

**SMEs in the environmental goods
and services market:
identifying areas of opportunity,
policies and instruments**
Case studies:
Argentina, Chile, Colombia and Mexico



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Executive Summary

Studies of Argentina, Colombia, Chile and Mexico conducted collaboratively by ECLAC and GTZ point to environmental impacts associated with small and medium enterprises (SMEs), particularly in the manufacturing sector. This impact is essentially local, though it can become significant at the aggregate level, i.e., SMEs are responsible for some of the environmental problems caused by industry as a whole. Though SMEs account for only a small fraction of such problems –at the national level, the effect is often marginal in terms of environmental degradation– the impact may be significant and fairly visible on a local scale.

The studies summarized in this book identified the principal sectors in which SMEs exert such an impact. In all four countries, the sectors in which SMEs have the greatest environmental impact are in areas such as food and beverages, textiles, metal–mechanics (including galvanoplastic), brick manufacture and chemicals. In general, these activities are concentrated in the regions, provinces or municipalities where development or urban expansion is most advanced.

All of the countries have some degree of regulation designed to mitigate and control the environmental impact of these activities, along with legal frameworks and functioning institutions to deal with such issues. Though there are significant differences in approach, and in the scope of enforcement, all countries have a body of regulations, control and prevention mechanisms, as well as laws, monitoring systems, sanctions, and incentives to encourage better environmental behaviour among productive sectors. The studies show that in all four countries this is the main force driving environmental improvements in productive sectors.

A range of problems, however, acts to reduce the efficacy of the regulations. First, the actual scope of enforcement is extremely variable, and all countries recognize that the vigour with which enforcement is carried out is highly dependent on national circumstances, particularly political ones. Second, the question has often been raised as to whether regulations truly lead to environmental progress (i.e., in specific sectors, not as a general proposition). All of the countries have primarily emphasized command and control instruments, which may in part explain these problems. Third, almost none of the regulations for control and monitoring of industrial emissions, effluents and waste differentiate between large firms, SMEs and microenterprises. In most cases, the ranges or parameters used to regulate environmental degradation are based on the “major polluters,” i.e., large firms. Thus, groups of SMEs and microenterprises are subject to uncertain, often excessive requirements. Except for isolated exceptions, current regulations for

productive sectors do not take account of SMEs and microenterprises, thus clearly compromising their effectiveness.

Under the current –though, as noted earlier, ambiguous– regulatory scheme, certain rules require all firms (large, small, medium and micro) to adopt measures that call for the use of environmental goods (particularly equipment and accessories to control and reduce emissions, effluents and solid waste) and services (especially consulting services to deal with clean technologies and management systems), as defined by the OECD. Studies have shown that the environmental goods and services (EGSs) available in these countries are inadequate to meet the firms' needs (whether from regulation or market demands). As a result, the EGSs are imported. With the exception of Argentina, which has the capacity to produce a significant portion of the EGSs that industry requires to fully comply with environmental laws, the countries' capacity to provide EGSs, though not entirely absent, is limited.

Country assessments coincide in indicating that sustainable development in the SME sector depends largely on the ability of environmental regulation to drive change in a positive direction, while also promoting modernization of the productive apparatus. However, the weakness of environmental regulation is not the only factor accounting for the sector's failure to keep abreast of environmental requirements. The SME sector is in a state of crisis in all countries, principally as a result of financial factors, involving high debt levels and limited access to credit. This situation constrains investment in equipment and technology, thus reducing competitiveness and ultimately translating into lack of competitiveness in the marketplace.

Nearly all of the major defects attributed to Latin American industry appear in the SME sector: traditionalism, risk aversion, scant awareness of environmental problems, an individualistic culture that hinders the formation of partnerships, scepticism regarding State action, a tendency toward short-term perspectives, and lack of courage in facing new challenges, especially in globalised markets. Against this background, access to emerging EGS markets will require novel public policy approaches and new efforts by entrepreneurs themselves.

Another factor vital to the development of SMEs flows from this situation, and has been cited in the national studies as an explanation for the need to improve environmental behaviour in the SME sector and promote the expansion of the EGS sector. This factor is the international market dynamic, which already affects certain products and is continuing to intensify. However, there has been minimal impact on the countries studied, at least insofar as it is reflected in the limited information brought together here. Markets with environmental needs have been too limited to have a decisive impact on the sector's behaviour. Only certain firms, offering goods and services of particularly high environmental quality –or environmental goods and services, as such– have been able to enter markets with a concentrated demand for these goods and services. Thus, there is no general phenomenon, within the SME sector, of environmentally sustainable productive transformation driven from outside.

New international trade arrangements, such as the free trade agreements that are in vogue in the region, contain explicit environmental clauses. These clauses relate to characteristics of specific products, though they most often involve enforcement of domestic regulations, and are concerned with whether the regulations have significant impact, both from a governmental point of view and from a community perspective.

In this global context, there is an actual and potential (though scattered and unfocused) demand for EGSs. Meanwhile, though EGSs are certainly present in some areas, the supply is generally limited and uncertain. This situation can only be effectively addressed through a combination of public policy measures and private sector commitments. The four country studies have indicated the following specific areas where action is needed:

- There is consensus regarding the need for a **review of existing regulatory and institutional structures**, in order to create an SME sector capable of responding to

demands for environmental quality, and of offering a reliable supply of environmental goods and services. Current structures, which fail to differentiate between large businesses, SMEs and microenterprises, have proven inadequate.

- It has become indispensable to seek **new institutional arrangements** adapted to the countries' needs, in order to highlight the issues. This may include legal arrangements.
- Given this situation, there needs to be an institutional structure within which promising **instruments can be implemented**, e.g., certification, public–private agreements and economic incentives.
- The cleaner–production policy adopted in a number of countries, except for Argentina, where such a policy is just now being implemented, is **one of the fundamental schemes** for creating a sustainable SME sector with access to environmental goods and services. This policy, however, must be reviewed.
- It is urgent to **integrate policies** –at least in the areas of productive development, productivity and competitiveness– with environmental policy, in order to avoid contradictions that create problems for firms.
- Since SME problems contain numerous financial components, the development of **economic instruments and new means of obtaining financing** are important tools. It is important to have a variety of such tools, as public policy attempts to address the problems of SMEs.
- A **mix of instruments** is needed, including direct regulation, economic measures and voluntary instruments. No single method can be relied upon, and the proper mix will depend on the realities in each country.
- **Partnerships** between large businesses and SMEs, as well as among SMEs, appear to be one way of moving forward on the difficult path to sustainability and to gaining footholds in emerging markets.
- Public and private policy for the SME sector must focus on **training and information**, if progress is to be made on technological and cultural fronts and in terms of management and efficiency.

In short, the studies point to a need to approach the issues not from an exclusively environmental, social or economic point of view, but comprehensively. This emerges from their assessment components, their analysis of the demand for environmental goods and services and what is currently available, and their conclusions regarding policy proposals and instruments to drive supply and demand in the SME sector. The situation is complex, and the market must be allowed to play its role, while specific regulations are used to shape the process so that it contributes to sustainability at the national and local levels. SMEs will have significant opportunities here if good systems of partnership with large businesses are in place to promote good environmental behaviour. Public policy is essential, given the role that SMEs play in creating jobs, and government must act to help them to modernize and become more competitive. This complex situation offers interesting opportunities for achieving sustainable development in this productive sector, which will doubtless become an engine of development in the region's countries over the long term.

Introduction

This book is based on work carried out by a group of consultants in the framework of the ECLAC–GTZ project entitled, “Identifying areas of opportunity in the environmental sector in Latin America and the Caribbean” (GER/01/038). As case studies, the project used Argentina, Colombia, Chile and Mexico.

The objective of this publication is primarily demonstrative –an effort to disseminate thinking on these issues within the region’s countries. Thus, it attempts to present the issues in the clearest way possible, avoiding subjective opinions, using little technical language, and often relying on examples.

The book represents a broad set of experiences in the countries studied. Summarizing the work of the consultants, it describes as concisely and usefully as possible the nature of national initiatives and the types of obstacles that prevent firms –especially SMEs– from taking advantage of opportunities. An attempt has been made to emphasize replicable situations, since progress in this area depends on joint efforts involving the countries and the productive sectors, with the private sector playing the leading role.

The focus of this cooperative effort was to help identify ways to overcome policy gaps or weaknesses. The first phase involved studies on the environmental needs of SMEs in four Latin American and Caribbean countries –Argentina, Colombia, Chile and Mexico. The purpose here was to pinpoint the principal environmental problems facing SMEs in selected sectors in which they have a significant presence. Environmental infrastructure needs were also examined in municipalities where SMEs represent a particularly significant level of economic activity.

In short, the point of the first phase was to identify the principal environmental problems facing SMEs, the most sensitive sectors, and the municipalities most affected, in order to establish an empirical basis on which to assess SMEs’ potential for gaining access to environmental goods and services markets.

In terms of the ultimate project objectives, the goal of this first phase was to increase the region’s limited knowledge of SMEs and of the EGS opportunities that may emerge in this sector, while reinforcing the notion that environmental performance must accompany economic performance. This is important because traditional proposals to improve environmental performance often meet with little interest on the part of SMEs. The idea was also to facilitate the development of more effective public policy by increasing awareness of environmental issues,

thus paving the way for more quantification of such issues, and helping to define their relationship to SMEs.

The second phase of the project was designed to analyse the potential role of SMEs as providers of environmental services, infrastructure and technology to meet demands at the national level, either through joint ventures with providers in developed countries or through other types of arrangements. Here, a number of successful experiences will be examined in detail, in order to see how they can be replicated and what incentives can be created to reproduce them.

The second phase of the project was based on an assessment of SMEs' environmental needs, and sought to define potential offerings in the countries, to meet SMEs' current or future needs.

The project's final phase focused on generating policy recommendations to promote the development of EGSs in the countries and thus create new branches of the economy to more successfully deal with environmental needs and problems within our countries. Regulatory changes and exploitation of fiscal and financial opportunities will increasingly drive the growth of the sector and lead to a new area of activity for SMEs.

In the third phase of the project, the challenge was to develop public policy recommendations based on the assessments and on the capacity of the countries to provide the relevant EGSs. The goal is not only to promote demand, but also supply, generating new areas of economic activity. This sector can be knowledge-intensive, provide value added, and create jobs. Hence, it is a sector with the potential to play a role in transforming the productive structure of Latin American countries, which is the ultimate goal. To move in this direction, however, requires public policy and information concerning the potential that environmental goods and services represent for SMEs.

Multiple benefits are involved here: creation of a new economic sector, helping SMEs to become active in more dynamic sectors of the economy, and solving countries' environmental problems. Thus, exerting pressure is not necessarily the route to achieving progress. Multilateral trade negotiations are already creating pressure to globalise countries' EGS sectors, so that the more competitive firms will enter the global arena and take advantage of the existing potentials of this market.

Adopting better environmental practices, under the influence of appropriate policies and incentives, is not only profitable for SMEs, but for the overall economy, while at the same it contributes to strengthening the relation between environmental and economic performance.

The book's first chapter, the introduction, focuses primarily on the international context in which the discussion of these specific areas of opportunity is unfolding, most notably in the EGS market. This is a special, and expanding, market that can be specifically addressed. Thus, an analysis of economic opportunities in the environmental area is presented here. The approach adopted differs from the traditional one, which focuses on protecting the environment and remedying environmental degradation. The attempt here is to clarify the concept and scope of what may be called the environmental goods and services industry. Among the subjects examined is the WTO and the deregulation strategies contemplated for the EGS market, with special attention to the need for an adequate supply of EGSs to meet environmental needs in international markets.

The first chapter concludes by addressing the question, "Why focus on SMEs, given their environmental and economic vulnerability, and the consequent difficulty they face in meeting the major challenges of modernization and efficiency?" Indeed, this question succinctly summarizes the context that motivated the ECLAC-GTZ project documented in this book.

The second chapter explores SMEs' needs for environmental goods and services. It examines their principal environmental problems and the gaps in technology, services and infrastructure that they face in Argentina, Colombia, Chile and Mexico, focusing on sectors

featuring certain characteristics identified in the country assessments. There is also an examination of the need for environmental infrastructure in municipalities where SMEs play an important economic role. An attempt is made to distinguish between phenomena associated with productive processes and the challenges of environmental management.

The third chapter deals with specific practical issues, suggesting ways of helping SMEs take advantage of opportunities in the EGS market. The specific questions addressed here include whether there is a significant supply of EGSs in the countries, and whether there are opportunities for SMEs to serve as providers. This chapter also analyses information regarding the potential for SMEs in Argentina, Colombia, Chile and Mexico to enter the international EGS market, providing a comparative analysis. The project's database includes information on 1,000 firms.

Chapter four outlines successful experiences, such as partnerships between firms, with the potential for promoting environmental sustainability. Especially relevant here are partnerships between large firms and SMEs, capable of facilitating SMEs' access to emerging EGS markets. Complementing the preceding chapter, this chapter deals with the countries' experience with initiatives to create partnerships between firms in the region and entities in developed countries. Also presented are selected cases from the four countries, relating to the production and marketing of EGSs. The database information is analysed, along with information from national studies and studies of partnership practices.

Chapter five presents proposals for action. It summarizes the country assessments and examines the construction of EGS databases for the countries. It first presents a conceptual framework for improving policy, strategy and instruments for the development of the EGS market and for the creation of opportunities for SMEs. It goes on to analyse the specific cases of Argentina, Colombia, Chile and Mexico, so as to arrive at concrete proposals based on work currently being carried out on these issues, as well as considering what can be achieved in the future. Finally, it provides a comparative analysis of the four countries, in order to help decisionmakers in other countries draw lessons from these cases and find suitable approaches to the issues in their own countries.

Chapter six is also in the nature of a summary, and is devoted to identifying and describing critical factors in the success or failure of related actions undertaken in all of the countries, as well as the difficulties involved in working with SMEs. Two types of such factors are identified and described here: macro factors relating to public policy and public affairs overall, and micro factors relating more closely to the actual work process of the productive unit, firm or company. These critical factors represent areas where action is needed, in the form of either global strategies or environmental management within firms.

Chapter seven summarizes conclusions and recommendations made by various individuals who participated in this ECLAC–GTZ project, all of whom are involved in development and have concerns and ideas regarding SMEs and EGS markets.

Most of the original documents providing material for this book are publications of the *Medio ambiente y desarrollo* series, with the following titles:

- No. 61: Necesidades de bienes y servicios ambientales en las micro y pequeñas empresas: el caso mexicano (LC/L.1791–P), by Lilia Domínguez, May 2003.
- No. 63: Necesidades de bienes y servicios para el mejoramiento ambiental de las PYME en Chile: identificación de factores críticos y diagnóstico del sector (LC/L.1851–P), by José Leal, March 2003.
- No. 66: Necesidades de bienes y servicios ambientales de las PYME en Colombia: identificación y diagnóstico (LC/L.1940–P), by Bart van Hoof, August 2003.
- No. 68: Oferta de bienes y servicios ambientales de la PYME en Chile. Base de datos y evaluación de potencialidades (LC/L.1967–P), by José Leal, September 2003.

- No. 70: Necesidades de bienes y servicios ambientales de las PYME en Colombia: oferta y oportunidades de desarrollo (LC/L.1971–P), by Bart van Hoof, September 2003.
- No. 74: Análisis comparativo de las necesidades ambientales de las PYME en Chile, Colombia y México (LC/L.2016–P), by Úrsula Araya, November 2003.
- No. 77: Demanda y oferta de bienes y servicios ambientales por parte de la PYME: el caso argentino (LC/L.2034–P), by Martina Chidiak, December 2003.
- No. 79: Oferta de bienes y servicios ambientales para satisfacer las necesidades de micro y pequeñas empresas: el caso mexicano (LC/L.2065–P), by David Romo, January 2004.
- No. 82: Microcrédito y gestión de servicios ambientales urbanos: casos de gestión de residuos sólidos en Argentina (LC/L.2084–P), by Martina Chidiak and Néstor Bercovich, March 2004.
- No. 89: La oferta de bienes y servicios ambientales en Argentina, El papel de las PYME (LC/L.2191–P), by Andrés López, October 2004.
- No. 93: Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos Exitosos de Colaboración Internacional e Industrias Proveedoras de Bienes y Servicios Ambientales más Idóneas para Formular Alianzas, by Ana María Ruz and Hernán Mladinic, February 2005.
- No. 94: Necesidades de bienes y servicios ambientales de las PYMES en Colombia: Políticas e Instrumentos para mejorar la gestión ambiental en la PYME y promover su oferta en materia de bienes y servicios ambientales, by Bart van Hoof, February 2005.
- No. 95: Políticas e instrumentos para mejorar la gestión ambiental en la PYME y promover la oferta de bienes y servicios ambientales: el caso mexicano, by David Romo, February 2005.
- No. 96: Políticas para mejorar la gestión ambiental en las PYME argentinas y promover su oferta de bienes y servicios ambientales, by Néstor Bercovich and Andrés López, February 2005.
- No. 98: Crédito y microcrédito a la PYME mexicana con fines ambientales: situación y perspectivas, by David Romo, April 2005.
- No. 105: Ecoeficiencia: Marco de análisis, indicadores y experiencias, by José Leal, October 2005.
- No. 119: Bienes y servicios ambientales en México: caracterización preliminar y sinergias entre protección ambiental, desarrollo del mercado y estrategia comercial, by Carlos Muñoz Villarreal.
- No. 112: Políticas e instrumentos para mejorar la gestión ambiental de la PYME en Chile y promover su oferta de bienes y servicios ambientales, by Marcelo Sepúlveda.
- No. 113: Revisión crítica de la experiencia chilena en material de crédito y microcrédito aplicado a iniciativas de la microempresa y PYME para lograr mejoras en la gestión ambiental, by Enrique Román.

Lastly, thanks go out to the project consultants for their substantive contributions and their analyses of the complex issues summarized in this book. The book itself is the responsibility of the project coordinators, Marianne Schaper and José Leal. Thanks are also due to the government employees, academic experts, business leaders and entrepreneurs who participated in the project's workshops and concluding seminar.

1. Introduction: Orientation of the environmental goods and services market

1.1 Economic opportunities in the environmental area

As the title of the project suggests (“Identifying areas of opportunity in the environmental sector in Latin America and the Caribbean”), this is a collaborative effort that was undertaken by GTZ and ECLAC between 2001 and 2004. It attempts to focus on economic opportunities related to environmental issues, unlike the usual or traditional approach, which is to focus on the constraints and additional costs associated with environmental concerns.

In the end, it will primarily be opportunities and economic interests that impel governments to act, and that will drive (or fail to drive) markets and firms to respond to environmental issues. Naturally, public awareness and health problems associated with environmental degradation also play a role. There is no intent to suggest here that environmental problems per se have become less important, but rather that new ways of viewing them have developed; thus, they now appear in the form of opportunities rather than as obstacles to development.

The region has undeniably moved beyond the stage in which environmental issues were simply considered a burden on businesses (especially producers), a brake on development, an impediment to private initiative, or an irritating issue championed by people viewed as near-subversive. Today, especially in the wake of the private sector’s active participation in the Rio de Janeiro and Johannesburg summits (1992 and 2002), the environment is a much less adversarial issue, and the concept and practice of sustainability have acquired a new meaning, paving the way for the change of attitude cited above.

Let us begin with the general ideas that shaped the work of ECLAC and GTZ presented in this book. The essential aim was to identify economic opportunities related to the environment. Two threads run through the work. One traces the web of opportunities emerging around the environmental goods and services industry (environmental services, technologies, equipment and infrastructure). The other points to the need for public policy and private-sector commitments to create opportunities for Latin American SMEs to become part of this dynamic sector.

The first thread, then, follows the growth of the EGS industry worldwide. This market represents approximately US\$300 billion annually, according to the OECD. That is more than the pharmaceutical industry, though less than the information technology industry. EGS is, therefore, a major sector, both economically and environmentally. From the perspective of international trade, as well, it occupies an important role. Large transnational enterprises, as well as European

SMEs, are pressing for the promotion of EGS markets, which have grown enormously at the global level, with some estimates now placing it at US\$450 billion, with growth expected to reach US\$600 billion over the next three to four years.¹

Studies show that despite the fact that the environmental market in Latin American countries has played only a marginal role in national economies (both in absolute terms and as a percentage of GDP), environmental businesses are projected to play an increasing economic role. This is because the environmental market in Latin America is clearly beginning to respond to a new dynamic. Indeed, a recent NAFTA study estimated that the region's environmental market could grow by more than 12% annually in the near future. In Mexico, according to the study, it could increase from 0.6% to 1.8% of GDP by 2010.²

The market is also a highly dynamic one. In Latin America, it has grown strongly—by 12% to 14% per annum in some countries. Thus, it is a sector that could prove to be important for development. Why, one might ask, has it grown so rapidly? One factor is the regulatory frameworks and new requirements in international markets; another is the ever-increasing public awareness and concern regarding the environment. Economic interests in developing countries are also driving the EGS market, pushing firms and governments to promote it. Ultimately, the market will depend on the fate of environmental regulation in the rest of the world. If regulation and standards become more stringent, there will be more demand for EGSs, and the sector will have greater growth potential.

All of the region's countries share, to some degree, problems such as emissions-based pollution, untreated wastewater, lack of equipment to treat and eliminate dangerous residues, and solid waste disposal, all of which are increasingly evident in the context of sustainable industrial development. To the extent that firms experience pressure to reduce the pollution they cause, there will be a growing need for environmental goods and services. Since the issues are shared ones, exchanging experiences is essential.

Despite the need for EGSs, however, there are major gaps in the region's supply. The region's countries experience many different environmental problems, and have very different ecosystems. Ultimately, however, the failure to treat wastewater, the use of obsolescent technologies, the problem of air emissions and pollution, and degradation of natural resources are issues facing all of the countries, and are increasingly palpable. Despite the diversity of ecosystems in the region, some countries do share ecosystems or have similar ecosystems, adding impetus to the rationale for developing cooperative approaches to the problems.

Finally, if there is a potential market, there should be business opportunities. Why focus on SMEs? The answer is that SMEs constitute an extremely important social and economic factor in Latin America. As is shown below, they are crucial as providers of jobs, and in their contribution to GDP.

¹ Most of the information presented in this text is from the *Medio ambiente y desarrollo* series referred to in the Introduction. The titles are repeated in the bibliography, and the reader is advised to consult the series.

² For more detail, see Muñoz Villarreal, n/d.

1.2 Opportunities in the environmental goods and services industry

One issue constant throughout this project is the potential role of Latin American SMEs in the EGS market—both regionally and nationally, on both the supply and the demand side.

Documents, as well as the workshops held in connection with the project, make it clear that in the four countries studied (as well as elsewhere) SMEs represent a vitally important economic and social phenomenon. Their contribution to job creation and production are substantial and increasing, despite the fact that the sector is in the midst of a crisis due to changes in the rules of the game, the fact that the State has become more limited, and the frequent indifference of government. The result has often been a reduction of SMEs' productive capacity, accompanied, in many cases, by major financial difficulties and even bankruptcy.

Nevertheless, SMEs can be expected to present a growing demand for EGSs. Like larger firms, they must comply with regulations and respond to market demands. The potential demand for EGSs on the part of SMEs is still somewhat hidden. It is fed by the fact that greater access to global value chains could be helpful to SMEs. These value chains are organized, and their power coalesced, around different links in the chain of production, within the large transnational chains to which SMEs may be able to gain access. However, their environmental behaviour and performance, as well as competitiveness, must meet certain standards.

It is in this framework that SMEs have the potential to create opportunities for themselves in the EGS market. To do so, however, they must significantly reshape their productive patterns, particularly in the context of a globalisation process aimed at liberalization. This is precisely the issue examined in the work summarized here.

1.3 The WTO and trade liberalization strategies for environmental goods and services³

Despite various proposed definitions of environmental goods and services (EGSs) and the market they represent, there is not yet a commonly accepted definition or single criterion for classifying them. Efforts to define an environmental sector in the economy have evolved. Initially, the sector was seen as comprising only public infrastructure for pollution control and remediation. However, it has come to include generic technologies utilized for environmental ends, as well as for other purposes. A broader definition also includes those goods and services whose production is ecologically efficient, i.e., products and technologies that involve less consumption of natural resources and/or reduce environmental impacts and risks from the start.

The Organization for Economic Cooperation and Development (OECD) and the Statistical Office of the European Commission (Eurostat) have proposed a fairly broad definition, including “activities that produce goods and services designed to measure, prevent, limit, minimize or correct environmental damage to water, air, soil, as well as problems related to waste, noise and ecosystems.” This includes “cleaner technologies and technologies and products which reduce environmental risk and minimize pollution and resource use.” The universe of goods and services thus delimited would include equipment and components, end products for consumption, services, and construction and operation of facilities.

³ The following is a summary of what is presented in Muñoz Villarreal, n/d.

A number of proposed classification schemes have emerged from international organizations. In the one proposed years ago by the Asia–Pacific Economic Cooperation mechanism (APEC), the environmental sector was defined narrowly as composed of remedial public infrastructure. The United Nations Central Product Classification (CPC), which has been used for many years to classify economic activity for a wide range of purposes, employs a somewhat broader definition of environmental goods and services. More recently, the OECD and Eurostat, as well as APEC, have proposed new, more–complex classification systems. Meanwhile, in the context of the World Trade Organization (WTO), countries such as New Zealand, Japan and Colombia have advocated a number of criteria to define environmental goods and/or services for the purpose of trade negotiations.

In addition to the merely formal question of how to classify these activities, defining and categorizing them is of practical importance, not only because it can facilitate the exchange of information across borders, but because it promotes better medium– and long–term decisionmaking by countries.

Clear definitions and a suitable classification scheme are important in at least three ways. First, they can lead to better environmental policy, since defining relevant activities makes it possible to clearly identify the market segments that must be stimulated in order to reduce both environmental imbalances and pressure on public resources resulting from environmental problems. Second, definition is important from the perspective of individual countries' industrial organization, since it affects strategies designed to complement existing local capacities by making use of international flows of goods and services. Finally, from the trade policy perspective, the fact that countries sign multilateral agreements operating with the force of law domestically, makes it important for them to use the clearest and best criteria possible in negotiating agreements, since the goods and services affected by the agreements will be a function of those criteria.

The WTO member countries have made a commitment (in the Doha Ministerial Declaration of 2001) to move toward the elimination of tariffs and nontariff barriers for EGSs. The negotiations have used the CPC classification. However, the path that lies ahead is far from easy. The definition of the universe whose elements are being negotiated is still in question, especially in the area of environmental services. Meanwhile, negotiations are already underway, making the issue of defining environmental services even more complex.

Trade in environmental goods takes place in the context of the GATT (General Agreement on Tariffs and Trade). There is no special chapter relating to trade negotiations, but the classification of the Harmonized Code is used. This allows countries to establish which goods are subject to liberalization and which are not.

In the case of environmental services, the principal classification instrument used, to date, comes from the General Agreement on Trade in Services (GATS) through the W/120 list, which in turn derives from the CPC. Here, the relevant services are defined essentially as those associated with infrastructure for the treatment or improvement of public services such as water and waste. In addition to the limitation involved here, there is a mutual exclusion clause to prevent a service already classified in a given category from being included in any other chapter. This may have secondary effects in different areas—for example, in the design of horizontal environmental strategies, or strategies to promote “horizontal” services, such as construction and consulting.

Though the CPC and W/120 classification schemes were important advances toward consistent definition of the environmental sector, changing markets have highlighted the limitations of the structure they provided. Today, market dynamics, changing scientific and technological knowledge, changes in institutions and new approaches to environmental policy make the OECD–Eurostat classification the most appropriate way to classify the market, though

the classification has limitations in regard to certain groups of goods and services that are important to some of the region's countries, e.g., Mexico's sustainably produced raw materials, and the environmental services provided by nature itself in that country.

The OECD–Eurostat classification categorizes the EGSs in three large groups, as shown in table 1.1:

TABLE 1.1
CLASSIFICATION OF EGSS

<p>Group A. Pollution control Group A is essentially composed of the set of harmonized categories corresponding to those goods and services used primarily as “end-of-pipe” instruments to defensively address environmental imbalances.</p> <p>Group B. Cleaner technologies and products Group B is composed of a still small set of categories corresponding to goods for end consumption and technologies (in the form of capital and intermediate goods, as well as services) that are considered to have less environmental impact than their equivalents in the marketplace. Unlike group A, this group includes generic technologies for which no international agreement on a rule for inclusion has been reached.</p> <p>Group C. Natural resource management Group C is composed of the service activities and products that involve the rational use of natural resources. This group includes a broad range of goods and services, e.g., management of water and sanitation services, installation and operation of electrical generation and distribution facilities based on renewable energy sources, and goods and services for sustainable primary activities and tourism. There is also a category for environmental goods and services that do not belong in any other category.</p>

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

This, then, is the framework in which national contexts and databases on EGS offerings are analysed throughout this book. A further question that must be asked is, “Why, ultimately, is it of interest to develop EGS markets?”

1.4 The need for an adequate supply of environmental goods and services in a context of increasing environmental requirements in international markets

EGSs represent an important pillar of environmental policy. Though it is true that measures for the protection of the environment and the sustainable use of natural resources require much more than technology and physical infrastructure, especially in countries of great socioeconomic complexity and diversity such as those studied here, such measures have unquestionably contributed to the assessment and monitoring of ecosystems and of pollution damage; the prevention of, and response to, natural disasters; the planning, implementation and verification of environmental protection measures; the reduction of environmental impact and risks; and more efficient use of natural resources.

It is precisely these last two factors (reduction of environmental impact and risks, and more efficient use of natural resources) that make EGSs economically significant as a direct contribution to maintaining natural capital. As an economic activity, EGSs are directly or indirectly responsible for creating a significant number of jobs and a wide range of satisfiers. While their aggregate contribution to the economy is relatively modest, it is steadily growing.

The use of goods and services classifiable as “environmental” has been increasing over the years. Initially, EGSs were those goods and services connected with the development of basic infrastructure—essentially urban infrastructure—as they began to be provided and used on a large

scale. They included primarily facilities, equipment, consumable inputs, drinking water and sanitation services, water displacement, as well as solid waste collection and disposal.

A second group of EGSs has seen extensive growth in the last three to four decades, as a result of concerns about the growing environmental degradation, and as a response to the development of environmental policies and regulations focused, in many countries, on emissions limits, pollution control and, where possible, the clean-up of contaminated sites. These changes led to the universe of what are called second-generation environmental goods and services, which constitute the major part of the market at present.

More recently, there has been a burgeoning of EGSs designed to facilitate the sustainable use of natural resources. This is the result of a shift several years ago in the environmental policies of certain countries (principally industrialized countries), many of which are also major suppliers of EGSs. The increase in EGSs is also the result of a general economic trend toward greater linkages between economic efficiency, medium-term positioning in the market, environmental performance and social responsibility. EGSs whose growth has occurred as a result of these factors include technological solutions to find replacements for industrial inputs with high environmental impact, goods that minimize energy consumption, and biodegradable substances. In addition to the environmental benefits involved, such goods tend to have positive effects on firms' long-term productivity and competitiveness.

In 2000, the volume of operations in the global environmental market was estimated at US\$518 billion, having grown at an annual rate of nearly 3.2% since 1996. Slightly over half the market, in monetary terms, involved the provision or management of water, along with waste management. Nearly one fourth of the total consisted of equipment, primarily for water management, but also for the management of solid waste and airborne emissions.

1.5 “Natural” environmental goods and services

One common feature of most of the internationally discussed classification proposals is that their definition of EGSs is based primarily on manufactured goods and human services, i.e., environmental goods and services created by human productive systems to defend against, prevent or correct harm to the environment and to natural resources.

However, little or no attention has been devoted to environmental goods and services of natural origin. Examples of these are primary goods obtained through sustainable agriculture, forestry or fishing; the service provided by a properly preserved natural landscape capable of attracting tourism; carbon-fixing by ecosystems, the international economic importance of which is increasing due to global warming and the Kyoto Protocol mechanisms; and exploitation of genetic resources provided by biological diversity, as opposed to the use of genetically modified organisms, with their attendant risks.

The CPC includes services that protect nature and landscapes. Group C, Natural Resource Management, in the OECD-Eurostat classification, includes categories for sustainable agriculture, forestry and fishing, as well as ecotourism. However, the classification provides only for equipment, inputs, and associated construction and installation services and activities. It does not take into account products derived from such activity or the services, provided by nature, that make the activity possible. The classification of these natural services remains an open possibility, but more work is needed to establish the classification.

Despite its neglect to date, the classification of goods and services provided directly by nature is of vital importance. The EGSs that nature provides to societies in the form of biomass or flows can directly and indirectly affect the functioning of economic systems. Nature is a part of productive systems for various reasons: Productive systems make use of the properties of natural

resources; natural resources are indispensable inputs in the productive chain; and nature is used as a dump (which, when its capacity is exceeded, can jeopardize a society's well-being).

Natural services are especially important for societies with extensive natural resources and biological diversity, such as Mexico. The proper care of environmental resources in such cases is highly dependent on the possibility of generating attractive economic alternatives for their conservation and maintenance.

The possibility of introducing sustainably produced primary goods and nature-provided environmental services into trade negotiation agendas should not be ignored. However, this clearly requires institutional structures capable of dealing with bio-economic issues, as well as more highly developed preventive environmental policies.

National capacities meriting greater development in the context of trade liberalization include goods and services that are mechanisms for the quantification and regulation of contracts for carbon capture by forests and plant cover; property rights and obligations regarding biotechnology-related intellectual property rights; and mechanisms for the reduction of risks associated with the productive use of genetically modified organisms. On the international level, dealing with these goods and services requires the development of at least two major institutional mechanisms: certification rules, and reliable and commonly accepted verification mechanisms.

1.6 Why SMEs? Size, features, and economic and environmental vulnerability of the sector

The collaboration of ECLAC and GTZ in this area was motivated not only by the socioeconomic importance of SMEs, but by the conviction that there is a growing demand for environmental goods and services at the national and local levels, and that SMEs are under increasing pressure to become more competitive and improve their environmental performance. There is also little doubt that SMEs are more vulnerable than they were in the past, given rising environmental requirements in international markets and domestic social and regulatory pressures. This vulnerability results from SMEs' lack of information and from the fact that there is an absence of policy for helping them develop effective strategies to adjust their processes and products to achieve better environmental performance.

Despite their importance, SMEs have remarkably little familiarity with these issues. This is especially true of comparative knowledge within the region, and particularly acute in the area of SMEs' industrial organisation and environmental performance, as well as in regard to policies designed to improve that performance. Thus, the present studies of Argentina, Colombia, Chile and Mexico are designed to light the path toward market opportunities for the sector, without in any way laying claim to ultimate solutions to the long-standing and complex environmental problems that affect SMEs and others.

Inasmuch as the studies focus on the relationship between SMEs and environmental problems, it is important to clarify whether the type of firm being examined is, in fact, what is meant in referring to SMEs. As may be seen in table 1.2, the definitions are based on number of employees:

TABLE 1.2
CLASSIFICATION OF ENTERPRISES ACCORDING TO NUMBER OF EMPLOYEES

	Microenterprise	Small enterprise	Medium enterprise	Large enterprise
<i>Argentina</i>	<= 10	11 to 50	51 to 300	>= 300
Colombia	<= 10	11 to 50	51 to 200	>= 200
<i>Chile</i>	< 10	10 to 49	50 to 199	>= 200
Mexico				
–Industry	< 30	30 to 100	101 to 500	>= 500
–Trade	< 5	6 to 20	21 to 100	>= 100
–Services	< 20	20 to 50	51 to 100	> 100

Source: Lilia Domínguez, “Necesidades de bienes y servicios ambientales en las micro y pequeñas empresas: el caso mexicano,” *Medio ambiente y desarrollo series*, No. 61 (LC/L.1791–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), May 2003. United Nations publication, Sales No. S.02.II.G.106; José Leal, “Necesidades de bienes y servicios para el mejoramiento ambiental de las pyme en Chile: identificación de factores críticos y diagnóstico del sector,” *Medio ambiente y desarrollo series*, No. 63 (LC/L.1851–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), March 2003. United Nations publication, Sales No. S.03.II.G.15; Bart van Hoof, “Necesidades de bienes y servicios ambientales de las pyme en Colombia: identificación y diagnóstico,” *Medio ambiente y desarrollo series*, No. 65 (LC/L.1940–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), August 2003. United Nations publication, Sales No. S.03.II.G.98; Úrsula Araya, “Análisis comparativo de las necesidades ambientales de las pyme en Chile, Colombia y México,” *Medio ambiente y desarrollo series*, No. 74 (LC/L.2016–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), November, 2003. United Nations publication, Sales No. S.03.II.G.177; Martina Chidiak, “Demanda y oferta de bienes y servicios ambientales por parte de la pyme: el caso argentino,” *Medio ambiente y desarrollo series*, No. 77 (LC/L.2034–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), December 2003. United Nations publication, Sales No. S.03.II.G.198.

As can be seen, Chile and Colombia use the same employee figures for dividing enterprises according to size. Mexico, however, not only uses different dividing points from Chile and Colombia, but defines enterprise size differently from one sector to another. Argentina’s classification is close to Chile’s and Colombia’s, though the threshold figure for large firms is higher. Multiple systems have been used to define firm size in Argentina. Thus, there is no uniformity even within Argentina. The differences, however, are minor, except in relation to large firms, which some studies define as those employing 200 or more people.

These discrepancies can introduce distortions in comparative analysis, both of SMEs in national economies, and in defining their relationship to environmental problems. For example, some of the problems involving SMEs and the environment in Mexico and Argentina presumably would involve “large” firms if the situation being examined were in Chile or Colombia.

Furthermore, Colombia and Chile divide firms according to economic criteria, as well as by number of employees. Colombia classifies them according to the value of their assets, while Chile uses sales figures, as seen in table 1.3:

TABLE 1.3
CLASSIFICATION OF ENTERPRISES BY ECONOMIC CRITERIA
(Chile: sales – Colombia: assets)

	Microenterprise	Small enterprise	Medium enterprise
Chile	< UF 2 400 (<US\$ 56 000)	UF 2 401 to 25 000 (US\$ 56 001 to 588 000)	UF 25 001 to 100 000 (US\$ 588 001 to 2 50 000)
Colombia	0 to 500 minimum wages (<US\$ 68 000)	501 to 5 000 minimum wages (US\$ 68 001 to 680 000)	5 001 to 15 000 wages (US\$ 681 000 to 2 040 000)

Source: Lilia Domínguez, “Necesidades de bienes y servicios ambientales en las micro y pequeñas empresas: el caso mexicano,” *Medio ambiente y desarrollo series*, No. 61 (LC/L.1791–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), May 2003. United Nations publication, Sales No. S.02.II.G.106; Bart van Hoof, “Necesidades de bienes y servicios ambientales de las pyme en Colombia: identificación y diagnóstico,” *Medio ambiente y desarrollo series*, No. 65 (LC/L.1940–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), August 2003. United Nations publication, Sales No. S.03.II.G.98; Úrsula Araya, “Análisis comparativo de las necesidades ambientales de las pyme en Chile, Colombia y México,” *Medio ambiente y desarrollo series*, No. 74 (LC/L.2016–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), November, 2003. United Nations publication, Sales No. S.03.II.G.177.

It is clear, then, as is the case with classification according to number of employees, that the economic parameters used vary from country to country, making it difficult to compare indicators of environmental problems, which are the central focus of the work here. Fortunately, however, the numbers are not so disparate as to totally invalidate the classifications for the purpose of making policy suggestions for these and other countries in the region.

