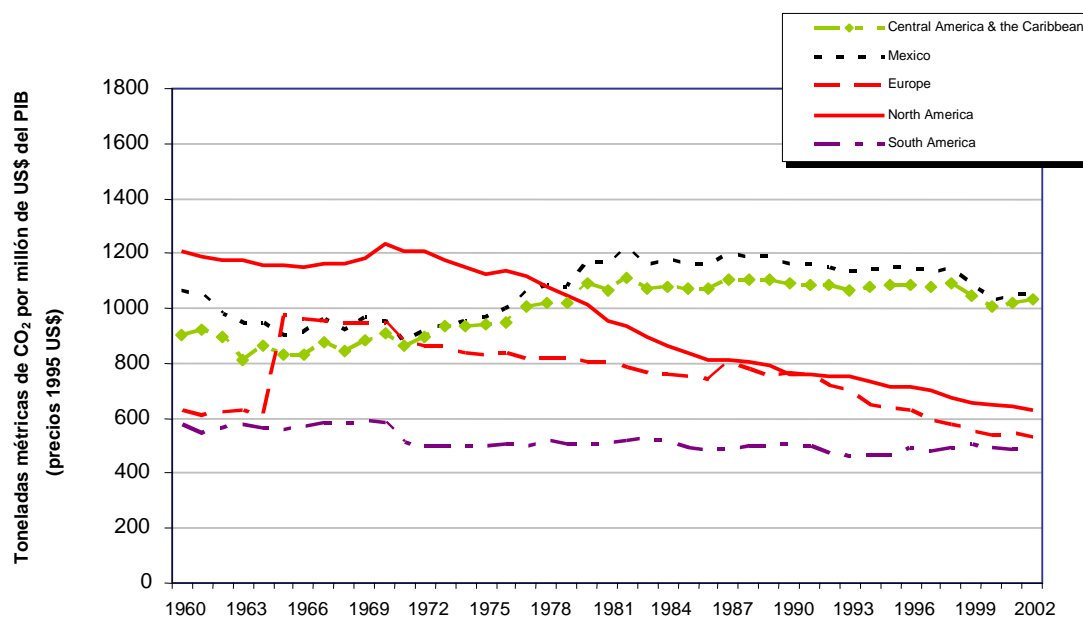
CO₂ emissions

While in comparison with other regions Latin America and the Caribbean is not a major emitter of greenhouse gases (GHG), in particular carbon dioxide (CO₂), emissions of this pollutant in 2004 were nevertheless 75% higher than those recorded in 1980, representing a steady annual growth rate of around 2.4%. This trend would seem difficult to reverse without active policies specifically designed for this purpose (Altomonte, 2005).

The countries of Latin America and the Caribbean are not included among those in Annex 1 of the Kyoto Protocol that have assumed a commitment to help mitigate the impact of

climate change. Today, through Clean Development Mechanism (CDM) projects, the region can seize the opportunities offered by the market for certified emissions reductions to introduce cleaner patterns of production and consumption that will have less negative impact domestically, since by reducing CO₂ emissions they can also reduce local pollutants.

FIGURE 2
CO₂ EMISSIONS IN LATIN AMERICA AND OTHER REGIONS

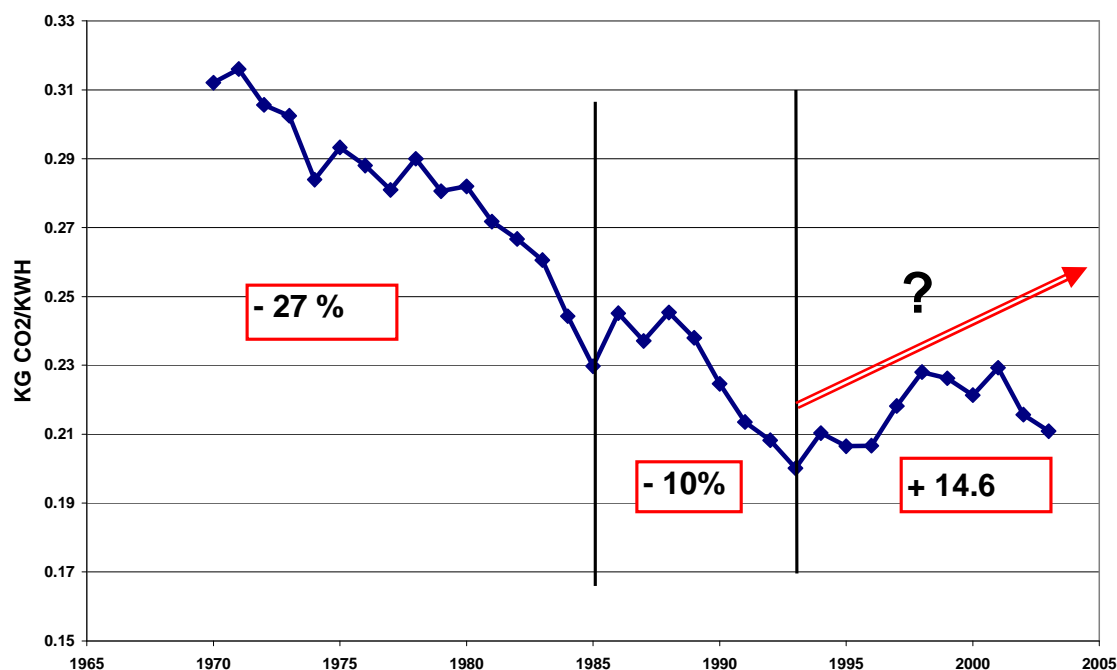


Source: World Resources Institute, "EarthTrends" (on-line database) <http://www.earthtrends.wri.org/>.

Energy use in the region has remained stable since the 1980s. There has been a slight decrease in energy intensity (or an increase in energy efficiency) in the northern part of Latin America and the Caribbean, which could be attributable to the introduction of combined cycle power generation, but this zone is less important in terms of CO₂ emissions.

An analysis of the power sector reveals an increase in recent years in the CO₂ emissions intensity indicator, which measures the volume of emissions per unit of power generated (kg-CO₂/kWh) and which allows the degree of cleanness of the technologies used to be assessed. This increase reflects the rising share of thermoelectric power in the region's energy matrix, compared to the slower progress of hydroelectricity and other renewable sources (Altomonte 2006), a situation illustrated in Figure 3

FIGURE 3
LATIN AMERICA AND THE CARIBBEAN: GREENHOUSE GAS EMISSIONS IN POWER GENERATION



Source: Altomonte, Hugo (2006), “*Energía y desarrollo sustentable en América Latina: enfoques para la política energética*”, document presented at the first regional implementation Forum on Sustainable Development, Santiago, Chile, ECLAC, 19- 20 January 2006.

The Latin America and Caribbean region is a world supplier of environmental services for the mitigation and capture of greenhouse gases. In this respect, it has the chance to exploit the CDM market to encourage lower energy intensity and reduce the emissions of these pollutants through greater efficiency and energy use. With the exceptions of countries such as Argentina, Mexico, Brazil or Columbia, this will require more deliberate policy measures in order to diversify the energy supply through the use of cleaner sources such as renewable energies, including the biofuels that are now being promoted in the region.

2.1.2 Structural changes in energy production and regional integration efforts

In Latin America and the Caribbean in general, and in South America especially, power consumption and the use of natural gas in power generation are likely to increase considerably. Adoption of the combined cycle as the dominant technology in that industry has reinforced the tendency to integrate electrical energy and natural gas producers: power companies have become involved in building gas pipelines, and public and private oil companies alike have begun to participate in the natural gas-electricity chain, attracted by favourable oil prices and business opportunities that have emerged in the wake of the power sector's problems in boosting investment (ECLAC 2005c).

For this reason, the power companies and the oil and gas companies have shown interest in acquiring assets in both activities, and are now creating energy companies of global reach. The power companies want to keep control over supply of the inputs needed to produce energy, while the oil companies want to assure markets for their natural gas output. Despite this tendency, however, the supply problem has yet to be resolved, and the power sector faces some serious challenges that could be addressed

through wider and more stable energy integration at the subregional level. This would allow countries that are dependent on oil and gas imports to take advantage of exporters' surpluses.

There are already some promising energy integration schemes in the region (Altomonte 2005):

- Colombia – Venezuela – Ecuador
- Electrical Interconnection System for Central America (SIEPAC)
- Brazil – Paraguay: Itaipú
- Argentina – Uruguay: Salto Grande
- Argentina – Paraguay: Yacyretá
- Argentina – Northern Chile: Salta
- Mexico – Guatemala: Mexico's first venture into the Central American power market

The most important gas pipeline projects, now at various stages of development, are:

- Venezuela – Colombia
- Venezuela – Brazil
- Bolivia – Brazil
- Peru – Brazil
- Bolivia – Argentina

Other proposed energy integration projects include *Petróleos de América* (Petroamérica) and the *Petrocaribe*, *Petroandina* and *Petrosur* initiatives, sponsored by Venezuela, and a Mesoamerican energy integration programme recently launched by Mexico, in which Colombia and the Dominican Republic are also involved. The latter project is being supported by the Inter-American Development Bank (IDB), the United States Agency for International Development (USAID) and other international agencies.

Other energy initiatives include the oil supply arrangements in which Mexico and Venezuela are joint participants, such as the 1980 San José Accord, or the Caracas Energy Cooperation Accord and the Integral Cooperation Agreement signed with Cuba, which have been in place since 2000. Also noteworthy are the *anillo energético* (energy ring) and *gasoducto del sur* (southern gas pipeline) projects, as well as the energy cooperation agreements negotiated under the Central American integration programme, the Andean Community, the Southern Common Market (MERCOSUR) and the Latin American Integration Association (ALADI) (Ruiz Caro 2006).

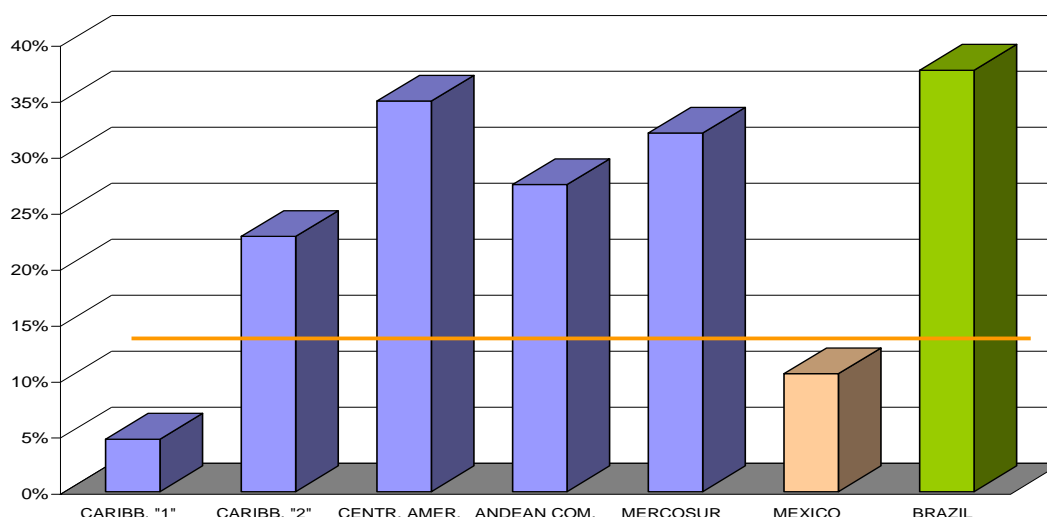
The Heads of State and Government of the Central American Integration System, at their 20th meeting in Panama in July 2006, called for the reform of regional agencies in order to move forward in energy matters, including the creation of a Central American power generating company. Plans include construction of a power line to connect to Panama, Costa Rica, Nicaragua, El Salvador, Honduras and Guatemala, on which work will begin in 2008. The Central American power grid project is a transmission network

that will carry electricity from Panama to Guatemala, boosting trade in energy and reducing the risk of supply shortages in the area.³

Renewable energy

Apart from hydropower, there has been little development of renewable energy sources in Latin America and the Caribbean. In 2003, renewable energy accounted for 26% of total energy supply (10.5% hydro, 0.5% geothermal and 15% biomass), compared to a 45% share of oil and 24% for natural gas.⁴ In 2004 the region was using only 15% of its hydroelectric potential, and despite the energy reforms of the 1990s it was losing the momentum built up in previous years. Installed hydroelectric capacity was 55% of the total in 1970; it peaked at 63% in 1990, and declined to 56% in 2004. Biofuels are an increasing focus of interest in the Latin American region's energy strategy, with Brazil, Argentina and Central America in the lead.