Thus, we concluded that differences in the definitions of SMEs will not preclude an understanding of the environmental problems affecting these firms. However, these disparities must be borne in mind, both in framing the environmental problems relevant to SMEs and in proposing solutions.

Despite the differences in defining SMEs, all of the authors of the studies presented here agree on the social and economic importance of SMEs. First, SMEs represent a large percentage of the countries’ total number of firms; second, they are responsible for a large number of jobs; and third, they occupy a vital place in the social fabric of the countries.

From a social perspective, SMEs are influential because of their number and the large number of jobs they represent. Table 1.4 shows the percentage of jobs for which SMEs are responsible in each country:

TABLE 1.4
JOBS CREATED BY SMES

	Micro	Small	Medium	Other	Large
Argentina	26%	55	%		19%
Colombia		50	%		
Chile	39%	16%	10%	22%	13%
Mexico	48%	12%	16%		24%
Manufacturing	28%	12%	27%		33%
Trade	58%	15%	14%		13%
Services	57%	10%	7%		26%

Source: Lilia Domínguez, “Necesidades de bienes y servicios ambientales en las micro y pequeñas empresas: el caso mexicano,” *Medio ambiente y desarrollo series*, No. 61 (LC/L.1791-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), May 2003. United Nations publication, Sales No. S.02.II.G.106; José Leal, “Necesidades de bienes y servicios para el mejoramiento ambiental de las pyme en Chile: identificación de factores críticos y diagnóstico del sector,” *Medio ambiente y desarrollo series*, No. 63 (LC/L.1851-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), March 2003. United Nations publication, Sales No. S.03.II.G.15; Bart van Hoof, “Necesidades de bienes y servicios ambientales de las pyme en Colombia: identificación y diagnóstico,” *Medio ambiente y desarrollo series*, No. 65 (LC/L.1940-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), August 2003. United Nations publication, Sales No. S.03.II.G.98; Úrsula Araya, “Análisis comparativo de las necesidades ambientales de las pyme en Chile, Colombia y México,” *Medio ambiente y desarrollo series*, No. 74 (LC/L.2016-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), November, 2003. United Nations publication, Sales No. S.03.II.G.177; Martina Chidiak, “Demanda y oferta de bienes y servicios ambientales por parte de la pyme: el caso argentino,” *Medio ambiente y desarrollo series*, No. 77 (LC/L.2034-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), December 2003. United Nations publication, Sales No. S.03.II.G.198.

Though not all the studies use the same type of data, the importance of SME jobs is undeniable in all four countries. According to the figures, microenterprises and SMEs are responsible for over three quarters of the jobs in these countries. SME jobs in Argentina and Chile, as well as in Mexico and Colombia, represent between 75% and 90% of all jobs.

In view of this, it may be concluded that the social weight of SMEs, along with their contribution to the countries’ economies, is decisive, constituting an important element in the countries’ social structures.

From an economic perspective, some general figures will demonstrate the importance of the sector. Table 1.5 shows country figures for SMEs as a percentage of all firms, providing a sense of the size of the sector in the countries.

TABLE 1.5
NUMBER OF ENTERPRISES BY TYPE (2000)

Type of firm	Argentina	Chile	Colombia	Mexico
Micro (1)	3 420	432 431	446 674	2 634 072
Small (2)	21 240	78 805	44 384	82 314
Medium (3)	162 000	10 870	8 472	21 951
SMEs (2) + (3)	183 240	89 675	52 856	104 265

Source: Lilia Domínguez, “Necesidades de bienes y servicios ambientales en las micro y pequeñas empresas: el caso mexicano,” *Medio ambiente y desarrollo series*, No. 61 (LC/L.1791-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), May 2003. United Nations publication, Sales No. S.02.II.G.106; José Leal, “Necesidades de bienes y servicios para el mejoramiento ambiental de las pyme en Chile: identificación de factores críticos y diagnóstico del sector,” *Medio ambiente y desarrollo series*, No. 63 (LC/L.1851-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), March 2003. United Nations publication, Sales No. S.03.II.G.15; Bart van Hoof, “Necesidades de bienes y servicios ambientales de las pyme en Colombia: identificación y diagnóstico,” *Medio ambiente y desarrollo series*, No. 65 (LC/L.1940-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), August 2003. United Nations publication, Sales No. S.03.II.G.98; Úrsula Araya, “Análisis comparativo de las necesidades ambientales de las pyme en Chile, Colombia y México,” *Medio ambiente y desarrollo series*, No. 74 (LC/L.2016-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), November, 2003. United Nations publication, Sales No. S.03.II.G.177; Martina Chidiak, “Demanda y oferta de bienes y servicios ambientales por parte de la pyme: el caso argentino,” *Medio ambiente y desarrollo series*, No. 77 (LC/L.2034-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), December 2003. United Nations publication, Sales No. S.03.II.G.198.

Twenty–five percent of Argentina’s firms are SMEs; they represent 45% of industrial jobs and 10% of exports. More recent estimates for Argentina suggest that SMEs (including industry, services and primary activities) represent 71% of GDP and 55% of jobs (81% of jobs, if informal jobs are included).

In Colombia, 10% of firms are SMEs, and 84% of these are small firms. If one adds microenterprises, which constitute 80% of the country’s firms, the resulting group represents 89% of all firms. In terms of GDP, SMEs represent some 40%. It is interesting to note the discrepancy between the value of their production and the number of jobs they represent. The total value added of their production is less than 40%, though they generate 50% of jobs.

In Chile, 18% of firms are SMEs; of these, 88% are small firms. If microenterprises (which represent 82% of the country’s firms) are added in, the resulting group constitutes a full 99% of all firms. SMEs are responsible for over 50% of the country’s jobs.

In Mexico, 4% of all firms fall under the definition of SMEs, and 80% of these are small firms. Adding in microenterprises, the resulting group constitutes 99.8% of all firms, an overwhelming majority of the country’s productive units.

These figures for the four countries, and particularly those for Mexico, clearly show that the sector is a vital factor in policymaking, inasmuch as policy designed to affect the sector will have major effects within the country. This, then, provides an initial answer to the question “Why SMEs?”

Finally, SMEs are the sector most vulnerable to increasing environmental requirements and regulations. This issue will continue to grow in importance, and the region must prepare to help SMEs meet the resulting challenges. SMEs are privy to scant information, have little technical and management capacity, and face severe financial problems. Increasingly, they struggle simply to survive from day to day, and therefore lack any long–term vision. Moreover, the role of the State has changed in Latin America: it is smaller, less interventionist, and less capable of implementing specific policies targeting SMEs.

2. The need for environmental goods and services by SMEs

One of the major deficiencies of environmental management in the Latin American and Caribbean region is a failure, among productive sectors, to undertake and carry out commitments, particularly in the microenterprise and SME sector.

The shortcomings in this sector are numerous, ranging from failure to comply with standards to poor insertion in markets (especially international markets and, more specifically, those characterized by environmental demands and requirements).

There is an entire realm of environmental goods and services (EGSs) in which (as described in the foregoing chapter) SMEs have, to date, offered little and demanded even less. This vicious circle must be broken. While this situation is limiting, it also contains opportunities for SMEs to undertake efforts on both the demand and supply sides, by:

- a) Generating *demand* for EGSs, thus stimulating the sector, especially at the national level, specifically in terms of increasing business between SMEs and forming partnerships between SMEs and large firms; and
- b) generating a *supply* of EGSs that meets the growing need for such products, on the part of both large firms and SMEs, at the national and international levels.

2.1 Environmental goods and services: a classification

There is little uniformity in defining environmental goods and services, either in the context of Latin American markets or globally. Some firms define themselves as providers of environmental goods and use this as a tool to market their products, even though the products do not qualify as environmental in the classification schemes of international trade organizations. The inverse also occurs, i.e., firms provide recognized environmental goods and services but do not use environmental channels to market their products. All of this makes studying the environmental market a complex challenge, and exposes the results to a variety of justifiable criticisms.

In the present work, the notion of environmental goods and services follows the proposed classification of the Organization for Economic Cooperation and Development (OECD). The sub-categorization of environmental goods also follows that of the OECD. The Classification of

All Economic and Social Activities employed here appears in the United Nations Inventory of Classifications. All of these schemes are presented in detail below.⁴

2.1.1 The environmental goods and services industry, based on the OECD

The OECD defines the environmental goods and services industry as that which produces goods and services to “measure, prevent, limit, minimize or correct environmental damage to water, air, soil, as well as problems related to waste, noise and eco–systems.... The classification system encompasses... cleaner technologies and... technologies and products which reduce environmental risk and minimise pollution and resource use” (OECD/EUROSTAT, 1999).

The environmental sector includes equipment and services for waste management, and for air and water pollution control. The industry, however, is growing and its structure changing. Currently, it lacks a clear identity, and is poorly represented as a separate sector. Canada, Japan and the United States have adopted broad definitions of the environmental industry; Italy, Germany and Norway, on the other hand, have opted for narrower criteria. These differences mean that data on the environmental industry must be interpreted with caution (International Trade Centre, 1999).

Given this problem of non–comparable data, it is impossible to identify environmental goods and services in a mutually exclusive or comprehensive fashion. Many goods can be used for protecting the environment as well as for other purposes, while some goods that appear, at first glance, to have no connection with the environment have applications in the environmental arena.

The OECD proposes dividing the environmental goods and services industry into three principal groups: Pollution Management, Cleaner Technologies and Products, and Resource Management (OECD/EUROSTAT, 1999). The defining characteristics of the categories are set forth in table 2.1:

⁴ The following is a summary of Ruz and Mladinic, 2005.

TABLE 2.1
ENVIRONMENTAL GOODS AND SERVICES OECD CLASSIFICATION

Pollution Management includes goods and services clearly used exclusively for environmental purposes, as well as goods and services that have a significant impact on reducing emissions of pollutants, and that are easily identified statistically.

The **Cleaner Technologies and Products** group includes goods and services that reduce or eliminate adverse environmental impacts, but that are ordinarily used for other environmental purposes. Their statistical evaluation is questionable, difficult or costly. The classification and collection of data for cleaner technologies and products is still in development.

The **Resource Management** group includes goods and services that may be associated with environmental protection, though their main purpose is not environmental protection (e.g., energy management and savings, renewable energy plants, systems for the control of pollutants in household air). This group will often be optional and its inclusion will depend on political interests and the feasibility of statistical assessment. The classification and collection of data for this group is still in development.

In addition to the above distinctions, the OECD classification structure defines three levels:

Level 1 distinguishes the three principal groups described above: (A) Pollution Management; (B) Cleaner Technologies and Products; and (C) Resource Management.

Level 2 distinguishes the principal categories of commercial environmental protection activities: production of specific equipment and materials, provision of services, construction and installation of facilities.

Level 3 includes the principal types of environmental protection activities: air pollution control, liquid waste management, solid waste management, remediation and clean-up of soil and water, and noise and vibration abatement.

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005; Carlos Muñoz Villarreal, “Bienes y servicios ambientales en México: caracterización preliminar y sinergias entre protección ambiental, desarrollo del mercado y estrategia comercial,” unpublished, n/d.

The OECD regards this as the most appropriate classification, since it best reflects the structure of the firms that provide environmental goods and services. By way of illustration, other classification approaches are shown below.

2.1.2 The International Family of Economic and Social Classifications

The International Family of Economic and Social Classifications (United Nations, 1998) is comprised of those classifications that have been registered in the United Nations Inventory of Classifications, reviewed and approved as guidelines by the United Nations Statistical Commission or other competent intergovernmental boards on matters such as economics, demographics, labour, health, education, social welfare, geography, environment and tourism. It also includes those classifications or similar subjects that are registered in the Inventory, and are derived from or related to the reference classifications and are primarily, but not solely, used for regional or national purposes. The Family is made up of three principal classes:

Reference classifications are those economic and social classifications resulting from international agreements approved by the United Nations Statistical Commission or some other competent government entity. This classification is widely accepted, and is cited in official agreements. Thus, it is approved and recommended as a guide for the preparation of

classifications. Its structure, as well as the definition and characteristics of its categories, may be used as a model for the development of other classifications.

Derived classifications are based on the reference classifications. These are formulated either by adopting the structure and categories of the reference classification, or by regrouping or adding items. The derived classifications are used at the national and multinational levels.

Related classifications are based partially on the reference classification, or are associated with it strictly in terms of specific structure. The procedures for maintaining, updating and revising statistical Family classifications are designed to resolve problems of partial correspondence between related classifications, while offering opportunities to enhance harmonization.

Table 2.2 shows both global and Latin American classifications for products:

TABLE 2.2
INTERNATIONAL FAMILY OF PRODUCT CLASSIFICATIONS

Products	World	Latin America
Reference	Central Product Classification (CPC) Harmonized Commodity Description and Coding System (HS)	Sistema Armonizado de Designación y Codificación de Mercaderías (SA) [Harmonized Commodity Description and Coding System (HS)]
Derived	Classification of Products by Activity (CPA) Standard International Trade Classification (SITC)	
Related	Trade in Services	

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

Table 2.3 shows classifications of economic activities used in Latin America and elsewhere:

TABLE 2.3
INTERNATIONAL FAMILY OF CLASSIFICATIONS OF ECONOMIC ACTIVITIES

Economic activities		Latin America
Reference	International Standard Industrial Classification of All Economic Activities (ISIC)	Classification Internacional Industrial Uniforme (CIIU) [International Standard Industrial Classification (ISIC)]
Derived	General Industrial Classification of Economic Activities within the European Communities (NACE)	
Related	Australian and New Zealand Standard Industrial Classification (ANZSIC) North American Industry Classification System (NAICS)	

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

The European Community’s General Industrial Classification of Economic Activities in the European Community (NACE) and the North American Industrial Classification System (NAICS) have different ways of classifying environmental activities. A convergence project is in progress to bring together Europe’s NACE and the U.S., Canada and Mexico’s NAICS. The

report that contains the proposed convergence (United Nations, 2002) is based on aggregates that do not allow for inclusion of environmental activities, except for one new group termed “sanitization,” which includes the collection and treatment of wastewater, and collection and treatment of other waste, as well as sanitization, remediation and other activities.

The CIU classification used in Chile and other Latin American countries provides only a generic treatment of certain environmental and economic activities. For the most part, these activities only appear in aggregate form in the CIU classification (summarized in Table 2.4), which makes it impossible to directly quantify the size of a country’s EGSs, or to set growth targets for this market.

TABLE 2.4
CIU CATEGORIES FOR ENVIRONMENTAL ACTIVITIES IN CHILE

37. Recycling	
371 Recycling of metallic waste materials	This category includes processing of metallic waste, as well as new and used metallic materials used to produce products that can be easily transformed into new raw materials. In general, both recyclable material and recycled material constitute metallic waste materials. The difference between the two is that recyclable material, whether or not classified, cannot be used directly in an industrial process, while recycled material can be used anew in processing, and hence should be considered an intermediate product. Recycling requires an essentially “industrial” process, either physical or chemical. The characteristic product of this activity is metallic waste material. However, this waste material is a part of traditional production in all industries that produce metals, metal products, machinery and equipment.
372 Recycling of non-metallic waste materials	Mutatis mutandis, this category includes the same types of activities as category 3710. The recycling process must not be part of the processing of the product that produces new raw material, and must not take place in the unit devoted to such processing. Thus, the entire process must be included in the category corresponding to such processing or unit. The products in this category can vary greatly, and may even be typical to many other industries.
51 Wholesale and commission trade, except trade in automobiles and motorcycles	
514 Wholesale trade in intermediate products and non-agricultural waste materials	
5149 Wholesale trade in other intermediate products and waste materials	This category includes wholesale trade in products such as basic chemicals for industrial use, fertilizers and plastics in primary form, textile fibres, waste materials, materials for recycling, etc.
52 Retail trade, except trade in automobiles and motorcycles; repair of personal items and household goods	
5240 Retail trade in second-hand stores	This category includes retail trade in second-hand stores. It also includes pawn shop activity. It does not include recycling centre activities.
74 Other business activities	
7421 Architecture and engineering, and related technical consulting activities	This category includes architecture, engineering and land surveying; geological exploration and prospecting; and associated technical consulting. Architecture includes designing buildings, preparing construction plans and in many cases supervising construction, as well as urban planning and landscape architecture. Technical and engineering includes specialized activities related to civil, hydraulic and traffic engineering, which may include supervision of works; electrical and electronic engineering; mining engineering; chemical, metallic, industrial and systems engineering; and specialized activities such as air conditioning, refrigeration, sanitation, pollution control and acoustic conditioning. Geologic and prospecting activities are based on surface measurements and observations designed to obtain information on the structure of the subsoil and to locate oil, natural gas and mineral deposits, as well as groundwater reserves, and may include air, aerogeophysical, hydrological studies, etc. Also included are associated cartography and land survey activities.

(Continue)

Table 2.4 (Conclusion)

37. Recycling	
90 Elimination of waste and wastewater, sanitation and similar activities	
900 Elimination of waste and wastewater, sanitation, and similar activities	This category includes collection of household, industrial and commercial garbage, waste, trash and waste materials, as well as their transport and elimination via incineration and other methods, and the disposal, treatment and elimination of human excrement through sewers, sewerage and other means. The activities of this category also include waste reduction; ash collection; collection of waste materials through receptacles placed in public locations; removal of construction waste; unloading of waste materials in the earth or at sea; burying and covering of waste materials and sewage sludge; emptying and cleaning of latrines and septic tanks; maintenance of chemical toilets; dilution, sifting, filtering, sedimentation and chemical precipitation; and treatment of activated sludge or other processes designed to eliminate wastewater, including maintenance of sewers and sewerage. Also included are the sweeping and cleaning of streets, parking facilities, etc., and the removal of snow and ice from highways, runways, etc. (using salt and sand).

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

International sales of environmental products are recorded in customs import and export records, using harmonized systems. However, there are no harmonized codes for certain environmental products, such as heat pumps, electric cars, fuel cells, etc.

Available environmental services are recorded in the countries, as are other economic activities, but there are no specific codes for environmental activities. Greater disaggregation is needed, but this has not yet been developed in Latin America, except for Mexico, which uses the NAICS codes.

2.2 Selection of relevant and environmentally sensitive SME sectors: identifying needs for environmental goods and services

This section examines the demand for environmental goods and services in each country. Situations from one country to another vary enormously; thus the global situation cannot easily be summarized as a whole. Country-specific examination, on the other hand, can provide both domestically significant ideas and interesting lessons for other countries that wish to encourage an EGS sector.

Following is a summary of what the studies found most important in the four countries. First, it must be borne in mind that different methods were used to select sectors. Direct information is not immediately available, and is difficult to produce. Thus, our consultants had to use indirect methods to determine in which sectors SMEs are important and have major environmental impact.

For Argentina, a combination of international classifications and national assessments was used to identify sectors of high environmental impact, as well as environmentally sensitive sectors. The most important sectors turned out to be textiles; leather tanning and finishing; cellulose pulp, paper and cardboard; paper and cardboard containers and boxes; printing and publishing; chemicals; fertilizers and pesticides; rubber products; and metal industries.

Regulatory schemes regard slaughterhouses, refrigeration facilities and sausage making as environmentally hazardous activities.

In Colombia, a number of existing studies were also used as a starting point, and three categories were created: sectors of major environmental significance; sectors with high recovery potential; and sectors with preliminary potential for pollution abatement. The most significant sectors were determined to be food products, textiles, the leather industry, printing, publishing, graphic arts, manufacture of chemical and industrial substances, and manufacture of ceramic products. These are sectors in which SMEs are important and exert significant environmental impact in Colombia.

In Chile, the selection was based on studies by the Ministry of the Economy and the National Environmental Commission, which have studied SMEs and their environmental problems. Four basic sectors were found to have major environmental impact: foods, textiles, metal–mechanics, and paper and paper derivatives.

Food manufacture, especially that of baked goods, creates a high amount of liquid and solid industrial waste. CORFO (the Corporación de Fomento a la Producción, or Production Development Corporation) and Chile's Ministry of Agriculture have promoted improved practices to reduce environmental harm from emissions resulting from inadequate combustion. The metal–mechanic industry is also problematic, with a great number of SMEs, creating major environmental impact due to toxic emissions and sewage discharge. It also produces noxious odours, noise, vibration and, in some cases, degradation of the landscape.

Another important sector, in relation to SMEs and the environment, is that of paper, printing and publishing. This industry has a major impact, particularly in the form of liquid industrial waste, odours and gas emissions. Finally, the textile industry contributes to environmental degradation, as a result of multiple factors similar to those already cited. These, then, are the four sectors deemed to be deserving of public policy consideration in Chile.

For Mexico, the World Bank's IPPS (Industrial Pollution Projection System) was used. This system is based on information from United States industries, and considers intensity of pollution per dollar. Figures for Mexico were extrapolated from the U.S. figures, but not always with a determination of which sectors were responsible for the most pollution. In Mexico, the three sectors considered to have the greatest environmental impact are brick manufacture, which contributes intensely to air pollution; leather and furs and products manufactured from them; production of fabrics; and soft fibre finishing. Thus, conclusions regarding the different countries reflect somewhat different classification methods. Nevertheless, the sectors identified largely coincide.

The studies also found a general lack of environmental services in various areas. Though opportunities to promote environmental goals do exist, SMEs – through lack of access to relevant information or simply a preoccupation with the day–to–day struggle to survive – tend not to take advantage of these. Moreover, though credit instruments designed to provide SMEs with financial services also exist, SMEs usually fail to meet the required credit qualifications. At the same time, hiring environmental consultants is too costly for SMEs. In short, SMEs' lack of technological information and training is compounded by the absence of any institution capable of providing more active intermediation between SMEs and government. This situation constrains the potential demand for EGSs.

The studies also identified deficiencies in terms of infrastructure among industrial parks, treatment plants, industrial dumps and recycling centres, as well as with respect to new energy options–i.e., in various EGS categories. The research also identified as significant factors: unmet management needs, as well as a lack of consistency in federal, state and municipal legislation; the fact that SMEs are viewed as short–term businesses operating on a limited time horizon; and the lack of knowledge on SME business–management tools, as well as regarding programs designed

to assist SMEs. The latter may be due to insufficient dissemination, concern for, and time to deal with such issues among SMEs, the tendency to conduct business in long-standing but outdated ways, and a variety of other cultural factors.

Finally, one must identify the factors that determine demand for EGSs on the part of SMEs. In terms of environmental practices, the situation in the four countries may be summarized as follows: In Argentina, regulation is split between national, provincial and municipal levels, with the result that requirements may vary and are at times contradictory. In Colombia, the legal framework exerts a negative effect on SMEs' demand for EGSs, given the absence of any clear, consistent policy, while end-of-pipe solutions are favoured, thus raising costs: instead of improving productive processes, this produces the need for investment as a means of compensating for unaddressed problems.

In Chile, while there has been an emphasis on controlling major sources of pollution, a certain permissiveness has prevailed with regard to SMEs, in light of the challenges of the overall economic situation and the problems firms face in merely surviving. Thus, in practice, standards for SMEs are not enforced, while SMEs view environmental regulation as a threat—or even as harassment. In Mexico, there is a tacit policy of leniency toward SMEs, with no major incentive for SMEs to reduce their levels of polluting beyond those established through regulatory measures.

Technical knowledge could be decisive in the demand for EGSs. In Argentina and Chile, this element is lacking, thus limiting the demand for EGSs. Typically, only medium-sized enterprises avail themselves of opportunities for training loans and consulting services. In Colombia and Mexico, as well, the demand for EGSs is limited by a lack of knowledge. In Colombia, environmental issues are not perceived as a potential source of earnings. In Mexico, while public institutions have endeavoured to create technical manuals outlining better productive practices, SMEs' have limited access to these documents.

Below is a review of the situation in each country, with further clarification of the approach adopted in conducting national studies.⁵

2.2.1 Argentina

There are different methods of identifying environmentally sensitive industrial sectors: (a) through international classifications (which may not reflect the sector's technological characteristics or the way the sector implements technology in the country, e.g., in terms of the prevalence of SMEs in the sector); (b) through local assessments; and (c) through local methods of classification. In Argentina, information of all three types was used to identify a group of sectors that were both environmentally sensitive and in which SMEs played a dominant role.

Assessments have identified surface- and ground-water pollution as the country's major environmental problem (see, for example, the World Bank's 1995 study). This is the result of a historical lack of sanitation services, treatment of liquid industrial waste and sewage, and proper disposal of solid waste, as well as inadequate enforcement of liquid-waste regulations. The World Bank study also identifies certain sectors in which SMEs have a major impact on water pollution in the greater Buenos Aires area. These sectors include refrigeration facilities, textiles, tanning, cleaning products and cosmetics, as well as other chemical products, metal products, and machinery and equipment.

The Secretariat of Environment and Sustainable Development recently stated that the magnitude of the water pollution problem—with its attendant health risks for the population—is due

⁵ The sources are each country's *Medio ambiente y desarrollo* series.

to the large number of informal and unregulated enterprises, for which information on environmental management is lacking.

The most significant source of information is the World Bank's Industrial Pollution Projection System (IPPS). In order to select a group of environmentally sensitive sectors, this classification was combined with the one used locally in the Province of Buenos Aires to grant environmental aptitude certificates for establishments prior to their being occupied. Of areas identified as potential sources of major pollution—under both the international classification and the Province of Buenos Aires classification—only nine are dominated by SMEs (excluding the fertilizer, pesticide and rubber sectors). According to these criteria, the environmentally sensitive areas in which SMEs predominate are those shown in Table 2.5:

TABLE 2.5
ENVIRONMENTALLY SENSITIVE SECTORS
WITH A HIGH PROPORTION OF SMEs

CIU Revision 3 Category	Description
1729–1820–3699–3720	Textiles, including industrial and recycled
1911	Leather tanning and finishing
2101	Cellulose pulp, paper and cardboard
2102	Paper and cardboard containers and boxes
2109	Other paper and cardboard products
2211–2212	Printing and publishing
2411–2429	Basic industrial chemicals
2412	Fertilizers and pesticides
2422–2424	Other chemical products
2519–2520	Rubber products
2891–2892	Metal articles

Source: Martina Chidiak, "Demanda y oferta de bienes y servicios ambientales por parte de la pyme: el caso argentino," *Medio ambiente y desarrollo series*, No. 77 (LC/L.2034-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), December 2003. United Nations publication, Sales No. S.03.II.G.198.

In assessing the impact of different industries, the Province of Buenos Aires classifies them in three groups, according to the amount of pollution they cause (Article 15, Law 11.459):

- a) *Nonharmful*: Their operation presents no risk or problem to the environment, nor to the population's safety, health or hygiene.
- b) *Inconvenient*: Their operation constitutes a problem to the population's health and hygiene, or harms material assets and the environment.
- c) *Hazardous*: Their operation constitutes a risk to the population's safety, health or hygiene, or causes serious damage to material assets and the environment.

Notwithstanding this system of categorization, regulations provide for an exception (Article 16) to the requirement for a "certificate of aptitude" in the case of businesses that employ fewer than five individuals and have a generating capacity of less than 15 horsepower. Below is a list of the category-3 activities (the "hazardous" category). It should be noted that within the category there is no ranking, i.e., the order does not reflect the degree of hazard posed.

- Slaughterhouses, refrigeration facilities and manufacture of sausages and related by-products
- Leather and fur tanning
- Manufacture of pulp for paper, asbestos paper and wallpaper
- Manufacture or refining of industrial chemicals
- Nitrogen fertilizers and pesticides

- Synthetic resins, plastics, artificial fibres and synthetic rubber (and related products)
- Paint, varnish and tar
- Colouring agents
- Medicines and drugs
- Inks
- Oil refineries
- Manufacture of glass and glass products
- Cement, lime and plaster
- Fibreglass and refractive products
- Asbestos, insulation products and abrasives
- Iron and steel foundries and forges
- Galvanoplastic and chroming shops
- Manufacture of accumulators and batteries
- Centres for the treatment, recycling and disposal of industrial waste, effluents and pathogenic waste, excluding household waste.

Based on the categorization of areas identified in table 2.5 as environmentally sensitive, and using available information, an estimate has been made of the number and impact of SMEs, in terms of the jobs in these sectors in key regions, as shown in table 2.6.

TABLE 2.6
INFLUENCE OF SMEs IN ENVIRONMENTALLY SENSITIVE SECTORS

Jurisdiction	Number of SMEs in environmentally sensitive sectors	SMEs as percentage of					
		All environmentally sensitive sectors		All industry		All firms (industry+trade+services)	
		Number of firms	Jobs	Number of firms	Jobs	Number of firms	Jobs
City of Buenos Aires	1 937	98%	n.d.	n.d.	n.d.	2%	0,2%
Province of: Buenos Aires	92 371	96%	58%	50%	27%	10%	9%
Santa Fe	16 861	93%	62%	41%	20%	7%	6%
Córdoba	11 796	92%	69%	37%	18%	6%	5%

Source: Martina Chidiak, "Demanda y oferta de bienes y servicios ambientales por parte de la pyme: el caso argentino," *Medio ambiente y desarrollo series*, No. 77 (LC/L.2034-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), December 2003. United Nations publication, Sales No. S.03.II.G.198.

Tables 2.4 and 2.5 provide a sense of the importance of sectors, in terms of their environmental impact and geographic distribution, as well as their contribution to jobs in Argentina.

2.2.2 Colombia

Along with their economic contribution, Colombian SMEs have contributed to pollution as a result of their productive activity, and due to their improper use of resources such as water, soil, air, energy and chemicals, etc. Subjective factors also come into play here, since environmental impact is determined by a firm's specific area of activity, rather than exclusively in terms of some absolute value (i.e., the impact of pollution in an urban area differs from its impact in a rural area). Thus, secondary information does not provide a clear distinction as to which groups of enterprises should be evaluated.

The analysis of pollution by SMEs presented here is based on specific national contexts, attempting to determine the impact of different sectors of the economy: focusing on the productive sector overall, then ascertaining the contribution of the SME sector to the country's overall environmental situation. This is the procedure used to determine the relative impact of the activities of SMEs.

The environmental impact produced by different sectors of the economy can be categorized based on the amount of resources used, as well as by the amount of pollution released into the environment.

a) Consumption of resources

Total demand for water: The demand for water in Colombia in 1996 was 5,790 million cubic meters. The major portion (57%) came from the agricultural sector, resulting from activities such as irrigation and livestock. Housing (urban and rural) represents the second most-important category, with industry and services responsible for lower levels of demand for water.

Demand for energy: In 1996, energy consumption was highest in the transportation sector (81,427 teracalories). The industrial sector ranked second, with 70,305 teracalories, with the residential sector taking third place (60,371 teracalories). Agriculture and mining occupied fourth place (19,027 teracalories).

In terms of demand for resources such as energy and water, the sectors with the highest impact on the environment are agriculture (due primarily to water consumption), transportation and industry (due to their use of energy).

b) Environmental degradation

Air pollution: The major producer of air pollution is the transportation sector, representing 61% of all emissions of CO, HC, NO_x, SO_x and particulates, with the country's approximately 2.8 million vehicles being the source of this pollution. In second place are stationary and airborne pollution sources, representing the remaining 39% of emissions. Here, the power generation sector (specifically, thermoelectric plants), industry, mining and open burning are the main sources of emissions.

Solid and hazardous waste: In this category, the residential sector is the major source, emitting 14,000 tons of emissions per day. Aggravating the situation is the fact that, as of 1998, 43% of municipalities have had no final disposal systems. Industry is in second place, with approximately 540 tons of emissions per day.

Wastewater: In 1999, the residential, industrial and agricultural sectors in Colombia produced approximately 9,200 tons of organic contaminants per day (of which 1,500 tons originated in households, 500 in industry and 7,200 in agriculture), representing a total discharge of approximately 4,500,000 cubic meters of wastewater.

Noise: The principal sources of noise in Colombia come from the industrial sector (50%), trade (21%), vehicular traffic (21%) and air traffic (8%).

As may be seen, the different sectors have different patterns of resource consumption and environmental impact. The residential sector is environmentally important, representing as it does the second-largest consumer of water and producer of wastewater, as well as being the major producer of solid waste. Transportation uses the greatest amount of energy and produces the greatest air pollution. Agriculture consumes the most water and generates the most wastewater. Industry is a major consumer of energy, while at the same time producing air pollution, wastewater and solid waste, though to a lesser extent than is true for transportation, agriculture and households, in that order.

Though there are no reliable estimates as to SMEs' share of responsibility for consumption and pollution, the leather tanning and food sectors may be singled out as the main producers of wastewater. Foods, manufacture of other non-metallic mineral products, and manufacture of mud, clay and porcelain products also produce emissions in notable amounts. In the latter case, this is due to continued use of wood as fuel for kilns. These sectors also account for significant volumes of solid waste.

c) Productive sectors with the greatest environmental impact

To identify which industrial sectors generate the greatest environmental impact, the results of the 1998 agreement between IDEAM and the Industrial University of Santander were used. This work identified principal technologies used by industrial plants in 87 different activities, identifying the overall harmfulness of the technologies.

To evaluate the environmental performance of different types of activities, indices were created to correlate the consumption of resources with the production of particular pollutants (emissions, dumping, solid waste). In terms of resource consumption, technologies involved in paper production (341101-X) were identified as the most harmful. Other notable technologies, in this context, are basic iron (371002-2) and leather-related activities (323101-7), and the manufacture of other non-metallic mineral products (369201-3).

Technologies producing the greatest volume of emissions are foods (313101-2, 311802-1, 311801-1), paper (341101-3, 341102-1), manufacture of other non-metallic mineral products (369201-3, 369201-7) and manufacture of mud, clay and porcelain products (361004-1), among others. In terms of dumping, foods (311501-2, 311904-1, 311101-2), leather (323101-7) and paper (341101-3, 341101-4), which have the most harmful technologies, are most culpable.

Based on partial technology-determined aggregates, an overall classification was created to give a general sense of which technologies are most harmful in various industrial sectors. According to the results of the work carried out by IDEAM and the Industrial University of Santander, the sectors with greatest environmental impact are: paper (341101-3, 341103-1), food (311501-2, 313101-2, 311802-1), leather (323101-7), manufacture of non-metallic mineral products (369201-3, 369201-7), basic iron and steel operations (371002-2), and manufacture of mud, clay and porcelain (361001-1, 361004-1).

In summary, the most important SME sectors, in terms of their contribution to economic development and their impact on the environment in Colombia, are:

- Agriculture
- Mining
- Manufacture of food products, excluding beverages
- Textile manufacture
- Leather and leather products
- Wood, wood products and cork
- Printing, publishing and related activities
- Manufacture of industrial chemicals
- Manufacture of other chemical products
- Manufacture of ceramics and other non-metallic mineral products
- Metallurgy
- Surface transportation.

SMEs' needs for environmental goods and services are a function of their environmental problems, their opportunities and the extent to which competitiveness affects them. Hence, their

needs relate to issues such as water, energy, waste, emissions and noise, as well as environmental performance certification requirements, in terms of both organizations and products.

In order to improve environmental performance and achieve diversity in processes and technologies, a range of deficiencies in services, infrastructure and technology must be addressed.

Turning next to a characterization of the environmental needs of SMEs, classified by category of environmental goods and services, there follows a description of the specific needs of SME sectors, arranged according to environmental category. For the description of the environmental components in Colombia, the list of activities constituting the environmental goods and services sector is used, pursuant to the OECD (2002) classification, including: (a) management of water and dumping; (b) energy management; (c) solid waste management; (d) air pollution management; (e) noise control; and (f) certification systems.

These categories represent the potential demand for EGSs on the part of Colombian SMEs. The following paragraphs categorize and quantify, to the extent possible, figures as related to SMEs.

Needs related to management of water and dumping

SMEs' needs for EGSs related to water management include technologies for pre-treating and treating wastewater, and those related to the categorization of dumps, rational use of water, and the search for substitutes to replace raw materials that contribute to pollution.

Pre-treatment and treatment technologies

Pre-treatment and treatment technologies consist of aerobic and anaerobic biological systems, grease and solids traps, and filters. Because they produce more pollution, the sectors of food (slaughterhouses, poultry rendering plants, fruit processing, dairy), agriculture (pork, flowers, coffee), leather, textiles, graphic arts, chemicals and metal-mechanics represent areas with the greatest needs.

Water-saving technologies

Practices and technologies for conserving water range from implementing appropriate manufacturing processes (rational water use in activities such as cleaning; leak prevention and control; production planning) to implementing water recirculation systems, installing water-saving devices, using rainwater, and improving irrigation systems. Given their level of water consumption and the corresponding needs, food sectors (slaughterhouses and poultry rendering plants), the leather industry and the metal-mechanics sector are of major importance. The agricultural sector is water-intensive, principally because of irrigation, and includes slightly over 6,000 registered SMEs nationwide.

Pollution prevention

In terms of preventing pollution through the replacement and recovery of raw materials—in areas such as inks, colouring agents, heavy metals and synthetic pesticides, etc.—the most important sectors are agriculture, mining, graphic arts, leather and textiles, which together account for approximately 14,000 SMEs. The demand for related goods and services is a function of the number of SMEs in the sectors identified, as well as of the extent to which the alternatives described above are implemented. These sectors include approximately 26,000 SMEs.

Energy management needs

To ascertain the energy management needs of SMEs, it is useful to distinguish among the forms of energy used, with the major ones being steam (typically in boilers), heat, mechanical power, electricity and lighting.

Solid waste management needs

The segment of goods and services related to solid waste management includes the categories of hazardous waste and common solid waste management. Hazardous waste management categories include transportation; treatment methods, such as incineration and/or exploitation of agricultural chemical containers as an energy source; and recovery and recycling of batteries, inks, cartridges, colouring agents and minerals. The productive sectors with the greatest needs in these areas are agriculture, surface transportation, graphic arts, chemicals, textiles and, to a lesser extent, tanning. The major sectors in terms of common waste are transportation, treatment, recycling (materials such as plastic, cardboard and aluminum), composting (organic waste), use of food, wood and leather by-products, and use of tires, sawdust and packing material as energy sources.

As regards waste management, the hazardous waste management sub-segment is estimated to include approximately 14,000 firms, principally in the following sectors: textiles, graphic arts, chemicals and agriculture (agricultural chemical containers) and surface transportation. In terms of common waste (both organic and inorganic), the most important sectors are foods, tanning, wood and agriculture, with approximately 11,000 firms in all.

The demand for goods and services related to solid waste management comes from SMEs in the most important sectors, and from the alternatives mentioned above, representing a total of approximately 27,000 SMEs.

Needs related to air pollution management

These include emissions analysis, as well as treatment and prevention alternatives that can be categorized based on whether they are designed for odours, toxic emissions or particulate matter. In terms of odours and toxic emissions, existing methods include: extraction of noxious odours; preventive measures, such as good practices in handling receptacles of volatile materials and organic waste; replacement of solvents; and maintenance of equipment (boilers) and infrastructure, such as painting chambers. The principal industrial sectors in which there is a need for such services include: chemicals, graphic arts, and painting/dyeing activities in sectors such as wood (furniture), leather (tanning) and textiles, representing a total of approximately 11,000 SMEs.

In terms of particulate matter, there are methods such as cyclone separators, higher smokestacks to dilute emissions, use of less contaminating fuels (e.g., diesel fuel-ACPM—in place of natural gas); and filters to reduce pollution or allow for the recovery of raw materials, as in the case of sleeve filters. The major sectors in this area are food, non-metallic minerals, surface transportation, metallurgy, and laundries, with a total of approximately 15,000 firms. In terms of air emissions, the demand for goods and services related to these sectors is represented by approximately 26,000 firms.

Needs related to noise control

Alternatives for controlling noise focus primarily on insulating the areas in which equipment is being operated, through the installation of sound barriers, and on maintaining equipment in optimum condition (lubrication, parts replacement, etc.). The major sectors involved here are wood, metal-mechanics and surface transportation. The demand for noise-control goods and services in the sectors identified is represented by some 5,500 SMEs.

Needs related to certification systems

While this area represents a relatively recent development for SMEs, there is a growing need for ISO 14000 certification, accompanied by the implementation of systems (development of procedures, training) and conducting of audits required to obtain the certification. Where product certification is involved (ecological products), restructuring of productive processes,

along with the corresponding audits, is necessary in order to obtain certification and receive the required seal.

The demand for this type of certification comes from SMEs that serve primarily as suppliers to firms with certification, as in the auto parts sector (metal–mechanics and rubber) and sectors that supply international markets, notably textiles and agribusiness.

2.2.3 Chile

In 1998, Chile's Ministry of the Economy conducted a study on how best to promote clean production. Ten environmentally critical sectors were identified:

- Slaughterhouses, meat preservation, and manufacture of meat products.
- Manufacture of dairy products.
- Production of crustaceans, fish and other marine products.
- Bakery production.
- Manufacture of miscellaneous food products.
- Threads, fabrics and textile finishing.
- Printing, publishing and related industries.
- Paint, varnish and lacquer production.
- Manufacture of plastic products.
- Manufacture of metal products other than machinery and equipment.

These sectors fall into four broad categories, comprising the activities with the greatest potential for environmental impact in Chile. These four categories are priority sectors for intervention. All are industrial: foods, textiles and publishing, chemicals (paint and plastics) and metal–mechanics.

The study emphasizes that, based on the volume and type of pollutants they release into the environment, it may later be important to give priority to certain other sectors, using instruments to promote clean production in these sectors, namely:

- Production of vegetable and animal oils and greases.
- Tanning and leather finishing shops.
- Shoe manufacturing.
- Manufacture of organic and inorganic industrial chemicals.
- Manufacture of electrical devices and supplies.
- Laundries and dry cleaners.

In terms of the presence of SMEs in sectors with a high degree of environmental impact, CONAMA conducted a study to introduce manuals on means of preventing and controlling pollution in activities identified as the most polluting (CONAMA, 1996). According to the study, the major areas in which SMEs play an important role in contributing to pollution are the following.

Manufacture of food products

A significant number of firms in this category use manual, rather than mechanized, production methods, generating industrial solid waste and liquid industrial waste that are difficult to break down or control. Bakeries are a case in point. This sector is undeniably complex, with numerous technological deficiencies and problems in organizing collective efforts. This is partially explained by difficulties relating to siting. For example, agribusiness firms often deal with local raw materials over which they enjoy a monopoly (e.g., in the fruit and wine industries). This makes it difficult for firms to reach cooperative agreements for the treatment of liquid industrial waste.

In Chile, the Ministry of Agriculture and CORFO are the primary supporters of efforts designed to encourage better production practices. (This undertaking is considered the equivalent of the clean production policy in the manufacturing sector).

Textile and clothing manufacture

Analysis indicates, above all, that there is little control of water use in textile and clothing manufacturing. This leads to liquid industrial waste, and to inadequate combustion systems releasing contaminants into the atmosphere. This sector has evolved in an interesting way to adapt to environmental requirements. Manufacturers have even entered into a clean production agreement, which is helping them to change their energy systems, improve drying systems and control waste production—all in search of greater efficiency and market competitiveness.

The metal–mechanic industry

This sector has clearly caused major environmental damage at the local level, with air pollution (often toxic), discharges of metals–laden wastewater into sewers, and release of dust, noise, etc. The sector also poses environmental risks in connection with fires and releases of gases and liquids. Moreover, the sector is technologically backward. However, clean production agreements have been established for the metropolitan region, with a resulting improvement in manufacturing processes, accompanied by major efforts to relocate firms.

Paper, printing and publishing

Water with large amounts of sulphates and sulphites poses the main problem associated with paper factories, with suspended solids and DBO5 also being important factors. There are also significant atmospheric emissions of particulates and sulphuric anhydride, with the publishing industry accounting for considerable releases of chemical solvents and inks, etc.

Wood and wood products

SMEs are not a major factor in the wood industry. In this area, environmental problems are related to the production and accumulation of sawdust, as well as with impregnation systems, both of which generate phenol–rich liquid industrial waste and DBO5. This sector has undergone considerable modernization, optimising its operations and processes, with a successful focus on exporting.

Rubber and plastics

This sector releases large amounts of hydrocarbons into the atmosphere. In addition, it generates large volumes of wastewater with chemical components and high pH. Few SMEs have water treatment systems. Nevertheless, SMEs play only a minor role in the pollution associated with this sector.

Manufacture of products based on non–metallic minerals

This sector produces particulate emissions. However, SMEs have little impact in the sector. In view of the information summarized in the foregoing paragraphs, particularly as regards atmospheric emissions from the industrial sector, the CONAMA study (1996) concludes that the SMEs with the most significant role as polluters are bakeries, heating system boilers, industrial boilers and industrial processes, with the principal contaminants being PM10, SO₂, NO_x, COV and CO.

A key case of environmental impact due to atmospheric emissions by SMEs is in the metropolitan region, where an abatement plan is in place. The percentages associated with SMEs are shown in table 2.7:

TABLE 2.7
SMES' SHARE OF INDUSTRIAL EMISSIONS IN THE METROPOLITAN REGION

Category of Industry	PM10	SO ₂	NO _x	COV	CO
Small(%)	8.16	9.12	11.4	71.87	10.1
Medium (%)	2.18	2.37	3.57	25.6	3.36

Source: José Leal, "Necesidades de bienes y servicios para el mejoramiento ambiental de las pyme en Chile: identificación de factores críticos y diagnóstico del sector," *Medio ambiente y desarrollo series*, No. 63 (LC/L.1851-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), March, 2003. United Nations publication, Sales No. S.03.II.G.15.

Though SMEs play some role in environmental impact in the metropolitan region, they are clearly minor contributors, except in the case of COV. However, this role is even less significant when the figures are compared with total pollution for this area, including transportation and energy, as shown in table 2.8:

TABLE 2.8
SMES' SHARE OF TOTAL EMISSIONS IN THE METROPOLITAN REGION

Category of Industry	PM10	SO ₂	NO _x	COV	CO
Small (%)	0.60	6.80	1.11	0.43	0.24
Medium (%)	0.15	1.77	0.34	0.15	0.08

Source: José Leal, "Necesidades de bienes y servicios para el mejoramiento ambiental de las pyme en Chile: identificación de factores críticos y diagnóstico del sector," *Medio ambiente y desarrollo series*, No. 63 (LC/L.1851-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), March, 2003. United Nations publication, Sales No. S.03.II.G.15.

In terms of liquid discharges in the SME sector, available information is still inadequate, since the promulgation of water quality standards is a recent phenomenon, with insufficient time, therefore, to generate substantial data.

As regards the need for EGSs on the part of SMEs in sectors with a high degree of environmental impact, such firms have not accounted for a major proportion of the pollution produced by the country's firms overall. Nevertheless, SMEs often appear—to the population at large and to a significant portion of government officials—to be the most visible culprit, especially in terms of local environmental impact.

The principal attempt at implementing public policy designed to promote environmental management in industry has occurred through the clean production policy, which is viewed as a preventive mechanism. In this framework, a series of promotional instruments have been developed to promote so-called "clean production" agreements.

In connection with formulating the clean production policy, a study was conducted in 1999 to identify the environmental priorities of SMEs. All of the issues listed below were raised by representatives of the sector, reflecting the sector's major concerns with respect to environmental issues.

- The need for government to deploy promotional and financial instruments to support environmental management in the SME sector.
- Access to experiences, in a range of modern industrial categories, in meeting the nation's industrial demand.

- Foreign trade and the environment, and linkages between the two, particularly as regards the fairness of certain demands placed on national producers as a result of foreign trade policy.
- The role of prevention in environmental enforcement and regulation, in order to avoid the traditional *ex post facto* controls that represent a problem for business.
- New standards for liquid industrial waste (released into sewers and surface water): identification of the effects these have on SMEs.
- Solid waste management: new requirements that would result from proposed regulations.
- Recycling and re-use of waste, with particular emphasis on the potential economic and environmental advantages for SMEs.
- Feasibility for SMEs to adapt clean technologies, particularly in view of the fact that such technologies have been considered applicable only to big business.
- ISO 14000 standards and their applicability to SMEs, since these are seen as a “threat” from international markets.
- Clean and alternative energy, including the subject of energy conservation and efficiency, and their effect on SMEs.
- Future trends in environmental standards, beyond those already planned or announced by authorities.
- Experiences that have proven successful in the business sector and that could be replicable in clean production agreements signed by SMEs.
- Resiting of SMEs, a subject that has repeatedly been raised—one that provokes fear within the sector due to the major associated economic implications.
- Ecological labelling programs and environmental seals (both national and international), and the implications, for SMEs, of new certification requirements.

These environmental concerns on the part of SMEs represent a series of demands on the environmental regulatory system—regulations regarding environmental and health conditions in the workplace, insertion in international markets, lack of public awareness, etc. At the same time, services are clearly lacking in the following areas:

- Promotional instruments: SMEs do not yet make systematic and efficient use of such instruments.
- Preferential bank loans.
- Environmental consulting services, beyond the means of SMEs.
- Technological information.
- Intermediation institutions.
- Access to international markets.

In addition to the above factors are deficits in infrastructure, most significantly in the following areas:

- Industrial parks.
- Treatment plants.
- Industrial dumps.
- Port infrastructure.
- Recycling plants.
- Energy alternatives.

2.2.4 Mexico

In order to identify areas in which the presence of microenterprises and SMEs generate the most pollutants, a two-stage analysis was conducted. The first considered firms of up to 250 employees; the second included firms of up to 50 employees.

In the first stage, estimates for volumes of pollutants produced by economic units of under 250 employees (microenterprises and SMEs) for given components highlighted 14 major areas of economic activity. For these, emissions were examined based on geographic location, and the 5 states with greatest emissions of each component were identified. This produced a list of 8 states responsible for 75% to 88% of pollution generated by microenterprises and SMEs, depending on the pollutant involved.

Considering the categories of activities with the greatest impact for each component, the total number of categories was reduced to 9, which are responsible for 86% to 97% of all pollution produced by these firms (the percentage varying in that range according to which substance is involved). Based on this, the following activities were particularly notable:

- Manufacture of dairy products
- Milling of *nixtamal* and tortilla production
- Threads, fabrics and finishing of soft fibres
- Leather, fur, and leather/fur products
- Manufacture of other chemical substances and products
- Manufacture of clay materials for construction
- Manufacture of products based on non-metallic minerals
- Basic iron and steel industry
- Basic non-ferrous metals industry
- Manufacture of metallic structures, industrial tanks and boilers, including blacksmithing
- Manufacture of metal products other than machinery

A similar exercise for enterprises with fewer than 50 employees points to the same areas of activity, except for basic non-ferrous metals and other chemicals and products. This produces some change in the order of categories, with the highest rankings occupied by: *nixtamal* and tortillas; industrial metal structures; and tanks and boilers, including blacksmithing.

In all, economic units of 50 employees or less represent between 32% and 84% of the total volume of pollutants produced by microenterprises and SMEs. The most important category is production of clay materials for construction—responsible for 87% of air pollution created by microenterprises and SMEs—with SO₂ being the principal contaminant. For firms of under 50 employees, however, the percentage is only slightly lower (81%). Thus, smaller firms pollute more. Within this category, we find that, in the brick manufacturing category, micro and small enterprises are responsible for 81% of the total.

In Mexico, brick manufacturing is very much a cottage industry. Bricks used in the construction industry are fabricated by mixing clay and water, then shaping and sun-drying them. The dry bricks are then piled in stacks around an energy source, which fires them. The fuels used in this process—tires, oils, industrial waste, etc.—are highly polluting. Another major contributor to pollution is the leather and fur industry, and the fabrication of products using these materials. The toxic substances and metals released in these activities represent 27% of all microenterprise pollution and 22% of all SME pollution. Half of these releases come from firms with under 50 employees (14% from microenterprises, 11% from small enterprises).

Within this category, leather tanning and finishing represent 89% of production, by value—and of pollution, by volume—among micro and small enterprises. The thread, fabrics and soft

fibre finishing category also produces large quantities of toxic substances, with a strong concentration of microenterprises and SMEs engaged in these activities. Toxic releases in this area represent 20% of overall pollution. Nearly 30% of the pollution generated by microenterprises and SMEs in these activities is produced by firms with under 50 employees, accounting for 7% of the pollution. Within this category is the subcategory of finishing of soft-fibre threads and fabrics, which is responsible for 32% of production by value in micro and small enterprises, and for a correspondingly high percentage of the pollution produced.

2.3 Influence of the institutional and regulatory environment on the environmental behaviour of SMEs in the productive sectors under consideration

Increasing environmental regulations in the region constitute one of the forces driving SMEs toward sustainability and involvement in EGS markets. Following is a review of environmental regulation in the four countries studied in the project.

2.3.1 Argentina (Chidiak, 2004)

In Argentina, the federal government is responsible for organizing environmental policy. According to the 1853 Constitution, the division of authority between the central government and the provinces is based on which powers the provinces delegate to the central government. Thus, Argentina's environmental policy includes national legislation (to which the provinces can voluntarily subscribe), as well as provincial laws and municipal standards and regulations. This has generated (and continues to generate) numerous overlaps, and even competition, between jurisdictions, leaving room for regulatory gaps and discrepancies.

The constitutional reform of 1994 explicitly introduced a division of authority between the central government and the provinces in the area of environmental affairs. However, the division of responsibilities has proven to be unclear. On one hand, Article 41 states that "the central government shall set rules for minimum environmental protection standards, while the provinces shall establish the necessary complementary standards, without such rules prejudicing local jurisdictional authority." Also left unresolved is the problem of jurisdictional overlap. According to Article 121, the provinces retain all powers not delegated to the central government. Finally, Article 124 establishes that "the provinces shall have primary authority for natural resources in their territory." In other words, the provinces delegate the authority to dictate "minimum standards" for environmental protection, but these are enforced based on the complementary standards, and taking into account natural resource use (which fall under the authority of the provinces).

There is a federal agency charged with coordinating environmental policy. This body – the Federal Environment Council (Consejo Federal de Medio Ambiente, or COFEMA)– was created by the provinces in 1990. To date, it has not played a leading role (largely because of a lack of clarity concerning its institutional status), though it may be expected to play a more important role in the framework of the new Constitution and the new laws on minimum standards.

Since the mid-1980s, the provinces have advanced considerably in setting environmental protection standards. In some cases they have adopted national laws; in others they have set standards adapted to their own needs. Levels of environmental protection established by national and provincial legislation are considered to be, on the whole, relatively stringent, in line with those in developed countries. However, responsibility for implementing the standards falls to municipal and provincial entities with little technical and financial capacity, which face an

additional challenge: the objectives set forth in the legislation fail to take into account the conditions under which local business and public institutions operate.

In the last few years, in parallel with the economic crisis, many institutional changes have taken place. In some cases this has led to a reduction in the environmental bureaucracy, in both the central government and the Province of Buenos Aires. While this has not impeded the ability to capitalize on the lessons learned during the 1990s, there has been regrettably little regulatory change, due to the low political priority and limited funding assigned to the issue.

The lack of differentiation between standards for SMEs and for large firms has lent particular importance to national, provincial and municipal regulations regarding principal environmental concerns (viz., industrial waste and liquid effluents).

National standards

Liquid effluents

These are covered by Law 13577 on National Sanitation Works, which was modified by Law 20324 and Regulatory Decree 674/89 (PEN). Law 24051 on hazardous waste also bears on this area: Decree under 674/89 of resolution 242/93 (Secretariat of Natural Resources and Human Environment, or SRNyAH) sets standards for discharges of environmentally hazardous toxic substances from specialized or industrial facilities. Finally, Resolution 97/01 (Ministry of Social Development and Environment) established regulations for the sustainable management of sludge generated in liquid effluent treatment plants.

Decrees 674/89 and 776/92 set standards for emissions from specialized or industrial facilities, and identified activities subject to control by the national environmental agency. These require that annual affidavits be submitted, establish fines for failure to do so, and set a special pollution fee to be levied if an establishment exceeds permissible levels of discharges. Proceeds from this fee cover costs for monitoring and cleanup of waterways. Affidavits and industrial discharges are monitored by the Secretariat of Natural Resources and Human Environment's (SAyDS) Office of Pollution Prevention and Management (formerly the Office of Pollution Control). There has been scant enforcement of the special pollution fee and of fines for failure to provide the affidavit, principally due to lack of funds on the part of the agencies responsible for command and control. Moreover, there are problems of jurisdictional overlap between the federal government agency and municipalities in the Province of Buenos Aires. In addition, due partly to the complexity of the procedures established in the regulations, there has been limited enforcement of the special fee, thus giving firms little incentive to develop compliance plans.

Industrial waste

Law 24051 (1992) covering hazardous waste, and the related regulatory decree (831/93), were recently modified by the Comprehensive Industrial Waste and Service Management Law (no. 25612, 2002). This latter legislation has been controversial in various ways, although it is being used as a basis for developing regulations. Law 24051 deals with the generation, transport, treatment and final disposal of hazardous waste (excluding household waste, radioactive waste, and waste from normal ship operations). It covers waste in locations under the jurisdiction of the central government and, in provincial territory, waste destined for transport beyond provincial borders. It also applies when the relevant enforcement agency believes the waste could affect the environment or persons outside the province in which the waste is being generated. The law creates a registry of hazardous waste generators and operators, requiring them to register, obtain operating certificates and submit annual affidavits.

The law provides for both civil and criminal penalties, including fines for non-compliance. The criminal sanctions apply to those directly responsible for waste management, as

well as directors, managers, trustees, oversight–committee members, administrators, etc., when the violations are the result of a corporate decision. Regulatory decree 831 imposes fees for generators of hazardous waste, with the value of the fees proportionate to the hazard posed by the waste generated (as well as to the amount of inputs and raw materials used), with reductions in fines provided to reflect decreases in the quantity, and degree of hazard posed by, waste produced and used in other processes.

Law 24051 encountered numerous implementation problems, a substantial number of which were due to the jurisdictional issues cited above and to the institutional weaknesses among the agencies involved. First, the top national environmental–regulation agency has authority only in national cases where jurisdictional lines are crossed or where the issues are international in scope, except when a cooperation agreement between the province and the federal government is in place or when a municipality specifically requests intervention. For example, the law’s provisions for administrative and criminal sanctions are enforceable only in areas covered by national jurisdiction under the SAyDS and in provinces that have ratified the law.

Second, of Argentina’s 23 provinces, 14 ratified the law, while 7 created their own legislation and 2 failed to adopt standards—though one of these two issued a regulatory decree covering hazardous waste activities. Only 14 provinces have issued regulatory decrees or taken administrative measures to implement the provisions of the hazardous waste legislation—and in 3 of these, only pathogenic waste is covered. It is not uncommon for provincial law to prohibit the movement of hazardous waste, thus creating problems, not only in terms of enforcing the law (since waste treatment facilities are unevenly distributed throughout the country), but also in the sense that it makes it difficult for private agents to place a value on waste. These problems need to be solved by specific inter–jurisdictional agreements.

Third, a lack of funding for the federal agency, as well as for provincial agencies, has led to lax enforcement efforts. Moreover, available information is not up to date, due to limited mechanisms for disseminating the information. In addition, some provinces have not even established a registry of hazardous waste generators and transporters. Among these, some have required firms in their territory to register with the national registry (in some cases, as a temporary measure pending creation of a provincial registry). Accordingly, some firms located in provinces without clear regulations on hazardous waste have opted to register with the national agency.

Atmospheric emissions

Finally, two other gaps in environmental policy deserve mention. The first involves air quality standards. The only national law in this regard is the 1973 Atmospheric Pollution Law (no. 20284) of 1973. A regulatory framework for this law was never established, and thus it was never enforced. The hazardous waste law, however, establishes certain control parameters. Resolution 708/96 (of the former SRNyAH) set standards for measurement of gas concentrations and particulates discharged from smokestacks, under Hazardous Waste Law no. 24051.

Prevention

Law 24354 makes environmental impact statements (EISs) mandatory for projects involving public investment, as well as for private projects involving subsidies, transfers, contributions, guarantees, loans, or other benefits. Hazardous Waste Law no. 24051 requires EISs for the installation of hazardous waste treatment facilities. The requirement for EISs has been incorporated in the new minimum standards laws described below.

Only in 2002 were the first minimum standards laws, designed to update Article 41 of the 1994 Constitution, enacted. These cover:

- Industrial waste
- General environmental legislation (framework law)
- Polychlorinated biphenyls (PCBs)
- Water management.

Law 25612, on Comprehensive Industrial Waste and Services Management, was promulgated in part in November 2002. It was designed to replace Hazardous Waste Law no. 24051; unique to it is the fact that it introduces the concept of prevention and reduction at the source. It also provides for: (a) the creation of provincial registries and a City of Buenos Aires registry for industrial waste generators, stockpilers, transporters, and parties responsible for treatment and final disposal; (b) periodic submission of affidavits specifying the nature of the industrial waste being generated; (c) identification of waste throughout its life cycle; (d) environmental impact studies for facilities stockpiling, treating or carrying out final disposal of waste; (e) civil, administrative and criminal sanctions; and (f) coordinated enforcement efforts involving the Secretariat of Environment and Sustainable Development (Secretaría de Ambiente y Desarrollo Sustentable, or SAyDS), the provinces, the City of Buenos Aires, and COFEMA.

Since the law's regulatory structure is still in the process of being created; and given PEN's remarks in the decree, providing for partial promulgation of the law, the criminal sanctions regime of Law 24051 remain in force, with its definition of waste remaining in effect until such time as risk levels and implementation mechanisms for the new law are determined. Thus, no imminent solution is at hand regarding the jurisdictional problems described above, or with regard to national enforcement of minimum standards, since some provinces must first enact complementary laws.

Law 25675, the General Environmental Law (or, formally, the Law on Minimum Standards for Sustainable Environmental Management), promulgated, in part, in November 2002, establishes the general framework for minimum standards in different areas. First, it establishes the general principles of environmental policy, among which consistency and progressiveness are important elements. Second, it establishes a definition for "minimum standard": "any standard that provides a uniform or common environmental standard for the entire national territory for the purpose of creating the conditions necessary to protect the environment" (Article 6). Third, it identifies the environmental management and policy instruments. These include environmental land-use regulations, environmental information and assessment systems, monitoring systems, economic regimes, self-management mechanisms (i.e., voluntary commitments and self-regulation), and mechanisms for certification by independent, duly accredited and authorized organizations. Fourth, it establishes a federal environmental system organized through COFEMA. Fifth, it establishes a framework for regulations regarding environmental damage (mandatory insurance or creation of environmental restoration funds, objective accountability for harm to the environment, and an environmental compensation fund).

PCB Law, no. 25670, covering minimum standards for the management and elimination of PCBs, was promulgated in November 2002, setting minimum standards for the handling of PCBs throughout the country under the terms of Article 41 of the Constitution. It is designed to provide control over activities associated with PCBs, decontamination or elimination of equipment containing PCBs, and prohibitions on the production, marketing or importation of PCBs. The enforcement agency (SAyDS) is slated to formulate and implement a national plan for the management and elimination of PCBs, in collaboration with COFEMA. A regulatory framework for this law is needed.

Law 25688, on environmental water management, was promulgated in December 2002. It establishes minimum standards for the preservation, exploitation and rational use of water. The national enforcement authority (yet to be determined) will be responsible for: (a) defining levels of acceptable contamination for different uses; (b) setting guidelines for the replenishment and

protection of aquifers; (c) establishing environmental water quality parameters and standards; and (d) creating and updating a national plan for the preservation, exploitation and rational use of water (subject to approval by the National Congress), which is due to include mechanisms to coordinate action in different watersheds. This law is highly controversial, and could be declared unconstitutional by various provinces that do not favour the creation of watershed committees.

2.3.2 Colombia (Van Hoof, 2003)

The general objective of Colombia's environmental policy is to restore and preserve priority areas in ecologically strategic regions, fostering sustainable regional and sectoral development in a context of peace building. The objective includes three specific policy proposals: conserving and restoring priority areas in ecologically strategic regions; strengthening sustainable urban, rural and regional development; and contributing to the area's environmental sustainability.

Water, biodiversity and forests represent the three main types of programs designed to meet the objective of conserving and restoring priority areas in ecologically strategic regions.

Quality of urban life and sustainability of endogenous productive processes constitute priority program areas related to the objective of strengthening sustainable urban, rural and regional development.

Finally, *cleaner production and green markets* are the principal subjects of priority programs in connection with the objective of building the region's environmental sustainability.

Law 99, of 1993, created the institutional structure of the National Environmental System (Sistema Nacional Ambiental, or SINA). Its funds are utilized for two purposes: first, to support beneficiary institutions; and second, to promote SINA programs (e.g., those directed by regional autonomous corporations), as well as to support research institutions, urban environmental units, the Ministry of Environment, and municipalities.

The Ministry of Environment is SINA's governing body and sets national policy, as well as national environmental regulations to be enforced by regional and local environmental authorities. In addition, it manages protected areas. There are 33 regional autonomous corporations, which are responsible for implementing environmental policy and standards at the regional level. Of these, 7 are defined as sustainable development institutions, created under a special regime, with responsibility for areas that are strategically important due to the diversity of their natural resources.

The urban environmental units exist in metropolitan areas with populations of over 1 million inhabitants. These include DAMA, in Bogotá; the Administrative Department for Environmental Management (Departamento Administrativo de la Gestión Medio Ambiental, or DAGMA), in Cali; the Aburrá Valley Metropolitan Area, in Medellín; and Dadima, in Barranquilla. These entities are responsible for managing and monitoring urban problems such as industrial pollution of air and water and generation of solid waste. Finally, the municipalities and subnational governmental entities are also responsible for executing national policy, through regional environmental management efforts.

There are currently problems in coordination—within SINA and with other institutions connected with the productive sector, e.g., unions and governmental institutions. In order to achieve more efficient operation and avoid duplication of efforts, there must be greater commitment and coordination between the different actors, as well as increased knowledge on the part of regional corporations regarding SMEs.

Research institutions concerned with these issues include the Alexander von Humboldt, Invemar, Sinchi, and John Von Neumann institutes, as well as IDEAM (an auxiliary body), all of which are dedicated to research and to the development of policy designed to address Colombia's environmental realities.

2.3.3 Chile (Leal, 2003a)

The Chilean government has assigned priority to clean production policy in attempts to address environmental problems in productive sectors. The objective of the policy is primarily preventive. Thus, instead of attempting to eliminate waste at the end of the pipeline, it focuses on ways to change production methods to reduce the generation of problematic waste. Given that the objective is to reduce pollution through improvements in the production process, political commitment to achieving this goal is considered more important than imposing sanctions after the fact. This policy could prove beneficial for business, since better production processes not only reduce pollution but also create a chain–reaction effect that could significantly reduce the cost of production through a series of savings and efficiencies. Thus, pollution ceases to represent a looming cost threat for businesses, becoming instead a route to better and more economical production.

Cleaner production is not, however, without some significant pollution–control costs for businesses—costs that most SMEs are unable to meet. A number of promotional instruments are in place to address this problem, though it is too early to determine whether these have improved the environmental performance of SMEs.

SMEs, in the course of carrying out their normal activities, must comply with a series of environmental requirements. Following is a summary of these requirements, based on a compilation made by CONAMA (1996) and CORFO (1997), and updated by SOFOFA (2001) (Leal, 2003a).

Workplace requirements on basic water and sanitation facilities, covering areas such as showers, cafeterias, drinking water, sewage and handling of trash, are set forth in the Ministry of Health’s executive decree 745/93. Industrial safety and hygiene are covered in the Occupational Illness Law (no. 16.744). Noise standards related to fixed sound sources are established in executive decree 146/97, which is based on a revision of the standards set forth in the Ministry of Health decree 286/84. Atmospheric emissions from boilers are governed by Ministry executive decrees 144/61 and 48/84. Visible smoke is regulated by Health Service resolution 1.215/78. Declared and certified particulate matter is covered by Health Service resolution 15027/94. Ministry of Health decrees 4/92 and 19057, and executive decree 59/98 establish the benchmark for MP10 breathable particulates, and define thresholds for air quality emergencies. Finally, in view of the fact that the Santiago Metropolitan Region has been declared a saturated zone, decree 812/95 mandates that standards for levels of particulate–matter emissions by new industries be set at levels that compensate for emissions from already established industries.

Other standards are specified in: executive decree 65/98 (regarding atmospheric emission of arsenic); executive decree 686/98 (setting standards for light pollution); executive decree 167/99 (governing noxious odours–hydrogen sulphide compounds and TRS gases–associated with the production of sulphurized pulp); and decree 136/2001 (establishing the benchmark for airborne lead).

With respect to liquid industrial waste, industrial facilities are required to adopt preventive, reductive or treatment measures to prevent damage to sewer systems (executive decree 609/98), as well as to surface and ground water, seawater, and inland bodies of water (executive decree 90/2001). Enforcement is overseen by the General Directorate of Water and the Superintendency of Sanitation Services (law no. 3133 and related regulations, and executive decree 351/92 of the Ministry of Public Works).

With respect to industrial solid waste and hazardous substances, resolution 5081/93 mandates that statements be submitted to the health authorities in the Santiago Metropolitan Region regarding any such substances leaving the premises of an industrial facility, and requires that authorization be obtained for the accumulation or treatment of waste on the premises. Various bodies of law define types of solid waste, while lists exist specifying hazardous waste

(Ministry of Health executive decree 745/93 and Ministry of Defence executive decree 1/92). All of these have major importance for SMEs.

In regard to atmospheric emissions, most of the regulations apply to the Santiago Metropolitan Region, where the problem is most acute. Ministry of Health executive decrees 4/92, 1583/93 and 1905/93 set levels and timeframes for reduction of gas and particulate emissions. These regulations distinguish between large and small sources, with some SMEs falling into the latter category. Executive decree 812/95 provides rules for offsets (established, as a principle, in executive decree 4/92) and defines their scope of application.

With regard to air pollution, a recent change in the regulations deserves mention. In September 2001, executive decree 59/98, which sets benchmarks for breathable particulate matter (PM10), was modified by executive decree 45/2001, making the daily standard more demanding by reducing the permissible limit from 150 $\mu\text{g}/\text{m}^3$ to 120 $\mu\text{g}/\text{m}^3$. This decree also established an annual limit of 50 $\mu\text{g}/\text{m}^3$ for PM10.

The most important consequence of this standard, originally devised for the Metropolitan Region, is that it will also apply to any other region that becomes a saturated zone. Thus, an abatement plan with limits for stationary industrial sources, residences, agriculture, transportation, trade, etc. is needed. Declaring new saturated zones will also impose limits on industrial growth, lead to the establishment of new standards for those areas, and involve offsets for emissions.

The most significant element of this situation, from SOFOFA's perspective, is that the comparative advantage of particular regions will be limited with respect to environmental issues. This will slow the trend for existing firms to migrate, or for new firms to locate outside of the Metropolitan Region, thus lightening the burden pollution imposes on the Metropolitan Region (particularly Santiago itself).

Another law notable in this regard is the law freezing industrial development (n° 19744, August 2001). This modifies Article 62 of the General Real Estate Development and Construction Law, and is designed to provide flexibility for standards that freeze development of industrial land, i.e., circumstances in which current metropolitan, municipal or sectoral zoning plans prohibit expansion or changes.

The object of the freeze was to prevent urban sprawl and the associated environmental degradation, traffic congestion and urban blight, to mention the most acute problems. The legislation was partially in response to neighbourhood conflicts, and in part a result of the need to reduce pollution in the Santiago basin. In view of these problems, authorities felt compelled to adopt measures to freeze expansion of existing industrial facilities.

This particularly affected SMEs, which did not have the capacity to invest and therefore fell behind in the race for market competitiveness. Because the freeze included environmental improvement initiatives, many potential efforts, e.g., in the area of cleaner production, were not carried out. In light of this, the government provided incentives for a group of 17 municipalities, within the Metropolitan Region, to utilize a special provision to reincorporate their problematic industrial zones in the Metropolitan Zoning Plan. While this has led to a number of studies by municipalities and labour organizations, and has produced limited progress, only two municipalities have met the necessary requirements.

In the wake of legal changes mandated by Law 19744, the current status is that land development is frozen only in the sense that the volume of construction cannot be increased. Anything involving investment in improving technology and equipment is permitted within this scheme. Furthermore, there is now an exemption for spatial expansions designed to mitigate adverse environmental impacts. Investments in treatment plants, for example, are not affected by the freeze, and can be carried out, provided that they comply with all environmental and other

regulations. Also permitted are enhancements of the architectural and aesthetic quality of existing facilities.

This regulatory framework has set forth a general roadmap, and in some cases the objectives have been achieved, e.g., reduction of particulate emissions from boilers was accomplished by conversion to natural gas. New standards for liquid industrial waste (affecting sewers, as well as surface and ground water) were implemented only recently, and thus far the major regulatory efforts have been aimed at finding ways to help firms comply with established standards. In this connection, clean production agreements have been useful. The reaction of the now privatised sanitation enterprises –whose responsibility it will be to oversee compliance with emissions standards (standards they themselves will be required to meet)– remains to be seen.

In terms of environmental standards for SMEs, it is clear that existing standards on noise and liquid industrial waste, as well as the Metropolitan Region’s abatement plan, will encourage firms to undertake cleaner technology initiatives. This could also occur in newly declared saturated areas.

There is as yet no initiative in the SME sector, which seems unconcerned about the issue, at least according to existing data. Informants indicate that the issue is not of concern to SMEs, though there is no independent evidence to confirm this. Absent more definitive data, it would appear that interest in ISO 14000 in Chile is confined to large firms.

Both the forestry and metal–mining sectors (specifically, copper) and the non–metallic mining (cement) sector could find themselves compelled to adopt tangible measures to obtain certification. This issue, however, relates to large firms, not to SMEs. A number of large firms in other sectors (Nestlé, the food products company, and the foundry AZA) have moved toward certification, but not under ISO standards.

A joint study by the consulting firm TESAM and the Environmental Research and Planning Centre (Centro de Investigación y Planificación del Medio Ambiente, or CIPMA) is working on categorizing different pressures, emanating from abroad, that affect Chilean firms (Leal, 2003a). The study indicates that a distinction is generally made between environmental requirements for products, and environmental requirements that apply to production. Product requirements are of the following types:

- Legal provisions setting minimum or maximum values, e.g., for chemical substances.
- Regulations on the application or prohibition of hazardous substances.
- Restrictions on the marketing of products with hazardous inputs (e.g., PCBs).
- Production and consumption quotas (e.g., CFCs).
- Limits on emissions and noise (e.g., automobiles).
- Requirements regarding energy efficiency or rational consumption of inputs for consumer products (e.g., refrigerators and washing machines).
- Requirements relating to the post–consumption phase (e.g., separation and recycling of refuse).
- Ecological labelling (e.g., statements regarding inputs).
- Regulations concerning packaging (e.g., percentage of recycled material).

These requirements are, of course, general in nature, and there is little documentation regarding the specific demands they have placed on Chilean firms. Some of this information, inasmuch as it relates to the marketing strategies of firms, may be confidential. This situation may also apply in the case of voluntary instruments such as “green” or “ecological” seals, which some firms deem necessary for marketing purposes. One such influential seal is the “European Flower” introduced by the European Union in 1992, which applies to washing machines, dishwashers, paper products, textiles, paints and lacquers.

2.3.4 Mexico (Domínguez, 2003 and Romo, 2005)

Though a federal law designed to prevent pollution of the environment has been in place since 1971, only in 1988 was the General Ecological Equilibrium and Environmental Protection Law promulgated. This was one year after the constitutional changes that gave the State responsibility for restoring and preserving ecological equilibrium and for environmental conservation. The first phase of industrial environmental policy in Mexico targeted the most conspicuous causes of industrial pollution. The standards were aimed at the use of separate regulatory instruments designed to deal with industrial pollution to water, air and the atmosphere, respectively. Development of regulatory schemes and mechanisms was unsystematic during this phase.

During the 1990s, institutional changes needed to enforce the 1988 law were implemented. In 1992, the National Institute of Ecology was created, with the mandate of overseeing administrative and regulatory functions related to environmental management policy and to the operation of the Office of the Federal Prosecutor for Environmental Protection.

Specific standards were set forth in the Ecological Technical Standards publication, first issued in 1992. The bulk of these standards relate to air quality, followed in number by those concerning standards for the management and disposal of hazardous waste. These standards relate primarily to industry, as shown in table 2.11.

TABLE 2.9
DISTRIBUTION OF THE 58 OFFICIAL MEXICAN ENVIRONMENTAL STANDARDS,
BY TYPE

Sector	Number of standards	Percentage
Air quality	31	53.45
Water quality	3	5.17
Management and disposal of hazardous waste	9	15.52
Conservation of natural resources	5	8.62
Ecological regulation	6	10.34
Noise emissions	4	6.90
TOTAL	58	100.00

Source: Lilia Domínguez, "Necesidades de bienes y servicios ambientales en las micro y pequeñas empresas: el caso mexicano," *Medio ambiente y desarrollo series*, No. 61 (LC/L.1791-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), May, 2003. United Nations publication, Sales No. S.02.II.G.106; David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

The approach to industrial standards has changed, moving toward identical conditions for all regulated parties, rather than addressing their individual technological characteristics, and toward establishing different limits according to which part of the environment is affected by the pollution. Thus, the number of regulations mandating standards has decreased, though new environmental impact issues have been incorporated.

The industrial sector has the greatest number of official standards. In distant second place is the transportation sector, accounting for 17.24% of all regulations on standards, with the service sector accounting for 12.07%. The agricultural sector lags far behind.

2.4 Institutional, regulatory and economic variables important to developing the environmental goods and services sector

This section continues to analyse the framework within which the four countries' environmental management is unfolding, with a view to uncovering opportunities for the development of EGS markets.

2.4.1 Argentina

Given the importance of finding ways for SMEs to make investments and progress in environmental management, it is worth reviewing the lines of credit available to SMEs wishing to improve their environmental practices. Here, a range of credit offerings, differentiated according to the source of funding, is examined.

Environmental-improvement loans funded in part by the Secretariat of Small and Medium Enterprise (SEPYME)

General Program for Micro and Small Enterprise Credit

“Iniciar”: This program seeks to increase credit opportunities for micro and small enterprise throughout the country. Loans are for a maximum of US\$50,000, with no minimum amount, for capital goods (procurement of fixed assets), working capital and/or technical assistance (training). Program funds are provided by the Inter-American Development Bank (IDB), and by the participating financial entities themselves. SEPYME serves as the executing agency.

Italian Credit:

SEPYME administers credit provided by the Italian government. The loans are for procurement of goods, raw materials, intermediate inputs, technology transfer, training, technical and trade assistance, industrial patents and licenses. The amounts range from 25,000 to 2.5 million euros, with repayment periods of up to 10 years, grace periods of up to 3 years, and a maximum annual interest rate of 5.2%. The technical evaluation committee (which includes representatives of the Ministries of Labour, Economy, Foreign Relations and Production) employs the following criteria, which determine priorities in granting loans:

- a) The percentage increase in employment achieved;
- b) Siting of productive activities in areas of the country with high unemployment and/or internal migration;
- c) Increasing the value added through the use of local raw materials;
- d) Firms in which a large percentage of jobs are held by young people and/or women;
- e) Introduction of technologies that facilitate job creation in areas of high unemployment while utilizing local raw materials, providing jobs for young people and women, and employing environmentally friendly technical processes.