FIGURE 4
RENEWABLE SUPPLY INDEX, 2002
(Total renewable supply/Total energy supply)



Source: Altomonte, Hugo (2006), "*Energía y desarrollo sustentable en América Latina: enfoques para la política energética*", document presented at the first regional implementation Forum on Sustainable Development, Santiago, Chile, ECLAC, 19- 20 January 2006.

The use of wood or ligneous biomass is still difficult to control in light of its potential local and domestic repercussions in Latin American cities, and increasingly in those of the Caribbean. While wood is a renewable energy source of great importance for the poorest population sectors, its sustainable use will require changes in forest exploitation patterns. There are however advantages in terms of productivity, efficiency and resource availability that justify wood-based energy programmes, especially at the local level (Coviello 2006).

³ <http://www.sgsica.org/>.

⁴ Renewable energy sources include the following categories: hydroelectric energy, geothermal energy, solar energy, wind energy, sustainable bioenergy (other than wood) and sustainable woodfuel.

Table 1 compares generating costs and unit investment requirements for selected energy sources.

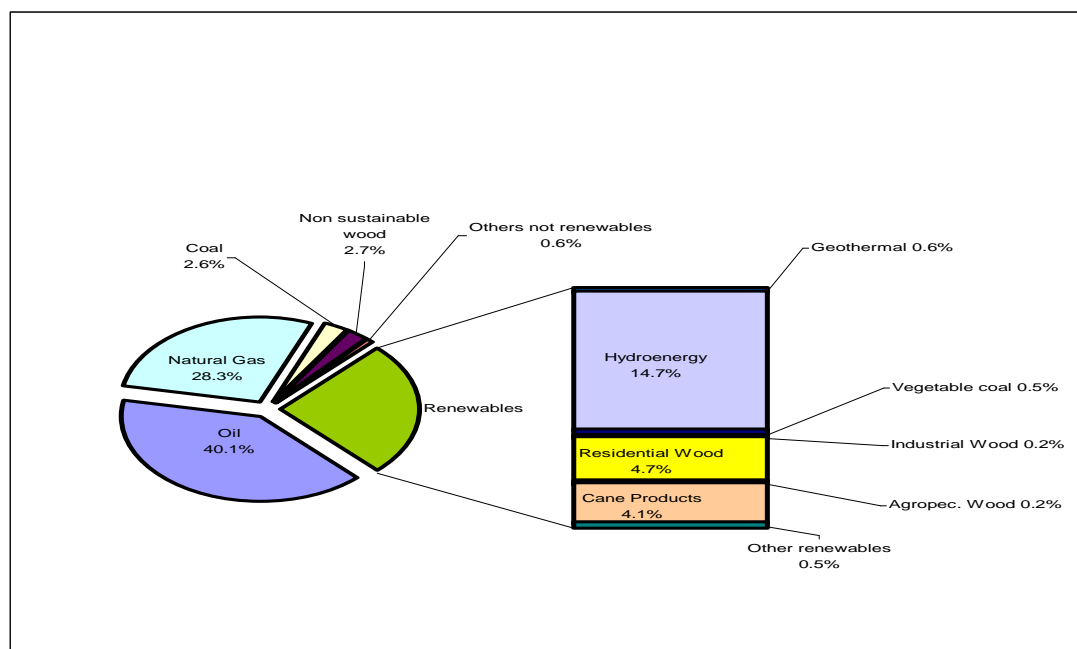
TABLE 1
UNIT COSTS OF SELECTED ENERGY SOURCES

Technology	Average generating cost (US\$0.00/kWh)	Relative cost (combined cycle = 100)	Average investment (US\$/watt)
Combined cycle	3.5 (3.0 – 4.0)	100	0.6 (0.4 – 0.8)
Coal	4.8 (4.0 – 5.5)	137	1.2 (1.0 – 1.3)
Nuclear	4.8 (2.4 – 7.2)	137	1.8 (1.6 – 2.2)
Wind	5.5 (3.0 – 8.0)	157	1.4 (0.8 – 2.0)
Biomass (25 MW)	6.5 (4.0 – 9.0)	186	2.0 (1.5 – 2.5)
Geothermal	6.5 (4.5 – 8.5)	186	1.5 (1.2 – 1.8)
Small-scale hydro plant	7.5 (5.0 – 10.0)	214	1.0 (0.8 – 1.2)
Photovoltaic	55.0 (30.0 – 80.0)	1 570	7.0 (6.0 – 8.0)

Source: Coviello, Manlio (2006), “Las energías renovables en América Latina: los desafíos post-Bonn”, document presented at the first regional implementation Forum on Sustainable Development, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), 19- 20 January

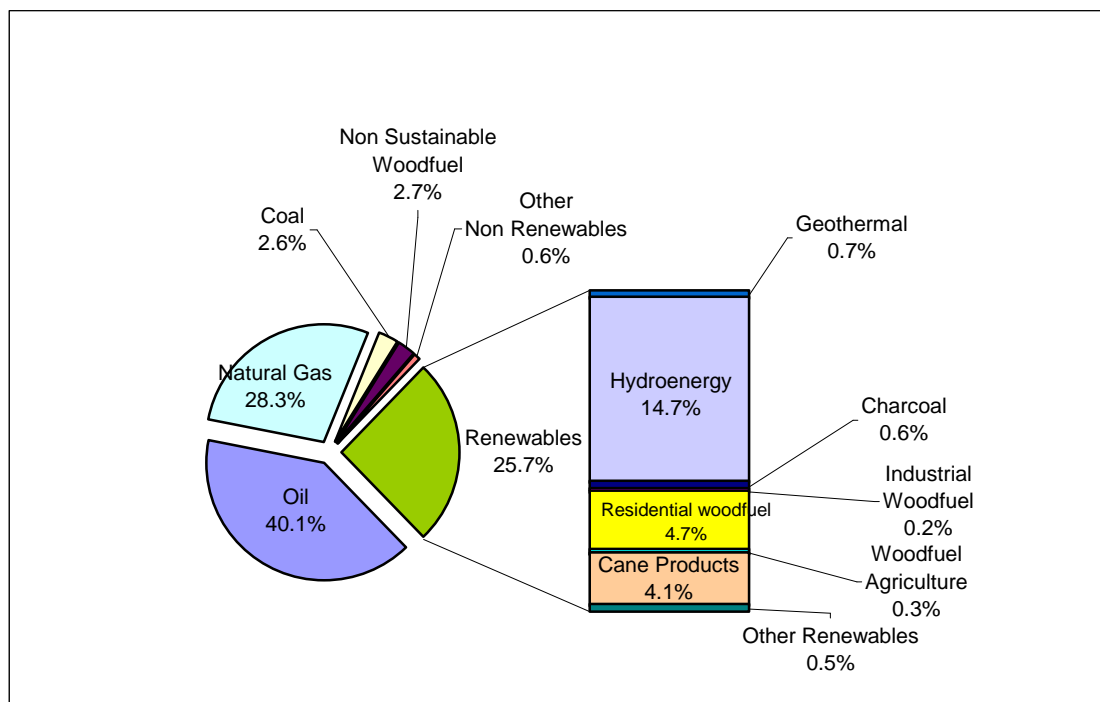
Because of cost differences in generating electricity from fossil fuels and hydro, compared to renewable sources (see Table 2), projections for Latin America and the Caribbean show only a gradual increase in the renewable energy share, with no major changes in the energy supply mix in the short run. This underlines the need to strive for energy efficiency and to create financial mechanisms and incentives to speed the incorporation of renewable energy sources into the total energy supply.

FIGURE 5
LATIN AMERICA AND THE CARIBBEAN 2002 – ENERGY OFFER



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

FIGURE 6
LATIN AMERICA AND THE CARIBBEAN – 2004 – ENERGY OFFER



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

An examination of Figures 5 and 6 shows that in the period 2002-2004 oil and coal consumption increased, while spending on renewable energy sources retreated slightly. To increase the renewable energy share will require steps to address the following obstacles of a financial nature that persist in the region: (i) scarcity of project finance; (ii) high transaction costs in accessing financial incentives and leading-edge technologies; (iii) lack of permanent international cooperation mechanisms for transferring technologies and financing their initial adaptation and dissemination; and (iv) the fact that investment projects do not consider environmental costs. In addition, there are technological barriers and information gaps relating to natural resources, supply networks and support services, and the capacity to generate projects is limited (Coviello 2006)

Table 2 shows generating costs and the approximate cost of externalities with selected energy sources; these are important factors that must be considered in formulating energy strategies (Coviello 2006).

TABLE 2
GENERATING COSTS AND EXTERNALITIES ASSOCIATED WITH SELECTED ENERGY SOURCES⁵

Energy source	Average generating cost (US\$0.00/kWh)	Cost of externalities (US\$0.00/kWh)
Coal	4.0 – 5.5	9.2
Natural gas	3.0 – 4.0	0.8
Large-scale hydro plant	1.8 – 3.0	0.01
Fuel oil	3.9 – 5.3	9.0
Nuclear (excluding wastes)	2.4 – 7.2	0.4
Geothermal	4.5 – 8.5	0.6
Small-scale hydro plant	5.0 – 10.0	0.01
Biomass	4.0 – 9.0	0.5
Wind	3.0 – 8.0	0.1
Photovoltaic	30.0 – 80.0	0.7

Source: Coviello, Manlio (2006), "Las energías renovables en América Latina: los desafíos post-Bonn", document presented at the first regional implementation Forum on Sustainable Development, Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), 19- 20 January

One of the most significant outcomes of the Brasilia Platform on Renewable Energies was an agreement "to further efforts to achieve the goal set forth in the Latin American and Caribbean Initiative for Sustainable Development of ensuring that by the year 2010 the use of renewable energy by the region, taken as a whole, amounts to at least 10% of its total energy consumption on the basis of voluntary efforts and taking into account the diversity of national situations. This percentage may be increased by those countries or subregions that voluntarily wish to do so." The region as a whole has already met this goal, although some countries have not yet done so (ECLAC 2003; ECLAC 2004; Coviello 2006).

Biofuels⁶

The biofuels area has seen technological progress in raw material output and yields and in the reduction of wastes and polluting emissions. Although there is still some cultural resistance in certain countries to the use of biofuels (and renewable energy sources in general), together with concerns about the potential environmental impact over their lifecycle, other countries, including Argentina, Colombia, Brazil and Chile and those of Central America, see them as an option that should be encouraged. The productivity that Brazil has achieved in making ethanol from sugarcane has not been completely replicated elsewhere, perhaps because of different land availabilities and production policies (ECLAC 2005b). In Central America, and particularly in Costa Rica, El Salvador and Guatemala, there are real possibilities for biofuel programmes, and several interesting experiments are under way (ECLAC 2005b; Horta 2006). But it is in Brazil that the greatest progress has been made with renewable energy, which now accounts for 45% of total energy supply, compared to 11.2% in the rest of the world. The biomass share is 23%, compared to a world average of 1.7%

As countries such as Chile and Argentina and international agencies such as the World Bank and UNDP have made clear, there are several reasons for promoting the use of biofuels in the region, including

⁵ The externalities indicated in table 2 represent potential damage from pollutants emitted by a given energy source during the kilowatt-hour lifecycle, and are shown only as an illustration to demonstrate their magnitude.

⁶ Prepared on the basis of discussions documented in ECLAC 2006c.

the following: (i) the need to diversify energy sources and reduce exposure to international price volatility for commodities such as oil and sugar; (ii) the opportunities they offer for rural development, job creation, and better land-use; (iii) the prospect of reducing pollution, especially from transportation and heating systems; and (iv) the opportunities presented by Framework Convention on Climate Change mechanisms (such as CDM) for making net reductions in greenhouse gas emissions (ECLAC 2005b), and for meeting an international market demand that is likely to grow.

Many countries have yet to decide their tax treatment of biofuels, the production of which could exert additional environmental pressures through changes in land use, intensified farming, water consumption and soil degradation, depending on the specific situation in each country.

Compared with ethanol, which is already being produced at competitive prices, biodiesel production is still in its infancy. Its growth will depend on removing the international trade barriers it faces, developing an institutional management framework, including appropriate technical standards, and in some cases creating mechanisms to develop and make available appropriate technologies. Oil prices must also be monitored closely, since many measures depend on this factor (ECLAC 2005b).