National Fund for the Development of Microenterprise and SMEs (Fondo Nacional de Desarrollo para la microempresa y la PYME, or FONAPYME):

FONAPYME finances projects for micro, small and medium enterprises already in existence or currently being formed, and for partnerships made up exclusively of such firms. The purpose is to finance investments that create or expand firms' productive capacity or facilitate the introduction of new products, services or processes with the demonstrated capacity to enhance the

development, expansion and growth of the firms involved. Priority is given to projects that target the domestic market, with the main emphasis on import substitution. High priority is also given to projects with a major impact on regional development and job creation. Individual projects receive a maximum of US\$150,000, while partnerships are eligible to receive up to \$250,000. The minimum, for projects of both types, is \$25,000.

Support Program for Business Restructuring (Programa de Apoyo a la Reestructuración Empresarial, or PRE):

This program is funded by the central government, the IDB and the beneficiary businesses themselves, for the purpose of strengthening the competitiveness of Argentina's SMEs. The program is co-funded by nonreimbursable contributions of up to 50% of the amount firms invest in professional technical services to increase their competitiveness. Currently, the program is open only to partnerships, i.e., to groups of firms that collaborate in addressing a specific need and achieving a common goal.

CERPOME Argentina:

The European cooperation project for Argentina's Regions and SMEs (ARG/B87–3010/95/172) is the result of a funding agreement between the EU and Argentina. The project's governing bodies are SEPOME and the European Commission. The mission is to improve the competitiveness of Argentine SMEs in their quest for greater internalisation, and to promote the development of regional economies. The beneficiaries of the project's activities are selected SMEs, productive development agencies, and business associations and organizations.

Trusts and mutual guarantee systems:

These mechanisms, developed in collaboration with Banco de Inversión y Comercio Exterior (BICE), are designed to grant loans to microenterprises and SMEs for projects that can demonstrate their economic viability, growth potential, and job creation capacity. Up to 15% of the fund may be used to finance start-ups. The mutual guarantee companies (MGCs) act as guarantors for the regional or sectoral investment funds promoted by BICE. The regional investment trusts –relying on private monies from the Retirement and Pension Fund Administrator (Administradora de Fondos de Jubilación y Pensión, or AFJP), banks, insurance companies, etc.– are capitalized by BICE, and by the province or local entities involved. The trusts were first proposed in 2000, designed to address four cases: La Pampa, Mendoza, Rafaela and Rosario. The MGCs, established by law in 1995 and modified in 2000, provided for the creation of FOGAPOME, a guarantee fund for SMEs, acting through provincial MGPs as a “second-tier” guarantee fund to stimulate the emergence of guarantees required by first-tier institutions.

Microcredit

There are currently no microcredit programs in Argentina specifically associated with private-sector environmental management or with the provision of urban environmental services. However, microcredit initiatives targeting the productive development of microenterprises, and applicable to environmental management needs, emerged in the 1990s. Previously, microcredit opportunities had placed greater emphasis on social development and rural initiatives.

Though microfinance has burgeoned as a poverty reduction policy instrument, various microcredit schemes for other sectors of the population have also appeared, reflecting a recognition of the fact that micro and small enterprises have difficulty obtaining bank credit. One of the early microcredit initiatives was FONCAP (Fondo Fiduciario de Capital Social, or Social Capital Fiduciary Fund), which was created ten years ago. FONCAP manages a line of credit designed for microenterprise finance institutions, focusing on institutions that have consolidated a

position in the microcredit field. FONCAP also provides training for beneficiary entities, and develops projects for the microenterprise sector as a whole. These projects may involve research, training or technical assistance, and can extend to activities related to environmental management.

There are also some programs, such as the City of Buenos Aires's Centre for Support to Microenterprises (Centro de Apoyo a Microempresas, or CAM), and the National Industrial Technology Institute (INTI). Though these are not microcredit programs, as such (since that nonfinancial components are also a vital part of the programs), the financial aspect has central importance from a business perspective.

CAM's activities focus on encouraging the emergence and consolidation of microenterprises capable of becoming sound producing firms. The objective is to help these enterprises grow and develop, rather than simply supplying emergency social aid. CAM's service is one element within the municipal productive development objectives; thus, it explicitly targets enterprises with the potential to create new business opportunities and create jobs, while at the same time providing financing for subsistence microenterprises. CAM is a comprehensive centre for financial services, training and technical assistance. It provides credit subject to the following conditions:

- Management is conducted by staff, and loans are granted to natural persons.
- The loans are targeted to businesses within the city of Buenos Aires.
- The maximum loan amount is US\$6,000.
- The interest rate is 0%.
- The repayment period includes up to 30 payments, with grace periods of up to 6 months.
- Loans are renewable.
- Technical assistance is provided during the loan evaluation period, as well as during the repayment period.

There is also a microenterprise support program (including microcredits) that has begun implementation under the National Industrial Technology Institute (INTI), a public institution that provides technical assistance and technological development services to Argentine SMEs. INTI is present throughout the country, and serves some 7,000 enterprises at least once a year. It has 29 specialized centres, including the Rational Energy Use Research and Development Centre (Centro de Investigación y Desarrollo para el Uso Racional de la Energía, or CIPURE), which promotes efficient energy use, and the Environmental Engineering Research and Development Centre (Centro de Investigación y Desarrollo de Ingeniería Ambiental, or CIIA), which focuses on natural resources, effluents, waste and industrial hygiene. This support for microenterprises includes a number of special programs. One is an environmental program, whose principal mission is to "coordinate the technological offerings and services of the INTI centres in order to provide firms with comprehensive solutions for identifying and evaluating environmental problems, facilitating the search for corrective measures, reducing pollution through minimization strategies and the implementation of clean technologies, and encouraging the recycling and use of waste." This program conducts training activities related to environmental conservation. It also participates in INTI activities in the following areas: environmental protection and rehabilitation technologies; wastewater and gas effluents; industrial waste; clean technologies (especially in manufacturing); and environmental management tools. Another special program associated with environmental problems is the industrial recycling program.

INTI also has a program known as Industrial Projects for Microenterprise Investment, which—according to statements by INTI representatives during interviews conducted as part of this study—assists and finances microenterprises. The program provides technical and financial assistance to microenterprises involved with environmental management services provided by

INTI. It is based on an agreement between INTI, Polo Tecnológico Constituyentes S.A., FONCAP S.A. and GARANTIZAR S.G.R. Microcredits in amounts of up to US\$15,000 are provided for productive microenterprises, with a maximum repayment period of 30 months (for fixed assets), or 12 months (for working capital) and grace periods of up to 6 months, with payments weekly, biweekly or monthly. Interest rates are non-concessional—currently 30% annually, equivalent to the rate charged by FONCAP, which funds the INTI program.

The Secretariat of Environment and Sustainable Development (SAyDS) has no funds or mechanisms of its own for promoting or financing environmental management investments. Only the Ozone Program Office (Oficina del Programa Ozono, or OPROZ) has the ability to provide funds (through donations from the Montreal Protocol Multilateral Fund) for restructuring activities designed to eliminate the use of substances damaging to the ozone layer. As of the end of 2002, it had 85 approved projects in implementation, involving some 100 firms, many of which were SMEs.

2.4.2 Colombia

In Colombia, the National Environmental System (SINA) serves as a pillar of environmental management. Its activities deal with standards, economic and financial instruments, and facilitators. For a number of reasons, the effectiveness of its regulatory and monitoring instruments in the SME sector, however, is limited. First, the sector includes a large number of firms, and the agency has limited resources for monitoring and control. Second, the regulatory structure employs end-of-pipe measures, which increase fixed operating costs rather than reducing production costs. To complicate matters, the standards are continually changing, with national and local regulatory jurisdictions overlapping. Some of the standards are unenforceable, particularly in the case of SMEs, which operate under special economic and technical conditions. Moreover, the scope of the regulatory system is limited by the fact that it does not deal with all types of waste (e.g., hazardous waste is not covered).

Programs to improve environmental management and promote self-management and self-regulation through such tools as clean production agreements and environmental management systems (EMSs) have also been of little use. This is due in part to a lack of awareness on the part of SMEs, as well as to the lack of professional and financial capacity required to implement them.

All of the programs, policies and funding mechanisms reflect the state of environmental affairs in Colombia, where environmental institutions will require greater capacity if government is to interact effectively with industry and other institutions to achieve the basic objectives for improving the country's productive and institutional structures.

SME policy in Colombia

The performance of SMEs prior to, during, and following liberalization in Colombia showed that these firms were a potential focus of development. However, they faced the same risks as large firms, making them particularly vulnerable to changing conditions. Thus, it was essential that government take a more active policymaking role to support business development by increasing the availability of financial instruments, technical advisory services, and training.

Below is a description of the policies and programs currently in place to improve Colombian SMEs' performance.

Law 590 of 2000 (Promotion of micro, small and medium enterprises in Colombia)

Law 590, of 2000, is designed to promote the integral development of micro, small and medium enterprises by improving institutional conditions, encouraging technological

development and facilitating access to financial markets. Given the goal of increasing the productivity of small capital, job creation, regional development and exportable goods are important. The principal objectives of the law are:

- to improve the institutional environment through proposals for technological and financial alternatives;
- to give SMEs greater representation by strengthening the High Council of Small and Medium Enterprises and by enhancing government strategy for the sector, making SMEs a target of public policy;
- to establish a single business registry, in which firms provide the information and records needed by public institutions, thus minimizing red tape without jeopardizing enforcement of tax and tariff measures;
- to promote a government procurement policy that stimulates SME goods and services markets, while relying on foreign–trade entities to carry out a similar function at the international level;
- to provide tools to remedy the problems SMEs face in obtaining loans; and
- to put the National Guarantee Fund into operation to facilitate formal financing for small businesses by providing guarantees.

National policy to promote entrepreneurial spirit and the formation of businesses

The policy was developed by the Ministry of Economic Development in order to promote entrepreneurial spirit and encourage the formation of businesses. This has primarily taken the form of technology transfer programs handled through research centres and universities. It also provides new lines of credit and supports the Industrial Development Institute (Instituto de Fomento Industrial, or IFI) through new guarantees for businesses. In addition, it supports business incubators, technology parks, venture capital funds and tax incentives for new businesses.

In short, the policy attempts to create an environment that favours the development of SMEs by strengthening their productive and competitive capacities and making available specific financial resources. The policy, which has been in place for only a few years, is not viewed as a short–term strategy. It emerged from a recognition that the SME sector, though traditionally neglected by government policy, was important for economic recovery in the wake of the latest economic crisis of 1999.

To articulate and implement policy approaches for the SME sector, the Colombian government has created a number of programs to provide financing and advisory services, as well as facilitate project development by SMEs. The most important of these programs are:

Special programs for SME development

- *Subcontracting network*: This is a computer system of contacts based on partnership between government, business organizations, workers’ organizations and technology centres. It seeks strategies designed to strengthen business performance among SMEs.
- *National design program for industry*: This program seeks to bring new management, development and innovation schemes to SMEs. It has offices in the cities of Bogotá, Medellín, Cali, Barranquilla, Bucaramanga and Manizales.
- *The “Buy Domestic” program*: This program focuses on SMEs as providers of goods and services for the public sector, as a means of strengthening the country’s productive sector. In 2000, 76% of public sector procurement of goods and services took the form of transactions with Colombian businesses.

- *Joint program of the United Nations Industrial Development Program and the Colombian Ministry of Development:* This program is designed to open channels to attract capital and technology to SMEs.

EXPOPYME

This program is directed to small and medium enterprises wishing to begin or strengthen international marketing activities. It was created in 1999, and as of December 2001, was working with 1,680 businesses. The SMEs are being advised by regional universities regarding the formulation and execution of export plans. In the second phase, Proexport finances 50% of the training of entrepreneurs who satisfactorily complete the EXPOPYME program. These graduates become candidates for multi-purpose EXPOPYME lines of credit at BANCOLDEX.

Technology parks project

Technology parks are collaborative projects that involve technological development centres (TDCs), business incubators, universities, municipalities and the business sector. They include three strategic lines of action: 1) models for innovation; 2) dissemination, transfer and marketing of technology; and 3) articulation with national and international networks. Currently, five technology parks are being developed. They are located in Antioquia, in the Caribbean region, in the primary coffee-growing region, in Cundinamarca and in Santander.

Program for the development of SMEs in the public service sector

The purpose of this program is to provide opportunities for SMEs as suppliers or operators of public services. Such activities are not limited to services supplied to government (as stipulated in the National Constitution and in the General Public Services Law). Here, incentives are similar to SME incentives in other contexts, and are designed to strengthen SMEs' participation in this market. Nationally, over 100 SMEs are involved in drinking water treatment, wastewater treatment, and solid waste collection and disposal. The principal information available regarding the scope of the program comes from the Antioquia region, where SMEs have expanded their activities in drinking water treatment, wastewater treatment and solid waste collection in regions without access to the services of public enterprises.

National agricultural technology transfer program (*Programa nacional de transferencia de tecnologías agropecuarias*, or PRONATTA), Ministry of Agriculture and Rural Development.

The principal objectives of this program are to facilitate rural producers' access to unfamiliar technological options, and to strengthen producers' organizations as a source of demand and as organizers of training projects. The total amount available for technological training projects is approximately US\$50,000. The program targets small rural producers.

National innovation system (Sistema Nacional de Innovación, or SINA)

This program is led by the Francisco José de Caldas Colombian Institute for Scientific and Technological Development (*Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología "Francisco José de Caldas,"* or COLCIENCIAS). The program draws support from 50 technological development centres (TDCs)—entities specializing in the generation and dissemination of knowledge for the productive sector. Participating SMEs receive training and advice from the centres to oversee the quality, measurement and enhancement of productivity, facilitate the development of e-business platforms, and promote leadership.

National quality assurance program (Programa Nacional de Aseguramiento de Calidad, or PNAC)

Under this program, the National Learning Service (*Servicio Nacional de Aprendizaje*, or SENA) provides training and specialized technical assistance for firms engaged in export or with the potential to do so. The program helps them implement and obtain certification for quality control systems capable of gaining access to foreign markets and improve their competitiveness.

In addition, the program promotes certification, under international technical standards, for firms located in cities with strong concentrations of industry.

Project to Support Rural Microenterprise Development (Proyecto de Apoyo al Desarrollo de la Microempresa Rural, or PADEMÉR)

The purpose of this project is to encourage job creation, increase the productivity of microenterprises, and make their products more competitive. The program, which is executed by the Ministry of Agriculture and Rural Development, through the National Technical Coordinating Unit, provides comprehensive assistance to microenterprises in areas such as technological development, marketing, and obtaining credit.

Financial resources

Completing the description of the foregoing programs is a summary of the financial resources available for their implementation, i.e., the national development funds available to help SMEs attain their objectives.

The National Guarantee Fund was established to provide guarantees for projects seeking credit for the first time. The fund guarantees between 50% and 60% of the total loan amounts. In 2001, the fund was involved in guaranteeing loans for nearly US\$ 192 million, providing benefits for 50,192 Colombian firms. The previous year, US\$78.7 million was provided to 37,243 firms.

For regional coverage (in Bogotá only), the Fund for Environmental and Technological Restructuring (*Fondo para la Reconversión Ambiental y Tecnológica*, or FRATI) co-funds environmental restructuring projects for SMEs, at the same time providing monies for the IFI-DAMA line of credit, earmarked for projects involving environmental abatement, technological development, waste minimization, fixed assets, and working capital.

Various options are available for providing support to business projects, depending on what phase they are in. For the conception phase, support is available from the country's ten business incubators, which are located in cities (Bogotá, Medellín, Cali, Barranquilla, Bucaramanga, Cúcuta, Pereira, Rionegro, etc.). This support targets technological projects. Also related to the initial phase of projects is the Bogotá Chamber of Commerce's "one-stop shopping," which is designed to simplify the procedures required for a firm to obtain formal legal status. For later phases of projects, venture capital funds also are available.

These programs provide the resources to carry out the provisions of the SME law. Elements such as innovation, technological development and developing firms' export potential are supported by funds earmarked for these activities. Notable successes include EXPOPYME and FOMIPYME, which have succeeded in inserting SMEs in markets not previously explored by such firms, including the international market.

There is a need for greater national dissemination of information regarding these programs since, to date, Bogotá, where the greatest number of SMEs are located, has received most of the attention. Other major cities have received scant attention from environmental authorities and other institutions working to support SMEs. The Inter-American Development Bank's Multilateral Investment Fund (MIF) is one of the few programs that has extended its activity to other cities, ensuring that the program will spread to other regions.

2.4.3 Chile

In terms of environmental compliance, SMEs are currently under little pressure from government. Since a number of studies showed that the new standards would be impossible for SMEs to meet, there was a deliberate effort to exempt them from most of the requirements. In addition, environmental policy in Chile has been shifting since 1994, when the General Environmental Law was enacted and the institutions needed to implement it were established. The principal instruments were designed to address issues related to major polluters (large firms), through a

program of prioritised standards and prevention and abatement plans, as well as new investment (involving a system to assess environmental impact).

The emphasis was placed on enforcement and control instruments. Other tools, such as economic incentives, were studied and designed in a tentative, preliminary form, but were not implemented. Only in the last few years has there been a shift toward accountability measures, and the re-emergence of an economic incentives tool (abatement bonds, an issue currently being debated in the context of proposed legislation).

Thus, there has never been an environmental SME policy, as such, merely interesting attempts to support SMEs in their efforts to comply –albeit only in part– with new regulations. One important attempt in this area is the second version of the clean production policy (2001–2005), which outlines a series of instruments, some of which are clearly designed to address SMEs' environmental problems.

The new standards on liquid discharges to sewers and to surface water (liquid industrial waste), the modification of noise standards, and the rules regarding hazardous solid waste are likely to affect SMEs. None of these new standards is yet being enforced. In urban centres, and especially in the Santiago Metropolitan Region, there is some pressure for compliance in relation to atmospheric emissions, particularly discharges from boilers and foundries. These standards are the result of the abatement plans. CONAMA believes that they will not affect SMEs, but other actors maintain that compliance efforts should not discriminate on the basis of firms' size, but should simply enforce the regulations. SME labour organizations have taken an aggressive stance and show little inclination to collaborate in attempting to meet environmental requirements. They have been highly vocal in the press regarding their opposition to government policy, and have exerted mounting political pressure. The reasons for this are understandable, given the crisis in the sector.

Most observers agree, however, that the major environmental demands on SMEs derive from recent Health Ministry executive decree 594/2000 (modifying a 1982 decree that, in turn, was modified by Decree 745/92). This decree establishes workplace environment and health standards. Its primary focus is not environmental; rather, it is aimed at the conditions within firms. Nevertheless, it represents the greatest environmental challenge to SMEs.

For reasons of social policy, Chile's position has advocated support for the SME sector, while at the same time making efforts not to neglect business criteria. It has placed special emphasis on modernization, competitiveness and efficiency. A number of development instruments, public–private committees, and training and technical assistance centres have been in operation for several decades. In order to enhance the effectiveness of environmental policy, some of these instruments have been adapted to address environmental problems among SMEs. The State has made been making valuable contributions in this area since 1996. These development instruments have been redefined, so that they now are linked to clean production policy –a preventive sectoral environmental policy overseen by the Ministry of the Economy, which has authority to earmark funds for the SME sector.

The policy also promotes tools and instruments such as the Public–Private Clean Production Committee, clean production agreements, the annual Clean Production Month (which features exchanges of information and training in all of the country's regions), and the INTEC Clean Production Centre.⁶ The clean production policy is part of the Productive Development Forum, a broad-based group from government and business (including workers) that is dedicated to advancing a common strategy to improve insertion in the globalisation process.

⁶ The Centre was discontinued in 2004.

To date, clean production agreements have been implemented in a number of industries: sawmills, cellulose, chemicals (liquid effluents, paints and containers), foundries, construction, pork production and agribusiness. These agreements have emerged primarily as a result of environmental demands related to changes in standards and foreign trade, a decision by enforcement agencies to focus on prevention, the involvement of business groups, the feasibility of utilizing development instruments to improve environmental management, and the presence of SMEs in most of these sectors. Thus, current activity under the clean production policy shows that these are probably the sectors with the greatest demand for environmental goods and services.

There have been notable efforts recently to extend the clean production policy to the municipal level, where pilot experiments are already in progress. This approach offers some interesting concrete possibilities for SMEs. While the policy always claimed to be oriented to SMEs, the fact is that it has been most welcomed by –and most effective among– large firms and in the most highly modernized economic sectors.

The application of certain development tools in the tanning and galvanoplastic sectors, outside the context of the clean production agreements, reveals a demand from SMEs in these sectors. Studies conducted in municipalities within the Santiago Metropolitan Region, especially among microenterprises, indicate that many local environmental problems are associated with auto repair shops (waste oil), stockyards (poultry and pigs), vineyards, goat husbandry and fruit operations, which often function on a clandestine basis. In these cases, pressure regarding environmental degradation comes principally from the population, and is felt at the municipal level, which in turn places pressure on the regional health services.

In the agribusiness sector, the best–practices approach has been emphasized, in both agriculture and salmon farming. This is considered the equivalent, for the agribusiness sector, of the clean production policy in the industrial sector. Action is being taken in poultry rendering plants and in pig and cattle slaughterhouses, milk production facilities, the fruit industry, and the salmon industry. In the latter case, an agreement, making available a line of development instruments, has been in place between the Ministry of Agriculture and CORFO. In this context, the environmental problems relate to liquid industrial waste and industrial solid waste, with special focus on pollution from pesticides and herbicides.

Other CONAMA and CORFO studies point to extremely high demand for environmental services on the part of similar sectors. Censuses show that it is in these same sectors that Chilean SMEs are most numerous. The conclusion, to summarize the studies, is that the sectors in need of greater study and field–generated proposals are:

- the food industry (particularly fruit and vegetable processing, poultry growers, meat processing and dairy production);
- textiles;
- publishing;
- chemicals and pharmaceuticals;
- the metal–mechanic sector; and
- the leather and shoe industry.

In all of these cases, however, structural factors impede the ability of users to access these instruments for environmental purposes. Bureaucratic red tape is one major problem. Another is the fact that information is not available to users in a timely fashion –a problem recognized by nearly all involved. Beyond these, however, is the fact that environmental policy has taken an increasingly low profile, from its inception to the present. It should therefore be no surprise that producers have shown little interest in making environmental investments, despite the availability of resources for this purpose.

Development instruments

The principal development instrument is the environmental Technical Assistance Fund (*Fondo de Asistencia Técnica*, or FAT). This fund, which provides support to businesses, with a special focus on SMEs, is designed to improve business management, competitiveness and productivity. Its primary tool is to subsidize professional services for specific programs. The fund includes environmental management within its areas of action, with emphasis on the following areas:

Environmental assessments and audits

Here, the objective is to identify environmental problems in industry, and to propose opportunities and methods for addressing them. In the current phase of environmental management in Chile, this line of action is particularly relevant to the enforcement of standards. Clean production initiatives represent another area of importance for the FAT fund (reference is sometimes made to the “Clean Production FAT”).

Environmental management studies

These are technical and economic studies that seek solutions to environmental problems in business. In most cases, the focus is on describing, quantifying and reducing industrial emissions. Eligibility for FAT funds depends on at least three factors: a) prevention options; b) technological alternatives (clean, cleaner or less polluting technologies); and c) abatement methods (e.g., end-of-pipe solutions).

Environmental impact studies and statements

FAT supports new production initiatives when such studies, statements and environmental approval are prerequisites to the implementation of investment projects.

Industrial restructuring and relocation studies. FAT is authorized to fund a portion of studies for firms that are obliged to restructure processes or relocate facilities to comply with environmental standards, zoning regulations (particularly municipal and inter-municipal zoning plans) and/or abatement plans.

Energy efficiency programs

An agreement between the National Energy Commission and CORFO provides for activities to optimise energy management in SMEs, increasing their competitiveness as a sector. These activities include energy assessments, certification of consulting firms, pilot projects, training and awareness-building campaigns. Funding is carried out through FAT.

In addition the ones cited above, other productive development instruments are also being utilized for environmental purposes. These include the Program to Support the Management of Export Firms (*Programa de Apoyo a la Gestión de Empresas Exportadoras*, or PREMEX); Development Projects (*Proyectos de Fomento*, or PROFO); the Provider Development Program (*Programa de Desarrollo de Proveedores*, or PDP); the National Fund for Technological and Productive Development (*Fondo Nacional de Desarrollo Tecnológico y Productivo*, or FONTEC); the Innovation and Development Fund (*Fondo de Desarrollo e Innovación*, or FDI); and Financial Intermediation Programs.

Since 2002, CORFO has considered projects to be part of its environmental line of activities, provided that their objectives relate to clean production, technical or economic environmental assessment, ISO 14000 certification, organic production, integral production, good agricultural practices, comprehensive pest management or improvement of management in firms that promote clean production. Table 2.12 presents a summary of activity in this area during the

last two years. Separate columns are devoted to government funds (CORFO) and business spending (in millions of Chilean pesos, with figures for each type of instrument).

The number of projects and firms in 2002 and 2003 cannot be totalled, since PROFO, PDP and PAG projects are of more than one-year duration.

TABLE 2.10
FUNDS IN CORFO'S ENVIRONMENTAL LINE

	Number of projects	Number of firms	CORFO contribution (millions of CLP)	Firms' contribution (millions of CLP)
PROFO^a				
2002	38	263	621.092	359.723
2003	53	449	1 017.864	437.406
		Total	1 638.956	797.129
FAT^b				
2002	238	231	634.499	242.989
2003	296	326	839.589	329.654
		Total	1 474.088	572.643
PDP^c				
2002	10	423	237.132	211.912
2003	14	820	325.187	321.536
		Total	562.319	533.448
PAG^d				
2002	15	15	88.369	90.067
2003	11	11	33.257	24.290
		Total	121.626	114.357
PI MA^e				
2002	59	53	118.724	88.186
2003	5	5	18.494	16.785
		Total	137.218	104.971
		Funds allocated	CORFO contribution (millions of CLP)	Firms' contribution (millions of CLP)
		2002	1 699.816	992.877
		2003	2 234.391	1 129.671
		Total	3 934.207	2 122.548

Source: Prepared by the author on the basis of information from Production Development Corporation (CORFO) and National Environment Commission (CONAMA).

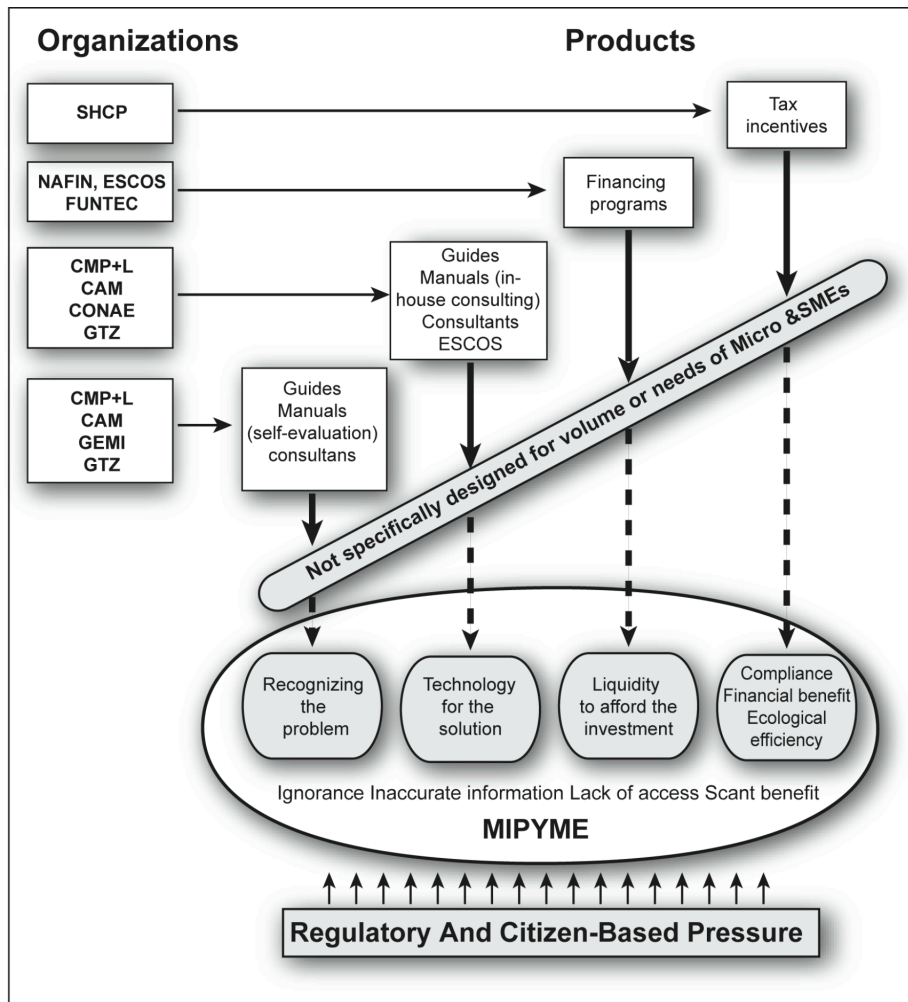
a) Promotional projects. b) Technical assistance fund. c) Program for the Development of Providers. d) Management Support Program. e) Environmental Pre-investment.

2.4.4 Mexico

A number of environmental programs and instruments have been created in Mexico in recent years, some by the State, others by business, and yet others of mixed form. In only two cases is there explicit reference to the problems of microenterprises and SMEs. While most of the programs are directed to industry in general, in some cases they are specifically directed at the microenterprise and SME sector, which have historically lacked access to such resources. Currently, efforts are being made to provide greater access to this sector.

The following diagram illustrates the various programs and instruments whose scope includes environmental problems referred to above, affecting microenterprises and SMEs in Mexico (Romo, 2005).

**DIAGRAM 1
INSTRUMENTS AND INSTITUTIONS DEVOTED
TO ADDRESSING THESE PROBLEMS**



Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

In terms of programs designed to identify the environmental problems of businesses, the issues are more complex. While no businessperson today is unaware of regulatory pressures to control pollution, the fact remains that in the case of firms using obsolete technology and makeshift machines, purchasing the most inexpensive inputs, and failing to document their procedures, the problem of identifying specific sources of pollution –much less quantifying them– is significant.

How, then, can business be induced to assess its environmental problems? Small businesses need access to tools, along with affordable prices, if they are to engage in assessing their own production processes. In this regard, a number of existing resources have promising potential. While these were not designed specifically for microenterprises and SMEs, they could be of considerable benefit to such firms. They include cleaner–production guides and preliminary assessments by the Cleaner Production Centre; GTZ–CAM manuals for the minimization of hazardous waste; and the self–assessment check–list produced by the Global Environmental Management Initiative (GEMI).

Cleaner–production guides

These monographs describe production processes and offer recommendations for the use of environmentally efficient technologies, i.e., technologies that focus on preventing pollution rather than remedying it after the fact. The publications are written in simple, direct language, with diagrams, questions, and answers. To date, the Mexican Cleaner Production Centre (CMP+L) has developed guides in seven areas: sugar, galvanoplastics, foundries, hospitals, food, carbonated water and public buildings. The guides are on sale at affordable prices at CMP+L offices.

Manuals on management of industrial hazardous waste

These, too, are descriptive monographs with recommendations for minimizing and properly handling hazardous waste. They were developed with support from GTZ and funding from GMZ, through TÜV ARGE–MEX, in collaboration with the Metropolitan Environmental Commission. To date, six manuals have been produced, covering foundries, galvanoplastics, metal–mechanics, chemicals, textiles and printing. The manuals are free of charge, and are available online. Like the manuals mentioned above, these are designed to make self–assessment by businesses a widespread practice.

Self–verification check–list

This is a computer program designed by the GEMI initiative. It contains a series of questions on environmental legislation and practices relating to water, waste, air, environmental impact/risk, and noise. After answering the multiple–choice questions via computer, the firm receives a grade, identifying the areas of the law in which the firm is in compliance, as well as the good practices it is employing. The program also provides information on standards, procedures and formats. Though designed for large firms, it can be used by microenterprises and SMEs. The program is free, and is available online.

Preliminary assessment by consultants

In addition, CMP+L has consultants who work on carrying out initial assessments. Promoting plant projects is one of the principal functions of the consultants' information dissemination activities. Presentations are available to industry groups or to any forum involving a group of firms. Promotion is also carried out on an almost door–to–door basis, in order to create opportunities for initial presentations and to stimulate interest. For this door–to–door work, the CMP+L uses interns from various fields, whom it trains for the purpose.

These efforts, while appropriate and desirable, could be improved. One striking deficiency is the lack of coordination. Though not in itself a serious problem, there are overlaps between the CMP+L production guides and the GTZ–CAM waste–management manuals in various areas (viz., metal–mechanics, galvanoplastics, foundries). Most important, however, is to publicize the programs of the various institutions, as well as to develop mechanisms for enhancing coordination between the different institutions.

There are also various limitations on the ability to actually solve the environmental problems of microenterprises and SMEs. Copies of the manuals are printed in limited numbers, and reprinting takes time. They are only sold at CMP+L offices, while other materials are available online. E–sales would be one possible solution—though not a complete one, since relatively few microenterprises and SMEs have computers and Internet access. Even for firms that do have Internet access, the existing manuals are not easy to find online. Though the different organizations that produce them attempt to disseminate their efforts through business groups, conferences and seminars, most microenterprise and SME owners remain unfamiliar with how to locate the manuals online. Moreover, even if they succeed in finding the materials online, there can be significant cost involved in printing out the 50 – or 100+– page manuals.

Programs to generate information on available technology may be a source of solutions. For the business owner who wonders how to solve problems, and what benefits may be obtained by doing so, various mechanisms are available: self–regulation manuals, specialized consultants available at low cost, and advice on energy saving.

Self–regulation manuals

In this area, one type of support is the self–help materials referred to above: the Cleaner Production Guides and the manuals for the minimization of industrial waste. These instruments provide the businessperson a self–regulation tool to follow in improving production, as the firm’s resources permit. As has been mentioned, however, lack of money constitutes a serious constraint on real solutions.

Consulting services

CMP+L has a program of great potential importance, which trains consultants associated with institutions where engineering is taught. In this program, a senior consultant teaches students or recent graduates, who work directly with firms, using materials designed for the program. The firms, for which lack of liquidity is a common denominator, receive the benefit of specialized consulting at reduced fees.

Another program to train instructors is supported by GTZ with funding from GMZ, through TÜV ARGE–MEX, in collaboration with CAM. The training is organized around the concept of minimizing hazardous waste.

Funding programs

These programs address questions such as, “How and where am I going to obtain the resources to make the investments needed to solve my firm’s environmental problems?” NAFIN is an organization that manages a number of these programs. Recognizing the difficulties involved, it has trained consultants in the use of its instruments. However, the efforts are aimed almost entirely at large businesses or institutions. There is no short–term plan for mass dissemination, and it provides no support for microenterprises or SMEs.

There are programs exclusively dedicated to environmental issues, such as: the environmental improvement program sponsored by NAFIN and the Japan Bank for International Cooperation; the Project for the Protection of the Ozone Layer; and the North America Environmental Fund (NAEF) program. Other funds may be used for various purposes, not only environmental. When loans are granted, the specifics relating to the purpose of the loans tend to

get lost in the shuffle, since for several years NAFIN has had no division dealing with environmental issues.

The NAFIN–Japan Bank for International Cooperation program operates with Nacional Financiera, utilizing funds from the Japan Bank for International Cooperation (JBIC). Nacional Financiera helps to fund domestic investment projects dedicated to efforts by firms to control, mitigate, eliminate or prevent contamination to water, air and/or soil.

2.5 Environmentally sensitive municipalities: geographic distribution of environmental problems and of the SME sector. Opportunities and challenges

This section explains the aspect of the studies that seeks to establish, in general terms, the geographic distribution of environmental issues as related to SMEs in the countries studied, in order to provide a geographic overview of the problem. One of the principal motivating factors here is that the issue of SMEs and the environment is essentially local. Attention must therefore be directed at local realities –where, in fact, there are opportunities for SMEs to provide EGSs to productive sectors that require them in order to meet governmental regulations and international trade standards, and to respond to public pressure– which can affect both large firms and SMEs.⁷

2.5.1 Argentina

Argentina has designated certain municipalities as problematic in terms of high–priority environmental problems. These are in the city of Buenos Aires, as well as in 18 municipalities within the Province of Buenos Aires (most of which are in the Buenos Aires suburbs). The Secretariat of Environment and Sustainable Development (SAyDS) is responsible for enforcing liquid effluent standards. The industrial water pollution control program has identified approximately 5,000 registered special and industrial facilities, most of which regularly submit annual affidavits of discharges.

Twenty percent of these firms are in the food and beverage sector; 23% are car wash facilities; 15% produce metal products; 15% produce chemicals, as well as oil and plastic products; 6% produce textiles, clothing and leather; and 7% are involved in producing paper and in printing. As a general statement, 43% are involved in areas of high environmental impact. An SAyDS program, seeking to identify establishments that are potential producers of effluents containing heavy metals, found approximately 900 firms (i.e., 7% of all establishments discharging liquid effluents). 74% of the 900 discharged effluents into sewers, with the rest producing discharges into waterways, watersheds or rainwater conduits. Only 62% provided some form of treatment of the effluents.

Not surprisingly, the establishments identified here were in environmentally sensitive sectors—namely tanning (sulphur); galvanoplastics, (cyanide salts); chemical and pharmaceutical products; paints; inks, dyes and bitumens (phenols and solvents); synthetic resins; rubber products; paper–related sectors, etc. The programs made it possible to design monitoring plans in 2000 and 2001, but subsequent spending adjustments and lack of funds led to lax command and control. The SAyDS Pollution Control Office nevertheless reported progress during the 1990s in inducing firms in some problematic sectors (especially galvanoplastics) to implement environmental management measures.

⁷ The following is based principally on Domínguez, 2003; Leal, 2003a; Van Hoof, 2003 and Chidiak, 2003.

Work has also focused on priority sectors in Rosario and other municipalities in the Province of Santa Fe. Interviews with environmental officials in the cities of Rosario and Santa Fe point to sectors dominated by SMEs as particularly important at the regional level.

The relevant sectors for Rosario are galvanoplastics, flours, and sausages. It is clear that industrial firms, with the exception of galvanoplastics, are gradually relocating to other municipalities. Relevant sectors for the Province of Santa Fe include dairy, refrigeration, tanning, and paper plants. Finally, interviews with officials in Rosario and in the Province of Santa Fe demonstrate that household waste—not only industrial waste—is a major problem at the municipal level. Inadequate treatment creates serious problems, and clandestine dumps are widespread.

Provincial and municipal legislation

Following is a summary of regulations related to problems experienced by municipalities with high-priority environmental issues:

Province of Santa Fe: Of particular interest here are regulations applicable in the municipality of Rosario. Articles 22 and 23 of Law 11717 (2000) on Environment and Sustainable Development establish the regulatory framework for hazardous waste. Applicable regulatory provisions are contained in decrees 1847/97, 592/02 and 1844/02. Important in terms of liquid effluents is Resolution 1089/82 (formerly DIPOS), entitled Liquid Effluent Discharge Regulations and currently under revision.