The use of biofuels has been discussed in a series of regional meetings involving the IDB, the United Nations Food and Agriculture Organization (FAO), UNDP, the Latin American Energy Organization (OLADE) and the Government of Brazil, among others, where the need to integrate the following aspects into the debate has been stressed:

- Involvement of various economic sectors, including energy, agriculture, the environmental authorities, and the private sector.
- The potential for South-South cooperation, given Brazil's importance in this field and the fact that its current policy promotes biofuels cooperation.
- The need to consider environmental aspects, including the possible consequences of bioenergy monocrops on the ecological characteristics of tropical zones.
- Ex ante evaluation of the social impact among certain rural sectors, especially small and medium-scale farmers who could be displaced from the productive chain.
- To ensure that biofuels become an energy source that will contribute effectively to mitigating the effects of climate change, attention must be paid to its potential repercussions on food security, sustainable production, prices for basic products, and the process of desertification.

Access to energy and renewable energy sources

Taxation and other policies to promote renewable energies must make room for local endogenous development and they must facilitate the productive use of energy in order to raise living standards for communities.

With large-scale hydroelectric projects, increasing attention has been paid to compensation, in the sense of relocating the affected population or mitigating specific environmental effects. Fluctuations in fossil fuel and electricity prices can have a significant impact on lower-income groups, and renewable energies can mitigate their social impacts. For this reason, some countries are adopting policies to address the energy coverage deficit for the most vulnerable groups, and are promoting the concept of "energizing" the countryside rather than "electrifying" it (in the sense of extending the power grids). Argentina, for example, has a project for renewable energies in rural markets (PERMER). In practice, initiatives of this kind entail adjusting poverty programmes to include the use of renewable energy sources that can boost

employment and local incomes. An example is the “Andean Programme for Energization through Renewable Means” (PAER) that has been mounted through the Andean Community of Nations (CAN).⁷

The Millennium Development Goals did not include an energy target, but access to energy is an important component of such aspects as health, deforestation and poverty. Because many poor families used conventional biomass as their primary energy source, steps must be taken to improve systems for the production and consumption of woodfuel in the region, especially in Central America. The UNDP considers access to energy as a means of advancing human development.⁸ Thus, in its “Guide to Energy's Role in Reducing Poverty” (UNDP 2005) it calls for urgent action that goes beyond the “business as usual” approach to energy, relating for example to the productive use of energy, in order to raise living standards and facilitate access to energy services for those extremely poor segments of the population that still have no electricity. This was the thrust of Brazil's “Light for All” programme.

2.1.3 Innovative policies on fossil energy and energy efficiency

In Argentina, where 7% of the energy supply comes from renewable sources (5% from hydropower and 2% from biomass), energy efficiency labelling is now compulsory for refrigerators, freezers and other energy-consuming appliances and equipment, pursuant to Resolution 35/2005 of the Technical Coordination Secretariat of the Ministry of Economy and Production. The Energy Secretariat is also seeking support for a project for “Energy Efficiency in Argentina” from the Global Environment Facility (GEF).⁹ The Environment and Sustainable Development Secretariat has a programme to replace old refrigerators with ones that are more energy-efficient.

In the face of rising oil prices, the energy ministers of Central America and the Dominican Republic approved the Emergency Energy Plan in 2004, and this was subsequently ratified by Heads of State of the region. A Matrix of Actions for Central American Energy Integration and Development has been created under this plan, with support from an international technical team, covering 65 regional lines of action that include energy savings and efficiency, institution building, rural electrification, sustainable energy use, and regional integration. It is currently being coordinated by the SICA General Secretariat, the Ministry of Environment and Energy of Costa Rica, and the ECLAC office in Mexico. To improve coordination of power sector activities in Central America, the SICA Secretariat is planning an energy unit that will begin its activities in early 2007.

Bolivia's programme for “electricity for a decent life” seeks to expand rural energy supply and establish mechanisms to meet the needs of the 30% of rural dwellers who now lack electricity service. One such mechanism sets targets for the existing utility companies in servicing the rural population, which is typically scattered or living in inaccessible settlements, and it also subsidizes the utilities so that they will remain profitable after they have expanded their coverage. The mechanism establishes clearly defined obligations and responsibilities for the utilities. A similar programme is been established in the Argentine province of Jujuy, whereby the power distribution companies have been grouped in accordance with the market they supply.

In Bolivia, the power utilities are no longer paid up-front for the energy they supply to rural dwellers, because they are not meeting the targets. The government has ordered that they will be paid ex-post, for each connection actually installed. There is also a move to broaden the range of players involved in rural electrification; in the past this depended solely on the prefectures, and they were chronically short of funds. There are now 40 private firms involved in this activity, under the Common Fund for Universal Access to Public Electricity Service.

⁷ <http://www.comunidadandina.org/>

⁸ <http://www.undp.org/spanish/temas/energias.html>

⁹ <http://www.energia.mecon.gov.ar>

Chile has made progress in energy efficiency, in response to its dependence on external energy sources, particularly natural gas, and recognizing that the close link between economic growth and energy use must be reversed if sustainable development is to be achieved (CONAMA 2004). Thus, the National Energy Commission and the Ministry of Economy introduced the "Energy Efficiency Country Programme." Energy consumption per capita in Chile, at 0.067 Tj, is not high in comparison to developed countries such as the United States (0.339) or Australia (0.243) (CONAMA 2004). A public-private committee has been established to run the programme, following a model that has been quite successful in the country. The Corporación de Fomento de la Producción (CORFO), the institution responsible for industrial policy, is designing a mechanism to foster energy efficiency. Among other things, it will verify the progressive removal from the market of less energy-efficient appliances, and will create a certification system.

In Argentina, the "Project to Increase Energy and Productive Efficiency in SMEs" (PIEEP) created by the Energy Secretariat, the Small and Medium-Sized Enterprise and Regional Development Department, and the German technical cooperation agency GTZ, is targeted exclusively at SMEs. Its objective is to promote the efficient and environmentally sustainable use of resources in production, in order to reduce costs and enhance the productivity of SMEs. PIEEP has provided support to sugar and citrus growers in the province of Tucuman, and to the dairy industry in the provinces of Buenos Aires, Córdoba and Entre Rios. It has also sponsored improvements in post-harvest services for cereals producers in the provinces of Buenos Aires and Santa Fe, in the irrigation system of the Province of Mendoza, and in the fruit packaging and conservation industry in the provinces of Rio Negro and Neuquen. The National Industrial Technology Institute is actively involved in many of these initiatives and, together with other agencies, is a member of the interagency working group that is putting together the operational structure for PIEEP. Mention should also be made of the Cleaner Production and Business Competitiveness Programme of the Environment and Sustainable Development Secretariat, which has been applied in several provinces, including Tucuman.¹⁰

2.1.4 Policies to increase the share of renewable energy sources

The countries of Central America, like those in the rest of Latin America and the Caribbean, are vulnerable to uncertainties in the supply and pricing of oil. To overcome this situation, the share of renewable energy sources in electricity production has increased to around 60%, with the figures for individual countries ranging from 23% to 98%. Five of the region's six countries now have legislation in this matter. Among the most successful examples are Guatemala's programme for power cogeneration in sugar mills, as a result of which eight plants are now supplying about 10% of the country's electricity needs; a hydroelectric plant is now using wastewater from Guatemala City; and Costa Rica has a programme for independent or parallel power generation under which private investors (for the most part Costa Rican) have sponsored more than 20 hydroelectric, geothermal and wind power projects that are now meeting 20% of the country's energy demand.

The Central American Environment and Development Commission (CCAD) has formulated a strategy for an efficient energy policy for Central America and the Dominican Republic, focused on electricity production and consumption. To establish a policy framework for these purposes, the CCAD has forged a strategic partnership with the Biomass Users Network Central America (BUN-CA), an organization that promotes energy savings and the use of renewable sources (Interiano 2006).

¹⁰ <http://www.producciontucuman.gov.ar/medioambienteppplimpia.asp>

BOX 1 **ENERGY EFFICIENCY**

The Regional Programme on Electrical Energy Efficiency in Industrial and Commercial Service Sectors in Central America, financed by the GEF, seeks to remove the barriers that inhibit energy savings measures and to promote the use of appropriate technologies. The strategic objective of this initiative is to foster the efficient use of electricity in the industrial and commercial service sectors, focused on motors, air-conditioning and refrigeration. It is expected thereby to reduce CO₂ emissions by at least 1.66 million tons (from electricity savings of 1.377 GWh), over a 20-year period.

Source: United Nations Development Programme (UNDP), "BUN-CA Strategy for energy efficiency" (<http://www.bun-ca.org/nuevo/index.p>)

Costa Rica currently has the largest expanse of wind farms in Latin America, and three countries (Guatemala, Honduras and Nicaragua) are using sugarcane bagasse to produce heat and electricity, with surpluses sold on the domestic market. Almost a third of sugar mills in Central America have a cogeneration project and are selling surpluses (Santizo 2006). Few Central American countries have made much progress in exploiting garbage dumps or landfills for biogas, despite the CDM inducements. One such experiment is underway at the Rio Azul garbage dump in San José, Costa Rica, and there are hopes to replicate it in other Central American capitals. A "turbo oven" (turbococina) has also been developed in the region: it uses only 10% of the wood needed to feed a conventional stove. Better forest management (e.g. to increase the supply of woodfuel) could produce gains at the consumption stage (Soto 2006b).

The Central American Bank for Economic Integration (CABEI) has signed a US\$11 million agreement with GTZ to promote the use of renewable energy sources and enhance energy efficiency in Central America, under which it will step up its microcredit programme for developing new technologies and energy saving measures in transportation, industry and electricity.

Brazil offers a number of cases of best practices, such as Law 10,438 of 2002, which created the programme of incentives for alternative sources of electric energy (PROINFA) that applies to wind, biomass and small-scale hydro-projects. To address market barriers and enlist the private sector, Brazil is moving to establish an energy efficiency policy focused on regulatory mechanisms and strategic planning, as well as on scientific research and the commitment of private business (Poppe 2005). It has also included biotechnology research in relation with renewable energy sources. Over the period 1975-2000, sugarcane yields per hectare rose by 33%, cane sugar content by 8%, and ethanol yields from sugar by 14%. (World Bank/UNDP 2005)*. For Brazil, an innovative policy is to access the United States market with lower trade barriers and investments within and beyond the region for producing ethanol from sugar cane.

BOX 2 **PRODUCTIVE USES OF ENERGY**

Energy as the engine of community development. In order to speed the social inclusion of some 12 million people who have no access to power services, 10 million of whom live in rural areas, Brazil is pursuing a programme called "Light for All." It is part of a federal government strategy for using electrical energy as a lever for promoting economic development and for reducing poverty and hunger. It seeks to ensure that access to electricity will result in improvements to living conditions and incomes. The programme's goals include encouraging the productive use of energy and employing local labour in electrification works. It is being implemented through "integrated actions" to ensure that the "Light for All" programme is properly coordinated with other federal social programmes in health, education and water supply, services that are facilitated through the supply of electricity.

Source: United Nations Development Programme (UNDP), "Energizing the Millennium Development Goals: a Guide to Energy's Role in Reducing Poverty, New York, 2005.

Argentina recently adopted the Biofuels Act (Law 26,093)¹¹ and, in 2004, the National Biofuels Programme, to promote the use of this product, taking advantage of the fact that oilseeds now account for 60% of crop output in Argentina, compared to 40% for cereals, and to support the region's largest vegetable oil industry (Sarquis 2006)¹².

Colombia's energy strategy calls for developing fuel alcohol and biodiesel on the basis of coordinated regulation that includes quality standards, recognizing that projects of this kind involve energy, agriculture, transportation and environmental components, as well as an appropriate tax structure to avoid the diversion of alcohol for other uses. To achieve an optimal allocation of resources, pricing policy reflects the economic cost of energy products, with suitable subsidies.¹³ The programme also takes account of environmental costs and includes control mechanisms for enforcing the standards. A Biofuels Act was recently approved as part of the programme, to promote the blending of biofuels, such as fuel alcohol and biodiesel, with petroleum-based fuels, an initiative that involves the public sector and interested private firms. The objectives are to reduce fossil fuel imports, to contribute to economic growth, to improve the competitiveness of the productive sectors and the transportation system, and to reduce air pollution and its effects on health. The strategic plan for the transportation sector and the national clean production policy both contain components of this initiative.¹⁴

BOX 3 **ENERGY SERVICES AND POVERTY REDUCTION**

On the Chilean island of Tac, a hybrid wind-diesel technology has been installed for rural electrification. The local cost of electricity has dropped by 75 to 90%. Before the arrival of electricity, islanders were paying the equivalent of approximately 2,500 pesos per kWh for small batteries, candles, small engine generators, and kerosene lanterns. They now pay anywhere between 211 pesos and 650 pesos per kWh. People in the community of La Barra, in El Salvador, also had limited access to electricity, which they produced with diesel and gasoline-powered generators. Homes have now been equipped with solar panels that produce power for lighting, radio and television, and irrigation pumps. Families have seen an 83% cut in their power costs: whereas they formerly spent 30.44 colones a month on fossil fuels, they now pay about 5 colones to maintain a solar panel systems.

Source: United Nations Development Program (UNDP), *Energizing the Millenium Development Goals: A Guide to Energy's Role in Reducing Poverty*, New York, 2005.

Jamaica, in the western Caribbean, is examining the possibility of increasing the use of methanol and of wind and thermosolar energy (Loy and Coviello 2005).

Mexico's National Energy Savings Commission (CONAE) is promoting the creation of "energy service companies", to help firms prepare the energy efficiency programmes that the government is encouraging through recognition awards. Under this heading, Mexico is also cooperating with Ecuador to coordinate the Energy Efficiency Plan (CCA 2006).

¹¹ Promulgated on 12 May 2006.

¹² Secretaría de Agricultura, Ganadería, Pesca y Alimentos

¹³ www.upme.gov.co

¹⁴ <http://www.ecopetrol.com.co>

2.1.5 Industry

The situation in Latin America and the Caribbean

The pattern of industrial development in most countries of Latin America and the Caribbean reveals greater international competitiveness for exporters, who have learned to operate in open and highly dynamic markets. Nevertheless, such modernization is limited to a relatively small number of firms, and this has sparked demand for policies to integrate small and medium-sized enterprises into the export sector.

The renewable and nonrenewable natural resources industry in the region has sparked debate over the sustainability of the strategies that countries have applied in the past and will continue to apply in the future. In many cases, the region shows growing specialization in environmentally sensitive industries that are also capital- and energy-intensive, together with a relative loss of capacity to compete in knowledge-intensive industries (Pensamiento Iberoamericano, October 2006). This makes the export sector vulnerable to environmental requirements and demands in developed countries' markets. On the other hand, export-based specialization is generating a productivity gap in the economy between export firms and those that have not cleared the competitive hurdle, thus exacerbating the duality of the economic structure. Economic performance and labour productivity are on the rise in sectors of recognized environmental impact, such as environmentally sensitive industries and those that make intensive use of natural resources. These are moreover the very sectors that gave rise to wage gaps and the dual economy, the concentration of economic power, and inequality, aggravated by the lack of resources devoted to research and development, in which the region is clearly at a disadvantage.

The industrial sector is crucial to economic growth and social development, for it constitutes an important source of employment, especially where small and medium-sized firms have developed adequate capacities. It is important to recall, as indicated in the energy chapter, that there is a close relationship in Latin America and the Caribbean between industrial development and energy consumption.

In all countries of the region environmental policies have targeted industry, with a view to reducing the potential impact on air, water and soil pollution and the generation of solid wastes. These policies have translated into such mechanisms as environmental impact assessments, environmental audits, and other voluntary inspection provisions, operating licenses, the creation of comprehensive regulatory frameworks, prizes and recognition awards for clean industries and, more recently, the growing preparation of emissions inventories.¹⁵ Nevertheless, the dichotomy between industrial growth and environmental care has not been fully overcome, and progress has not always been uninterrupted. In Colombia, for example, environmental policies relating to industry have been amended, both with respect to control and monitoring and with respect to cleaner production. Some environmental licenses were changed to make their application voluntary rather than mandatory, and in 2006 the decree limiting the import of hazardous wastes was modified. Environmental policy has been designed to facilitate private sector development to the maximum, and to dismantle some of the obstacles posed by environmental regulation.

The impacts of fluctuating oil prices on industry's environmental performance must be monitored closely, for they could lead to fuel substitution, with varying results.

¹⁵ Mexico has included greenhouse gas reporting as a requirement for granting operating licenses, representing a step forward in terms of local response to a global pollutant, and a source of additional information for the inventories.

2.1.6 Innovative industrial policies

Cleaner production

Cleaner production policies have made steady progress in the region, reflecting the success they have had in more industrialized countries in terms of committing the private sector to environmental protection and compliance with regulations, in an approach that reconciles modernization and competitiveness.

In Bolivia, the environmental regulations adopted in 2002 for the manufacturing industry were the result of an agreement among the various stakeholders. Their thrust is primarily preventive, and provides environmental management incentives through the negotiation of cleaner production agreements. Some 80 companies have committed themselves voluntarily to new practices that will save energy, water and raw materials, and will reduce organic loading. The fact that the time limit for fulfilling the agreements is flexible and that, if necessary, companies can negotiate new time limits on the basis of a compliance plan has encouraged greater numbers of businesses to join the system. In this context, a biennial prize for eco-efficiency was created, as well as a "wastes exchange"¹⁶ and a programme for corporate social responsibility. Progress has also been made in decentralizing environmental management, recognizing that municipal governments and prefectures have a role in enforcing technical guidelines for bringing industrial processes up to established standards.

In Chile, the policy for promoting clean production is seen as the link between environmental policy and economic development policy. Since 2001, clean production agreements have been signed with various companies in industry, mining, construction and agriculture, covering such areas as pulp and paper, aquaculture, foundries, hog producers, sawmills, and chemicals. Agreements of this kind foster compliance with environmental rules, well beyond minimum enforcement levels, and have served to simplify regulations and procedures and to establish support mechanisms for achieving objectives (Ministry of Economy 2001). There is also preventive supervision, which generates economies of scale, and encourages firms to take the funds that they would otherwise have to pay in fines for violations and devote them to problem solving. Evaluations to date have demonstrated favourable results for the initiative (Borregaard, Leal and Sepúlveda, 2002). Among the most recent measures has been a move to involve local and municipal governments in the process.

Central America is also supporting clean production through a regional network of cleaner production firms through which experience and technologies can be exchanged for making efficient use of raw materials and energy, eliminating toxic raw materials, and reducing the volume and toxicity of emissions and wastes. With respect to products, the intent is to reduce the adverse effects during their life cycle, and with respect to services, the environmental aspect is incorporated both in their design and in their delivery.

In El Salvador, for example, there is a clean production agreement to promote competitiveness and environmental protection and attention to personal health (Ministry of Environment and Natural Resources, Ministry of Agriculture and Livestock, Ministry of Economy, and the Salvador Hog Breeders' Association, 2004).

The establishment of clean production centres in many countries has been important for legitimizing initiatives and for training consultants and private firms. However, the process has encountered difficulties in some cases, particularly in the lack of stable financing. In the Global Environment Outlook 2003, the UNEP points to the existence of centres of this kind in the region, noting that in Brazil and Mexico they are a key factor in the pursuit of sustainable industrial and technological development.

¹⁶ These wastes are used as inputs by other industries.

New markets

In recent years, some countries of Latin America and the Caribbean have been developing innovative environmental policies targeted at industry:

- "Green market" programmes to create and develop businesses for bringing environmentally friendly products and services to market, through research, promotion and domestic sales. In Colombia, for example, there are more than 300 firms engaged in marketing green products or services of one kind or another. In some cases government funding facilitates the creation of such firms, through product fairs, trade missions and certification programmes. In other cases, such as the Mesoamerican Biological Corridor, they are the result of international cooperation. With the growing output of organic products in the region, a number of corporations and chambers of commerce have opened offices for promotion and technical assistance. Research groups have been set up in universities and in organizations such as the Alexander von Humboldt Institute in Colombia, the National Commission for the Understanding and Use of Biodiversity (CONABIO) in Mexico, and the national biological diversity commissions (CONADIBIOS) in Central America. Experience to date suggests a great potential for this sector, which combines sustainable practices with economic development. The promotion of sustainable businesses is also having an effect on public education and awareness.
- Environmental manuals for business management, which include rules, treatment systems, good practices and cleaner technologies. Today there are more than 25 such manuals that incorporate environmental variables in different industrial and agricultural sectors, but their spread and acceptance in the business world is not even. This mechanism can facilitate the enforcement of rules, but cannot substitute for them.
- In Argentina and Costa Rica certain industries, such as hydropower generators, are paying for environmental services, thus integrating industrial policy with ecosystem conservation. Costa Rica devotes 3% of its fossil fuel tax and financing programmes of this kind.¹⁷

Business initiatives

Corporate social responsibility (CSR) is an ethical commitment contained in the United Nations Global Compact, to which the major businesses of most Latin American countries have subscribed. Based on voluntary compliance with international or ISO standards and other measures, the compact has been of limited effectiveness in measuring industry's contribution to sustainable development, but it has produced training activities and the exchange of experience.¹⁸ While the presence of multinational enterprises in the region has certainly been positive from the viewpoint of environmental policies and technologies, the track record varies greatly among countries. Transnational groups are however engaged in a number of interesting experiments that are worth noting.

The Grupo Nuevo, for example, with forestry operations in several countries in Latin America and the Caribbean, has sought to strike a balance between economic, social and environmental factors (Correa 2006). The Polpaico Group, majority owned by the Swiss Holcim concern, with cement production interests in Mexico, Central America, Dominican Republic, Colombia, Ecuador, Peru, Chile, Argentina and Brazil, has designed sustainability indicators and an environmental management accounts system (Procile 2006).

¹⁷ Various reports on Central America and Mexico are available online at <http://www.rimisp.cl/boletines/bol16/>.

¹⁸ <http://www.unglobalcompact.org/>.

The International Finance Corporation has set certain environmental and social responsibility requirements for the financing it provides to businesses in the region. As one of the new criteria for evaluating loan proposals (Kyte 2006), applicants must have systems in place for environmental and social management and assessment, pollution prevention and control, community health and safety protection, and the conservation of biodiversity and the sustainable management of natural resources.

In Bolivia, the Corporate Social Responsibility Programme combines environmental, social and labour aspects to ensure that businesses behave ethically and contribute both to economic development and to raising living standards for workers and their families.

Policies for micro, small and medium-sized enterprises

Although the problems facing micro enterprise and SMEs are similar, the dynamics differ from country to country. For this reason, it would be premature to suggest policies and measures applicable to the region as a whole, except as they relate to creating and improving credit mechanisms and the manner in which environmental requirements must be met. There are discrepancies in the scope of environmental impacts in this sector, and despite a readiness to cooperate with the authorities there seems to be no consensus on the best route to follow.

Argentina, Chile, Colombia and Mexico are promoting new policies for sustainability that will help overcome the limitations of the sectoral focus, and there is a real spirit of cooperation among the environmental, economic and industrial authorities. Despite the coordination mechanisms in place and the effectiveness of the measures taken, which have been winning political support, the continuity of government action is still weak (Leal 2006).

The SME-environment relationship could well evolve toward an SME-sustainable development focus (Leal 2006) but this will require:

- (i) Revising regulatory and institutional frameworks to promote SMEs that can respond to the demands of environmental quality and at the same time be reliable suppliers to the potential market for environmental goods and services.
- (ii) Establish cleaner production agreements and update them regularly in light of technological progress and new market conditions.
- (iii) Pursue the integration of economic development, competitiveness and environmental policies to overcome the dichotomy that small businesses now perceive.
- (iv) Create partnerships between large firms and SMEs, and among SMEs themselves, to move forward in environmental matters and to carve out space in emerging markets.
- (v) Make it both a public and a private policy to provide training and information so as to move SMEs forward on the technological, cultural, management and efficiency fronts.

Binational projects

Cooperation is typically based on binational projects and, in some cases, on the lines of action of international agencies. However, differences between government bodies and international institutions impede their coordination. One example of joint action by the public sector, private sector and international organizations is the programme for "Protecting the Industrial and Urban Environment in Argentina", sponsored by the Processing Industries Chamber of Argentina (CIPRA),¹⁹ an association of small and medium-sized enterprises. It has hired national and international experts to help SMEs comply with environmental policy at an affordable cost, through clean technologies, environmental management and cooperation with the public sector. It has also supported the public sector in the areas of legislation, implementation, institutional strengthening, and cooperation with the private sector.²⁰

Other examples of coordinated action can be seen in the following projects:

- "Competitiveness and Environment" in MERCOSUR, to create economic incentives for sustainable development as an alternative to conventional management and control systems.²¹
- "Eco-efficiency in the private sector", sponsored in 2004 by GTZ and Mexico's CANACINTRA (National Chamber of the Processing Industry), which promoted sustainable practices in various productive sectors, including SMEs.

Experience with these projects shows that it is possible to pursue such measures as eco-efficiency, economic instruments and clean production in an industrial policy that will command the support of the private sector.