Province of Buenos Aires: Law 11720 (1996) on Special Waste, and the regulatory decree associated with it (806/97), establish the regulatory framework for industrial waste. Law 11459 on Industrial Siting, and the regulatory decree associated with it (1741/96), establish requirements for EIAs and set conditions that must be met by facilities in order to obtain operating permits. Liquid effluent regulations are under municipal jurisdiction. In municipalities in the Buenos Aires suburbs, establishments are subject to decree 674, with the SAyDS responsible for enforcement. In the remainder of the province, Law 5965 (1958) applies, along with associated regulatory decree 2009/60 and the subsequent modifications set forth in decree 3970/90. This law is designed to protect water and air sources, as well as bodies of water and air affected by discharges. Municipalities must subscribe to the provisions of decree 3970/90 in order to be covered by it. Resolution 389/98, issued by the General Administration of Sanitation Works of the Province of Buenos Aires (AGOSBA), which is a part of the province's Ministry of Public Works and Services, sets limits on emissions.

City of Buenos Aires: National standards govern water pollution and hazardous waste, with SAyDS responsible for enforcement. Though the city was declared autonomous in 1994 (i.e., comparable to a province), the authority for environmental affairs has not yet been transferred from the central government, which historically was responsible for matters of “national” import. The only areas in which the city is responsible for enforcement are permits for facilities and the EIA requirement. EIAs are mandated by Law 123 (1999) on Technical and Administrative Environmental Impact Assessment Procedures, along with associated regulatory decree 1252/99). The provisions were subsequently modified by Law 452, which defines activities with “significant environmental effects” that are required to carry out EIAs before obtaining permission to operate.

A recent study of these laws and regulations found that various aspects of their design are responsible for the low levels of enforcement, namely:

- a) There are problems of institutional organization, as well as a lack of material resources for enforcement agencies to conduct verification activities.

- b) The rationale for the classification of industries is not clearly set forth, and a confusing combination of urban development and environmental criteria inform the standards (e.g., “bothersome” and “hazardous” are used synonymously).
- c) There is a lack of mechanisms to facilitate rapid updating of firms that are out of compliance (particularly, firms responsible for major environmental impacts).
- d) There is a lack of knowledge concerning the technological characteristics of the city’s firms. This is a factor in discouraging environmental investment and improvements; it creates legal uncertainty; it drives activities out of the city; it creates room for a multiplicity of situations involving illegality or non-compliance-activities that can engender corruption; and it encourages “technical advisory” activities aimed at overcoming legal complexities, rather than focusing on improving environmental management, etc. (Chidiak, 2003; Bercovich and López, 2005 and López, 2004).

The authors emphasize the need (not contemplated in the legal and regulatory provisions) to include a cost-benefit analysis in the assessment that precedes the permitting procedure. Thus, social and economic factors must be considered, as well as environmental ones, taking into account all of the positive and negative consequences of an activity (e.g., job creation, increased productive activity, environmental risks, etc.). Benefits would also flow from a simplification of bureaucratic procedures. Unifying enforcement agencies to the extent feasible (e.g., by placing enforcement of national standards within the city under the authority of the municipal government) would help simplify procedures, and would reduce the problems with overlapping jurisdictions.

Financial instruments

The City of Buenos Aires offers loans to SMEs that may be used for environmental management. A new program for financing microenterprises and SMEs, entitled SME Capital, was recently inaugurated. The loans are granted by the city’s General Office of Industry and Commerce, which is part of the Secretariat of Economic Development. The loans may cover up to 70% of investment projects, to a maximum of US\$50,000, and have a fixed annual interest rate of 10%. The funds provided may be used to finance working capital (wages, raw materials), durable goods (machinery, equipment, real estate) or intangible goods (patents, trademarks, licenses, software, etc.). Though not specifically stated, these loans can also be used for equipment to treat effluents, to purchase other equipment for improving environmental management, and to obtain environmental management certification under ISO 14001. A grace period of up to 3 months is provided for, with maximum repayment periods of 12 months for working capital, 24 months for intangible goods and 36 months for durable goods. Acceptable guarantees include a security policy (by which an insurance company guarantees that the funds will be used for the project); co-signers (with monthly incomes three times the amount of the monthly payment) or partners capable of providing guarantees; mortgages; or a guarantee from Garantizar—a mutual guarantee company.

Loans may be granted to firms already in operation, legally constituted firms still in the formation process (general partnerships or workers’ cooperatives), or informal one-person, or de facto one-person, firms. The eligibility requirements include: (1) that the firm’s productive activities for which the loan funds are to be used be within the city of Buenos Aires; (2) that the firm fall under the definition of microenterprise or SME as set forth in SEPYME Resolution 24/2001; (3) that a statement of status *vis-à-vis* the tax authority and social security agency be submitted (with proof of compliance with tax and social security laws); (4) that information on credit status, and proof of an operating permit be presented; and (5) that general information on the firm, technical information on the firm and project, economic/financial information on the project, and data on guarantors and co-signers be presented.

2.5.2 Colombia

The varying geographic distribution of Colombia's productive sectors leads to differing conditions for the development of SME activity in the various sectors. The absence of environmental service infrastructure and goods affects industry's impact on the environment. An examination of each of the sectors selected for the study reflects a concentration of activity in Bogotá and certain other departments (principally Antioquia, Valle del Cauca, Atlántico and Santander), which are responsible for approximately 60% of the nation's GDP. In the case of industry and transportation, SMEs are primarily located in the industrial corridors of capital cities and neighbouring municipalities. This includes the metropolitan areas of Bogotá D.C.–Soacha, Medellín–Valle de Aburrá, Cali–Yumbo, Barranquilla–Soledad and Bucaramanga–Floridablanca–Giró.

The principal sectors with large proportions of SMEs responsible for environmental problems in metropolitan areas are: a) residences, primarily in terms of wastewater and solid waste; b) major industries, for the preceding reasons, plus atmospheric emissions; and c) SMEs themselves, because of their location in residential areas, and because of their number.

In general terms, metropolitan areas such as Medellín and Bucaramanga have efficient services, with coverage of over 50%, varying with the type of service. On the other hand, cities such as Bogotá and Barranquilla lack installed infrastructure, and there is need for improvement in the services provided. In regard to atmospheric emissions, progress is being achieved in specific programs (e.g., records of gas emissions from mobiles sources) in areas such as Bogotá–Soacha. However, improvement is needed in fuel quality, in the air quality monitoring network, and in sectoral regulations and policies. Solutions to these problems depend on action by the Ministry of Transportation and Ecopetrol. No structural projects are in place to address soil remediation.

Currently, there are fewer than 20 sanitary landfills in the nation. This represents an opportunity for SMEs to collect and exploit solid waste, as well as opportunities for the industrial and commercial sector, in terms of both preventing and exploiting waste. Hazardous waste collection and treatment is still in an early stage of development. Thus, the transportation and treatment of hazardous waste also represent a potential opportunity for SMEs.

In terms of noise levels, the highest priorities relate to replacement of public vehicles, as well as mitigation of the effects of noise in the industrial and commercial sectors. Projects to improve mass transportation are advancing in cities such as Cali, Barranquilla and Bucaramanga.

Controlling pollution from mobile sources requires technological improvement of engines, environmental improvement of fuels (reduction of lead and sulphur in gasoline), promoting the use of, and conversion to, alternative fuels (e.g., natural gas), and inspection and maintenance.

Outside of these metropolitan areas, the situation is different. Towns of under 2,500 inhabitants suffer from an absence of infrastructure and from lack of coverage by services such as aqueducts, wastewater treatment, and trash collection and disposal. The needs of these (principally rural) areas call for construction of appropriate infrastructure to facilitate normal functioning of these services, or for extending metropolitan systems to cover neighbouring municipalities.

Also important, in relation to these areas, is the fact that they are not linked to the electrical grid. They therefore must seek alternative energy sources, making power costly to users.

Summarizing the situation in metropolitan areas, the major common problems are wastewater treatment, and management of solid and hazardous waste. Expanded infrastructure, additional prevention and treatment alternatives, and improvement of current services are all

important factors, offering opportunities for SMEs as providers of environmental goods and services.

2.5.3 Chile

The municipalities most affected by the sectors with the highest environmental impact are in the three regions with the greatest number of SMEs involved in industrial activity: the Metropolitan Region, the Valparaíso Region (Region V) and the Bío-Bío Region (Region VII). There are specific towns in these regions that are home to industrial sectors in which large firms and SMEs coexist.

Many municipalities in the Santiago Metropolitan Region play a major role in the capital's productive activities, as well as in its severe pollution, and since Santiago has the greatest concentration of SMEs in Chile, SMEs play a significant role there. Most affected by pollution are those municipalities that fall within the Américo Vespucio beltway (one of the capital's principal arteries). Of particular note are the municipalities of Renca, Huechuraba, El Bosque, Lampa and Alhué.

The Talcahuano Environmental Recovery Plan (Plan de Recuperación Ambiental de Talcahuano, or PRAT) recognizes the town of Talcahuano, in Region VIII, as having major environmental issues. The coastal towns of the Valparaíso Region (Region V) are also recognized as having major environmental problems.

A more detailed analysis of the geographic location of environmental impacts shows that in the Metropolitan Region and in Regions V and VIII, the greatest impact is due to air pollution of various types, liquid industrial waste, and high noise levels. The fact that these regions and their towns and cities have the highest indices of pollution (especially air pollution) does, however, have one positive side effect, namely, that these are generally large cities that have funds, and are capable of gradually implementing abatement plans, waste treatment plans, and environmental awareness campaigns.

Indeed, in Santiago, as well as in Valparaíso and Concepción, abatement plans are expected to address between 80% and 95% of air and water pollution problems by 2005. This will involve the support of sectoral organizations (ministries and agencies), based on regional abatement plans. Municipal government, however, will play only a small role.

2.5.4 Mexico

Municipalities representing significant economic activity were analysed, after first defining the major economic classifications involved in pollution derived from the activities of microenterprises and SMEs. The resulting geographic overview of pollution indicates that the major concentrations of pollution, with its associated problems, are in contiguous or non-contiguous municipalities that have the highest levels of emissions.

The Industrial Census provides data on the volume of contaminants by size of firm at the state level, but not at the municipal level. Thus, carrying the analysis further here requires examining activities in the most heavily polluting economic categories, in which microenterprises and SMEs account for the greatest market share.

Some of the municipalities with the highest levels of pollution are home to multiple high-polluting activities. This makes it important to localize SME pollution, as is the case, for example, in the industrial zone of Guadalajara. In other cases, it is the concentration of a type of activity at the regional level that is responsible for the high pollution levels. Some municipalities have one or two activities that, while not themselves highly polluting, occur also in neighbouring municipalities, thus creating an accumulation of emissions within a small geographic area and constituting a problem for the region. Such is the case with leather tanning and finishing, which is

responsible for a high percentage of production (by value) in two municipalities that neighbour Guanajuato (namely, León and Purísima del Rincón). Ninety percent of publishing, printing and binding activity is located in seven districts of Mexico City and in one municipality in the suburban zone. The manufacture of clay-based construction materials is concentrated in three municipalities in the state of Puebla. Finally, four contiguous municipalities in the state of Nuevo León host the major concentration of activity in precious metals and lead and zinc metallurgy.

2.6 Factors that provide incentives for, or influence, SMEs' demand for environmental goods and services in the countries

This section reviews some key factors that impede the link between SMEs and EGSs. The situation varies from country to country, based on the assessments presented up to this point.⁸

2.6.1 Argentina

SMEs represent a significant potential demand for environmental services, since they play an important role in industrial production and are present in numerous industrial sectors (including those with high environmental impact). Although there is a range of fairly stringent environmental regulations, the level of compliance is low; thus, the actual demand for EGS is also low. A number of factors are responsible for this situation.

First, SMEs have little knowledge of environmental regulations, either national or international (e.g., regarding standards governing environmental management systems). Second, firms have difficulty finding solutions appropriate to their individual situations. Third, they face a series of costs, associated with assessments to identify appropriate technologies, implementation of the technologies, and halting production in order to implement the technologies. Given the obstacles to obtaining financing, the overall prospects for SMEs are problematic.

However, firms could begin by concentrating on areas of environmental management with competitive benefits (reduced costs). This requires knowing and incorporating certain cleaner production practices that reduce the use of raw materials and inputs; closing water and energy circuits, etc.; reusing production waste or overages, etc. Such measure is capable of reducing the volume of solid and liquid waste. According to some available assessments, while large firms focus on these practices, they have not been priorities for SMEs, which remain largely unaware of them (Bercovich and López, 2005, Chidiak, 2003 and López, 2004).

Indifference to complying with environmental regulations may also be a result of the sector's highly informal composition: even when sanctions for non-compliance are in place, the risk of monitoring and detection is low. One negative factor, in this respect, is the lack of technical and financial resources, and lack of political support from enforcement agencies. The low priority given to environmental problems may also be due to the country's troubled social situation and high rate of unemployment, particularly since the late 1990s. In cases where enforcing environmental standards can result in closure of firms (given the drastic management changes needed to comply), enforcement agencies are under pressure to ignore the environmental problem in order to preserve jobs. To a great extent, this is the result of the fact that environmental regulations are not adapted to the social, economic and technological environment in which local firms and enforcement agencies operate.

⁸ The following is based principally on Domínguez, 2003; Leal, 2003a; Van Hoof, 2003 and Chidiak, 2003.

Other factors have a positive effect on the demand for environmental services. The potential environmental management demands for SMEs involved in export represent one example. The environmental demands from clients in the European Union, the United States and other developed countries, or from large domestic subsidiaries of transnational firms, increase the demand for environmental services. This is reflected in the decision of many Argentine export firms to seek ISO 14001 certification as a means of increasing or maintaining their presence in the markets of developed countries. Public pressure and pressure from nongovernmental organizations (NGOs) also influence firms, since their “image” may be at stake.

In summary, the incentive businesses have to demand environmental services are associated with pressures of various types, as shown in table 2.12.

TABLE 2.12
PRESSURES ON SMES

<p>From the market: environmental or environmental quality requirements imposed by domestic or international clients. This includes compliance with international product and process standards (ISO 14000). Providers of financing, and insurance companies, may also require that firms meet certain safety, maintenance and environmental management standards to be eligible for their services.</p> <p>From regulatory structures: national, provincial and municipal regulations. Pressure to comply may occur when NGOs file complaints and/or when civil society does so (via <i>amparo</i> applications).</p> <p>From corporate social responsibility standards, either voluntarily adopted by firms, “imposed” through agreements with transnational firms, or adopted in response to the demands of clients (large local firms or foreign clients).</p>
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Source:???. **Traducir por favor:** Martina Chidiak, “Demanda y oferta de bienes y servicios ambientales por parte de la pyme: el caso argentino”, *Serie Medio ambiente y desarrollo*, N° 77 (LC/L.2034-P), Santiago, Comisión Económica para América Latina y el Caribe (CEPAL), diciembre 2003. Publicación de Naciones Unidas, N° de venta S.03.II.G.198.

2.6.2 Colombia

There are a number of entities and programs for developing environmental activities among SMEs. Colombia’s Toward Cleaner Production initiative is considered the basic program providing environmental management opportunities for firms. Implementation of the program is supported by the Ministry of Environment, the Regional Autonomous Corporations (Corporaciones Autónomas Regionales, or CAR) and the Urban Environmental Units (Unidades Ambientales Urbanas, or UAU), which have promoted training and technical assistance programs for SMEs. The program has instruments promoting the concept and practice of cleaner production among SMEs; facilitating access to clean technologies by providing on-site assistance, creating financing opportunities and supporting pilot projects; providing training; and adopting measures that promote awareness among SMEs.

Noteworthy in terms of local implementation of these activities is the Capital District’s Environmental Technical Assistance Unit for SMEs (Unidad de Asistencia Técnica Ambiental para la PYME del Distrito Capital, or ACERCAR). This project promotes environmental restructuring among microenterprises and SMEs. It is executed by the Bogotá Chamber of Commerce and the nongovernmental organization CINSET. However, there are few programs of this type in other parts of the country.

The Ministry of Environment has moved forward with a project entitled Regional Cleaner Production Nodes, which supports microenterprise and SMEs in the central, Atlantic coast, south-western, coffee-growing and Santander regions, as well as the Cúcuta *Ventanilla Ambiental*, with an emphasis on urban areas. Regional corporations are also developing initiatives

to promote ecological production (“green” products). An agreement involving the IDB/MIF, the Colombian Institute of Technical Standards and Certification (Instituto Colombiano de Normas Técnicas y Certificación, or ICONTEC), and SENA has created an environmental quality and management (Calidad y Gestión Ambiental, or CYGA) program. The purpose of this effort is to increase the competitiveness of Colombia’s SMEs by promoting a culture of quality and environmental protection. Meanwhile, CINSET and ACOPI have created the Environmental Management for Productivity (Gestión Ambiental Productividad, or GAP) project, which seeks to increase SMEs’ competitiveness by improving environmental management.

The object of these programs is to improve environmental performance, enhancing the competitiveness of SMEs through more efficient production methods. Next is an examination of the effects of policies and support programs for the development of the SME sector.

The performance of the SME sector over the last several years has been the object of major attention by the national government. Recognizing the economic importance of SMEs, the government has designed measures to increase their competitiveness, focusing on factors such as quality, innovation and productivity. These measures have taken the form of programs, support entities, and resources for the development of SMEs.

Finagro and the National Guarantee Fund are part of this line of action, guaranteeing loans for small and medium producers. There has been a substantial increase (144%) in the number of guarantees that the National Guarantee Fund provides for SMEs. Nevertheless, these do not come close to meeting the current need. A quick glance at the average amount of these guarantees shows the low level of financing to which the SMEs have access, with average loans being under US\$2,080 in 2000, and under US\$3,800 in 2001.

There are also lines of credit such as IFI–DAMA, which focus on the technological restructuring needed to implement cleaner production. These funds have been frozen until the renewal date for the ACERCAR program (and pending inauguration of programs such as CYGA, which are not yet in operation). The experience of the last few years has shown that lack of dissemination and sluggish disbursement of resources have held back the use of this source of support.

As a support to competitiveness, EXPOPYME has become a platform for firms to launch themselves in the international market, an achievement of major importance, given the weakness of domestic demand. Export activity has stimulated economic growth in the last two years, and it is precisely non–traditional products that have seen the greatest growth. Exports by firms associated with EXPOPYME grew by 37% between 1999 and 2000.

Support for productive chains is also an important element, bringing together firms from the same sector in order to increase their productive capacity. This helps create larger volumes, provides an opportunity to share experiences, with a view to optimising technology, and also provides greater bargaining power *vis-à-vis* providers, financial entities and clients. For microenterprises and SMEs, these goals are impossible to attain individually.

In short, government initiatives for promoting the performance of SMEs –in both environmental and economic terms– do exist. However, their scope is limited, given the lack of dissemination of information on the programs, and the limited funds available. The major advances are in the area of export promotion. However, problems of business approach, organization and process persist, as a result of the high degree of informality found among SMEs.

Economic instruments directly applicable to the SME sector include earnings–based, compensatory and use–related fees. These fees are designed to charge for the direct or indirect use of environmental resources (based on the “if you pollute, you pay” principle). Enforcement is weak, due to the number of firms to be monitored and the limited resources of the environmental agency. On the positive side, the regulatory framework does promote the restructuring of

productive processes as a means of reducing air pollution; water pollution regulation, on the other hand, focuses on end-of-pipe measures (Van Hoof, 2003).

In terms of financing, the commercial banking sector's approach is highly limiting, since there has been a reluctance to assume the risks associated with small business. Guarantees covering 65% of loans have been insufficient to compensate for the risk, resulting in eligibility criteria that SMEs are unable to meet.

Only two years have passed since the enactment of the Law on Microenterprises and SMEs and the creation of the various support programs associated with it. Thus, it would be premature to draw definitive conclusions about their performance.

2.6.3 Chile

In regard to demand for environmental services resulting from international pressure, a review of the most important treaties and agreements does not indicate that any significant demand is being created by those instruments. However, some SMEs are compelled to obtain certifications, especially in the area of foods and natural resources, if they wish to participate in foreign markets. At this stage, ISO 14000 seems to be of concern primarily to large firms, though some partnership efforts, driven by large firms, may inspire concern for ISO 14000 among SMEs that provide inputs. The issue of ISO 14000 has gained momentum in the last few years, after being relatively static, and as of 2003 Chile had roughly 50 certified companies (all large firms, according to a recent CONAMA report). The same situation applies to other types of certification, particularly in the areas of forestry and mining.

The assessment concludes that there are specific sectors in which new regulations and international pressure could place demands on SMEs. This results from the fact that some SMEs have become part of state-of-the-art export sectors, due to the leadership of large firms. Products in the areas of agriculture, fisheries and forestry are examples of this. Support in these areas requires a focus on sustainability. Thus, the economic problems of SMEs (finance, efficiency, management) must be addressed, along with their social challenges (jobs, welfare, image) and environmental shortcomings (pollution, waste generation, over-exploitation of resources). At present, it is not practical for SMEs to undertake improvements that are exclusively environmental in nature, and government is not eager to press the issue, given the spectre of recession and economic chaos. Thus, any solution to the environmental problem that jeopardises economic growth is avoided.

Better conditions for the functioning of existing instruments, creation of new instruments, improvement and expansion of technical and financial intermediation institutions, promotion of partnerships, strengthening of sectoral and regional environmental practices, and the creation of an institutional and legal framework to reinvigorate the issue of environmental management at the municipal level—all represent ways of strengthening the viability of SMEs and promoting their modernization. This observation is important for Chile's development strategy, which is in a process of major change, as well as for the country's social and cultural situation. Addressing this highly complex situation requires a clear political will.

2.6.4 Mexico

A number of studies examine business activity related to protecting the environment. A study by Dasgupta, Hettige and Wheeler in 2000 used an econometric model to examine 236 industrial firms in Mexico (Domínguez, 2003 and Romo, 2005). It found that one of the important variables related to level of compliance was the firms' environmental management systems.

Two equations were examined, in a two-stage process. The first analysed the relationship among various factors: a firm's management practices, the inclusion/exclusion of management and workers in environmental issues, and the existence of general environmental training within the firm. The second analysed the level of compliance reported by the firm in relation to management practices (as an instrumental variable), and in relation to regulation and sectoral dummies. According to the authors, the results are mostly negative. Most of the international variables with some claim to influence turn out to have no significant effect. This includes contacts with the OECD as a result of foreign capitalization and management training, the existence of recent technology, and indirect pressure from the community. The variables that correlated with level of environmental efforts by management were scale, managers' educational level, regulation, and whether the firm was traded on the stock market. The variables associated with compliance were quality of environmental management (processes related to ISO 14000), regulatory pressure, the presence of environmental education for all company employees, scale, and public scrutiny via the stock market.

The results suggest that management behaviour has a strong effect on compliance, after controlling for other factors. The authors conclude that in developing nations with weak regulatory systems, the carrot of subsidy for management training can function as a complement to the stick of regulation. Indeed, the results suggest that measures of this type can be more cost-effective than stringent regulation, because training produces greater reductions of emissions without economic distortion.

Thus, the Dasgupta, Hettige and Wheeler study considers firms' level of compliance as a dependent variable. A complementary approach directly examines firms' abatement efforts, based on surveys in the metropolitan area of the Mexico City Valley. The dependent variable here represents the amount of attention to the environment, and reflects firms' responses to questions about programs for efficient water and fuel use, water treatment and recycling, waste recycling, and institutional attention to the environment. The relationships among a large number of variables on which the survey provides information are then analysed. The variables include firms' motivation to take account of the environment (primarily in terms of compliance with standards and the firm's image in the community); the influence of visits by environmental authorities on company decisions; technological variables such as access to green technology and age of plant; the level of industrial business culture, in the sense of capacity to adopt new methods of managing production; the amount of capacity used in the three years prior to the interview, as an approximation of the firm's financial strength; the ownership of capital; and the export-to-sales ratio. Finally, there is a weighting for the three most heavily polluting industries.

The results of this analysis show that attention to the environment is associated with:

- need to protect the firm's image in the community;
- regular visits by environmental authorities;
- degree to which productive capacity is utilized;
- presence of company programs for modern management and industrial business culture;
- export orientation, and dummy variables in regard to two of the three highly polluting sectors, paper and chemicals.

Scale, average age of equipment, ownership of capital, and other factors, were not significant. On one hand, protection of the firm's image as a motivating factor in firms' environmental behaviour suggests that a good reputation may lead to economic gain, or prevent economic loss. Unexpectedly, there is no evidence that foreign firms concerned about the risk of harming their image in the financial community pay more attention to environmental issues. Compliance with standards, also, failed to show up as a significant motivating variable. However, the importance of regulation as a motivating factor was confirmed by a correlation between firms' environmental behaviour and visits from environmental authorities.

Taking utilization of capacity as an indicator of firms' financial position, analysis shows that firms respond less to environmental concerns when they have financial problems. The negative effect of scale is surprising. However, because very small firms and microenterprises were not included in the sample, this finding must be interpreted with caution.

As concerns technological variables, the effect of industrial business culture suggests that a firm's ability to solve problems in general, and its readiness to undertake change in particular, are important factors. The ISO 14000 process itself does not guarantee improvement in performance, though it is certainly likely that plants that complete the process will be better informed, organized and motivated. Export activity is positively correlated with attention to environmental issues.

3. Opportunities for SMEs in the environmental goods and services market

This chapter attempts to ascertain whether there is a significant supply of EGSs in the countries, and whether there is room for SMEs to serve as providers. It examines information on opportunities for SMEs in Argentina, Colombia, Chile and Mexico to move into international EGS markets. Comparative analysis is provided.⁹

3.1 Background of the situation from a supply-side perspective

The context in which this chapter examines the above questions includes the supply of EGSs in the region as a whole, and in each of the countries. Databases were created in the countries, with an initial survey of firms and products that fall in the EGS category.

The SME sector in Latin America has grown steadily in the last few decades, though individual firms do not necessarily persist over time. Growth has been driven primarily by domestic dynamics, since SMEs face challenging requirements if they attempt to penetrate international markets. The growth has not been greatly affected by governmental action, since the size of the State in the region's nations has been diminishing, and government has had diminishing capacity to invest in SMEs.

At the same time, there are vast gaps in the region's supply of EGSs. Most needs in this area are met by imports, suggesting that there is a potential market for SMEs to fill. The major issue that confronts them, however, is how to make their low levels of production significant as an element in global value chains. Paradoxically, this is simultaneously an opportunity and a difficulty, for despite the demand for EGSs, succeeding in this market requires a level of competitiveness that is uncommon among SMEs.

⁹ The following summarizes the material in Leal, 2003; van Hoof, 2003; Romo, 2004 and López, 2004.

A series of problems has directly affected SMEs in Argentina over the last ten years: sharp downsizing of personnel, replacement of domestic products by exports, abandonment of industrial production, lack of vitality, inadequate networks, low levels of investment, low utilization of financial support systems, lack of export orientation and difficulty obtaining financing.

Nevertheless, the country's SME sector does have strengths that provide a clear basis for the notion that this market is capable of becoming strong. Its businesspeople represent a major resource of human capital, significant progress has been made in training, and there is a nucleus of successful SMEs in the export sector. There also are a number of successful SMEs with stable export performance; these were not only able to deal with competition from imports during the 1990s, but emerged stronger as a result of the efforts and investments they made in increasing their competitive capacity.

In Colombia, the first item of note in examining the study's database (created with a view to ascertaining the nature and scope of the country's supply of EGSs) is that a number of factors limit the supply of EGSs. First, demand from SMEs is small. Second, regulatory agencies are able to exert very little pressure, and it has been difficult for environmental management to develop in Colombia. The third obstacle is competition from large foreign firms and the fact that demand for recycled products is concentrated among a very few purchasers, creating a relatively limited horizon for development.

In Chile, it is primarily large companies that are affected by pressure for environmental improvements. However, SMEs may turn this pressure into opportunity in various ways. They may support improvements in productive processes, acting either as direct providers or in partnership with other SMEs to solve specific environmental problems. Thus, the sector is far from irrelevant in terms of current environmental changes, which directly concern not only large firms, but also SMEs and the country as a whole. Nevertheless, SMEs do not account for any noticeable supply of EGS.

The current Mexican economy can be briefly described as follows:

- Microenterprises and small firms dominate industry.
- Gross capital formation rates have increased since the mid-1990s.
- Services have increased as a percentage of GDP.
- Foreign trade flows are concentrated in the industrial sector.
- International trade focuses on the North American region.

In environmental terms, Mexico faces major challenges, which may be divided into three main groups:

- infrastructure deficiencies (drinking water and drainage, and sanitary landfills);
- environmental imbalances associated with structural problems and socioeconomic disparities (e.g., deforestation linked with poverty and with low productivity in the primary sector);
- problems associated with a process of industrialization based on non-sustainable production and consumption patterns (witness automobile emissions).
- In almost all of the major environmental categories (natural environment and resources), significant lags and imbalances are present.

These problems are also evident in the other countries in the region, where SMEs face cost barriers. Although most businesspeople are beginning to understand that technological development is important if their businesses are to become more competitive, the notion that environmental measures imply increased operating costs and lower profits still prevails.

3.2 The countries' supply sectors

In this section, the situation of countries, as related to the supply side of the EGS market, are considered, along with various conditions that affect that market. All country data on firms, goods and services may be found on the ECLAC–GTZ project website (ECLAC, n/d).

3.2.1 Argentina

Argentina is similar to other Latin American countries, in that there is no real “environmental EGS supply sector”, but only a series of providers of widely differing types of goods, services, technologies, etc., which are often integral parts of the productive process, and which are therefore difficult to classify in specific environment–based categories. In the private sector, there are over 750 firms offering environmental goods and services. Much of the supply is concentrated in the cities of Buenos Aires, Córdoba and Santa Fe.

The most important activities are equipment sales (to which nearly 24% of the firms are dedicated); consulting (18%); waste treatment and waste collection/transport/disposal (15% and 16%, respectively); and engineering services (14%). In contrast, few firms seem to be working in areas such as certification, odours, or alternative fuels. The lack of offerings in these areas is probably due primarily to scant local demand. One notable focus of EGS supply is science and technology institutions, of which 42% provide consulting, 19% training and 13% treatment technologies.

There is a high penetration of transnational firms in the Argentine economy, and local subsidiaries have often had to shape their domestic environmental practices according to standards set by headquarters. The average level of environmental awareness in the community has been on an upward trend. Thus, complaints by neighbours, workers, and others increasingly force firms to adopt appropriate environmental behaviour.

However, the crisis that Argentina experienced at the end of the last decade seems to have reduced the demand for EGSs sharply, and especially the demand from SMEs. Given this drop in demand, it is not surprising that there is currently a surplus of environmental goods and services.

In terms of the share of the environmental market occupied by SMEs, a clear segmentation can be observed. Though divisions between segments are not precise, large firms tend to contract with large firms and/or foreign firms for their environmental problems, while SMEs tend to contract with other SMEs.

TABLE 3.1
SMES' SHARE OF EGS SUPPLY EQUIPMENT
SALES AND REPRESENTATION

Type of firm	Number of firms	Share (%)
SMEs	240	86.3
Foreign firms	35	12.6
Large local firms	3	1.1
Total	278	100

CONSULTING

Type of firm	Number of firms	Share (%)
SMEs	171	82.6
Foreign firms	33	15.9
Large local firms	3	1.5
Total	207	100

TREATMENT

Type of firm	Number of firms	Share (%)
SMEs	165	86.4
Foreign firms	22	11.5
Large local firms	4	2.1
Total	191	100

WASTE COLLECTION, TRANSPORT AND FINAL DISPOSAL

Type of firm	Number of firms	Share (%)
SMEs	162	93.6
Foreign firms	8	4.6
Large local firms	3	1.7
Total	173	100

ENGINEERING

Type of firm	Number of firms	Share (%)
SMEs	126	79.3
Foreign firms	29	18.2
Large local firms	4	2.5
Total	159	100

Source: Andrés López, "La oferta de bienes y servicios ambientales en Argentina, El papel de las pyme," *Medio ambiente y desarrollo series*, No. 89 (LC/L.2191-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), October 2004.

As the table shows, though SMEs have a high rate of participation in all of the categories, it is highest in waste collection, transport and disposal, and lowest in engineering. Moreover, according to Chidiak's (2003) analysis of the market, SMEs play a particularly important role as consultants and providers of less-sophisticated equipment. Lack of local demand seems to be fundamentally responsible for the lack, or unsophisticated nature, of these offerings.

3.2.2 Colombia

EGSs in Colombia are supplied by both private and public entities with various legal statuses: firms, cooperatives, partnerships, NGOs and temporary unions, independent professionals, etc. The target markets range from the business sector to municipal government. This gives rise to different marketing strategies and organizational schemes, as firms attempt to address the features of different market segments. Thus, the supply can be categorized according to target markets.

Environmental services

In the business sector, the supply of environmental services consists primarily of supporting, identifying, designing and implementing practices and technologies. The supply of environmental services in Colombia may be summarized as follows:

TABLE 3.2
ENVIRONMENTAL SERVICES IN COLOMBIA

Segment	Service
Environmental consulting	<ul style="list-style-type: none"> • Environmental quality assessment • Advice/consulting on water and sanitation issues • Environmental management systems and preventive methodologies
Environmental technology	<ul style="list-style-type: none"> • Water management technology • Energy efficiency technology • Emissions management technology • Biodigesters • Belcosub (coffee-growing sector) • Recycling technology
Solid waste management	<ul style="list-style-type: none"> • Collection, transport and cleaning • Hazardous waste treatment and incineration • Final disposal of waste in sanitary landfills and dumps • Waste recycling • Plastics • Paper and cardboard • Glass • Ferrous metals • Aluminum • Waste composting
Drinking water	<ul style="list-style-type: none"> • Catchment, treatment, distribution and marketing • Catchment, distribution and marketing • Distribution and marketing only
Wastewater treatment	

Source: Bart van Hoof, “Necesidades de bienes y servicios ambientales de las pyme en Colombia: identificación y diagnóstico,” *Medio ambiente y desarrollo series*, No. 65 (LC/L.1940–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), August 2003. United Nations publication, Sales No. S.03.II.G.98.

Environmental consulting and advisory services are conducted through support programs that offer services to SMEs. One of the principal programs of this type is ACERCAR, which coordinates various research, business and public-sector entities, and provides training for SMEs. Its activities include implementing cleaner technologies, in collaboration with a number of corporations and with the clean production centre.

The supply of environmental quality assessment services primarily targets discharge, as a result of the demands of Colombian regulation in this area. Services that assess air quality are

provided primarily by laboratories within governmental agencies, and by a few large firms. Soil assessment services are concentrated within the oil sector.

Analysis by sector reveals that environmental services are concentrated in two major sectors: solid waste management, and drinking water.

There are two areas within solid waste management: collection, transport and cleaning; and recycling and composting. All of these activities are commonly part of the same chain, representing different phases of work.

In the field of water, there are currently, in addition to municipal enterprises, urban enterprises composed of organized communities or private entrepreneurs; these exploit natural sources and provide aqueducts in specific sections of their towns or cities. Their activities vary in scope. Some provide catchment, treatment, distribution and marketing; others cover catchment, distribution and marketing; while still others are involved exclusively in distribution and marketing.

Finally, some SMEs provide wastewater treatment services. There are 930 municipal SMEs that typically work jointly to provide sewerage services. Similar to what is described above, the rest of the enterprises providing sewerage services have been decentralized through wastewater treatment concessions in which private capital plays a role.

Environmental goods

In terms of environmental goods, technology for different sectors represents the most important factor.

In connection with water, there are pre-treatment and treatment technologies and practices, as well as efficient-use technologies based on metering. For energy, there are systems that optimise the use of electricity, and maximize efficiency of automated heating and air conditioning systems. These systems are currently being provided by large multinationals, not by SMEs. Finally, emission control, given the high technology costs associated with it, does not represent a potential market for SMEs.

For solid waste management, there are incineration and composting technologies. Five firms are dedicated to plastic recycling, with biodigesters in place for industry—clearly an important alternative for the treatment of organic waste, including coffee by-products.

3.2.3 Chile

Chile's supply of EGSs has undergone exponential growth, principally because of plans and regulations, both primary (relating to human health) and secondary (relating to the environment). Chile's EGS strength is the result of clear institutional structures and effective intersectoral coordination. The EGS sector has close political links to the President of the Republic, which has clearly helped to make environmental issues an integral part of various productive sectors. The institutions have focused on a number of environmental management tools, thus driving certain environmental services, which have grown at a faster pace than environmental goods.

Environmental services

According to the study's database, consulting and engineering are the major environmental services. The former is directed principally at environmental impact studies and statements, providing legal advice, implementing environmental management systems, and conducting training in areas such as ISO certification. The latter is directed at developing and evaluating investment projects for large domestic and international firms, as well as State enterprises, primarily in relation to waste treatment plants.

The collection and transport of industrial and household solid waste has created a need for specialized firms. Though these functions are essentially a municipal responsibility, the municipalities have increasingly outsourced them as a part of widespread attempts to improve efficiency and use of both monetary and human capital.

Environmental goods

The most representative, or most common, goods include high-technology equipment designed to directly reduce emissions of pollutants (end-of-pipe technologies). There are also goods for erosion control, and for water and energy efficiency, sectors in which business management has a presence only on the demand side. Examples of this are mines and electrical companies. When such firms terminate operations, they may hire specialized firms to oversee environmental recovery of the area involved.

The database of firms supplying EGSs in Chile indicates that the greatest concentrations of supply are in the categories of consultants and equipment sales and representation, followed by treatment and engineering.

TABLE 3.3

SUMMARY OF ENVIRONMENTAL GOODS AND SERVICES OFFERED BY SMES IN CHILE

1. Consulting:	Firms that primarily conduct environmental impact studies and consult on issues related to Law 19.300 (Bases Generales del Medio Ambiente), which covers general environmental rules.
2. Treatment:	Firms providing services for solid and liquid waste treatment, whether on-site or at dedicated plants.
3. Engineering:	Organizations that either develop and assess investment projects for large national and international firms or for the State, or provide specific services, such as software implementation and installation of computer networks.
4. Waste collection, transport and final disposal:	Firms dedicated to solid waste management.
5. Recycling and composting:	Firms specializing in recovering waste and converting it into final or intermediate goods.
6. Labs and monitoring services:	Firms dedicated to taking and analyzing samples, and providing solutions for problems of gas and liquid emissions containing contaminants.
7. Equipment sales and representation:	Firms that either have developed equipment using nationally-produced technology, or are subsidiaries of international firms.
8. Training and education:	Primarily institutions of higher education specializing in SMEs and offering courses to managers in a range of areas, from environmental efficiency and energy audits to market strategy, etc.
9. Technical publications:	Specialized journals on environmental issues in industry.
10. Construction waste * management:	Companies created by businesspeople in the sector for construction material treatment and recycling.
11. Environmental legal advice:	Generally offered by lawyers specializing in environmental law, and providing a necessary complement to SMEs' production management. ^a
12. Firms promoting alternative fuels:	Companies specializing in waste treatment and the use of wastes in combustion processes that involve low levels of emissions of pollutants.
13. Odor control:	Firms specializing in implementation of systems to improve the quality of the workplace environment.

Source: José Leal, "Oferta de bienes y servicios ambientales de la pyme en Chile. Base de datos y evaluación de potencialidades," *Medio ambiente y desarrollo series*, No. 68 (LC/L.1967-P), Santiago, Chile Economic Commission for Latin America and the Caribbean (ECLAC), September 2003. United Nations publication, Sales No. S.03.II.G.127.