2.1.7 Air and atmospheric pollution

The situation in Latin America and the Caribbean

The region has suffered rising atmospheric pollution, primarily of urban origin, with adverse effects on health, productivity and the quality of life. In most cases, the lack of reliable information has made it impossible to calculate the costs involved. Moreover, air quality is not assessed at the country level, but rather at the city level, because it is there that the most important problems are to be found, especially when high emission levels coincide with poor natural conditions of dispersal or ventilation.

The key factors of urban pollution have been clearly identified in Latin America and the Caribbean: these relate to urban sprawl, which poses serious problems of land use and longer commuting distances (ECLAC 2006a), population growth, economic growth, and the consequent increase in energy consumption, in addition to erosion and biogenic factors (Molina and Molina 2002).

Generally speaking, policies have been reactive rather than preventive, and in big cities such as Santiago, São Paulo and Mexico City there is a considerable gap between the scope of the problem and the control measures taken. Moreover, these cities, and other mid-sized cities, suffer significant geo-climatic constraints that prevent ventilation. One noteworthy initiative is the Quito Air Improvement Corporation (CORPAIRE) that Ecuador created to control vehicle emissions. As well, lead was eliminated from fuels in 2000, thereby permitting fleet renewal.

¹⁹ Financed by GTZ.

²⁰ <http://www.gtz.org.ar/espanol/cipra.php>

²¹ <http://www.mercosurgtz.org/>.

The emission reduction efforts launched first in Mexico City, then in Santiago and finally in São Paulo constitute a benchmark for air quality management in Latin America and the Caribbean. The sheer magnitude of the problem demanded an integrated approach to emissions reduction, embracing policy measures relating to industry, transportation, urban development, education, health and other areas, and involving a great many stakeholders in their design. These cities were also pioneers in monitoring air quality, a practice that has now been extended to the major metropolitan areas of South America. Yet there is still the challenge of ensuring that the information collected is useful and that the monitoring stations are representative of the degree of public exposure to emissions, and their impact on health.

While the most seriously affected cities show encouraging trends in emissions of the principal atmospheric pollutants and in the concentration of coarse particulate matter, there are still considerable problems with ozone, carbon monoxide, and nitrogen oxides (ECLAC 2006a and Simioni 2006). Countries in the region usually exceed the concentration limits for various pollutants, and stronger management and control of air quality is needed. The situation is alarming in Lima, for example, where available data show annual average PM10 particulate emissions in excess of 140 ug/m³, indicating the need for stepped-up control mechanisms. The major urban centres of Central America and the Caribbean reveal varying concentrations of PM10, and of PM2.5 as well. The ozone problem would seem to be less acute, although available information is limited.

While the reliability, quality and representativeness of monitoring are issues of lesser importance (ECLAC 2006a), they are essential aspects for evaluating the scope of the problem and the effectiveness of mitigation measures. In Central America and the Caribbean, for example, information is gathered only sporadically, primarily with passive diffusion tubes which, nevertheless, can deliver a spatial characterization of the situation at low measurement cost. This method is being used in Costa Rica, El Salvador and Nicaragua, but only in Costa Rica are there plans to conduct permanent monitoring. On the other hand, the cities of Panama, Tegucigalpa and San Pedro Sula (Honduras) have only recently been in a position to undertake some kind of monitoring. Initial results from measurements in other countries reveal PM10 problems, especially in the case of Kingston, Jamaica.

The region faces other significant challenges such as controlling emission sources (for example, through a vehicle inspection system such as that used in Mexico, or inspection of fixed sources), promoting the use of non-motorized transport,²² and regulating the purchase of polluting second-hand cars, especially in Mesoamerica and in the Mexico-United States border region.

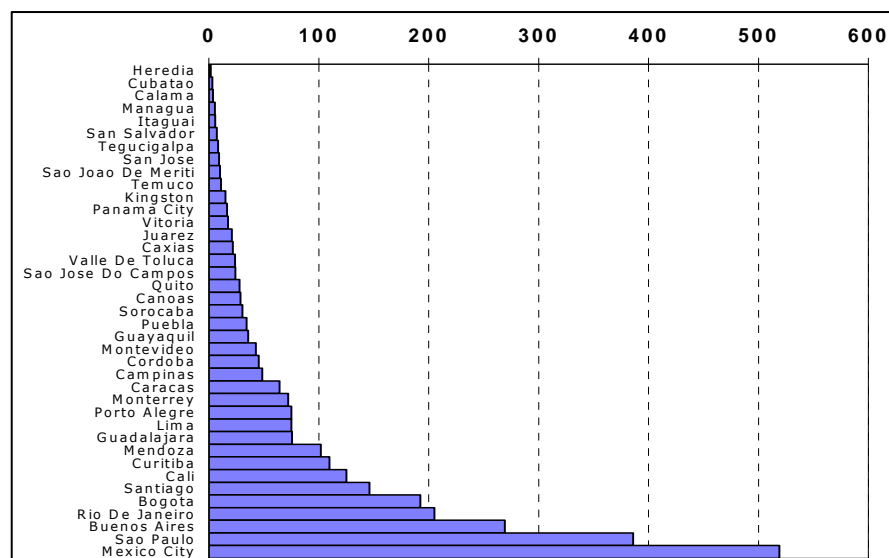
2.1.8 Innovative policies for improving air quality

Information

Important studies based on compiling and assessing data on the health impact of air pollution include the "Evaluation of the Health Effects of Air Pollution in Latin America and the Caribbean", published in 2005 by the Pan American Health Organization, and the IDB's study of "Urban Air Quality and Human Health in Latin America and the Caribbean." The latter study provided an economic calculation of the health benefits from reducing PM 0 concentrations in 39 selected cities, under various emissions control scenarios. The results are shown in figure 6.

²² This has been done in Bogotá, and to a lesser extent in Mexico City in Santiago, for example, or as part of the public transit network, as in Paris and Barcelona.

FIGURE 7
UNIT VALUE OF PM10 CONCENTRATION REDUCTIONS IN SELECTED CITIES
(US\$ 000 per $\mu\text{g}/\text{m}^3$)



Source: ECLAC, “Energía para el desarrollo sostenible, desarrollo industrial, contaminación del aire/atmósfera y cambio climático: resultados, tendencias y desafíos para América Latina y el Caribe”, document presented at the first regional implementation Forum on Sustainable Development, Santiago, Chile, 19- 20 January.

While countries still do not have an integrated air quality management policy, some have begun to compile information on the issue. Yet measurements are sporadic and the result of one-off campaigns. In the case of Bolivia, the campaign was sponsored by municipal governments under the Clean-Air Project²³ created in 2003. The objective of this initiative was to strengthen the capacity of public institutions to monitor NO₂, O₃, MP₁₀, SO₂, NO and CO, and to support awareness campaigns for preventive vehicle maintenance and environmental education.

Market mechanisms

An interesting mechanism now operating in the region is the market for "emission credits" (bonos de descontaminación) based on atmospheric pollutants ceilings and designed by the Metropolitan Region of Santiago, Chile.²⁴ With this instrument, known as the "fixed-source emissions compensation system", particulate emissions are subject to a cap. The system is used to control about 560 industries that produce annual emissions of around 1700 tons. New sources that establish in Santiago or those that decide to expand their activities must offset their emissions, by incorporating mitigation technologies, substituting less polluting technologies, or cutting back their operating hours. In addition, the Atmospheric Prevention and Clean-up Plan introduced the requirement to offset PM-10 emissions and those of four other gases (nitrogen oxide, sulphur dioxide, carbon monoxide, and volatile organic compounds) for any new activity established in Santiago, a requirement that is enforced through the environmental impact assessment. Thanks to this mechanism, there have been around 200 PM-10 permit trades, and 30 new activities in

²³ Project financed by the Swiss Foundation for Technical Cooperation (Swisscontact) funded from private Swiss sources.

²⁴ Cáceres 2006.

metropolitan Santiago have been subjected to control.²⁵ The decree revising and updating the plan declared that private savings from the mechanism over the period 2005-2015 would amount to US\$180 million (net present value).²⁶ However, because of a mismatch between emissions compensation and the legal provisions, the number of transactions, at 230, is low in comparison with the 5,000 or more existing industrial sources.²⁷ The measures will have to be enforced more strictly in order to meet air quality standards by 2012.

Another system that has combined a market perspective with a regulatory framework was introduced in Mexico to change consumer preferences in the purchase of vehicles. The Government of the Federal District, with the support of the National Ecology Institute, designed a programme to extend the validity period of the technical certification of cleaner and more efficient automobiles. As of January 2007, new cars with a fuel performance (kilometres per litre) below the minimum threshold, and with emissions exceeding the cap, will be subject to technical inspections every two years. If the fuel performance is better and the omissions lower, the frequency of compulsory inspections is reduced considerably.²⁸ To supplement this measure, the Government published on the Internet a list of emissions and fuel performances for cars sold on the Mexican market. The programme was designed for user information and convenience, and its objective was to encourage people to buy cleaner and more economical cars.

Although some countries are accustomed to ranking health measures on the basis of their economic effects, this is not a widespread practice in Latin America and the Caribbean, with a few exceptions.²⁹ Because of the lack of information, environmental initiatives are sometimes evaluated from the viewpoint of their cost effectiveness instead of their social cost-benefit relationship. Analysis of this kind enables the economic authorities to participate in deciding and implementing the measures (ECLAC 2006a). Research is now beginning on the positive externalities related to infrastructure and the location of public works such as the Metro (Galilea, Reyes and Sanhueza 2006), and could in future lay the foundation for economic instruments.

Adjusting clean-up plans

There are five identifiable components in the evolution of environmental clean-up and air pollution control plans: monitoring; setting standards for air quality or pollutant concentration levels acceptable from a health viewpoint; "sectoral" measures for controlling pollution; capping maximum permissible particulate concentrations (with emergency measures when these are exceeded); and adjustments to caps in order to bring them gradually into line with health standards.

On this last aspect, Mexico's Ministry of Environment and Natural Resources (SEMARNAT) and the Metropolitan Environment Commission (CAM) introduced stricter pollution controls in 2006, by reducing the ozone emergency trigger level from 240 to 200 points on the Metropolitan Air Quality Index (IMECA) scale; the pre-emergency level was moved from 200 to 170 points.³⁰ This decision followed a study showing a 4% increase in the number of cars with non-DF license plates that were not subject to

²⁵ Together with this system, which was later supplemented with progressive improvements in the sulphur content of oil, gas from Argentina was introduced in metropolitan Santiago in 1997.

²⁶ See Supreme Decree 58/2004.

²⁷ The law approving the bonos de descontaminación is still before Parliament.

²⁸ Cars with a fuel performance of 9 km per litre are subject to annual technical inspection; from 9 to 13 km per litre, biennial inspection; from 13 to 20 km per litre, inspection every four years; and beyond 20 km per litre, inspection every six years. The measure had no effect on prices, but it was resisted by carmakers and dealers, even though it expanded the range of consumer options significantly, and entailed obvious environmental and economic benefits.

²⁹ In formulating and updating its prevention and clean-up plans, Chile conducted a general economic and social impact analysis to calculate the social benefits of each measure (ECLAC/OECD 2005).

³⁰ Press Release 137/06, Mexico City, 18 August 2006.

environmental regulation and were thus producing higher emissions. The measures taken in Mexico include improvements in fuel quality, with the introduction of low sulphur-content (50 ppm) diesel and gasoline, which has encouraged the use of new vehicles with better environmental performance and modernization of the public transit network with a system of exclusive bus lanes.

Another example in this respect is El Salvador, where the Ministry of Environment and Natural Resources is applying a national air quality policy that calls for a clean-up programme in critical areas and an air quality regulatory framework (Ministry of Environment and Natural Resources, El Salvador, 2003).

Urban transportation

The surface rapid transit systems developed in cities such as Curitiba,³¹ Bogotá,³² Quito, Guayaquil, Mexico City,³³ São Paulo and Santiago, Chile,³⁴ promise to be more sustainable and to mitigate the massive use of private cars. A number of studies of these systems have been conducted, from which emerge some interesting details with respect to sustainability. Among the most important features are the following:

- Renewal of the bus fleet, with stricter emissions standards.
- Creation of service provider firms.
- Pre-payment of fares in the stations.
- Drivers are paid per trip.
- Centralized bus dispatch to match supply and demand.
- Exclusive public transit lanes.
- Articulation of surface transit with other systems such as subway.

While these systems have not been free of obstacles and problems, they are developing their potential and are achieving significant benefits in terms of reducing emissions, noise and traffic congestion.

2.1.9 Climate change

The situation in Latin America and the Caribbean

While the Latin America and Caribbean region's contribution to global emissions of greenhouse gases remains relatively insignificant, the region needs to strengthen its capacity to deal with the effects of climate change. The phenomenon is a source of concern for our countries because of the potential impact of events associated with global warming, such as more frequent extreme atmospheric disturbances, changes in agricultural productivity, rising sea levels, water shortages in the cities, and others that can affect the quality

³¹ <http://www.curitiba.pr.gov.br>.

³² <http://www.transmilenio.gov.co/>.

³³ The Metrobus system, launched in 2005, has the following characteristics: operation on a single avenue, creation of companies with a single roster of drivers, exclusive lanes, stations with prepaid fare machines, and articulated buses; drivers are paid per trip. However, it has not been possible to integrate either trips or fares with the Metro. Although it lacks some of the features of the Transmilenio, such as a long-term network growth plan, centralized bus dispatching, traffic light controls, parking for cars and bicycles to facilitate intermodal travel, 100% of obsolete vehicles have been withdrawn and there is a full ban on taking the same avenue to other roads. The reduction in ambient noise has been significant, as has the increase in travel speed, both for the buses and to a lesser extent for private cars. In Chile, the Transantiago has encountered great problems because it lacks many of the features described above, such as prepaid fares, exclusive lanes, a fleet of sufficient size, and centralized bus dispatch; it is still at the breaking-in stage.

³⁴ <http://www.transantiago.cl/>.

of life. For the countries of Latin America, adaptation is as important as is mitigation in the developed countries.

In Central America and the Caribbean, including Mexico, the most compelling issue is vulnerability to climatic developments such as the increased frequency of hurricanes and flooding, which are among the most serious threats to human life.³⁵ Some countries in the region have stressed the need for developed countries to fulfil their international commitments to cooperate in mitigation and adaptation efforts (Soto 2006a and Soler 2006).

The economic fallout from natural disasters, some of which are caused by extreme atmospheric events that scientific evidence is linking ever more closely to climate change, could amount to several percentage points of GDP in some countries. This is demonstrated in ECLAC's evaluation of the economic cost of natural disasters over the last 10 years (Meli 2005).

Most countries of Latin America and the Caribbean have shown an interest in joining the Clean Development Mechanism (ECLAC 2006a), and thereby helping to ensure that developed countries fulfil their commitments in Annex B, while at the same time mobilizing resources for cost-effective emission reduction approaches. If the CDM works as it should, this will allow for more active participation by developed countries as well. Within the region, the CDM is underutilized.

A worrying trend in Latin America and the Caribbean is the growing share of the transport sector in energy consumption and in total particulate emissions. Over the medium term, indeed, transport demand is expected to grow steadily, as incomes rise.

Innovative policies relating to climate change

From the institutional viewpoint recent years have seen a number of government responses to climate change. These include the creation of national inventories, the designation of national authorities responsible for the issue, the diversification and decentralization of the players involved in order to include governments and local organizations, negotiations for the exchange of information, and outreach and awareness activities in the private sector. Some countries have prepared national communication strategies for the Framework Convention on Climate Change, and in a few cases they have required industries to submit reports on greenhouse gas emissions when applying for environmental operating licenses.

Bolivia's departments of natural resources and environment, for example, have created "inter-prefecture liaison offices" on climate change which, together with NGOs, are promoting adaptation measures and pilot projects in communities of the Altiplano and in the eastern valleys. These efforts have revealed the need for prior work in the communities in order to secure their informed participation. Under the Five-Year National Programme on Climate Change, a fund has been established to finance projects prepared by universities, indigenous organizations, municipal governments and prefectures. It covers 70% of the cost of such activities, and the counterpart 30% can be contributed in the form of labour. Indigenous communities have been the beneficiaries of certification of the first million tons of CO₂ reduction in one of Bolivia's national parks. The same policy has been applied to sanitary landfills for capturing methane. Mexico and Argentina have also created funds to promote mitigation projects,³⁶ and secondary markets for emissions trading have been established in Brazil and Panama.

Some countries have shown renewed interest in the conservation of forests as carbon sinks, and they recently presented proposals to the CDM Executive Board during the 26th session

³⁵ <http://www.eclac.org/mexico/>.

³⁶ The Mexican fund dates from 2006, and the Argentine fund issued its first call for proposals in March 2007.

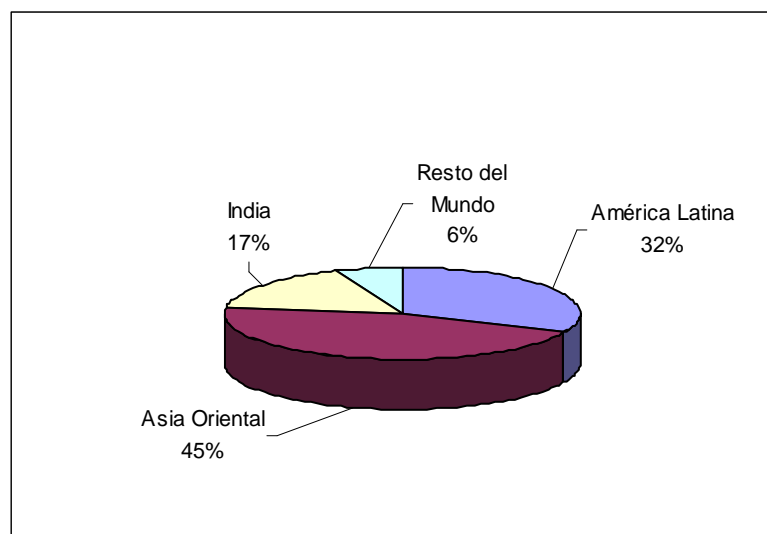
of the subsidiary bodies of the Framework Convention on Climate Change. These countries stress the importance of conservation for mitigating global climate change, and see it as an opportunity for creating synergy among the various worldwide environmental agreements. Two broad approaches are in play here. In the first, conservation is viewed as an additional global service, priced at the opportunity cost that forest conservation represents in the carbon cycle. In this sense, conservation and foregone deforestation would translate into credits that can be traded on the carbon market, as with the CDM projects. Under the second approach, countries would undertake on their own to conserve carbon sinks and mitigate their emissions through a quantitative commitment relative to their baseline, as an unrequited contribution to combating climate change, i.e. positive externalities. In this way, they could claim tradable credits only for any conservation efforts and foregone deforestation that exceed their international commitment.

Other countries, however, maintain that it would be technically unfeasible and politically impossible to include projects for conserving forests as carbon sinks in the CDM, for this would require amendments to the Marrakesh Accords of 1997 that established the legal rules of the mechanism. In their opinion, since mature tropical forests are in a state of carbon equilibrium, projects of this kind could endanger the environmental integrity of the CDM because they would not serve to absorb any significant volume of carbon from the atmosphere.

CDM projects

Colombia has presented approximately 7 emission reduction projects to the CDM Executive Board, and another 15 to 20 are now being prepared. The most important ones relate to hydroelectric and wind power. The new projects include some forestry initiatives that were denied approval because of methodological issues.

FIGURE 8
REGIONAL SHARES IN CERTIFIED EMISSIONS REDUCTIONS FROM CDM PROJECTS
(Percentages of total)



Source: ECLAC, based on the Clean Development Mechanism (CDM), 2006.

Although Central America currently accounts for around 8% of the global CDM project market, it has great potential for forestry and reforestation programmes that, according to calculations, could absorb around 243 million tons of carbon over the next

decade. The surface area available for mitigation projects exceeds 2.5 million ha (Soto 2006a and b). In El Salvador, for example, studies for joining the CDM market are being conducted by the Ministry of Environment and Natural Resources (MARN), with funding from the Japan International Cooperation Agency (JICA) and technical assistance from the José Simeon Cañas Central American University.(UCA). The idea is to favour electricity projects in particular (Sanchez and Ayala 2006).

The Chilean company Agrosuper has become the first agro-industrial firm to market Certified Emissions Reductions (CER), selling 225,000 tons of CO₂ annually to Tokyo Electric Power (TEPCO) and 175,000 tons to TransAlta of Canada. Agrosuper negotiated the sale of its certificates under the CDM guidelines of the Kyoto Protocol, and its experience may be useful to other agricultural firms.³⁷

There are more than 40 CDM projects in Peru, 10 of which have been officially approved by the National Environment Council (CONAM). In one of these projects, Cementos Lima was able to sell CERs amounting to \$27 million over 21 years, by substituting gas for a portion of the coal used in its operations. In the case of the Poechas hydroelectric station, the value of the transaction was \$1 million. Other Peruvian companies planning to join the system are Paramonga and the Huanza, Tarucani and Santa Rosa hydro stations.

The Ministry of Environment of Ecuador is promoting several initiatives, including a project to design and implement climate change adaptation programmes in the Andes and another plan for adaptation through efficient water management. The country is also preparing a national strategy on this topic.

As reported at the experts' workshop, Panama has merged 9 or 10 economic units into a single project for energy efficiency and cleaner production, for presentation to the Executive Board as a "bundled project." Honduras, working with the Massachusetts Institute of Technology, has placed CERs worth 10 to 15 euros a ton on the basis of a solar drying project for coffee.

TABLE 3
PROJECTS PRESENTED TO THE CDM EXECUTIVE BOARD, MARCH 2006

	Estimated annual volume of certified emissions reductions (CERs)		Number of projects	
	Annual CO ₂ reduction (in tons)	Annual CO ₂ reduction (percentages)	Country or region	Percent of total
Latin America & Caribbean	37 571 886	32.0	231	39.2
Brazil	19 441 976	16.6	114	19.4
Mexico	9 565 742	8.2	28	4.8
Chile	2 584 332	2.2	18	3.1
Argentina	2 250 760	1.9	8	1.4
Peru	820 067	0.7	6	1.0
El Salvador	434 595	0.4	4	0.7
Nicaragua	426 839	0.4	3	0.5
Ecuador	424 971	0.4	9	1.5

(continues)

³⁷ <http://www.agrosuper.cl/>

(concluded)				
Guatemala	424 361	0.4	6	1.0
Honduras	306 376	0.3	15	2.5
Colombia	290 370	0.2	6	1.0
Bolivia	260 191	0.2	4	0.7
Costa Rica	173 009	0.1	3	0.5
Panama	98 405	0.1	4	0.7
Jamaica	52 540	0.0	1	0.2
Dominican Republic	11 588	0.0	1	0.2
Uruguay	5 764	0.0	1	0.2
Total LAC	52 732 701	45.0	89	15.1
China	38 086 047	32.5	30	5.1
Republic of Korea	11 136 805	9.5	8	1.4
Thailand	1 228 865	1.0	12	2.0
Viet Nam	829 619	0.7	4	0.7
Indonesia	792 178	0.7	5	0.8
Malaysia	335 801	0.3	9	1.5
Philippines	283 406	0.2	20	3.4
Cambodia	39 981	0.0	1	0.2
Total LAC + East Asia	90 304 587	77.1	320	54.3
India	19 823 227	16.9	234	39.7
Rest of world	6 998 401	6.0	35	5.9
Total	117 126 215	100.0	589	100.0

Source: ECLAC, based on the Clean Development Mechanism (CDM), 2006

3. Opportunities for regional cooperation

3.1 Energy³⁸

With the widespread adoption of legislation to promote biofuels, their production is rising and they are being used increasingly in blends with diesel and gasoline. Regional cooperation to facilitate the exchange of information could speed these processes, and costs could be reduced if countries were to standardize technical specifications for biofuels and their tax treatment. Compatible legal rules would also facilitate intraregional trade in these products. Brazil's leadership in this field represents an important asset for Latin America and the Caribbean.

On the topic of energy efficiency, some countries suggested that regional cooperation could strengthen governments' capacity to overcome technical obstacles in evaluating the most efficient technologies. Energy efficiency guides could also be useful in sectors of major interest for the region, especially the Caribbean, such as construction, hotels and ground transport.

One possible area for regional cooperation on energy efficiency would be to negotiate common energy consumption specifications for household appliances, something that has helped to reduce demand substantially in some countries. There is great potential in Latin America for educating consumers and fostering informed demand on the basis of labels that describe the energy characteristics of products on the market. At the same time, the impact of labelling on consumer prices could be identified. From this viewpoint, Mexican experience could be very useful for the region.

There is also an opportunity to replicate initiatives for using biogas to generate power at the local and municipal levels. To date, projects of this kind have relied primarily on technical assistance from multilateral banks, which have promoted their development, and on the subsequent sale of CERs. Regional cooperation among cities, under the auspices of their respective countries, would facilitate the adoption of this technology and could even produce climate benefit credits in the context of bundled projects under the CDM.