3.2.4 Mexico

Since Mexico's most highly polluting sectors are brick manufacture, leather tanning and finishing, and fabric finishing, they represent the clearest opportunity for ESG offerings.

Data show that there is a large number of businesses in this category. Firms carrying out these activities face extremely competitive markets, especially in the brick and leather industries, since it is relatively easy to enter these areas of activity. Given the fierce competition, there is a constant struggle to lower costs. The environment ultimately pays the price.

As to the relative strength of environmental goods and services in Mexico, the number of service firms is greater than the number of goods-producing firms. This is due in part to the institutional features of government.

As of 2002, service firms associated with the provision of environmental goods (predominantly marketing firms) were concentrated in the pollution control field. At the same time, firms offering only environmental services were strongly concentrated in the area of natural resources management, which also includes the generic category "other." The overall Mexican EGS market is small, but hardly negligible, and has potential. It should be noted that the greatest portion of EGS production in Mexico is for local consumption, not export.

Environmental services

In the service sector, the greatest demand is for specialized technical services, and machinery and equipment repair and maintenance. Within the area of environmental services, the category "support services" includes a markedly active consulting subsector.

Consulting has grown unevenly in Mexico. The supply has dropped drastically, especially in the area of environmental impact and risk assessment, and there has been a decline in consulting for infrastructure and works construction as well. The areas developing most quickly are audits and certification, laboratories, environmental audits and safety and consulting.

The industries in which the supply of services is concentrated are, in descending order of concentration:

- Solid waste
- Water
- Soil problems

Firms normally offer both goods and services, i.e., they are multimodal, providing services in more than one specialized area. Thus, the sectors that are most important for services occupy a similar importance for goods.

Environmental goods

Next will be an examination of the distribution of the supply of environmental goods in Mexico. If one plots the three categories within the environmental sector against the types of industry (i.e., type of product) involved, one finds that manufacturing predominates in the market for environmental goods designed to facilitate pollution control.

Thus, the environmental goods market in Mexico is concentrated in the pollution control segment, with manufacturing occupying a central place.

The Mexican environmental goods market is an economic segment of growing importance, and is gradually consolidating its position in the economy. Notably, as in the rest of the Mexican economy, small economic units are primarily responsible for production. Thus, the structure of the sector is shaped by the dominance of small firms.

3.3 Similarities and differences between the countries

There is a limited supply of goods and services in all four countries. The types of goods and services offered are generally similar, and the productive sectors in which they are concentrated (waste management, water treatment and soil remediation) are also similar.

The countries are also similar in terms of the types of services and goods offered. Thus, environmental consulting and advisory services play a major role, followed by solid and liquid waste treatment and transport systems, and engineering works.

The exponential growth of environmental certification services is notable, and is attributable to increasing enforcement of environmental legislation and regulations as these relate to firms' operations.

In terms of goods, a principal area of supply in all four countries is equipment sales and representation.

The studies show that the supply of services is greater than the supply of goods in all four cases, though the market of suppliers is broader and more diverse. The difference in size is probably due to the fact that it costs less to provide services than to produce goods.

This situation takes a special form in Mexico. Though there are more providers of goods than of services in Mexico, the services market is greater in breadth and coverage than is the goods market.

EGS providers in each country are diverse. In Colombia, for example, they vary according to the type of environmental service involved, ranging from partnerships and cooperatives to SMEs and large firms. No doubt, there are markets, such as hazardous waste management, that pose difficulties for groups or cooperatives that lack organization. The providers in such markets are generally large firms. The situation is different in the case of paper and cardboard collection, which is handled by more informal organizations such as cooperatives and partnerships.

Clearly, SMEs have a greater presence in some sectors than in others. In particular, they are more numerous in environmental services than in environmental goods. This is due to the above-mentioned fact that producing environmental goods involves greater cost and complexity than can typically be handled by SMEs.

As providers, SMEs share the environmental goods market with a number of foreign firms that have sales offices, and sell, in Mexico.

Another factor is that, in all four countries, environmental services provided by SMEs are fulfilling functions that are normally the responsibility of municipal government—in particular, with regard to trash collection and water treatment.

It is also clear that existing goods and services focus on end-of-pipe solutions more than on the prevention of environmental disasters or the prevention of irregularities or illegalities in production. In Mexico, for example, EGS offerings concentrate on controlling pollution once it has occurred.

Argentina has a special situation in terms of the relation between supply and demand, because the economic crisis of the last decade sharply curtailed the demand for goods and services, leaving a supply surplus. Though this was not explicitly addressed in the studies of the other countries, it can be assumed that the relationship is different there, given that it is not a matter of demand having declined, but rather that it has never developed fully in those countries.

Finally, a feature seen in all four countries, reflecting the Latin American context of this emerging EGS market, is that a number of firms provide multimodal offerings, both in services

and goods for water– and soil–related areas. Specialization has not yet occurred, since the market is not sufficiently segmented, with demand still in the early stages.

3.4 Experiences with cooperation within countries

This section describes some forms of cooperation among firms within the countries, pointing to an approach that could be a noteworthy strategy for the development of EGS markets.¹⁰

3.4.1 Argentina

In Argentina, a variety of experiences are worth mentioning. These include public, public–private and private–sector clean production and environmental management initiatives.

One example is the National Program to Promote Sustainable Production –a program of the Directorate of Environmental Regulation. Much effort has been expended to disseminate information on this program and to provide training nationwide.

The National Cleaner Production Strategy Project is designed to create a national clean production strategy for Argentina.

The Program for Energy and Production Efficiency Among Argentina’s Small and Medium Enterprises falls under the direction of the Secretariat of Energy, in collaboration with GTZ. The program works for 6 to 12 months in each firm, recommending improvements to optimise the use of resources, while helping the business reduce costs and raise productivity.

A technical cooperation agreement was signed in 2002 between the National Water Institute and the Japanese International Cooperation Agency (JICA) for a project entitled Sustainable Pollution Prevention Technologies. The objective of the project is to disseminate clean technologies and clean production methods, and to conduct demonstrations and tests.

The National Plan to Increase Awareness of Waste is a program of the Directorate of Environmental Quality. Its purpose is to encourage widespread reduction of waste (either quantitatively or qualitatively) through production, consumption and/or marketing processes and guidelines that minimize and/or eliminate waste.

Finally, a pilot project entitled Prepare for Certification addresses the implementation of environmental management systems in small and medium enterprises. It is managed by the SAyDS’s Directorate of Environmental Quality, and began its initiative with 8 firms, of which at least 4 were ready for certification after one year of work.

3.4.2 Colombia

A number of experiences at the regional and local levels have supported and funded projects, including research projects or studies of solid waste management; modernization of businesses providing public services; and technical training and assistance, as well as funding, for initiatives to improve the environmental performance of SMEs.

One notable case is the cooperative project on municipal waste management in the municipality of Silvia, Cauca. The cooperation involved an aqueduct and sewerage company, the Secretariat of Health, and UNICEF. Despite the progress achieved, it is recognized that more work needs to be done to minimize waste at the source, through educational campaigns and the dissemination of educational material. The municipality also needs to create mechanisms to

¹⁰ According to information that appears in Araya, 2003; Domínguez, 2003; Chidiak, 2003; Leal, 2003a; Leal, 2003b; López, 2004; Romo, 2004; van Hoof, 2003a and van Hoof, 2003b.

support the institutions (hospital, schools) involved in the project, since lack of coordination jeopardizes the project's sustainability (technically, financially and environmentally).

ACERCAR is a program for cooperation on technical assistance and consulting for SMEs. DAMA, which is responsible for environmental conservation in the Capital District, initiated this program in 1996 as a pro-active measure to control industrial pollution in the SME sector. The program is supported through an agreement with the United Nations Development Program (UNDP). Among the goals achieved are 600 assessments of SMEs in Bogotá, 200 technical assistance projects for individual firms, and the creation of promotional materials.

Compostaje Armenia is a cooperative project for the management of organic waste, involving the government of Quindío and the Colombian-German Chamber of Commerce. This project demonstrated how cooperation between Colombian and German professionals could create a high-technology composting enterprise. Thus, international cooperation can be a profitable component of regional projects that involve private-sector participation in technically and economically viable initiatives.

Finally, in the municipality of Putumayo, there is a cooperative drinking water project involving the Ministry of Economic Development, municipal governments and local community enterprises. The Ministry of Development worked alongside the local municipal governments, which provided support for the processes developed. The Peace Fund (Fondo para la Paz, or FIP) also was involved throughout, as were UMATA, health centres, community action groups, community councils, NGOs, social groups and some other institutions, such as local schools.

These experiences, along with others in Colombia, point to the following conclusions:

- 1) Research and studies involving cooperation show that the supply of environmental consulting services at the national, and even international, level, can be encouraged by financing studies that provide guidelines for strategies to generate and expand the supply of environmental goods and services.
- 2) In the area of training, one case of cooperation involved training the community to separate waste at the source, in order to facilitate selective trash collection. It demonstrated that the effectiveness of this kind of cooperation depends on the management capacity of the local operator, and on the availability of official cooperation agencies and their willingness to participate.
- 3) As regards cooperation for technical assistance and/or financial support to SMEs, ACERCAR and the IFI-DAMA line of credit are outstanding examples. The assistance provided by ACERCAR confirmed the value of emphasizing economic benefits as a means of encouraging cleaner production.
- 4) In project consulting and execution, where the cooperating entity is foreign, the project may represent competition for domestic suppliers of EGSs. However, it may be beneficial insofar as it ensures the transfer of knowledge and technology in such a way that the national counterpart assimilates them and adapts them to local conditions.
- 5) Finally, for cooperative projects to be effective and lasting, a comprehensive assessment of their plans is essential. In specific cases such as that of the municipalities of Silvia and Chía, it is clear that a failure to examine certain legal issues from the outset affected the viability of the initiatives. Thus, in addition to technical factors, it is important to consider social, legal (regulatory compliance) and economic factors vital to ensuring the sustainability of the initiatives.

3.4.3 Chile

The Chilean study presents a number of cases of implementation of sustainable environmental measures with participation by different actors.

The first example is in the tanning sector, and involves the firm Vestimenta y Calzado JORDEC, a medium-sized firm located in the Metropolitan Region. To address a series of pollution problems, measures were taken that brought economic benefits as improvements were made in the use of chrome, while environmental benefits were achieved as the volume of chrome in liquid waste was reduced.

Another group of successful experiences was carried out with SMEs and the Alberto Hurtado Labour Studies Centre. Here, a project was developed with the basic objective of strengthening the union role in environmental initiatives, based on social consensus, specifically in the area of clean production. One of the firms involved was the canned-products firm Nielsen, which is an SME.

The purpose the efforts at this firm was to implant and develop a new working philosophy, in order to minimize the impact of the firm's activity on the environment, increase productivity, expand in the market, and achieve personal development benefits for all members of the firm. Members of the project committee learned that the concepts of re-use, recycling and reutilisation could be applied to each of the activities taking place in the firm. They thereby gained an ability to evaluate activities with a view to raising productivity and improving the use of inputs (energy and water).

The advice of experts from specialized centres (in this case, INTEC and its Clean Production Centre) is essential in motivating businesses and providing them with future guidelines. In all of these cases, work still remained when the projects concluded. The success of the program is reflected in the fact that when work within the firms ended, the committees were expected to continue their work, stating that they had learned the benefits of producing in a manner harmonious with the environment.

3.4.4 Mexico

Among the experiences of partnership and clean technology implementation in Mexico are the interesting cases of certain municipalities that have historically had high levels of pollution.

First is the municipality of Saltillo, in the state of Coahuila, where there are approximately 500 brick producers within the metropolitan area. Tires are the main fuel used in the furnaces. In 2001, the Coahuila Institute of Ecology began to implement a new program aimed at eliminating the use of tires as a fuel, reducing the emission of carcinogens, and meeting international environmental standards for the production of tiles and bricks. The new technology proposal was to use recycled motor oil as a fuel.

The program has reduced the consumption of waste tires and the number of people with respiratory illnesses, while increasing the reutilisation of oil. Currently, the program receives federal, state and municipal financing through a trust that supports restructuring efforts among producers.

A second example is the municipality of León, which is the country's main tannery centre. The environmental effects of this industry are well known. Currently, the region's tanning operations are organized as the State of Guanajuato Tanning Industry Chamber. The Chamber trains businesspeople, often with support from the Centre for Leather and Shoe Research and Technical Consulting. The small tanneries of León thus have two major alternatives for financing the changes needed to improve their plants' environmental performance.

Two promising cases of implementation of clean technology should also be mentioned here, since they are instructive in terms of the adoption of good practices.

In one of the cases, 11 large companies located in the city of Guadalajara made a voluntary agreement with the Secretariat of the Environment and Natural Resources to provide advice to other small enterprises, which functioned as their providers, in an effort to encourage them to implement environmental management systems. An assessment conducted approximately two months after the implementation of the EMSs showed that 80% of the participating SMEs reduced emissions of pollutants, improved the workplace environment by nearly 70%, and reported improvements in waste management and energy efficiency of nearly 50%.

The other case involved the metal–mechanic industry and the small firm of Cromadora Delgado, with 18 employees, which is involved in chroming automobile bumpers. In such cases, the Mexican Cleaner Production Centre assists small firms increase the environmental efficiency of their processes. For Cromadora Delgado, the assessment led to recommendations for 14 changes, which began to be implemented in 1997. These changes produced substantial environmental improvements.

These experiences in specific municipalities show that encouraging cleaner production methods in microenterprises and SMEs is still in an initial stage of development. However, some general conclusions can be sketched:

- 1) In general, firms that need to find providers of environmental goods and services do not experience difficulty in doing so. The solution can often be found in institutions of higher education. The research found no complaint concerning lack of offerings. The principal complaints and frustrations on the part of environmental authorities came from lack of *demand* for these services.
- 2) Of the activities studied, the brick and tanning industries have aroused special concern on the part of civil society, as well as within municipal and state governments.
- 3) Cooperation among microenterprises and small businesses to identify the environmental impact of their activities and solve problems independently is rare. Indeed, the research turned up no such situation.
- 4) There are no private–sector providers of EGSs exclusively dedicated to serving the microenterprise and SME sector.
- 5) All successful cases reviewed produced clear economic benefits along with environmental efficiency for the companies involved. Thus, economic benefit was essential to the permanence of the changes.

4. Success stories and partnership experiences

It is notable that although the countries vary in size, environmental conditions, GDP and level of development, they generally share air and water pollution problems, solid and hazardous waste disposal difficulties, issues of deforestation and soil degradation, etc. Thus, in all four countries, there is growing demand for environmental solutions adapted to local economic, environmental and infrastructure conditions.

Against this background, the objective of the ECLAC/GTZ collaboration has been to help foster an economic sector that can take advantage of an expanding environmental goods and services market. It is certainly in the region's interest to meet increasing demands in the environmental protection sector, particularly if this can be achieved through partnerships or joint ventures.

To promote these objectives, the project attempted to:

- identify segments of the environment-friendly technology market and the market of promising environmental services in the selected countries, and to suggest potential development strategies; and
- identify business opportunities and investments in the environmental protection market, and ascertain growth projections for the four Latin American and Caribbean countries studied.

Specifically, it analysed successful international collaborations between SMEs in the international EGS market, and identified the EGS providers that offer the most promising possibilities of partnership with Latin American SMEs.¹¹

¹¹ This chapter summarizes the material in Ruz and Mladinic, 2005.

4.1 The environmental goods and services market

4.1.1 Demand

Environmental goods and services for which there is demand in Latin America are generally linked with urban growth (waste management, water supply and treatment, air pollution abatement, power plant infrastructure, noise control, conservation of natural areas, etc.) and with economic activities related to the exploitation of natural resources (forests, minerals, and marine and agricultural products).

As table 4.1 shows, there is a more developed and precise classification for EGSs related to urban maintenance and growth than is the case for natural resources activities. This reflects the priority given to urban EGS needs, which, were it neglected, would quickly lead to the cities' collapse. The classification used here is the OECD system cited above.

Table 4.2 shows a more generic list, where items such as “sustainable forests” and “sustainable agriculture and fishing” reflect the high level of aggregation and low level of development of EGSs in this area worldwide. (There is one exception: businesses that provide remediation and cleaning of soil, surface water and ground water. These firms represent greater volume, and a number of them produce some of the highest earnings in the EGS market.)

These firms are still few in number, and in most cases sell innovative goods and services, generally provided by scientific research institutions. They conduct research projects, particularly on natural ecosystems, genetic change, and displacement of animals as a result of human activity—knowledge needed in restoring natural ecosystems, animal populations and vegetation.

TABLE 4.1
ENVIRONMENTAL GOODS AND SERVICES IN DEMAND FOR THE MAINTENANCE AND GROWTH OF CITIES IN LATIN AMERICAN COUNTRIES

Services in demand	OECD classification		
	Level 1	Level 2	Level 3
Waste management	A. Pollution control group	Level 2 Production of specific equipment and materials, provision of services, and construction and installation of:	Solid waste management; liquid waste management
Water supply	C. Resources control group	Production of specific equipment, technology and materials, provision of services, and construction and installation for:	Water supply
Water treatment	A. Pollution control group	Production of specific equipment and materials, provision of services, and construction and installation of:	Remediation and cleaning of soil, surface water and ground water
Air pollution abatement	A. Pollution control group	Production of specific equipment and materials, provision of services, and construction and installation of:	Air pollution control
Control of pollution within households	A. Pollution control group	Production of specific equipment and materials, provision of services, and construction and installation of:	Air pollution control
Power plant infrastructure	C. Resources control group	Production of specific equipment, technology and materials, provision of services, and construction and installation for:	Heat/energy savings and management; renewable energy plants
Noise and vibration control	A. Pollution control group	Production of specific equipment and materials, provision of services, and construction and installation of:	Noise and vibration abatement

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

TABLE 4.2
ENVIRONMENTAL GOODS AND SERVICES IN DEMAND IN CONNECTION WITH
NATURAL RESOURCE USE IN LATIN AMERICAN COUNTRIES

Natural resource	OECD classification		
	Level 1	Level 2	Level 3
Forests	C. Resources control group	Production of specific equipment, technology and materials, provision of services, and construction and installation for:	Sustainable forests; other (conservation of nature, habitats, and biodiversity)
Minerals	A. Pollution control group	Production of specific equipment and materials, provision of services, and construction and installation of:	Remediation and cleaning of soil, surface water and ground water
Marine products	C. Resources control group	Production of specific equipment, technology and materials, provision of services, and construction and installation for:	Sustainable agriculture and fishing; other (conservation of nature, habitats, and biodiversity)
Agricultural products	C. Resources control group	Production of specific equipment and materials, provision of services, and construction and installation of:	Sustainable agriculture and fishing; other (conservation of nature, habitats, and biodiversity)

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

Different actors are responsible for demand in the two sectors of goods and services. The demand for services comes from private enterprise, which requires EGSs to operate in a legal and socially acceptable manner, and from local, regional and national authorities, which need to guarantee citizens that their cities will continue functioning. It is usually pressure from the public or the legislative branch of government, for example, that is responsible for surges in a country’s demand for the services listed in the above tables.

4.1.2 Supply¹²

The OECD makes the following observations concerning the structure of the world’s environmental industries:

The environmental industry is characterized by a few large firms that dominate a small number of market segments, and a great number of small and medium enterprises. The demand side is highly diverse (involving a range of entities, from divisions of chemical companies to consultants). Its distribution of activities is structured differently from country to country, and the national sectors vary in size.

Firms’ level of specialization, defined as the ratio of environmental profits to total profits, is low to moderate. The production of environmental goods and services is often less than 50% of total production. This is particularly true in large engineering and chemical firms.

¹² See Ruz and Mladinic, 2005 for sources and details.

The degree of diversification, defined as the range of environmental products, is higher in most of the mature segments and for the largest companies, which produce a wide range of products and services.

Environmental Business International, Inc. collects annual data on the 50 leading firms in the market. The information shows that United States, European and Japanese firms dominate. The top 10 firms include 3 French companies, 3 U.S. companies, 3 Japanese companies and one company in the United Kingdom. France's Vivendi, formerly known as Général des Eaux, is the world's largest environmental company, with 1998 earnings of US\$13 billion. Another French firm, Suez Lyonnaise, occupies third place, with 1998 earnings of US\$7 billion. The leading U.S. firms are Waste and Browning Ferris Industries, which are second and fourth, respectively, in the ranking. Severn Trent occupies the highest ranking among British firms, while Mitsubishi Heavy Industries, in seventh place, is the highest-ranked Japanese company.

According to the Environmental Business Journal (EBJ), there is a trend toward consolidation among environmental firms. This is seen in mergers of the largest companies and a general trend toward increasing concentration of earnings among the 50 firms in the ranking. Thus, in 1994, according to the EBJ, these firms represented 17.5% of total earnings. The figure was 18.6% in 1995, and had risen to 20.6% (nearly US\$100 million) by 1998. Notable mergers include that of Waste Management, Browning Ferris Industries and Suez Lyonnaise des Eaux, which, led by Suez Lyonnaise, surpassed Vivendi in profits.

The United States, Germany and Japan represent the three leading companies in EGS exports. The EBJ estimates that, in 1998, between 20% and 25% of the German environmental industry's earnings were generated abroad (considerably more than the U.S. figure of 10%). In Japan, between 15% and 20% (US\$15 billion) of the environmental industry's US\$88 billion in earnings was generated abroad.

Another observation that the EBJ makes is that globalisation seems to have occurred more quickly in the environmental goods market than in the environmental services market, due to the nature of what is being sold. In other words, it is easier to export a manufactured product than a consulting project. While the U.S. equipment sector represents only 26% of the EGS industry, it accounts for 58% of the industry's exports. Inversely, while the service segment is responsible for over 50% of the industry's earnings, it represents only 19% of the industry's exports.

4.1.3 The size of the market

According to the International Trade Centre (ITC), though not easily recognized by the general public, environmental technologies, products and services have grown to levels equal to the aerospace and pharmaceutical industries in a 20-year period, reaching US\$450 billion worldwide in 2000. By 2010, the figure is expected to be US\$640 billion. Developing and emerging markets represent over 15% of this volume.

Currently, the market is dominated by developed countries in North America and Europe, and by Japan. However, markets in developing countries in Asia and Latin America are growing rapidly, as the environment becomes a high-priority issue. Developing countries that are progressing rapidly and have growing populations require environmental goods and services. In addition, international aid agencies are placing emphasis on sustainable development and environmental performance in their financial support programs.

According to the ITC, the growth of this market is due to regulatory requirements, public pressure, infrastructure development, and privatisation and reform.

In South America, Brazil and Chile have the most advanced regulatory systems, although the enforcement infrastructure is still in the process of development. The growth of the

environmental market is expected to be led by infrastructure and privatisation projects, as well as increasing enforcement of existing environmental legislation. The regional market is projected to reach US\$15 billion by 2010.

The WTO estimates that the global environmental market represented US\$452 billion in 1996. In 1998, it was estimated at US\$484 billion, and in 2000 at US\$518 billion, according to the OECD. The United States, Western Europe and Japan accounted for 87%, with developing countries representing the remaining 13%. Latin America accounted for a mere 1.9%. However, it is developing markets that show the highest projected rates of expansion and growth (12%, as against a world average of 3%).

Environmental services represented 51% (US\$246.9 billion) of the EGS market in 1998, with solid waste management accounting for 43% (US\$105.4 billion) and water treatment 28% (US\$68.5 billion).

The private sector has taken the lead as the region's main engine of economic growth. This is due in part to disenchantment with the inadequate results of development strategies led by the public sector, and in part to a redefinition of the State's role, as it has withdrawn from an interventionist stance to take a more limited position in promoting economic strength.

As a result of the rapid advance of economic globalisation, accompanied by liberalisation and greater openness of markets, international flows of private capital have increased substantially in the last few years.

Between 1985 and 1987, world trade grew from US\$2.3 trillion to US\$6.7 trillion. While the manufacturing sector represented 60% of trade in 1997, services exports experienced the greatest growth (from 16% to 20% of the total). In the 1990s, the flow of capital to developing countries increased from US\$100 billion (in 1990) to US\$340 billion (by 1997), then dropped slightly to US\$290 billion for 1999 (UNIDO, 2001). The essential point is the role of foreign direct investment, which represented 24% of the total in 1990 but had risen to 66% by 1999—while the share due to government funds dropped from 60% to 20%. These data reflect the growing importance of private capital in the investment schemes of developing countries.

Today, the world's countries compete for foreign investment. Economic regulations—aimed at attracting foreign investment and controlling the conditions under which it operates—have tended to converge among various countries. Thus, these regulations have become less important as determinants of firms' investment strategies. At the same time, the simple advantages of low labour costs have lost relative importance, as product quality, accountancy and inherent capacities assume a more central role.

Given this global situation, a dual challenge faces most countries: first, not to go unnoticed in the international flow of mobile investment; and second, to guarantee that investment has as great an impact as possible on national development.

One key mechanism for combining integration in the global market with local development is to promote linkages between local firms (especially SMEs) and international firms that are interested in investing in developing countries, with the object of strengthening the product and service value chain.

There are currently different types of partnerships, including public–private partnerships and partnerships between private–sector firms. In all cases, however, the trend is toward integrating more stakeholders in the partnerships, in order to ensure sustainability while increasing the probability that the action taken will prove successful and sustainable.

Partnerships may occur at different levels:

- *Domestic*: Domestic partnerships aim to improve macroeconomic conditions and frameworks through consensus among government, industry, unions and labour organizations, and research institutions.
- *Regional*: Regional partnerships target issues such as the development of clusters, or development of productive clustering in specific sectors: mining, forestry, environment, etc. In these cases, local government works with industrial associations and local support organizations such as financial institutions, development agencies and research centres to improve local and regional economic systems.
- *Sectoral*: Partnerships in specific sectors seek to improve and restructure programs.
- *Multilateral*: Examples are arrangements such as partnerships between United Nations organizations and the private sector, e.g. the United Nations Industrial Development Organization (UNIDO).

There are various reasons for the growing interest in public–private partnerships. One is the recognition that although governments can set policy, they rarely have the financial and administrative wherewithal and technological know–how for effective enforcement. Thus, the recognition that government can provide guidelines for, but not lead, economic development has become almost universal since the 1980s.

Similarly, the limitations of a purely market–based development paradigm are recognized. While economic deregulation and liberalization represent powerful incentives and pressures for improvement and modernization, they do not, in and of themselves, guarantee results.

A more critical view has recently emerged, emphasizing the systemic nature of competitiveness. In this view, improving competitiveness depends as much on a stable and well–defined macroeconomic framework as on firms’ microeconomic strategies, and is also a function of the so–called “meso” level, at which the economy organizes knowledge and puts it to use. Until these different levels of economic organization attain a common vision and move in synchrony, their efforts may be futile.

4.2 Analysis of partnerships

Following is an examination of five successful public–private partnership programs of international importance, as well as some general experiences of private–private collaboration. The attempt here is to identify or propose a model that can be replicated in Latin American countries to ensure that the region’s firms have the opportunity to capture a significant percentage of the growing EGS market.

The public–private partnerships analysed here were formed in the context of the following projects and programs:

- UNIDO Business Partnerships Programme
- ECOPROFIT
- Chile–Sweden Environmental Partnerships
- GTZ Public–Private Partnership program
- Quebec–Chile Technology Transfer project

These programs were selected based on the following criteria: Their success has been publicly recognized; information on them is available; they involve action by parties in developed countries, aimed toward developing countries, employing a variety of conceptual frameworks.

Also analysed were collaborations between Latin American businesses and international firms, or Latin American representatives of such firms, that have offered and sold EGSs.

All of these experiences were examined in two key dimensions: time (the different phases of a business partnership), and actors (domestic and foreign, their interactions, and the basic conditions governing their relationship).

4.2.1 UNIDO Business Partnerships Programme

One of the organizations that has been developing and promoting trade partnerships is UNIDO (the United Nations Industrial Development Organization). UNIDO promotes industrial development in developing and transitional countries through a network of regional and country offices. It promotes investment and technological development, as well as cooperation among different actors in the development process. Its Business Partnerships programme focuses on the quality, efficiency and international competitiveness of SMEs, seeking to promote:

Technological impact and learning in the management context

- increased use of domestic resources to produce and increase income and productive employment.

In UNIDO's view, partnerships can be an effective industrial development tool, especially insofar as the development of SMEs is concerned, by helping these firms gain a foothold in increasingly complex value chains.

“[Partnerships] can be defined as structures for joint action in which complementary resources (know-how, skills, funding, equipment) can be tapped and different interests be balanced while the parties involved retain full independence” (UNIDO, 2002). UNIDO business partnerships are, by definition, multisectoral relationships involving all of the major actors in the development process. The partnership process, as fostered by UNIDO, requires participants to engage in ongoing learning and seek to understand the others, so that different work cultures can join in achieving the ultimate goal of sustainable development.

Thus, much time and effort are initially spent in building awareness and establishing commitment, as well as in identifying partnership-building mechanisms and tools, i.e., appropriate and effective forms of collaboration. The next vital component, according to UNIDO, is achievement: increased competitiveness, improved access to markets, expanded capacities, more jobs, and poverty reduction.

Actors

The types of partners involved in a business partnership depend on the nature and objective of the partnership. The different types of principal parties involved, and their basic roles, are described below.

Private firms

Private firms join partnerships primarily for the business opportunities they offer. The main role of the private firms is to produce goods and services, generate wealth and create jobs. Within this general scheme, various kinds of firms may be involved. Transnationals contribute international vision, access to world markets, and major resources in the form of experience, technology and financial capital. These firms are generally seeking new market opportunities.

Small and medium enterprises view these partnerships as a way of associating themselves with international firms possessing both experience and technology. The international firms offer knowledge, experience and channels that partners can exploit in their own local markets. For

SMEs, associations with large firms whose size, technological capacity and financial capital are much greater than their own open the door to compete in the global dynamic of today's economy.

Governments

Partnerships can be an important tool for national development strategies. National governments can help ensure the success of the partnerships by:

- creating a good business environment (laws, education, basic infrastructure, incentives, etc.);
- creating framework conditions for economic, political and social development;
- making and enforcing laws and regulations, including international agreements;
- confirming and ensuring the credibility of the partners involved.

Government and private firms often differ sharply in their views of development, and one of the challenges of development partnerships is to find room for cooperation. The responsibility for creating a good business environment has recently shifted toward local and regional governments, which are competing to attract new investment.

Multilateral organizations

Not surprisingly, multilateral organizations such as UNIDO, other specialized agencies in the U.N. system, the World Bank, the IDB, etc., have developed an interest in business partnerships, and undertake various actions to facilitate them:

- They identify partnership opportunities at the world level.
- They act as neutral intermediaries or catalysts, making use of their contacts with senior government officials, key development institutions and private-sector management.
- They persuade governments to remove regulatory obstacles, bringing to bear international experience usually not available to businesses (training, standards, etc.).
- They share their global information networks.
- They help fund business partnerships.

Support institutions

These institutions benefit both the public and private sectors, and include universities and research institutions, technological centres, business centres, financial institutions, regional development agencies, etc. They play varying roles, depending on the specific partnership involved. For example, chambers of commerce and trade groups have a great deal of knowledge on the conditions governing local trade, as well as experience in public- and private-sector cooperation. Through the partnerships, the universities and research institutions gain opportunities to market their scientific knowledge.

Civil society

There is widespread recognition that economic, social and environmental problems cannot be solved entirely by top-down action, but require bottom-up efforts and participation by civil society. In UNIDO's view, the most important social organizations are business organizations that promote social responsibility, nongovernmental organizations involved in development, and associations of exporters and environmental groups. Business organizations involved in responsible development have become more important in recent years, with the increased pressure to reconcile stock value with social values and environmental sustainability. These organizations' contribution usually takes the form of training and awareness building, which are important elements in ensuring that social and environmental issues are fully addressed in the partnerships.

Factors in successful partnerships

Given that a partnership is a process that unfolds over time, the following factors are essential in the successive stages of the process:

- shared values;
- trust (partners' credibility, and an acceptance of different national and organizational cultures);
- common objectives that serve to motivate cooperation;
- selection of capable and responsible partners;
- involvement of senior management;
- participation of all relevant actors;
- development of a shared strategic vision;
- presence of leaders with the capacity to guide the partnership;
- agreement regarding the partners' initial contributions; and
- commitment on the part of the ultimate beneficiaries.

Thus, achieving the objectives depends on building trust through good interpersonal relations, and on transparent information and decisionmaking. Also important are flexibility in meeting unexpected challenges, a realistic approach to financing and well-defined timeframes. Fair sharing of risks and benefits among all the partners, continuity and long-term commitment are also contributors to success.

Conflict resolution

A systematic approach is needed to build partnerships with realistic objectives, clearly defined roles and benefits for each partner, and transparency and communication throughout. Complex partnership rules can be counterproductive. Mutual trust is more important than strict controls, though, of course, it is essential to have rules and procedures to govern contingencies such as conflict resolution and termination of the partnership.

Partnerships constitute a process that unfolds over time, and the building of a partnership is a cumulative process. Agreement must be reached on basics before more ambitious objectives can be addressed, and initial goals should be modest and concrete. Throughout the phases of a partnership, the parties must jointly define the partnership and its activities.

Resources

UNIDO's Business Partnerships projects have operated with cash contributions as well as goods and services from both the private sector and government. The largest financial contribution (US\$2.5 million) has been from Telefónica. Phase I of the auto parts industry project in India received US\$50,000 from Magneti/Marelli/Fiat and US\$100,000 from the Indian government. Phase II received US\$250,000 from the Government of India and US\$250,000 from the private sector. In Nigeria, a programme to develop an economically viable, environment-friendly 2- or 3-wheel vehicle received US\$200,000 in cash from the Japanese government and US\$150,000 in goods and services from the business partners.

Environmental goods and services bought and sold

The UNIDO business partnerships are not based exclusively on EGSs, as may be seen in the following list of recent projects:

- Auto Parts Industry Partnership Project in India;
- UNIDO–BASF environmental efficiency assessment project in Morocco;
- UNIDO–TBL project for the development of Asian export countries (India, Pakistan, Sri Lanka and Thailand);
- partnership program for 2– and 3–wheel vehicles in Nigeria;
- UNIDO–ERICSSON program for the development of electronics and cellular telephone industries in Egypt, Sri Lanka and Uganda.

Results

UNIDO recognizes the critical role that SMEs play in promoting industrial and economic development, but also understands that the objective can only be fully achieved if SMEs keep up to date and participate fully in the global value chain of products. Through its collaborations in the Business Partnerships Programme, UNIDO seeks to help SMEs accomplish this. The Business Partnerships Programme is considered technically friendly, economically viable and institutionally sustainable, and is considered to represent a model that can be replicated in different countries for a variety of productive sectors. UNIDO considers the programme to be proceeding well, though it began only recently.

A firm's ability to participate successfully in global markets depends strongly on its ability to innovate. Long-term profitability requires improving performance continually in order to stay ahead of the competition, developing new products and processes, finding new combinations of activities, and exploring new markets. In this process, the economic networks in which a firm operates are key factors in determining what profitable alternatives emerge and what priorities the firm establishes. Transnational corporations are often the biggest innovators. In a global economy, however, it is vital for SMEs to attract large firms as partners. The integration of SMEs in global value chains can lead to the transfer of know-how, techniques and experience that contribute to sustainable development. These can help developing and transitional countries progress toward the creation of balanced economies.

Achieving this involves addressing issues and time horizons that go beyond individual actors' range of action. Public and private sectors, as well as civil society, must cooperate to take full advantage of the resources of each (technical and financial skills, management, know-how, etc.).

Summary

The UNIDO Business Partnership programs described above:

- bring together the operations of large companies (BASF, ERICSSON, FIAT, BAJAJ) with those of SMEs in developing countries;
- make use of research and innovation in large companies (TBL, REAP Software), taking the place of research entities;
- involve the governments and private sectors of the countries;
- unfold over time, with the initial phase, the operational phase, and conflict resolution all taken into account when the partnership is formed. Short-term success is also a goal, with the large firms required to make only low levels of investment in the initial phases, increasing later on;
- use economic information about the results of the partnerships as quantitative indicators of success, essential to the evaluation and replicability of the results;
- are shaped by the roles that the actors play over time in the different stages of the partnership, and in the context of specific projects.

4.2.2 The ECOPROFIT project

SMEs adopt cleaner production methods when cooperative projects can be established to compensate for specific problems affecting SMEs. These cooperative projects bring together firms, universities, regulatory agencies and international organizations.

Among the most important cooperative projects in Europe are: PRISMA in the Netherlands, AIRE/CALDER in Britain, CATALYST Merseyside and SPURT in Denmark, LANDSKRONA in Sweden, and ECOPROFIT and PREPARE in Austria. The United Nations Environment Programme (UNEP) initiated its clean production programme in 1989, and has established cleaner production centres in the Czech and Slovak Republics, in Hungary, India, China, Mexico, Brazil, Nicaragua, El Salvador and Costa Rica in collaboration with the United Nations Industrial Development Organization (UNIDO).

The environmental service offered through the ECOPROFIT program (ECOLOGICAL PROject For Integrated environmental Technology) fall in the OECD category of Cleaner Technologies and Products.

ECOPROFIT's objectives are:

- to strengthen the economic position of firms in a city or region by introducing pollution prevention;
- to improve the ecological situation of regions and achieve sustainable development;
- to involve increasing numbers of firms of different sizes (with an emphasis on SMEs) from different sectors (commerce and industry); and
- to create some form of pollution prevention platform or network.

Since sustainability requires closed-loop thinking, and fails when only technical solutions are taken into account, ECOPROFIT provides training that “helps people to help themselves,” assisting companies in exploring their business from a new perspective. By taking a systemic approach and involving all of the partners, the program creates situations that produce ongoing progress.

The ECOPROFIT project model was designed for one-year projects. Over that period, a series of workshops are provided for employees from firms' environmental or waste-management divisions. Each workshop begins with a feedback session, where the homework from the previous workshop is presented. An informational block, an interactive section, and a final discussion follow. Between workshops, firms collect data and prepare the information needed for the workshops, ultimately providing the capacity to implement changes. The firms are in constant contact with the consultants, who continue offering training to the firms between workshops. One of ECOPROFIT's achievements is that it implements measures during the period covered by the workshops, achieving concrete results. The workshops have been adapted to provide for simultaneous participation on the part of large and small firms, which learn to take advantage of the opportunity to work together.

The workshops conclude with the presentation of the City of Graz ECOPROFIT Prize. To receive the prize, firms must document their environmental achievements, and must include their plan for the implementation of measures for the following year, to be overseen by the ECOPROFIT Commission, comprised of Graz officials. The prize is given for one year.

The firms that have participated in previous years, along with STENUM and the city of Graz, form the ECOPROFIT Club. They meet four times per year to address issues previously agreed upon. The member firms also contribute to the basic programme with presentations of their work. The innovation pool provides additional resources for the firms, allowing them to contract for additional consulting. The consulting firms include STENUM and other specialized firms.

ECOPROFIT was inaugurated in Graz in 1991. Starting in 1993, it began to operate in other cities and regions in Austria. Currently, over 300 Austrian businesses have implemented cleaner production programmes with the help of ECOPROFIT. International projects have been carried out in the Czech Republic (1994/95), the Slovak Republic (1994/95) and Brazil (1996/97/98) within the framework of the UNIDO/UNEP Cleaner Production Programme. Other programmes that have been conducted are ÖKOFIT/KMU–Feldbach (Austria) and ECOPROFIT–Dorog/Salgótarján.