³⁸ This portion of the study was prepared by ECLAC on the basis of comments received during the expert workshop held in Mexico in September 2006. The opportunities mentioned relate to fields in which the countries of Latin America and the Caribbean can share experience, have been through similar processes, or have common needs, and where joint action would improve the likelihood that governments will adopt desirable policies. The objective was to propose opportunities from a regional perspective.

The vulnerability of fossil fuel-importing countries creates opportunities to strengthen trade integration and to create infrastructure jointly with countries that have surpluses. In this respect, Bolivia, Ecuador, Mexico, Trinidad and Tobago and Venezuela have a key role to play for the region.

3.2 Industry

One of the industrial cooperation opportunities identified is the introduction of market mechanisms to improve environmental performance. Examples are content rules and labelling, recycling, and energy efficiency, which will help reduce energy waste and atmospheric pollution.

The process has already been applied in some countries, and can be readily replicated. Its development at the regional level would serve to reconcile environmental demands with those of competitiveness, on export and import markets alike. In this way, consumers could demonstrate their preference for cleaner or more efficient products. Despite concerns about the impact such requirements might have on consumer prices, there could be benefits such as the use of cheaper inputs and reduced energy consumption.

One aspect of this process could involve the progressive replacement of household appliances, with suitable mechanisms for absorbing or distributing costs over time; there are already some successful examples of this approach within the region.

Another measure, related to some extent with the previous one, is to hire local certification services, working not to ISO standards but to those of CDM projects. It was also considered desirable to cooperate in the preparation of industry-specific best-practice manuals or guidelines for cleaner production.

Some countries mentioned the consequences of free trade treaties for industry and other sectors, and the possibility of collaborating in trade negotiations and in preparing models for dealing with their eventual effects, both economic and environmental.³⁹

The poultry industry in the region is facing a great risk from the spread of epidemics such as avian flu. Technical cooperation for prevention, including the provision of vaccines, sanitary management of outbreaks, and the preparation of coordinated response plans are areas of possible regional cooperation of particular interest for the Caribbean.

In the transportation area, a coordinated regional focus is required to combat cross-border pollution, both atmospheric and marine, caused by hazardous wastes, spills and pests.

3.3 Air quality

With respect to air pollution, especially in urban areas, special efforts are needed to produce a solid and convincing quantification of the negative externalities on health⁴⁰ and the environment,⁴¹ in order to establish more constructive dialogue with the economic, and in

³⁹ Expert workshop, Mexico, 2006. This aspect was mentioned in particular by Central American and Caribbean countries.

⁴⁰ This issue was emphasized during the meeting, as well as the impact on poverty.

⁴¹ The positive territorial externalities identified in cities of the region include the following (Camagni, Capello and Nijkamp 1998): economies of scale in energy use, street lighting, transportation and domestic efficiency; environmental values: demand for goods or location factors for activities; accessibility of services: housing, diversified labour markets, educational institutions, cultural centres, qualified health services; social interaction facilities: concentration of historical, cultural and environmental externalities, and accessibility of public environmental goods. Among the negative externalities are the scarcity of natural resources and biomass, declining

particular the financial, sector (Delacámara and Azqueta 2007). In Mexico, for example, the externalities provoked by the emission of three atmospheric pollutants in the electricity sector have been studied and published. The social valuation approach could also be used for more transparent ex-ante comparisons of urban transport investment projects, their efficiency and their repercussions in terms of atmospheric pollution. Spatial management as an instrument for improving air quality by reducing travel demand, and the welfare gains relating to infrastructure location (positive externalities) are issues for which there is virtually no integrated policy.⁴²

The informed participation of civil society is essential to sound pollution control policies. There is great potential for regional cooperation, for example, on mechanisms such as the Pollutant Release and Transfer Register (PRTR), which few countries in the region are now using.

Air quality control and clean-up plans are health-related initiatives that have been pursued with the collaboration of different levels of government. However, they are not widely enforced on a voluntary basis. There is a need to rethink the way different levels of government work together to protect a national asset – the atmosphere—so as to enhance the transparency of city management and its accountability to the national authorities. This measure is most visible in federally organized countries. Regional consideration of the issue, on the basis of adequate information, could support the adoption of national air quality policies (ECLAC 2007). Policies of this kind can be supplemented with various mechanisms for social participation within an appropriate institutional framework.

Some countries see regional cooperation among gasoline refineries as a way to speed the replacement of methyl-tertiary-butyl-ether (MTBE), a neurotoxic oxygenate, by ethanol, as well as the elimination of lead from gasoline.⁴³

Several countries in the region declared their concerns over the import of used vehicles, because of their impact on atmospheric pollution, and suggested that it would be easier to establish common standards through a regional agreement among importers than on a country-by-country basis.⁴⁴

Finally, countries should share and reproduce their experience with air quality control plans. The atmospheric clean-up plans already in place have highlighted the importance of criteria such as comprehensiveness (participation by all stakeholders, combination of policies), progressivity (prioritizing measures in light of their cost-effectiveness, and the timeframe and manner of applying them), and flexibility (combination of rules, economic instruments and voluntary agreements). With respect to road space, there has been little exploration of ways to strengthen municipal planning institutions in order to reduce travel demand.

returns to private transport, congestion, air pollution and noise pollution, aquifer pollution, urban sprawl driven by high centre-city rents, social conflict in the labour market, new forms of poverty, domestic disputes and neighbourhood violence, destruction of historical heritage and monuments, loss of cultural heritage, social conflicts over access to natural resources, social segregation, and the collapse of law and order.

⁴² ECLAC

⁴³ UNEP proposal discussed at the Mexico workshop in September 2006.

⁴⁴ Proposal mentioned at the Mexico workshop in September 2006.

3.4 Climate change

As a roadmap for regional cooperation, it would be useful to have an inventory of initiatives in different countries, covering all actions taken to bolster capacities for natural disaster prevention and response, and studies to provide input to current discussions over the development and operation of the climatic regime.⁴⁵ Of great importance to the region is the debate over the kinds of projects that qualify for the CDM, as well as the dissemination of up-to-date information on this aspect.⁴⁶

Caribbean countries, which are perhaps those most vulnerable to climate change, stated their interest in post-disaster assistance, including integral evaluation and other issues such as the effectiveness of insurance. Andean countries declared their interest in a subregional environmental strategy that would link climatic to social scenarios, and would include ex-ante economic evaluation of vulnerability as well as of prevention and adaptation.

Other countries pointed to the advantages of integrated programmes for fostering synergy between energy efficiency and clean production and the climate change agenda, for example, and between that agenda and other international treaties in this area.

Collaboration between countries and international agencies could include studies of bundled or sectoral projects for the CDM, in order to reduce costs along the learning curve.⁴⁷ When it comes to individual projects, there is already a market for private consulting services. However, the different sectors of economic activity and territorial units such as large cities can take advantage of international cooperation to develop suitable approaches.⁴⁸ CDM projects make it possible to exploit economies of scale and to create public-private partnerships and synergies between local urban clean-up programmes and the international climate change agenda.

One interesting development is the dialogue between the private financial and commercial banking sector and the multilateral banks for adapting financing facilities to the specific requirements of climate change mitigation projects.⁴⁹ To date, CDM projects have been financed by purchasers from Annex B countries, brokered by some multilateral bank. Although these are projects with specific financial obligations and risk profiles, the commercial banks are not familiar with them and have not participated actively to facilitate certification of the region's emission reductions. If private-sector interest in and demand for CDM projects is maintained, and if appropriate forums are created for dialogue, then the private banks should be able to play a more active role in financing those projects. For their part, the multilateral banks have sought to direct their investments into less GHG-intensive activities.

The countries of Latin America and the Caribbean could also benefit from an accredited organization with lower operating costs and greater familiarity with the region's specific features. In terms of financing, there would be an advantage in a coordinated approach to negotiating more international funding for building capacities to

⁴⁵ The Canadian government has paid for Spanish translations of methodologies approved by the Executive Board, to facilitate their study and use.

⁴⁶ Proposal put forward by ECLAC and discussed at the Mexico workshop in 2006. A number of meetings have been organized within the region, including the one hosted by Ecuador in 2006 and those convened by the Ibero-American Network of Climate Change Authorities, which meets periodically to exchange national experience.

⁴⁷ Mexico and ECLAC are currently examining this approach, which was discussed at the 2006 Mexico workshop.

⁴⁸ A number of activities with emission mitigation potential, such as transportation, electricity consumption and sanitary landfills, are concentrated in the cities.

⁴⁹ This relates to the workshops organized by Mexico in 2006, jointly with ECLAC, the government of Spain and other public and private financial institutions, to discuss adaptation of financing criteria to the characteristics of CDM projects, and the financing of mitigation investments.

address the adverse impacts of climate change, more transfer of technologies, and eligibility for mitigation via carbon markets.

Other countries declared their interest in investigating possible programmes of swapping debt for energy projects in relation to mitigating global warming, and granting incentives to national and foreign investors who invest in projects of this kind.

4. Cross-cutting issues

One of the major challenges to achieving greater sustainability, and in particular environmental sustainability, is to integrate policies more thoroughly, especially economic and environmental policies. Progress in the economic field does not require the abandonment of social or environmental objectives. Sustainability without resort to trade-offs is the ultimate objective of the relationship between the economy and the environment. This means that there must be forward movement in economic policies such as those relating to taxation, public-private cooperation, energy, international trade, the exchange rate and free-trade treaties in order to make globalization and the open economic model sustainable.

4.1 Policy integration

One of the mechanisms debated in many countries is to apply a system of strategic environmental assessment to policies, plans and programmes in order to gain a broader and more coherent appreciation of their potential effects. The mechanism is fundamentally distinct from, but complementary to, the environmental impact assessment used for projects of smaller scale.

What is needed here is greater resolve on the part of the public authorities to recognize the importance of the environmental issue and sustainable development when considering matters relating to energy and industrial development, which are normally subject to sectoral policies and are thus approached in piecemeal fashion.⁵⁰

Similarly, some countries have experimented with institutional coordination mechanisms for sustainability, and their experiments could be replicated in other countries in a manner complementary to the advisory councils. In any case, environmental institutions and inter-agency coordination within those mechanisms need to be strengthened.

Tax policy has not been particularly sensitive or appropriate to environmental objectives. In the case of fuel taxes, for example, while they are designed for a countercyclical effect at times of rising oil prices, they fail to incorporate objectives such as controlling pollution through differentiated tax rates on "dirty" and "cleaner" fuels, to promote the latter. Nor is there much in

⁵⁰ For example, adjusting energy prices to reflect social costs.

the way of dialogue between the environmental and taxation authorities, or between the environmental and the trade authorities, in order to bring greater mutual coherence to their policies.

In the trade policy area, there are now fewer mechanisms available for steering investment into activities with lower environmental impacts and, as noted above, much of the region has been specializing in environmentally sensitive industries.

Because the region is currently experiencing a period of recovery, it is appropriate that consideration be given to reducing environmental liabilities and capturing the economic rents from natural resources in order to offset social, environmental and economic gaps.

The intent to integrate policies can be strengthened through instruments such as cost-benefit analysis, cost effectiveness analysis, and certain policy models or specific mechanisms. This would allow governments to respond in a more coordinated manner and to reconcile environmental with economic concerns. Political will must be based on a communication strategy, on strategic partnerships, and on social legitimacy. Mechanisms designed to favour integrated policies can give rise to more active, informed and participatory societies.

4.2 Regional cooperation

Some of the challenges identified in the region could be addressed collectively through horizontal cooperation among countries of Latin America and the Caribbean, especially when it comes to environmental measures or standards, and this would at the same time serve to safeguard the competitiveness of countries and their businesses in trade and in the environment.

International coordination makes it easier to create competitive platforms that will prevent environmental dumping and help overcome the divide between competitiveness and environment when it comes to taking specific decisions

While there has been a worldwide increase in requirements for funding such as that offered by the Global Environment Facility, some countries in Latin America and the Caribbean have seen a decline in such cooperation. This underscores the need to improve coordination between governments and international agencies in terms of defining tasks—public goods such as training, institution building, economic analysis, information and the dissemination of best practices—in order to optimize available resources.

Capacity building remains an important consideration, for many countries lack the professional and technical resources to fulfil their international commitments. A collective effort to expand the number of trained professionals in the region would speed enforcement of the conventions. To strengthen public demand for sustainable development policies and to make their goals politically more relevant, participation by population groups that receive economic, social or environmental benefits from such policies should be encouraged.

5. Replicable experiments in Latin America and the Caribbean

5.1 Energy

(1) Colombia: Electricity Market Reform

Enercol 2005, Carlos Caballero Argaez, “A manera de memoria: Una reforma a mitad de camino.”

A middle-of-the-road approach or “controlled” privatization was implemented which resulted in a 50/50 mix of public and private sector entities in generation and distribution and brought the best of both sectors to the integrated system.