Actors

ECOPROFIT's activities are based on a tripartite partnership scheme, involving firms, a consulting group, and local authorities. Coordination and oversight are handled by the head of the Environmental Protection Office (EPO) in Graz and the chief consultant at STENUM.

The consulting firm involved is STENUM, which developed ECOPROFIT along with the city of Graz and the Technological University of Graz. Since 1993, STENUM's experts have been responsible for the workshops, consulting, and other projects. Its experts participate as trainers in all of ECOPROFIT's UNICO/UNEP activities (in the Czech Republic, the Slovak Republic and Hungary). Thus, STENUM trains local consultants in the methodology of cleaner production technology, planning of workshops, building local consulting capacity, and makes initial visits to participating firms accompanied by local consultants, while providing the local consultants with the tools needed to solve problems using cleaner production methods.

Civil society participates by supporting and selecting local government participants, and through public recognition in the form of the City of Graz Prize, which is given to the firms.

Resources

During the pilot phase, Graz invested US\$23,400. Since then, it has spent approximately US\$234,000 per year on ECOPROFIT. In addition, the firms pay for the courses, with fees varying according to the number of employees in each firm (US\$1,490 to US\$4,575). Considering the total hours of work that the firms dedicated, their investment each year is US\$622,400. There are some additional subsidies, which can cover amounts of up to 66% of the cost to the firms.

Environmental goods and services bought and sold

The EGSs bought and sold as part of the ECOPROFIT programme (i.e., the harmonized codes covering environmental goods, and related CIU or NACE codes) are not predetermined, and are different for each firm, and for each project within a firm. Though aggregate information is not available, the information above would indicate that approximately US\$600,000 is transacted in the programme annually.

As shown in Table 4.3, an environmental consulting firm such as STENUM publicizes the environmental services offered using the following language to describe its products:

TABLE 4.3
PROMOTION OF ECOPROFIT

ECOPROFIT
<p>The product includes workshops, establishment of networks, consulting for one year and application for the City of Graz Prize. See further details on ECOPROFIT in Annex 7.</p> <p>Training</p> <p>Training for auditors and training in environmental issues: management of raw materials; technical management; water, energy and oil management; logistics; environmental legislation; storage and handling of hazardous waste; environmental costs and indicators; enhancing appreciation of the environment; networks and cooperation; environmental product and strategy design.</p>
UNIDO
<p>Carry out work, as UNIDO experts, on cleaner production, with consulting on:</p> <p>Training of local cleaner production consultants (building local skills)</p> <p>Cleaner production demonstration projects within firms</p> <p>Supervision of projects, and support for local consultants</p> <p>Networks comprised of firms, centres and communities</p> <p>Explanation of the benefits of cleaner production to different non-technical actors (chambers of commerce and industry, ministries, etc.)</p> <p>Environmental management systems</p> <p>Services offered are:</p> <p>ISO 14000 certification</p> <p>Comprehensive management systems</p> <p>Optimisation of processes and procedures</p>
ECOPROFILE
<p>Assessment of the firm's ecological profile</p> <p>Development strategy and vision</p> <p>Company Agenda 21 consists of a project to help firms discover potential through a strong regional economy.</p> <p>Ecostrategies offers development of company policy and vision, including environmental issues and definition of strategies for their implementation.</p> <p>Cooperation between companies offers help forming alliances between firms, which can lead to economic partnerships.</p> <p>Research and development</p> <p>STENUM offers the opportunity to develop cooperative research and development projects for SMEs, in addition to analysing opportunities for funding and coordinating the work with universities.</p>

Source: Ana María Ruz and Hernán Mladinic, "Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas," *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

Results

In 1996, the 29 firms participating in ECOPROFIT identified 460 measures, of which 55% involved repayment periods of under two years. Twenty percent of the measures were energy related.

Overall, the savings of the firms that received the Graz prize in 1996 totalled 2,341 tons of primary and secondary materials, 183 tons of solvents, 389 tons of regular waste, 591 tons of hazardous waste, 435 tons of paper, 210 tons of recyclables, 171,650 cubic meters of water, 5.08 gigawatt hours of electricity, 13.09 gigawatt hours of heat, 1.1 million cubic meters of natural gas and 70 tons of oils.

From the point of view of the firms, participation in ECOPROFIT also ensured that they would gain a better knowledge of environmental legislation, while preparing them for legal requirements and audit certification. The Graz Environmental Protection Office, meanwhile, used the experience from ECOPROFIT to formulate the objectives of its environmental program “TMkostadt 2000” (Eco-city 2000).

ECOPROFIT also had an effect on the economic master plan of the city of Graz. According to the plan, Graz will become an “eco-high-tech cluster”. In 1996, it was one of five cities to receive the European Sustainable City Prize.

All of the actors involved confirmed the importance of networks as an element of the program, and the importance of the prize as a means of increasing firms’ identification with the program’s activities, while also indicating the importance of attaining rapid, highly visible successes through the immediate implementation of measures.

On the negative side, it was concluded that the data, and tools for analysing them, are inadequate at this point, and that continuous development of outside initiatives is needed to keep the issue on firms’ agendas.

Summary

The factors identified in ECOPROFIT as necessary for success and sustainability over time are:

- a well-defined conceptual framework and a holistic, systemic and dynamic vision that integrates economic, social and environmental factors;
- contact, on at least a yearly basis, with the firms, to ensure that they implement concrete cleaner production measures, thus leading to positive feedback for the firm as it sees results and quantifies them in economic terms;
- public recognition of the firms for their efforts, in the form of the annual prize awarded by the City of Graz, which must be won anew each year by implementing new cleaner production measures;
- importance of the fact that the consulting firm, STENUM, was spawned at the University of Graz and continues to work with the university’s academics, thus providing a conceptual framework and fostering firms’ confidence in STENUM;
- presence of the ECOPROFIT Club, which helps maintain the social relationships of trust created during the first year of the program;
- importance of the fact that STENUM partners with UNIDO to provide consulting in Latin American cleaner production centres, offers training in cleaner production issues, and then leaves the scene. Given the time limits on this participation, it does not, in itself, replicate the conditions for sustainability typified by the Austrian program and outlined in previous paragraphs.

4.2.3 Strategic partnerships between Chile and Sweden

The Chile–Sweden Strategic Partnerships project for the environment was in operation between January 1997 and December 1999, and was coordinated in Chile by the Technological Research Corporation INTEC–Chile, and by the Swedish counterpart and the consulting firm Eurolatina A.B. It was funded by the Chilean Production Development Corporation (CORFO) and the Swedish Agency for International Development (SAID).

The project's general objective was to foster the creation of strategic partnerships between Chilean and Swedish firms in the environmental area, in order to generate joint ventures that would benefit both economies, as well as improve the environmental situation in Chile.

The specific objectives were:

- to promote the creation in Chile of new environmental technology and services firms, as well as strengthen existing ones; and
- to facilitate the transfer of environmental technology from Sweden, in order to support environmental improvements in Chile's productive sector.

The programme gave Chilean businesses working in the environmental field the opportunity to create business partnerships with nearly 130 Swedish firms in different environmental areas. The firms that participated in the program and created partnerships with Swedish companies were eligible for a subsidy of up to US\$65,000 under the Start Syd program, designed to cover the costs of technology transfer and train the Chilean personnel. Loans of US\$32,000 for purchase of equipment were also available.

Once the Chilean and Swedish firms concluded a cooperation agreement through a letter of understanding, they were eligible to apply for Sweden's Start Syd subsidy. Eligibility required that the partners have in place an agreement for a training plan to be implemented in a given timeframe. The training plan included training Chilean personnel in Sweden, as well as visits to Chile by Swedish technical staff.

The activity was part of a joint effort by the two governments to facilitate access to Swedish environmental technologies in Chile. The program was funded by CORFO and SAID (the Swedish Agency for International Development).

The form of the interaction was novel, since the idea was for the business networks in the two countries to identify joint business ventures that would benefit them while increasing the supply of environmental solutions in Chile.

Among the anticipated results of this program were:

- formation of at least 12 strategic partnerships between Swedish and Chilean EGS firms;
- technical/trade missions to Sweden by 55 Chilean firms;
- meetings of businesspeople to explore business opportunities in environmental technology and services in Chile, with the participation of 48 Scandinavian firms;
- technical/trade meetings of businesspeople in Chile and Sweden, with participation by Swedish experts and businesspeople from the environmental technology and services field;
- incorporation of the project's activities in other programs funded by the European Union;
- entry of other private-sector actors in efforts to promote business partnerships;
- the promotion of environmental discussion between firms and organizations in the sector, and other institutions.

The expected impact of the project was to transfer technology and contribute to progress in—and solution of—problems in Chilean industry.

Actors

The institutions participating in this program were:

- CORFO (Corporation for the Development of Production) Chile
- AGCI, Chile's International Cooperation Agency
- SAID, the Swedish Agency for International Development
- INTEC-CHILE, coordinator in Chile
- EUROLATINA A.B., coordinator in Sweden
- FONTEC – CORFO

Resources

The three-year project had a budget of US\$120,000 from the FONTEC project, comprised of a CORFO subsidy and contributions from Chilean firms. No information is available as to contributions from Eurolatina, from Swedish firms, or from Start Syd.

Environmental goods and services bought and sold

Of the 37 Chilean and 121 Swedish firms that participated in the project, partnerships were formed between 16 Chilean and Swedish firms. These 16 firms sought to buy or sell the EGSs listed in Table 4.4.

An analysis of the current state of these partnerships indicates that only in two firms were transactions of goods and services actually carried out, namely, Analítica Weisser S.A. and Minimet S.A.

TABLE 4.4
ENVIRONMENTAL GOODS AND SERVICES THAT CHILEAN AND SWEDISH FIRMS
SOUGHT TO BUY/SELL

	Chilean firm	Swedish firm	EGSs bought/sold
1	CMAIND INTERNATIONAL S.A.	ECOMINAS AB	Bring to Chile technology and knowledge related to environment–friendly mining, and remediate problems of mining waste.
2	MINIMET S.A.	EMENDO AB	Treatment of wastewater in developments and small towns
3	ANALITICA WEISSER SA	OP SIS AB	Produce and sell OPSIS products in Chile.
4	INGEAGUAS Ltda	NERTHUS MILJÖ AB	Compost machine for organic household waste, and Bio Meal, which transforms organic waste into humus in 48 hours. Future production in Chile.
5	Cartografía Geosistemas Digitales (CGD)	Institutet för Vatten och Luftforskning (IVL)	Specialized consulting in environmental geographic systems.
6	Cartografía Geosistemas Digitales (CGD)	Sweede Survey	Specialized consulting in digital cartography.
7	EMERES	Borlänge Energi	Treatment of solid waste – Energy. Training of personnel. Sale of knowledge to municipalities, landfill managers and clean–up enterprises.
8	Heatex	Retech Recycling Technology AB (System REDOMA)	Recycling of cables, recovery of raw material without polluting.
9	INGEPRO	Wash & Circulation	Vehicle washing with recovery of water and detergents. Plants will be produced in Chile, along with–in the long term–the chemicals needed.
10	INGEPRO	Water Management	With Swedish assistance, assemble, scale and install inverse osmosis water treatment plants in Chile.
11	Taggsa SA	ECT Offshore Service AB	Produce and sell liquid industrial waste treatment plants for Chilean industry.
12	Manantial Chile SA	Vyr Metoden	Offer the Chilean market the VYR method for making water potable, and introduce other methods such as biogas treatment and waste disposal Make water potable before bringing it to the surface.
13	ORIOI Ambiental	CASMA Gruppen	Build firms’ environmental image to develop a return on technology and environmental–care investments, so as to comply with environmental demands from developed countries. Provide firms with advice on environmental marketing.
14	Urbano Ltda.	Jaako Poyry Consulting	Consulting in Jaako Poyry’s areas of specialization, in collaboration with Urbano Ltda, in relation to environmental solutions for municipalities, waste treatment enterprises and the forestry industry.
15	World Clean Chile	AWI AB	Organic waste composting equipment for households and restaurants. Sale of composting equipment. Future manufacture in Chile.
16	World Clean Chile	Sweco	Solutions to environmental problems related to mining, recovery of contaminated soils and remediation of pollution in the industrial sector.

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

Results

The project was evaluated, one year before its conclusion, in a workshop designed to analyse the programme's current situation and generate consensus proposals to improve it (INTEC, 1999).

In terms of the project phases proposed by UNIDO—start-up, management and achievement of objectives, conflict resolution—this workshop was part of the start-up phase. Its conclusions represent a concrete contribution.

Summary

While transfer of knowledge and equipment occurred in two cases, the project's time horizon was insufficient to produce an increase in the number of partnerships formed. The EGSs bought and sold (as well as those potentially bought or sold) represent an interesting path for transferring technology and increasing the offerings of Chilean SMEs.

However, the project lacked four essential factors needed for sustained success:

- a definition of partnership as a dynamic system unfolding in stages, with different actors taking different roles at different stages, and contributing their respective evaluations;
- short-term successes, and their dissemination to the other actors and firms participating, so as to create positive feedback loops that would generate ongoing activities once the official project period was over;
- public-sector participation to provide public recognition for the achievements;
- participation by universities or research institutions, to produce innovations or adaptations of the technologies.

4.2.4 GTZ Public-Private Partnership programme

Development partnerships with the private sector, better known as public-private partnerships, or PPPs, are a new mode of cooperation aimed at fostering development. Here, GTZ works with the private sector in developing and transitional countries. GTZ's slogan for the new model is "Recognize opportunities, use synergies, work together!"

Globalisation brings new challenges for development cooperation, as well as for the private sector. A change in approach is needed, since, in developing countries, there has been a curtailment of opportunities relying solely on government support. Private firms are playing an increasing role in development in these countries through job creation, training of local workers, transferring of know-how and technology, and creation of wealth.

At the same time, private firms, and especially SMEs, face problems. They often lack the tools and local contacts needed to compete in today's international setting. In this respect, the PPP program of the German Federal Ministry for Economic Cooperation and Development (BMZ) plays a contributing role. Its premise is that if partners join efforts and resources, they can achieve their objectives more economically, efficiently and quickly. Experience has shown that development policy and private goals often overlap and complement each other.

To date, the project has worked with over 50 partnerships. Some published cases and specific actors appear in Table 4.5:

TABLE 4.5
GTZ PUBLIC–PRIVATE PARTNERSHIPS

	Local SME	Local public entity	German SME	German technical cooperation
Coffee production	Peruvian farmers and local cooperatives	Peruvian Coffee Chamber	Jacobs Kaffee	GTZ
Training for welders	Welders in the port of Cienfuegos	Cuban Ministry of Basic Industries	Stefan Messer GmbH	GTZ
Waste treatment	Mechanical–biological waste treatment	Municipality of São Sebastião do Paraíso, Brazil	Faber Recycling GmbH	GTZ
Health training	AIDS information and education	South African government	DaimlerChrysler South Africa	GTZ
Organic production of essential oils	Shambala Herbal & Aromatic Industry	Not available, Nepal	Primavera Life	GTZ
Training in quality issues, cutting techniques, weaving and information technologies	Visatex	Local training centres, Lithuania	Textile Partners	GTZ

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

The firm Jacobs Kaffee, in Bremen, concluded an agreement with the Peruvian Coffee Chamber to improve the quality of export coffee by training producers. With support from local cooperatives, a PPP project provided advice on coffee processing for small farmers.

In Cuba, the firm Stefan Messer GmbH and the Ministry of Basic Industries designed a project to create a school for the training of welders in the island’s major port, Cienfuegos. The project is based on the observation that the local economy needs welders for maintenance in industrial facilities, and for pipeline construction in the energy and food sectors. A subsequent project was Oxícuba S.A., a joint venture on the outskirts of Havana carried out by Gases Industriales de Cuba and Stefan Messer GmbH (of Krefeld, Germany). Oxícuba’s capitalization is US\$14.3 million, and it is owned in equal parts by the two companies. It provides 140 tons of oxygen daily in Cuba.

An initiative by the municipality of São Sebastião do Paraíso, in south–eastern Brazil, and the German firm Faber Recycling GmbH is designed to address the problem of waste storage, taking into account the increasing sensitivity of environmental issues. For purposes of the project it was necessary to develop a mechanical–biological waste treatment procedure.

Primavera Life is one of the principal buyers and marketers of essential oils extracted in Nepal. It has been operating there since 1992, and is seeking secure long–term contracts for production. It also provides support for all phases in the production of these 100%–natural oils, and is endeavouring to certify them as naturally produced, where possible. The cooperation involves training local specialists in organic growing and weed–control methods. Primavera Life’s local partner is Shambala Herbal & Aromatic Industry.

Visatex, in Lithuania, is a subsidiary of the German firm Textile Partner. It attempts to address the lack of trained local workers through a PPP program that provides training on management and quality control, organizing and preparing production flows, cutting and sewing techniques, and basic computer techniques.

Resources

Since the inception of the PPP program in January 1999, GTZ and the private partners involved have initiated over 250 partnerships in more than 60 countries. In excess of 100 million euros have been made available for the projects. Public funds have represented an average of 40% of project funds.

To promote cooperation between private –and public– sector institutions, the German Federal Ministry for Economic Cooperation and Development (BMZ) has created a special fund to finance one– to three–year projects. The public contribution may be as high as 200,000 euros (more in exceptional cases). The amount of the public contribution depends on the public–policy benefits for the partner country. In the first three years of the PPP program (1999–2001), GTZ participated in PPP projects, representing a total of approximately 40 million euros.

The public contributions are not subsidies: the projects are planned, financed and executed jointly by the parties involved. GTZ only supports aspects of the projects that go beyond the central business of the enterprise.

Environmental goods and services bought and sold

Only in two of the five cases described above were EGSs bought and sold. These cases involved waste treatment in Brazil and organic production of essential oils in Nepal. Other projects have not involved purchase/sale of any goods and services rigorously falling under the OECD classification of environmental goods and services.

Results

Though there is insufficient information to evaluate the economic, social and environmental impact of the partnerships, it is clear that the relationships are sustainable over time. Thus, if there is a second stage in which the cooperation agency does not play a role, the relationships among firms and between firms and local public entities can be expected to continue.

Summary

A transfer of knowledge did occur in every GTZ partnership. The partnerships were not designed specifically to promote EGS transactions, but with the broader purpose of fostering development in the partner countries.

4.2.5 Quebec–Chile technology transfer project

Trade and industry relationships between Chile and Canada, as well cooperation activities, have increased in the last 10 years. The decisive factors in this process include the two countries' free trade agreement, associated agreements and, above all, the will of Chilean and Canadian entrepreneurs and managers.

The Quebec–Chile technology transfer project began as an agreement to promote exchange for the purpose of fostering strategic partnerships between firms in Chile and Quebec and promoting technology transfer, exchange of trade information, etc. The approach seeks to identify strengths and synergies to facilitate the growth of trade between Chile and Quebec.

INTEC Chile and Voz International participated in the program in 2000. The objective was to promote the formation of strategic partnerships between Chilean firms and Quebec firms in the environmental field, in order to create joint ventures to help improve the environmental situation in both Chile and in Quebec, while benefiting both economies.

Voz International Inc., which, as counterpart, coordinates the project, is a Canadian firm that brokers and consults for international projects designed to foster internationalisation projects involving Canada and Chile. It enjoys financial support from the government of the Province of Quebec. Thanks to the Canada–Chile technology transfer program, a tool created by Voz International, Chilean firms, institutions and organizations can present their projects proactively to their Canadian peers, with a view to developing them collaboratively.

The objectives of the program are to promote and carry out transfer of new hard technologies (machinery, industrial processes, etc.) and know-how from Canada to Chile through the formation of strategic partnerships, joint ventures and cooperation projects. The essence of the programme is the effort to address the needs and requirements of the Chilean situation through a win-win model that seeks compatibility between the interests of Chilean and Canadian actors.

From October 2–4, 2000, a Canadian delegation representing 22 enterprises and institutions visited Chile. Its objective was to find partners that could facilitate the creation of subsidiaries in Chile, as well as enter into agreements for technical cooperation, product distribution and marketing, while fostering lasting trade relations, business partnerships and joint ventures. The delegation was the largest Canadian environmental mission ever to visit Chile.

The mission was part of the environmental sector of the 2000 Chile–Quebec technology transfer programme. The program was a joint effort by INTEC Chile, Voz International Inc., and the Quebec provincial government's programme, Quebec's Decade of the Americas.

The Canadian partners included representatives of firms such as Atrium (which treats agricultural and plant waste generated in the manufacture of fertilizers and animal feed); Collège Laflèche (which provides education in ecotourism and hotel management); OxydH2O (which designs wastewater treatment plants); and Sogi Informática (which markets an environmental software application).

The Canadian visitors met with private firms and institutions, and with public-sector organizations in the fields of waste management, energy management and liquid industrial waste treatment, as well as with representatives of municipal governments and institutions of higher education. There are over one thousand firms in Quebec involved in activities associated with the environmental industry, representing a volume of business of approximately US\$2 billion, of which 15% represents exports.

According to the programme evaluation, the Canadian delegation's mission was a great contribution to Chilean firms seeking partners to internationalise their business. The goal was to broaden the field of cooperation to other areas of development, such as information and communication technology firms.

The programme has also sent other business missions, with public- and private-sector representatives, to Chile. The most recent was in 2002, in the context of the Environmental Efficiency Fair.

Canadian representatives attending roundtables in 2000 were:

- VOZ International
- ATRIUM Medio Ambiente (Recypro technologie, Dec technologies, Purin Pur, Menart S.L.)
- Centre d'Études en procédés chimiques, or CEPROCQ (College de Maisonneuve, ACT-5 filial de DOZ technologies)
- COLLÈGE LA FLÈCHE (college-preparatory and technical training in tourism, ecotourism and hotel management)
- Group CONPOREC Inc. (Composting and separation of household waste)
- CSI Environment (Centre d'Expertise en Analyse Environnementale du Québec – Groupe S.M. International – Cogexel Inc. – Enviroservices Inc.)

- ENVIRONNEMENT E.S.A. INC. (analysis of liquid industrial waste and municipal wastewater)
- GESPRO (in-motion weighing for trash-collection trucks carrying trash, recyclable materials and software)
- OXYDH2O (design and construction of wastewater treatment plants)
- SOGI-CSPP SOGI informática Ltda. (Cegep de Trois-Rivières, a centre specializing in pulp and paper)
- Société québécoise d'assainissement des Eaux (SQAE)

New firms join the programme each year. As Carla Avila, the Director of Voz International, pointed out at the 2002 Environmental Efficiency Fair in Santiago, there were, in that year, five new enterprises of this type: Aquabiotech, Environnement ESA, BOSS Technology, H2O Innovation and Oxydh2O.

Resources and results

Available information indicates that no partnerships have yet been formed.

Summary

The object of the Quebec–Chile technology transfer programme is not to create partnerships but, rather, simply to transfer technology. Thus, it was not designed to take account of social issues, and environmental issues are addressed only to the extent that EGS firms become involved in transfers, which they do in hopes of fostering bilateral trade.

The programme is coordinated by Voz International in Canada, and has no strong leadership counterpart in Chile.

4.2.6. General findings¹³

It is important to distinguish between public–private partnership programmes and individual projects that take place within their frameworks. There are two phases of operation, and from the outset each must have clear definitions and provisions for independent quantitative and qualitative evaluation. Subsequently, the projects sustain themselves as they attain the final goal, which is to achieve a flow of goods and services, with the participation of SMEs in developing countries.

The UNIDO programme and GTZ's public–private partnership programme are particularly notable, among the cases covered here, for the fact that they create partnerships between firms of different sizes through value–producing chains, incorporating and retaining SMEs in the productive process.

Only in the case of the UNIDO business partnerships was it possible to obtain economic data on the investments made, and the available data covered only environmental benefits, not economic benefits. Ideally, programmes define the parameters by which they will be economically evaluated in different phases (investment, earnings, and flows of goods and services), given that such parameters are necessary to measure success.

Since sustainability requires closed–loop thinking, and fails when only technical solutions are taken into account, ECOPROFIT provides education based on the principle of “helping people to help themselves”. As stated in the InterSEE report prepared by the Psychology

¹³ For more details, see Ruz and Mladinic, 2005.

Department at the University of Kiel, “the programme succeeds in creating ongoing momentum based on a systemic approach and on involving all of the responsible parties”.

According to Hakanson and Snehota, “the structural features of a business relationship should take account of a number of variables, including continuity (stability and duration of the relationship), complexity (multiple actors and relationships), symmetry (parity of capacities and resources) and informal factors (trust). However, the dynamic of this structure depends on an interactive process that includes adopting new approaches, one that addresses issues of cooperation and conflict and deals with social interaction and routinisation”.

One element needed to replicate successes is for information about them to be disseminated. “Unlike its predecessor (the PREPARE programme), ECOPROFIT achieves immediate implementation in a form directly related to the objective. (‘Success stories matter’)” (University of Kiel, 1998). Planning for achievement in the short term makes it possible to place in motion feedback loops; this, however, is seen only in ECOPROFIT and in some UNIDO business partnership projects.

4.3 Private partnerships

4.3.1 Internationally marketed services

According to the OECD’s International Trade in Services Manual (2001), there are four modes through which services may be traded internationally: (1) cross border; (2) consumption abroad; (3) commercial presence; and (4) presence of natural persons.

4.3.2 Partnerships between private enterprises

This study deals with EGS providers in Chile, Mexico and Colombia. The objective is to identify the types of partnership that have been formed in the private sector, and examine how they operate, rather than to present an exhaustive list of environmental goods and services enterprises in each country.

Here, private–sector partnerships that have increased the availability of EGSs in Latin America are identified. In categorizing the partnerships, the OECD trade in service categories have been used.

Information on the firms has been taken from the following sources:

- Chile: Directorio Induambiente 2002–2003; the directory of firms at sostenible.cl; ECLAC’s *Medio ambiente y desarrollo* series No. 68; company websites.
- Mexico: the study that appears in ECLAC’s Environment and Development Series No. 79; the Global Directory for Environmental Technology (www.eco-web.com); company websites.
- Colombia: the study that appears in ECLAC’s Environment and Development Series No. 70; the Global Directory for Environmental Technology (www.eco-web.com); company websites.

These lists do not include all of the enterprises offering EGSs in the countries in question, but only a sampling taken from the above–mentioned sources for the purposes of this analysis.

Nevertheless, it would be of great interest to have a Latin American directory listing firms that produce EGS technology, along with firms that distribute EGS technology made by others, while at the same time describing their different types of strategic partnerships.

4.3.3 Types of international partnerships in the private sector

All four of the OECD's means of providing services may be found in the EGS market as we have observed it. Table 4.6 shows specific examples of such partnerships.

TABLE 4.6
TYPES OF INTERNATIONAL PARTNERSHIPS PROVIDING ENVIRONMENTAL GOODS AND SERVICES IN THE PRIVATE SECTOR

Types of international partnerships	Observations
Modes: 1: Cross border	
<p>Offices of foreign firms established in a Latin American country.</p> <p>Enterprises created by multinationals to provide specific services to other enterprises in the same conglomerate.</p>	<p>Such offices do not necessarily represent all enterprises in the conglomerate. For example, Mitsubishi does not have any representation for Mitsubishi Heavy Industries (seventh in the top-50 ranking). Nor do the firms represented necessarily offer all of the services, as in the case of Bechtel, which works with large mining operations.</p> <p>This is the case of the Chilean firms Ecoriles S.A. and Análisis Ambientales S.A., associated with the Suez group.</p>
Mode 2: Consumption abroad	
<p>Training in environmental issues and ecotourism.</p>	<p>Individuals travel for training in environmental concepts and techniques.</p> <p>Individuals travel to other countries for ecotourism.</p>
Mode 3: Commercial presence	
<p>a) Enterprises representing a foreign firm.</p> <p>b) Enterprises representing a variety of EGSs, particularly different equipment needed to implement the projects developed.</p>	<p>An example is Aguas y Riles S.A., which represents CIBA Speciality Chemicals.</p> <p>Engineering firms offering services for industrial process control represent a range of control equipment (BAPA S.A., Ambiente y Tecnología S.A. etc.)</p>
Mode 4: Presence of natural persons	
<p><i>(Not addressed in this study, which examines relationships between organizations).</i></p>	

Source: Ana María Ruz and Hernán Mladinic, "Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas," *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

4.3.4 Lessons learned

The study has shown that some firms describe themselves as part of the EGS market, although the goods and services they provide are not recognized as environmental by international trade organizations (e.g., AGA S.A., a marketer of industrial and medicinal gases in Chile), while other firms do not describe themselves as such, despite the fact that their activities fall within the international classifications for environmental goods or services. Examples of Chilean firms in the latter category include Wireless Energy (renewable energy solutions) and Deuman Ingenieros (environmental and energy consulting).

Information from the company websites of 94 Chilean firms shows that roughly 60% of Chilean firms have partnerships with international firms under one of the following modes: modes 1a and 1b, international enterprises that open offices in a country, and firms created by

multinationals to provide services in a country; and modes 3a and 3b, enterprises representing a foreign firm, and enterprises representing various firms. Twenty percent of the Chilean firms have no international partners. Six percent market their goods and services in Latin America. As a whole, the Chilean firms do not include environmental training or ecotourism firms. Twelve percent of the companies had no website, and thus were not taken into account in this analysis. The goods and services offered are related principally to the country's mining activities and related industrial processes (Leal, 2003b).

Information from the websites of 76 Mexican companies shows that 30% have partnerships of types 1a, 1b, 3a and 3b; 37% have no international partners; 7% market their own technologies worldwide; and 5% offer environment-related training. Nine percent of the relevant firms have no website, and 14% are public entities or nonprofit organizations, and therefore were not included in the analysis. The goods and services offered are predominantly related to water purification and treatment (Romo, 2004).

The sample includes only 21 Colombian firms. Thirty-three percent of these have international partners of types 1a, 1b, 3a or 3b; 5% have no international partners; 28% are not firms but, rather, public entities for the protection of flora and fauna. This latter category is of note, since it contains enterprises that are dedicated to protecting the country's natural resources but do not appear explicitly in EGS directories either in Chile or Mexico. Note, again, that organizations without websites are not included in the analysis (Van Hoof, 2003).

The enterprises analysed do not constitute statistically chosen samples representing countries' local markets, but are simply an attempt to provide a glimpse of the types of partnerships that exist in these markets. Important results could be expected from more thorough research that used the OECD classification of environmental goods and services to study partnerships of Latin American firms.

It would also be interesting to examine in greater depth those Latin American enterprises that have a striking presence in the EGS market in different categories, e.g.:

- Enterprises in a Latin American country that provide services in the region, such as Disal Ltda. (Chile) and Edospina Internacional (Colombia).
- Latin American enterprises with their own technological products or services capable of being exported beyond the region (e.g., Biotecnología del Agua Ltda.).
- Latin American consulting firms that export their services to the region (e.g., Deuman Ingenieros).
- Latin American enterprises that work specifically on remediation in the wake of natural resource exploitation (e.g., Centro de Ecología Aplicada).

Some firms have opened offices in other Latin American countries or the United States to market their own technologies (e.g., ETC de las Américas, SA de CV in Mexico, Etec S.A. in Colombia and Disal Ltda. in Chile).

4.4 Activities most suitable for partnership arrangements

The foregoing chapters have taken a systemic approach, examining the concepts and experience of partnership programs, as well as specific projects of those programmes, in an attempt to identify international EGS providers that are good candidates for partnerships with Latin American SMEs. This approach has been relevant both in examining the characteristics of the firms and in examining their partnerships and other relationships.

Based on the strategic partnership programmes analysed above, certain conclusions can now be drawn in terms of the partnerships that have worked best. In addition, the question of which EGS enterprises are the best candidates for partnerships with Latin American firms will be explored.

4.4.1 Identification of successful partnerships

As with the rest of this study, the evaluation here deals with two levels of activity, partnership programmes and the projects within them. A summary appears in Table 4.7.

On both levels, the criteria used to gauge success are:

- achievement of objectives;
- fulfilment of commitments (results or products);
- achievement of goals, based on qualitative and/or quantitative indicators.

TABLE 4.7
EVALUATION OF THE SUCCESS OF PUBLIC–PRIVATE PARTNERSHIP PROGRAMMES

Programme	Objective	Achievement of objectives	Fulfilment of commitments (results/products)	Fulfilment of goals/indicators
UNIDO business partnerships	To aid SMEs in updating and in the gaining access to global markets.	The programme is still in its initial stages.	Information available on five projects.	No information available on indicators of partnership's performance.
ECOPROFIT	To strengthen the economic situation of the firms in a city or region by introducing pollution prevention; to improve a region's environmental situation and achieve sustainable development; to involve an increasing number of firms of different sizes and from different sectors; to create a pollution prevention platform/network.	Yes. Worldwide public recognition of effectiveness.	Detailed information available on projects carried out, and on their continuing impact.	Economic indicators suggest that public and private investment has brought the region environmental benefits, in regard to the quantification of which see section 5.3.2.
Chile–Sweden strategic partnerships	To promote the formation of strategic partnerships between Chilean and Swedish enterprises in the environmental field, in order to create joint ventures that benefit both economies, while at the same time improving Chile's environmental situation.	In general, the objective was achieved and the anticipated products resulted.	At least 12 partnerships were formed; technical/trade missions were conducted; meetings of firms were held in Chile (48 Scandinavian firms); and technical/trade meetings were held in Chile and Sweden. No information is available on incorporation of the programme's activities in other programmes funded by the European Union. Nor is information available on the incorporation of other private–sector activities.	Low level of sustainability over time. Of the 12 partnerships formed in 1999, only 2 remain in operation. Information on flows of money and goods is not available.
GTZ public–private partnerships	To help firms recognize the opportunities and collaborative synergies.	Project still in its initial stages.	Information available on six projects carried out.	No information on indicators to define partnership's performance.
Quebec–Chile technology transfer	To promote the formation of strategic partnerships between firms in Chile and Quebec in the environmental field, in order to create joint ventures that improve the environmental situation, while benefiting both economies.	The programme has been in progress for over two years, and no concrete partnerships have been formed between Chilean and Canadian firms.	No information available on projects carried out.	No indicators defined for the partnership.

Source: Ana María Ruz and Hernán Mladinic, “Identificación de áreas de oportunidad en el sector ambiental de América Latina. Casos exitosos de colaboración internacional e industrias proveedoras de bienes y servicios ambientales más idóneas para formular alianzas,” *Medio ambiente y desarrollo series*, No. 93 (LC/L.2249–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

It can be concluded that the most successful partnerships, according to their own criteria for success and the information available, are the UNIDO Business Partnerships Programme and the ECOPROFIT project.

4.4.2 Suitable industries

In identifying the most suitable industries for partnership with SMEs, various factors must be considered:

- The concept of environmental goods and services must be present.
- Firms should be considered in terms of the classifications of international trade organizations, not simply in terms of their own marketing-driven descriptions.
- On the demand side, as a result of urban growth and activity, there are EGSs common to all of the countries, as well as EGSs specific to each country, based on natural resource exploitation in the given country.
- The overall outlook for the region's EGS market must be taken into account. Disaggregated estimates of the growth of the EGS market and the firms in it must be generated.
- In terms of actors, it is essential to consider firms' capacities and their interest in forming business partnerships, as well as multilateral organizations' interest in, and capacity for, bringing private enterprise into partnership programmes.
- In regard to scenarios and sustainability over time, national and international public actors and instruments are important factors in creating the conditions in which the most favourable features of firms can express themselves.

4.4.3 Opportunities

According to the ITC growth projections, the EGS market in Latin America will reach US\$15 billion by 2010. As indicated above, the EGSs in demand in Latin America (waste management, water supplies and treatment, air pollution abatement, power plant infrastructure, noise control, conservation of natural areas, etc.) are linked with urban growth, and with economic activities related to the exploitation of natural resources (forestry, mining, marine and agricultural products).

At the global level, the 50 major firms providing EGSs satisfy the demand arising from urban growth, which undoubtedly accounts for the sector's greatest monetary volume. These firms are therefore strongly represented in the ITC's projection of market size.

Thus, an initial opportunity for Latin American SMEs probably lies in forming partnerships with large firms such as Vivendi (Générale Des Eaux), Waste Management, Suez Lyonnaise des Eaux, Browning Ferris Industries, Severn Trent, SITA (Lyonnaise), Mitsubishi Heavy Industries, Ebara Corp and Bechtel Group.

One barrier that must be overcome, however, is the autonomous nature of these conglomerates, which often simply create the firms they need to supply their inputs. Ecoriles S.A. and Análisis Ambientales S.A. in Chile, for instance, are subsidiaries of the Suez group.

The second barrier is the risk that the SME in question will simply be acquired by the international corporation. The third is that international cooperation organizations have a bias in favour of firms from their own country (for instance, the German technical cooperation agency, GTZ, emphasizes projects with German firms), which are not necessarily in the relevant segment of the EGS market (e.g., the power generation market in Latin America).

An additional opportunity lies in the need for EGSs involved in sustainable exploitation of natural resources. Multinationals, such as the top 50 firms mentioned above, focus on standard,

tested technologies, and do not offer the EGSs required for this purpose. SMEs must therefore form partnerships with research institutions, universities or innovative international enterprises.

The opportunity here lies in the diversity of products and services that are needed to meet the diverse demands of each country's natural ecosystems with a high degree of innovation.

According to the Environmental Business Journal, the globalisation of the environmental goods market appears to have occurred more quickly than the globalisation of the environmental services market. This is a result of the nature of the activity involved, for it is easier to export a manufactured product than a consulting project. "While the U.S. equipment sector represents only 26% of the EGS industry, it accounts for 58% of the industry's exports. Inversely, while the service segment is responsible for over 50% of the industry's earnings, it represents only 19% of the industry's exports." (Environmental Business Journal, 1999).

Thus, there is an important opportunity here for Latin American SMEs that are providers of environmental services. Profit levels are high in this area, and there is less competition from international firms.

4.4.4 Outlook

On the international level, environmental goods and services are defined by the OECD. However, an analysis of offerings in both international and country-specific directories of environmental firms clearly shows that neither public-sector nor private-sector agents use the international definitions. For many types of environmental goods there are no harmonized codes, and the same is true of environmental services and of the CIU categories. There is a need for harmonized codes for environmental goods, and environmental services need their own classifications. Such codes and classifications would make possible clearer statistical analyses of the market, and allow the use of specific economic instruments to stimulate the market.

As mentioned, the most successful partnerships, according to the criteria established and the information available, are the UNIDO business partnerships programme and the ECOPROFIT project. However, there is a general lack of transparency regarding the objectives of the partnerships and their net economic results among the firms, the countries and the organizations promoting the partnerships. Partnerships exist in time, with different actors achieving goals and learning from failure. However, frequently the lessons are not valued and get lost. In other words, organizations underestimate the importance of the learning process, and fail to retain the knowledge generated.

Though the present analysis of EGSs is not based on a statistically valid sample, the four types of international trade partnerships defined by the OECD can be observed. Moreover, Latin American enterprises that move beyond national borders to offer their products and services can be identified. Further analysis would be useful, in order to identify specific firms with major trade potential.

The best candidates for partnerships are firms that are active in the area of environmental goods and services, are capable of meeting demand in specific countries, conduct activities that are consonant with the outlook for the region's EGS market, have the technical and management capacities needed to form partnerships, operate in a suitable legal and political environment, and are sustainable over time.