Government, electric utilities, electricity regulatory bodies, consumer groups, private power producers

(2) Argentina – Biofuel Law

<http://www.sagpya.mecon.gov.ar/new/0-0/agricultura/otros/biodiesel/trabajos.php>

The Argentine Senate approved a bill that will grant tax incentives to the producers of biofuels while guaranteeing them a share of the market for 15 years. The new legislation grants tax exemptions to farmers who use vegetable oil to produce biodiesel, sugar cane or corn to produce ethanol, or organic waste to produce biogas.

(3) Barbados – Promotion of solar water heating systems

<http://www.sidsnet.org/successtories/11.html>

The promotion of solar water heating systems in Barbados resulted from concessions granted by the Ministry of Finance, which enabled manufacturers to import materials duty-free, and provide consumers with partial or full tax deductions for the cost of the heaters. The solar water heating industry saves Barbados about US\$ 6.5 million per year in imported fuel.

(4) International Partnership for the Hydrogen Economy (IPHE)

<http://www.iphe.net/>

The International Partnership for the Hydrogen Economy was established in 2003 as an international institution to accelerate the transition to a hydrogen economy. By creating the IPHE, the Partners have committed to accelerate the development of hydrogen and fuel cell technologies to improve their energy security, environmental security and economic security.

(Members of Partnership) Australia, Brazil, Canada, China, European Commission, France, Germany, Iceland, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Russian Federation, United Kingdom, United States

(5) Central America– Clean Energy Financing in Central America

<http://webapps01.un.org/dsd/caseStudy/public/displayDetailsAction.do?sessionId=DFC7D386EBE4D1C44A5A62356C3857E9?code=15>

<http://www.un.org/esa/sustdev/csd/csd14/lc/presentation/singer.pdf>

Creating confidence within local banks is essential to financing clean energy projects. If successful then financing can readily be scaled-up and the fund design adapted for other developing markets and small- to medium-scale infrastructure projects.

E+CO, Inter-American Development Bank, USAID, Central Bank for Economic Integration, BIO, FinnFund and the Triodos Renewable Energy for Development Fund.

(6) Generation IV International Forum

<http://gif.inel.gov/>

Ten countries are working together to lay the groundwork for the fourth-generation nuclear reactor. The next generation of nuclear energy systems –generation IV– must be licensed, constructed and operated in a manner that will provide a competitively priced supply of energy. They must consider an optimum use of natural resources, while addressing nuclear safety, waste and proliferation resistance and public perception concerns of the countries in which those systems are deployed.

(Members of Forum) Argentina, Brazil, Canada, Euratom, France, Japan, Republic of Korea, South Africa, Switzerland, United Kingdom, United States.

(7) Carbon Sequestration Leadership Forum

<http://www.cslforum.org/>

The Carbon Sequestration Leadership Forum is an international climate change initiative that is focused on development of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage. The purpose of the CSLF is to make these technologies broadly available internationally; and to identify and address wider issues relating to carbon capture and storage. This could include promoting the appropriate technical, political, and regulatory environments for the development of such technology.

(Members of Forum) Australia, Brazil, Canada, China, Colombia, Denmark, European Commission, France, Germany, Greece, India, Italy, Japan, Republic of Korea, Mexico, Netherlands, Norway, Russian Federation, Saudi Arabia, South Africa, United Kingdom, United States.

(8) Mexico–Innovative Financing for Energy Efficiency

http://www.conae.gob.mx/work/sites/CONAE/resources/LocalContent/2962/1/images/17_esmapnadbank.pdf

It is useful to have development banks take the first step with a clear strategy of moving to commercial lending of EE projects after proof of concept.

US–DOE, World Bank ESMAP, North American Development Bank, SENER, CONAE, Mexican NGOs.

(9) Efficient Lighting Initiative in Poland, Argentina, Czech Republic, Hungary, Latvia, Peru, Philippines, South Africa, Vietnam

<http://www.ifc.org/ifcext/enviro.nsf/Content/EfficientLighting>

Applying a range of measures (public education, standards, financial incentives, linking with utility DSM programmes, credit, etc) is the most effective way to transform a market to higher efficiency.

Gov Latin America and the Caribbean References in the CSD 14 / 15 Matrix (up to 11 April, 2007)ernments, IFC, partnerships, manufacturers, electric utilities, retailers, lighting professionals, and designers.

(10) Barriers to Technology Diffusion: The Case of Compact Fluorescent Lamps (CFLs)

http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1826

The study provides five case studies of programmes designed to enhance CFL penetration in Brazil, California, China, South Africa and the UK. Among the key lessons learned is that successful programmes addressed multiple barriers relating to cost/technology, structure of the lighting sector, and consumer behavioural/information.

IEA, country programmes analyzed.

5.2 Industrial Development

(11) Mexico: Starting a Business

http://www.doingbusiness.org/documents/DB_Mexico_English.pdf

Countries differ significantly in the way they regulate entry of new businesses. In some, the process is straightforward and affordable. In others, the procedures are so cumbersome and costly that there are strong incentives for corruption and business informality.

Government ministries of trade and industry, industrialists and researchers, and partnerships for technology transfer.

(12) Chile – Cleaner Production in the Textile Industry

<http://www.bsdglobal.com/studiesbycountry.asp?cid=4>

The resulting environmental benefits included water, energy and chemical conservation, and reduced emissions and effluent–borne solids. Most of the measures adopted had payback periods of two years or less.

Textile companies.

(13) Brazil – SESI

<http://www.sesi.org.br> (Portuguese)

The SESI programme, established 60 years ago, aims to enhance the quality of life for workers and their families through education, healthcare and recreation, while also encouraging socially responsible management by industrial enterprises. SESI helps industries incorporate sustainable development in their management practices through deploying Corporate Social Responsibility (CSR).

Government, industrial enterprises, workers.

5.3 Air Pollution / Atmosphere

(14) Mexico City– Heavy–Duty Diesel Retrofit (Partnership for Clean Fuels and Vehicles)

<http://www.unep.org/pcfv/Regact/LAC/LAC.htm>

<http://webapps01.un.org/dsd/partnerships/public/partnerships/178.html>

Setting up a senior–level, multi–stakeholder planning process through an advisory board and technical committee helped advance project development and operation.

Government of Mexico City, USAID, USEPA, local transport authorities, WRI/Embarq, industry, NGOs and academia

(15) Brazil – Ethanol from sugar cane

www.eclac.cl/dmaah/noticias/paginas/5/23775/poppe.pdf

The use of biofuels, such as ethanol, can significantly increase employment opportunities in rural areas and agribusiness. The use of ethanol in Brazil has resulted in complete elimination of lead additives in gasoline and reduced greenhouse gases emissions.

Government, agricultural community, major groups, industry.

(16) Bangladesh and Peru– Integrated Programme Models for Cleaner Cooking in Bangladesh and Peru

<http://webapps01.un.org/dsd/caseStudy/public/displayDetailsAction.do;jsessionid=DFC7D386EBE4D1C44A5A62356C3857E9?code=16>

http://www.usaid.gov/our_work/economic_growth_and_trade/energy/publications/projects/cleaner_cooking.pdf

By utilizing more efficient stove and ventilation technologies, switching fuels and changing cooking practices, poor women can significantly reduce indoor air pollution and its consequent health impacts.

USAID, Winrock International, local NGOs and financial institutions.

5.4 Climate Change

(17) Caribbean Community Climate Change Centre (CCCCC)

<http://www.caricom.org/jsp/community/ccccc.jsp?menu=community>

6. Replicable experiments in Latin America and the Caribbean: Mexico

TABLE 4

REPLICABLE EXPERIMENTS IN LATIN AMERICA AND THE CARIBBEAN: MEXICO					
Best practice	Location	Participants	Resources allocated	Information sources	Dissemination and expansion plans
Air and atmospheric pollution					
Pollution control measures					
Incentives programme for the use of more environmentally-friendly automotive technologies.	Zona Metropolitana del Valle de México (ZMVM).	Comisión Ambiental Metropolitana (Instituto Nacional de Ecología/ Secretaría de Medio Ambiente y Recursos Naturales (INE/ SEMARNAT), Government of the Federal District and Government of the State of Mexico). Asociación Mexicana de la Industria Automotriz. Asociación Mexicana de Distribuidores de Automotores.	Each participating institution is fielding two staff members Communication materials funded by the Hewlett Foundation.	http://www.ine.gob.mx http://www.sma.df.gob.mx	Outreach campaign using posters and brochures targeted at vehicle dealers in ZMVM.
Aire pollution in enclosed spaces					
Use of efficient stoves for cooking and heating in rural homes: included an assessment of exposure to indoor contaminants	Rural areas of Michoacán	Grupo Interdisciplinario de Tecnología Rural Apropiada (GIRA, A.C.). University of California–Irvine. Universidad Nacional Autónoma de México (UNAM). Instituto Nacional de Salud Pública (INSP). Instituto Nacional de Ecología.	Funds provided by the Shell Foundation	http://www.gira.org.mx http://www.ine.gob.mx/dgicurg/calair/index.html	GIRA plans to reproduce the experiment in other states (see Internet portal).

(continued)

TABLE 4

REPLICABLE EXPERIMENTS IN LATIN AMERICA AND THE CARIBBEAN: MEXICO					
Best practice	Location	Participants	Resources allocated	Information sources	Dissemination and expansion plans
High-capacity bus system with dedicated lanes to replace small and mid-sized buses. Included an evaluation of passenger benefits.	México, D.F.	Government of the Distrito Federal. Centro de Transporte Sustentable. Instituto Nacional de Ecología.		http://www.metrobus.df.gob.mx http://www.ctsmexico.org/ http://www.ine.gob.mx/dgicurg/cal aire/aire_intra muros.html	Querétaro already has a basic design for a high-capacity transit system using exclusive lanes.
Improvement of monitoring and management capacities					
National Atmospheric Monitoring Programme (PNMA), designed to: strengthen environmental monitoring through an agreed framework of appropriate procedures and practices, dissemination and information mechanisms to promote awareness among decision-makers and the general public, techniques for nationwide evaluation of monitoring networks, manual for management and analysis of atmospheric monitoring data,	Nationwide	Municipal and state governments and the Instituto Nacional de Ecología.	Funding from the Instituto Nacional de Ecología and the cooperation project with the Japan International Cooperation Agency (JICA).	Programa Nacional de Monitoreo Atmosférico (PNMA) http://www.ine.gob.mx/cenica/pnma.html Sistema Nacional de Información de la Calidad del Aire (SINAICA) http://sinaica.ine.gob.mx/	The National Air Quality Information System (SINAICA) publishes air quality data. Training and information workshops are planned for this year with support from the Training and Education Centre for Sustainable Development (CECADESU), as well as workshops on good practices and air quality data monitoring and

(continued)

TABLE 4

REPLICABLE EXPERIMENTS IN LATIN AMERICA AND THE CARIBBEAN: MEXICO					
Best practice	Location	Participants	Resources allocated	Information sources	Dissemination and expansion plans
upgrading the Calibrations and Standards Laboratory as the national reference point, and design of the second phase of the Atmospheric Monitoring Programme 2007 – 2010.					management. Stepped-up air quality monitoring is planned wherever required; a new Mexican Official Standard will regulate monitoring practices and make monitoring mandatory in cities with more than 500,000 inhabitants

TABLE 4 (CONCLUSION)

REPLICABLE EXPERIMENTS IN LATIN AMERICA AND THE CARIBBEAN: MEXICO					
Best practice	Location	Participants	Resources allocated	Information sources	Dissemination and expansion plans
<p>National Programme for Monitoring, Evaluation and Management of Toxic and Persistent Substances in Mexico (PRONAME).^a</p> <p>Objective: to compile data as input to policies to identify, evaluate and reduce risks to health and ecosystems from substances of this kind, which because of their toxicity and persistent accumulation in the biosphere are of national concern. PRONAME will also fulfil international commitments under the Stockholm Convention and the North American Commission for Environmental Cooperation (CEC).</p>	Nationwide	<p>Secretaría de Salud/Comisión Federal para la Protección contra Riesgos Sanitarios (SS/COFEPRIS), Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA), Instituto Nacional de Salud Pública (INSP), Comisión Nacional del Agua (CNA), LTER sites, research centres, universities, state governments and INE/SEMARNAT.</p>	INE/SEMARNAT has seed money from CEC to prepare a proposal, and is seeking international financing.	In the design stage.	There are plans for three persistent toxic substance monitoring sites, based on the principle environmental matrices, and six satellite sites for data evaluation.

Source: prepared by the authors

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