This study has identified three opportunities for Latin American firms:

- One opportunity for Latin American SMEs lies in forming partnerships with the large corporations that are primarily engaged in meeting demand arising from urban growth.
- The second opportunity in the EGS market consists in responding to demand for EGSs to facilitate sustainable exploitation of natural resources. This issue is not being addressed by the large corporations, but is within the purview of international research organizations. Thus, the challenge for SMEs is to form partnerships with research entities.
- The third opportunity can be found in the environmental services market, which, given the nature of environmental problems, is different in each country and ecosystem.

5. Policies and instruments for developing the environmental goods and services sector in relation to SMEs

5.1 Conceptual framework and best international practices¹⁴

Environmental regulatory mechanisms for SMEs: economic tools versus instruments of direct regulation

Traditional public policy for addressing environmental problems in the international context consist primarily of direct regulation, i.e., environmental quality standards, standards for emissions and effluents, etc. Under these systems, firms must meet certain environmental requirements, and compliance is monitored by regulatory agencies.

Such instruments have advantages and disadvantages. One advantage is that since pollution is monitored by regulatory agencies, strict enforcement can ensure that maximum levels of emissions or pollution are not exceeded. Enforcement is relatively simple, since the same standards apply to all firms. A disadvantage is that the process requires a great deal of information, both in order to set the standards and to enforce them. Moreover, setting environmental standards may discourage firms from going beyond what the standards require. Finally, regulatory agencies may find themselves under pressure from firms seeking to gain advantages from these practices.

The last two decades have seen the spread of instruments that address environmental problems by creating market incentives. These instruments relegate to firms the decisions regarding how much pollution to create; it is the firms that determine their “optimum” pollution levels based on the “price” (cost paid by the firm for each unit of pollution). Instruments of this type include direct and indirect emissions taxes, subsidies, fees, negotiable pollution permits and legal accountability mechanisms.

¹⁴ Summary based on Romo, 2005 and Bercovich and López, 2005.

A third group of environmental policy instruments focuses on the interest some firms have in demonstrating that they employ environmentally responsible practices. These instruments—essentially “voluntary agreements”—encourage firms to make commitments to regulatory authorities to use self-regulation to improve certain aspects of their environmental management. The primary advantage of these policy tools is that they promote cooperation between the public and private sectors, replacing the adversarial relationship that has been traditional between the two sectors in regard to environmental issues. Examples of this type of agreement include commitments by firms to comply with given standards in exchange for various benefits, and agreements in which firms offer to perform beyond certain established standards in exchange for flexibility in regard to others. These agreements emerged from cooperation experiments between national governments and large firms, and have begun to be applied to SMEs in the local setting over the last several years.

The latter two approaches are part of the so-called “new generation” of environmental policies. They are based on two pillars: firms’ voluntary attempts to address environmental issues, and the involvement of the public and the government. The principal advantage of this approach is that regulatory costs drop, since the government transfers a major portion of the enforcement burden to the community and to NGOs. However, both economic incentives and voluntary agreements require a rather highly developed institutional environment. Thus, their use in developing countries has been limited.

Best international practices

On the international scene, both private and public sectors are adopting environmentally sustainable production practices, implementing comprehensive environmental management systems, waste treatment and recycling systems, etc. Below is a description of some experiences, primarily in the developed world, that may be relevant to designing policy for SMEs in the countries of our region.

5.1.1 Environmental policy in the United States and Canada

Traditionally, the United States and Canada have based their environmental policies on “command and control” instruments. However, the apparent decline in the efficacy and efficiency of such tools, along with the trend toward increased concern for environmental issues on the part of private-sector organizations, has recently pushed public policy toward market-based instruments, such as negotiable pollution permits (primarily a U.S. tool), reimbursable deposit systems, publication of environmental information and voluntary programmes. Such tools provide firms greater flexibility, in that they are free to choose the methods of pollution control and environmental protection least costly to them.

This trend toward greater self-regulation by business, and toward the internalisation of environmental concerns on the part of firms, is reflected in the increasing number of voluntary initiatives in the private sector. These initiatives are often motivated by market pressures, and include elements such as programmes to redesign processes and products in order to prevent pollution, environmental quality certification, adoption of environmental management standards, “green” labelling for environmental products, internal audits, etc.

In light of these changes, a number of environmental organizations have begun to promote the adoption of environmental management systems (EMSs) by both large firms and SMEs. The assumption is that voluntary systems to meet internal goals can be effective in addressing public policy objectives regarding environmental management and protection. EMSs can include commitments to prevent pollution, to reduce environmental risks and to publish information on firms’ environmental performance. These schemes emphasize reduction at the source, and provide for periodic documented audits.

Along this line, the public sector in North America has been working to foster the implementation of various types of EMSs by providing technical assistance, public recognition and other benefits. Efforts range from the Responsible Stewardship Programme for the chemical industry, to ISO 14001 certification. The plan of action of the Environmental Protection Agency (EPA) to promote the use of environmental management systems is one of the major programmes of this type. It supports voluntary setting of environmental performance goals through free audits, reports on the results of audits, training in implementing EMSs, assistance for firms seeking environmental certification, etc.

Canada also promotes wider use of EMSs. Its programmes include the Responsible Stewardship Programme, the Sustainable Forest Management Programme, and an ISO 14001 certification programme.

However, while EMSs have proven highly useful in enhancing firms' overall performance and compliance with standards, they do not guarantee that there will be either enforcement of standards or overall improvement in environmental performance.

Some other EPA programmes are also worthy of note, as they are designed to promote sustainable environmental management among SMEs. These include the following:

- a) Provision of information and technical assistance. The EPA is implementing various support programs for industry, providing consulting on issues related to implementation of environmental laws and standards through:
 - free technical assistance;
 - publication of informative pamphlets (with data on standards for emissions of toxic substances in different productive sectors);
 - provision of online information on a variety of issues, including incineration, condensation, carbon capture, gas purifiers, etc.; technological support, public recognition for successes; a directory of federal, state and local assistance programs; guides for implementation of EMSs; guidelines for prevention of and/or response to environmental emergencies; information on enforcement of environmental standards and regulations;
 - seminars and conferences that provide an opportunity for SMEs to dialogue and share information;
 - a national network of regional information centres on pollution prevention and enforcement of standards and regulations.
- b) Initiatives to **prevent pollution**. The EPA funds technical assistance programmes to help small businesses adopt preventive approaches to environmental management. Though the specific content of the programmes varies from state to state, all are based on the notion that the most efficient way of dealing with industrial pollution is to prevent it at the source.
- c) For **reengineering of equipment and machinery** to employ less-polluting fuels (e.g., compressed gas).
- d) **More-flexible environmental standards and enforcement**. For SMEs, the EPA can extend timeframes for complying with standards and regulations.
- e) Offering options to **reduce the cost of purchasing** pollution-reduction equipment.
- f) **Reduction or forgiveness of fines**. For firms that discover violations of standards and wish to correct them promptly, the agency applies less severe monetary sanctions, or can waive the fines entirely.

5.1.2 Environmental programmes for SMEs in Europe¹⁵

In Europe, government support for improving environmental performance in businesses usually takes one of two forms. The first is direct financial subsidies to (partially) cover costs of environmental management improvements. The second is assistance and training for implementing improvements. In recent years, however, policy has shifted from direct financial support to emphasize a wider range of instruments designed to address management capacity and provide information and training to employees and employers. These initiatives cover a range of areas, including implementation of formal environmental management systems (EMSs, ISO 14001, and comprehensive systems covering health, safety and environment), environmental efficiency measures and environmental design. Many of these measures are specifically tailored to meet the needs of SMEs.

In 2000, the OECD Working Group on Environmental Performance conducted a review of environmental policy in 32 member states, with the aim of helping the countries improve their individual and collective environmental performance. This revealed that countries such as Belgium are promoting regulatory reforms designed, among other objectives, to incorporate more economic instruments in environmental policy (increases in environmental-impact and pollution fees and taxes, implementation of various types of voluntary agreements, etc.) and improving cooperation between public agencies and industry. In regard to SMEs specifically, Belgium has in place “environmental consulting” programmes, as well as programmes to provide training for good environmental management.

France has recognized the need to improve the quality of data on stocks and flows of industrial waste, and there is a general recognition that SMEs must assume greater social responsibility for the waste they generate. While there are different proposals for local and regional final waste disposal, the focus is on reducing waste at the source, recycling, recovering and treating waste, seeking markets for recycled products, and revising waste management regulations.

In Austria, the ÖkoBusinessPlan Wien (Eco-Business Plan for Vienna) was implemented in 1999, and has successfully coordinated, organized, promoted and supported environmental protection among Viennese firms. The participating businesses (both large firms and SMEs) receive financial support (between 30% and 40% of costs, up to a maximum of 98,000 euros) and practical support (professional advice and consulting for environmental investments).

Good examples of programmes specifically designed to improve SMEs’ environmental performance are the Environmental Stewardship system of the Province of Gelderland, in the Netherlands, and the Environmental Support Programme of the Senate of Berlin, in Germany. Both are part of the European Commission’s Sustainable Cities Project, launched in 1993 by the Commission’s Expert Group on the Urban Environment, which works to promote sustainable urban development and encourage the incorporation of environmental objectives in business planning and management strategies. Through local and regional authorities, these programmes provide various types of advice and assistance. The Gelderland programme supports SMEs in implementing formal environmental management systems, fosters dialogue by training managers, identifies productive processes that could be improved, and recommends environmental management procedures consonant with firms’ specific needs. The Berlin programme provides subsidies for SMEs, covering a maximum of 50% of the cost of environmental investments and

¹⁵ According to information from the OECD and the Observatory of European SMEs, quoted in Bercovich and López, 2005.

innovations. Its objectives are to reduce pollution levels, disseminate new technologies and encourage innovative solutions, while promoting environmental awareness among smaller firms.

Great Britain has recently conducted innovative experiments with policies designed to overcome SMEs' resistance to adopting good pollution prevention practices. These are essentially voluntary measures to minimize waste, and involve groups of SMEs, as well as governments and communities at the regional level. Those participating in the collective initiatives seem to find the results satisfactory, though recent studies suggest that the success and spread of such initiatives with SMEs require a more tailored approach that takes into account their organizational and management limitations, since many voluntary schemes require resources and capacities that SMEs do not have.

Thus, a key to the success of voluntary methods involving SMEs would be to identify the incentives capable of inducing participation. Owners must feel that they will benefit, and that "it is worth it" to participate. Another prerequisite is that there be an atmosphere of trust and cooperation between the governments and firms involved, since otherwise the costs of monitoring and verification can be excessive. Finally, one factor that appears to be decisive is whether good coordination and follow-up can be relied upon from the agencies involved in the effort. This requires a degree of institutional sophistication on the part of the public agencies promoting the policy.

There seems to be broad consensus that voluntary approaches to SMEs should play a role as one among a number of policy instruments, and should not be seen as a substitute for regulation or economic incentives. Indeed, countries such as the United States, Canada, Austria, Netherlands, Great Britain and New Zealand have been using voluntary agreements as part of a broader arsenal of policies.

5.1.3 Policies for the promotion of clean production and technologies adapted to SMEs

Over the last decade, there has been growing worldwide interest in reformulating traditional "remedial" environmental policies (based on end-up-pipe processes) to emphasize prevention, environmental efficiency and clean production processes. Environmental policy tends to focus on clean production, though environmental policy is increasingly integrated with technological and industrial development programmes, with which it shares the objectives of increasing productivity, fostering competitiveness and achieving sustainable growth. Despite the integration of environmental and development policy, clean production measures have generally retained their specific role.

To date, advances in clean production have generally been slow. And while clean production objectives have in many cases been incorporated in environmental programmes, they do not constitute a high-priority component of environmental policy. Thus, the resulting policies have often been inconsistent with, or even contradictory to, industrial development policy.

It is not unreasonable to suppose that early emphasis on "end-of-pipe" solutions and direct regulation have created a situation in which firms (as providers of equipment), R&D institutions and policymakers find it difficult (or lack incentives) to move away from the institutional and organizational structures associated with the environmental management system of the past. Thus, shifting to a clean production focus clearly requires time and effort, even when the economic and environmental advantages of the change seem clear a priori.

The experience of countries where clean production has effectively become a policy priority (Australia, Austria, United States and Netherlands, among others) shows that policy must go beyond isolated governmental agencies, emphasizing coordination and joint action by all of the institutions involved. One reason for this is to avoid contradictions between clean production measures and those designed to promote industrial development. Moreover, policy must not be

limited to providing information and training, but must also include a structure of regulatory pressures, as well as economic and financial incentives.

Spurred by the trend toward clean production as a major focus, and an atmosphere in which environmental and industrial objectives are mutually supportive, a significant amount of exploration is underway, seeking technological alternatives to improve efficiency and lower costs, while reducing intensive use of resources and lessening environmental impact. So-called clean technologies (CTs) do not always provide win-win solutions. However, major investments are being made in developing such technologies, and the results are promising. Energy-saving processes are one example.

This new technological path offers great opportunities for SMEs. For this reason, specific strategies have begun, in a number of countries, to provide information to SMEs regarding these opportunities. By way of example, there follows a description of some recently implemented policies in Asian countries. These were designed to promote the production and use of clean technologies, particularly by SMEs:

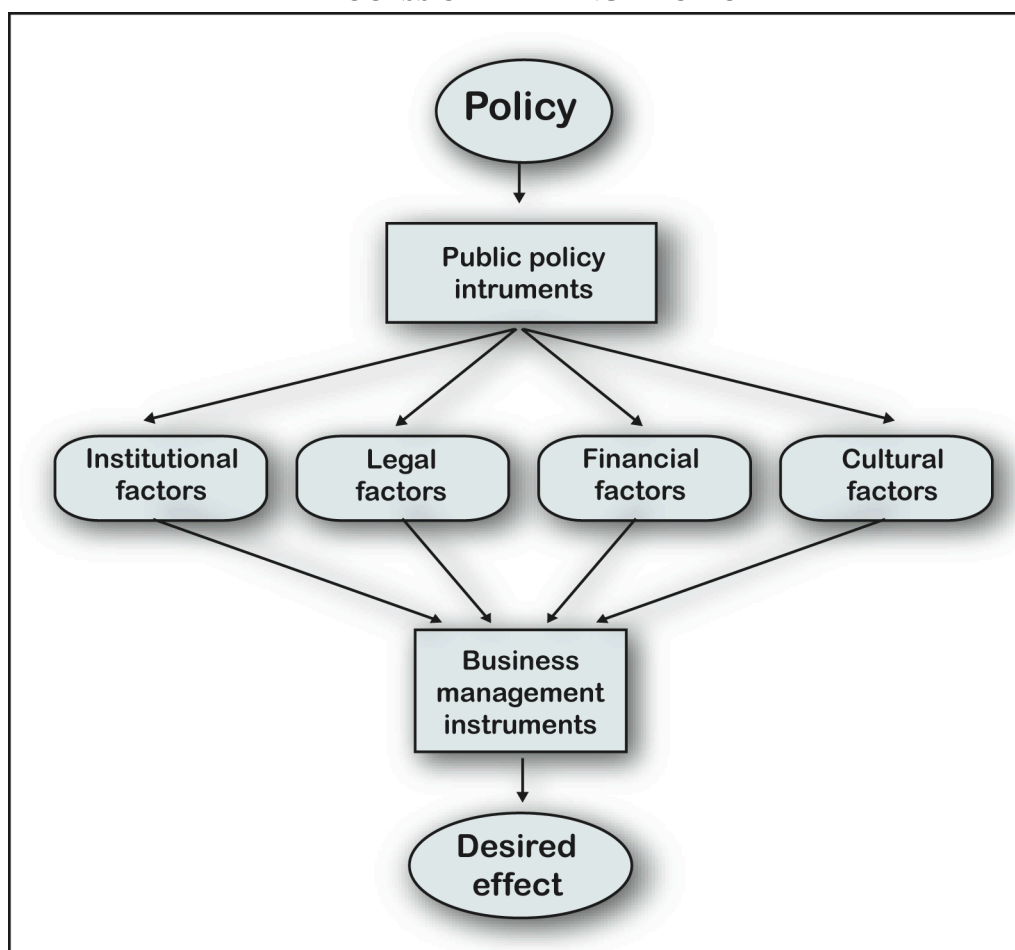
- funding R&D on clean production;
- specific funding for projects designed to develop clean production technology;
- creation of extension services capable of demonstrating to SMEs, in their own businesses, how clean production technologies work and what their advantages are. In some cases, activities are rewarded by measures such as tax incentives and official recognition;
- creation of a system to collect and disseminate information on clean production advances among SMEs, available technology, etc.
- establishment of circles of excellence involving representatives of SMEs that are active in clean production, in order to share information and experiences;
- organization of technological mentoring arrangements, by which firms with successful experience with clean production measures can transfer know-how and experience to other firms, generally their clients or suppliers;
- setting of benchmarks for environmental performance in different economic sectors;
- promotion of linkages among local industrial sectors through foreign industrial or technical associations, in order to organize the transfer of know-how.

One key point in this connection is that in progressing toward clean production and technologies, the development of innovative capacity and the training of human resources has the potential to have as much impact as do changes in the regulatory framework (Warhurst, 1992). One of the crucial needs is to reinforce firms' capacity—this is particularly relevant for SMEs—to define their technological needs and evaluate technological alternatives before choosing among different options. According to Barnett (1995), policies that focus on increasing the capacity for managing technological change have a greater chance of being effective than do policies limited to transferring specifically environmental technologies. Warhurst also underlines the role of policies designed to encourage firms' overall productive efficiency. There seems to be a trail-blazing effect, in which adopting strict environmental standards is easier if a firm has already had the experience of adopting quality standards, e.g., ISO 9000 (Bercovich and López, 2005).

5.1.4 Options for public policy instruments¹⁶

Public policy ultimately seeks to create changes that governmental decisionmakers consider desirable for society as a whole. Moving beyond rhetoric, however, policy must translate into instruments that can change the behaviour of agents in such a way that desired objectives are achieved. Diagram 5.1 shows, schematically, the process of applying a policy to produce a desired effect.

DIAGRAM 5.1
PROCESS OF APPLYING A POLICY



Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

¹⁶ Summary based on Romo, 2005.

Policy, here, means a set of statements or intentions at a high level of government that serves as a guideline throughout the process. In the example considered here, policy can be defined as steps to “improve the environmental performance of the activities of small and medium enterprises.”

To have a practical effect, however, policy must take the form of a set of instruments designed to change institutional, legal, financial and/or cultural realities. These changes establish obligations, rights, rewards and sanctions for the actors involved, in order to help achieve the desired effect. When these changes are perceived, economic agents modify their behaviour by implementing different internal management instruments within the firm in order to adapt to new conditions. It is precisely these changes within the firm that ultimately produce the desired effect.

Following is an examination of the principal public policy instruments available for changing SMEs’ environmental behaviour. In Table 5.1, the taxonomy of pollution control instruments proposed by Blackman in 2000 is employed. The objective of this chapter is merely to identify available alternatives: the recommended instruments, their institutional, legal, financial and cultural effects, as well as the management instruments that can be implemented by firms, will be explored in subsequent chapters dealing with the situation in individual countries.

TABLE 5.1
POLLUTION CONTROL INSTRUMENTS

	Direct	Indirect
Command and Control	Emissions standards	Technology standards (requirement to use a specific type of technology) Plant relocation
Economic incentives	Taxes by units of emissions Negotiable permits	Taxes on inputs or polluting products Subsidies for clean inputs or products
Government investment	Common waste treatment facilities Development of clean technologies	
Information-based	Programmes to create public awareness of firms’ environmental performance Educational programmes	

Source: David Romo, “Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano,” *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

As the table makes clear, the possible instruments may be grouped in four categories: (a) command and control instruments; (b) economic incentives; (c) instruments based on public investment; and (d) information-based instruments. One may also distinguish between instruments that require emissions monitoring by regulators (direct regulation) and those that do not (indirect).

Although, in theory, all of these instruments have the potential to reduce industrial pollution, not all are feasible for SMEs. Since regulatory agencies do not have the capacity to directly monitor the SME sector (the largest sector in terms of number of firms), direct instruments are not feasible. Thus, only those instruments shown in the shaded cells are available to authorities as ways of improving SMEs’ environmental performance.

In the command and control category, technology standards require firms to install certain types of equipment to control and reduce pollution. Though such instruments are relatively easy to apply in the SME sector (since authorities need only verify that the equipment has been installed), implementation can be impeded by the difficulties SMEs encounter in obtaining financing to cover initial costs. In addition, such measures can inhibit new, potentially

more effective, technological innovations. The other instrument in this category consists of relocating polluting plants in order to reduce the number of people exposed to pollutants and facilitate access to shared treatment equipment and facilities. However, relocation is usually costly, and vigorous opposition from small businesses can be expected.

The second group of instruments includes those that create financial incentives for pollution abatement. Thus, they create price-based signals to encourage producers and consumers to adopt measures that foster environmental objectives. One such incentive is a tax on polluting inputs or products, designed to discourage their use. This instrument has the additional benefit of generating income that can be used toward the cost of operating the programme. However, since the tax does not apply to emissions (which would require direct measurement) but only to inputs, incentives are not created to reduce pollution, but only to change inputs (though with the hope that the new inputs will generate less pollution). Given these practical problems, the alternative is to subsidize cleaner inputs. Obviously, subsidies represent a cost to the State (unlike taxes on dirty inputs), but they are more likely to be accepted by the parties affected.

This category also includes tax incentives for environmental ends. The impact of these measures, however, is limited, since they favour the implementation of technologies to control pollution, rather than changes in process that reduce pollution at the source. The effectiveness of such instruments is further diminished by the fact that a substantial portion of SMEs in a given industry may belong to the informal sector.

The category of instruments based on public-sector investment includes two principal options. The first is to create common facilities for waste collection and management, since, in most cases, it is prohibitively expensive for small firms, individually, to properly dispose of waste (especially hazardous waste). The construction of common facilities benefits from economies of scale, since the facilities serve more firms, while making monitoring easier for regulators. The obvious disadvantages include construction and operating costs. If use fees are imposed, businesses may decide to avoid them by continuing to dispose of waste illegally. Finally, this instrument does not produce incentives for reducing pollution in the firm, but only for proper disposal of waste once it has been generated.

The second instrument is government support for the development of new technologies in specific industries, designed to facilitate transition to cleaner production methods. Once a process technology with less environmental impact is developed, its spread to a greater number of enterprises in the sector is encouraged. Firms escape development costs, and only have to bear the costs of implementation.

The last category is information-based instruments, which are especially important in countries where existing regulations are poorly enforced. Here, the idea is to make people aware of the magnitude and effects of industrial emissions, so that the community can exert pressure and encourage a shift to less polluting production processes or to better waste disposal procedures. This process, then, is an informal system of regulation, in which civil society plays a fundamental role.

In any given situation, various instruments may be feasible—in principle, at least. When this is the case, how is the choice to be made? The OECD (1991) has proposed a set of five criteria to make the best choice and maximize the possibility of success. Though the report focuses on economic instruments, these criteria can also be used to evaluate other types of instruments. The criteria are:

1. *Environmental effectiveness.* The instruments will be more environmentally effective if they provide permanent incentives for pollution reduction and technological innovation.
2. *Economic efficiency.* A broad definition of the term implies that an instrument should produce the optimum allocation of resources. Under a narrower definition,

appropriate for present purposes, the costs of enforcement associated with a given environmental benefit should simply be minimized.

3. *Equity.* Different instruments have different distributive effects. In other words, a given instrument involves different costs for different actors. Equitable distribution of costs is crucial, since an actor or group that perceives its share of the cost as disproportionate will oppose implementation of the scheme.
4. *Administrative feasibility and cost.* All instruments involve implementation and require creating an enforcement structure. This affects feasibility and cost.
5. *Acceptability.* It is crucial that the groups and actors involved accept and actively cooperate in implementing a proposed instrument. Major resistance will diminish the efficiency of the instrument and increase the cost of implementation. Acceptability increases if proper information is available, if a consultative process is provided for the parties affected and, in some cases, if plans for gradual implementation are formulated.

Subsequent chapters describe instruments that may be used in strategies designed to improve the environmental performance of SMEs in the countries studied.

5.2 Argentina¹⁷

5.2.1 Environmental management support initiatives for SMEs

This section deals with initiatives relating to environmental management in SMEs. Since clean production is a major priority for the coming years, it is of great importance to know which services, associated with implementing clean production, are available. Below is an examination of major initiatives of this type.

The SAyDS's Office of Environmental Regulations (*Dirección de Ordenamiento Ambiental*, or DOA) has a national programme to promote sustainable production (the *Programa Nacional de Promoción de la Producción Sostenible*). Between 2000 and 2002, this programme, along with the Office of Environmental Quality's Environmental Audit programme and its programme for the promotion of ISO 14000 standards, made substantial efforts to disseminate information on the issue, and to conduct training throughout the country.

Currently, the SAyDS's Office of Environmental Regulation, with support from the United Nations Division for Sustainable Development (Department of Economic and Social Affairs, or UNDESA), is developing a joint project to formulate a national clean production strategy for Argentina.

In addition to promoting the incorporation of clean production as a concept in local firms' environmental strategies, this initiative is designed to encourage the creation and marketing of clean technologies. A key factor here is to coordinate clean production efforts with programmes of other government entities, such as the Secretariat of Industry, Trade and Small and Medium Enterprise (specifically, the Under-secretariat of Small and Medium Enterprise and Regional Development) and the Secretariat of Science, Technology and Productive Innovation (*Secretaría de Ciencia, Tecnología e Innovación Productiva*, or SETCIP). Though these entities are active in ways closely related to the issue of clean production, they have no explicit responsibility for clean production policy at present (see Chidiak and Beláustegui, 2002).

¹⁷ Based on Bercovich and López, 2005.

Some of the actions associated with the initiative have already been completed: (a) an assessment of opportunities for clean production initiatives in Argentina; (b) an inventory of opportunities for funding and providing technical assistance for such initiatives; and (c) an evaluation of opportunities for replacing technologies in two sectors identified in the assessment.

Other actions underway include: (1) creating strategic planning guides for technology policy in Argentina; (2) producing a manual containing guidelines and recommendations for designing and implementing clean production policies; and (3) promoting public and private R&D for the creation, development and marketing of clean technologies in Argentina. Much dialogue has occurred in the framework of this project (among firms, business groups, representatives of various areas within the public sector, representatives of the science and technology community, NGOs, etc.), and a consensus document was produced in 2003, entitled “Basic elements for the design of a national clean production policy.” The document deals with clean production policy implementation priorities in Argentina, and sets forth the following objectives:

- to consolidate and strengthen cooperation among public–sector entities for the integration and creation of joint policies;
- to adjust the country’s legal framework to the new principles on which the nation’s environmental policy is based;
- to consolidate and strengthen public–private cooperation;
- to develop and strengthen relationships and cooperation with scientific and technological organizations concerning clean production activities;
- to develop and adapt instruments that promote and provide incentives for clean production;
- to develop and disseminate information and knowledge regarding mechanisms that create links between competitiveness and clean production;
- to create clean–production instruments and generate mechanisms to communicate and disseminate information on clean production.

A case of special interest is the clean production plan for the Salí Dulce River basin in Tucumán, developed in the context of the World Bank–SAyDS Pollution Management Project and the regulatory changes (minimum standards legislation) promulgated by the SAyDS’s Office of Environmental Regulation as of 2002. The goal is to implement a clean production plan that involves restructuring a total of 20 firms involved in sugar and citrus production in the upper portion of the river basin. The objective is to provide technical assistance and conclude clean production agreements involving provincial and national authorities, as well as firms, in order to help the firms comply with current standards.

Another case is the Project for the Protection of the Industrial and Urban Environment in Argentina (*Protección del Medio Ambiente Industrial y Urbano en Argentina*, or PAI), an initiative of the Processing Industry Chamber of the Republic of Argentina (Cámara de la Industria de Procesos de la República Argentina, or CIPRA), which receives technical and financial support from the German Technical Cooperation Agency, GTZ. The project began in 1995, and was designed to last until the first quarter of 2004. It involves training consultants; providing legal advice and environmental management assistance for industrial SMEs, municipalities and provinces; and promoting public–private dialogue. The consulting efforts concentrate on certain subsectors and industrial regions. Numerous environmental assessments and environmental impact studies are conducted, and affidavits regarding special waste and gas emissions are produced. The programme has worked with various industry groups (CIPRA, AIM, CETSUM), as well as with environmental authorities in different municipalities (Morón, Avellaneda, Hurlingham, Vicente López, La Matanza, Río Gallegos, Caleta Olivia) and provinces (Santa Cruz, Santa Fé, Buenos Aires).

The production and energy efficiency programme for Argentine SMEs (*Programa de la Eficiencia Energética y Productiva de la Pequeña y Mediana Empresa Argentina*, or PIIEP) is overseen by GTZ and the Secretariat of Energy. It works with individual firms over periods of 6 to 12 months. Based on a comprehensive assessment of plant, equipment and processes, recommendations are made to optimise resource use. The programme works with the firms as they identify means of reducing costs and raising productivity. The programme is inter-institutional, and includes the Buenos Aires Business Development Institute (*Instituto de Desarrollo Empresarial Bonaerense*, or IDEB), the City of Buenos Aires Secretariat of Industry, Commerce and Technology, the National Technological University and the National Institute of Industrial Technology. The programme was instrumental in providing technical assistance for improving energy management SMEs involved in the pork butchering and dairy production areas.

INA/JICA project. The National Water Institute is a decentralized agency that is part of the Under-secretariat of Water Resources, which in turn is overseen by the Ministry of the Economy. INA's environmental activities relate to surface water, groundwater, urban water, water quality, and pollution; to the quality of waterways and bodies of water in which waste is deposited; water and effluent treatment; environmental impact studies and databases on water resources; clean-up, etc. In 2002, INA signed a technical cooperation agreement with the Japanese International Cooperation Agency (JICA) to conduct a Sustainable Pollution Prevention Technologies Project. The purpose of the project is to disseminate clean technologies and production methods, as well as to conduct demonstrations and experiments. The Japanese cooperation seeks to strengthen INA for research and dissemination of technologies used in the management of industrial effluents and waste. It covers the purchase of equipment and materials, as well as training for INA staff.

An additional source of information on clean production solutions and environmental efficiency is provided in the case studies published by the Argentine Business Council for Sustainable Development (*Consejo Empresario Argentino para el Desarrollo Sostenible*, or CEADS), which was created in 1992 as an Argentine subsidiary of the World Business Council for Sustainable Development. For some years, this organization has been holding annual seminars in which case studies in environmental efficiency are presented, in addition to seminars on specific issues relating to environmental regulations and environmental management for business. The institution has plans to carry out further activities. One involves public-private dialogue concerning regulations; another relates to self-regulation and planning; and a third aims to generate agreements in particular industrial sectors.

Other activities worth noting for their impact on environmental management among SMEs is described briefly below:

SAyDS is the enforcement agency overseeing liquid effluents standards (pursuant to national decrees 776/92 and 674/89). In the past, these standards were generally under the responsibility of the enterprise known as the National Sanitation Works, which was privatised in 1993. The region covered by the agency includes the city of Buenos Aires and 18 municipalities in the Province of Buenos Aires (primarily in the Buenos Aires suburban area). The programme for the control of industrial water pollution identified a total of 4,985 registered industrial and special facilities in this geographic area. Of these, 4,928 regularly submitted annual affidavits on discharges. Another SAyDS program was designed to identify entities that might generate effluents containing heavy metals. The result was a total of 859 firms (7% of all firms emitting liquid effluents), of which 74% emitted discharges into sewers, and the rest into waterways or rainwater conduits. Only 62% provided some type of treatment. Under these programmes, monitoring plans were designed in 2000 and 2001. Unfortunately, however, due to subsequent adjustments and budget shortfalls, there was little monitoring or enforcement.

The IBRD-UNDP pollution management project (IBRD 4281-AR/UNDP ARG/99/025) implemented a pollution control programme in the Río Negro basin (the valley of the Neuquén,

Limay and Negro rivers) designed to restructure selected agricultural activities by providing funding and training on environmental audits. Seven thousand fruit growers were targeted, with a focus on rational pesticide use, proper pest-control practices and the management of waste generated in the orchards. The fruit processing industry (juices and cider) was also targeted. In addition, regional legislation regarding pollution and plant health—known as Municipal and regional pollution management in Zárate–Campana (Buenos Aires Province)—was proposed. This was focused on the environmental liabilities posed by old dumps, and by municipally-generated water pollution. Finally, in Patagonia (in the town of Puerto Madryn, Chubut Province, and in the Patagonian coastal area), the project included studies and technical assistance to solve pollution problems caused by waste, efforts to promote the use of treated water for irrigation, provision of environmental training, and supply of equipment for municipal environmental command and control.

The National Plan to Enhance Appreciation for the Value of Waste (Environmental Quality Office, SAyDS) was designed to promote reductions in quantity and improvements in quality of waste. To this end, production processes and guidelines were addressed, as well as consumption and/or marketing to minimize or eliminate waste. The program also sought to implement a waste management system based on agreements with agents involved in the complete waste life cycle. These included provincial and municipal governments, firms, industry groups, NGOs and others. Finally, the programme attempted to remediate and decontaminate open landfills, and promote the formulation of national minimum standards for urban solid waste management and for containers and packing materials. The programme was oriented to small municipalities of up to 200,000 inhabitants, and was designed to identify municipal initiatives for enhancing appreciation of the value of waste, promote exchange of information and relevant experiences, provide technical assistance, and in some cases provide partial funding (e.g., for equipment appropriate to small-scale projects). The plan was expanded in late 2003 to include nearly 80 municipalities.

Measures to prepare for certification, a pilot project of the SAyDS's Office of Environmental Quality, was designed to implement environmental management systems in SMEs. The project took place from 1997 to 1999 in the framework of a cooperation agreement between the SAyDS and Canada's Ministry of Industry, with the collaboration of the Argentine Industrial Association.

The Business Mentoring Pilot Programme began in October 2000 as part of the cooperation involving the Federal Investment Council (*Consejo Federal de Inversiones*, or CFI), the Argentine Business Council for Sustainable Development (*Consejo Empresario Argentino para el Desarrollo Sostenible*, or CEADS) and the Argentine Institute of Standards (Instituto Argentino de Normalización, or IRAM). The project includes financial and technical assistance, coordination, and human resources training to foster the development of SMEs that are providers or clients of CEADS member firms. The objective is for the SMEs to implement certifiable quality management systems (under ISO 9001) and environmental management systems (under ISO 14001) within 18 months.

Other programmes sponsored by large firms include the following:

The Export Initiation Program was linked with the firm Gas Natural BAN, which has one of the largest gas distribution networks in Argentina. The programme began in 2001, and was designed to provide free specialized advice to SMEs that wished to launch exporting operations. The programme included a series of workshops and conferences introducing participants to environmental management. The objective was to disseminate the idea that environmental management is a prerequisite to exporting. As of August 2003, some 5,000 SMEs had participated in the export and environmental stewardship activities.

A quality and environment strategy, involving coordination between providers and contractors, was created by EDENOR, a firm in the EDF group, which distributes and markets electricity in Argentina. The programme was launched in 2000. Its objective was to develop group quality and environment strategy with its network of providers and subcontractors. Thirty firms, all SMEs, are associated with the project and receive technical assistance. The goal is to complete ISO 9000 and ISO 14000 certification for all of EDENOR's providers and contractors.

Ford created an ISO 14001 program for its providers, along with imposing a requirement that they deploy environmental management systems under the ISO 14001 standard. Ford provides initial tools through a training workshop for managers in provider firms. The objectives are to share experiences, provide information on Ford Argentina's Corporate Policy Letter #17, which deals with health and the environment, and educate providers and contractors regarding the firm's environmental policy. The programme also holds conferences to enhance awareness.

Thus, a range of interesting initiatives has been launched over the last few years, and some remain in place and are having real impact. The emphasis, however, has been almost exclusively on providing information and training, with technical assistance and funding occupying a more marginal role. In other words, these initiatives are useful, but not sufficient, and only a small number of SMEs have received concrete assistance. Unfortunately, the initiatives in the field, to date, are not part of any ongoing national effort capable of mobilizing resources and promoting action on priority issues by invoking effective rewards and sanctions, one that could also provide monitoring and evaluation mechanisms.

5.2.2 The views of SMEs: a survey

In order to poll the views of SME owners on current support initiatives and other measures that could promote environmental management among SMEs, a survey was conducted to explore the views of firms that have already made advances in environmental management. Since these firms have some experience in resolving environmental management problems within the individual firms, they were considered key sources of information to validate the design of support policies.

Responses were obtained from 9 firms. As a control, the questionnaire was also given to 2 institutions (one public, the other private). The responses were analysed with representatives of other public and private institutions associated with the issue of environmental management in SMEs. The results of the survey are described below.

The firms are familiar with a number of the public programmes that directly or indirectly support environmental management in SMEs. Programs that appear to have garnered particular respect include: the environment and industrial recycling programmes of INTI; the Secretariat of Energy—GTZ Production and Energy Efficiency Programme for Small and Medium Enterprise in Argentina; and the programmes of the Argentine Technological Fund (Fondo Tecnológico Argentino, or FONTAR), which finances and subsidizes business projects for innovation and technological modernization.

The first group of questions sought opinions on possible changes in environmental policy that could facilitate improvement of environmental management among SMEs. The results are shown in Table 5.2.

TABLE 5.2
VIEWS OF SURVEYED SMES' REGARDING POSSIBLE CHANGES
IN REGULATORY FRAMEWORK

Possible changes	Degree of importance
Establishment of regulatory standards adapted to SMEs	High
Simplification and inter-jurisdictional coordination of environmental regulations	Medium
More information on existing regulations	Medium
More emphasis on cleaner production initiatives	Medium
Voluntary public-private sector agreements	Medium
More enforcement of current environmental regulations	Low
Introduction of new economic-type regulatory instruments (taxes, fees, negotiable permits, etc.)	Low
More-stringent environmental regulations	Low

Source: Research Centre for Industrial Transformation (CENIT)/Economic Commission for Latin America and the Caribbean (ECLAC) survey cited in Néstor Bercovich and Andrés López, "Políticas para mejorar la gestión ambiental en las pyme argentinas y promover su oferta de bienes y servicios ambientales," *Medio ambiente y desarrollo series*, No. 96 (LC/L.2270-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

The first point emphasized by almost all of the firms surveyed is the need for environmental standards to differentiate SMEs from larger firms. In practice, this means flexibility and graded standards, so that the realities of SMEs' situation (limited financial and technological resources, etc.)—are taken into account.

Second, the firms emphasized the need to simplify regulations and, not unexpectedly, the need to coordinate the different jurisdictions (national, provincial and municipal). Simplifying the regulatory scheme and the methods of enforcing it are essential if small firms, whose management capacity is generally modest, are to effectively receive and process information regarding environmental obligations, enforcement agencies, timeframes, etc.

There is also a need to improve information on the regulatory framework. Such information exists, but it is dispersed, and in order to grasp it in all of its complexity (given overlapping, etc.) requires considerable effort—an effort that, in many cases, small businesses are not willing (or able) to undertake. Thus, there needs to be a simplification and centralization of information, while making it more accessible to small businesses.

The SMEs also indicated that policy should place greater emphasis on clean production. This response is particularly interesting, since it comes from firms that have already taken their first steps in environmental management. The fact that they value source-oriented pollution- and waste-reduction activities—along with their demand for greater support in this area—points to two conclusions. First, it indicates a valuable recognition of the importance of clean production methods (their low relative cost, and the fact that their implementation does not conflict with firms' objective of increasing competitiveness). Second, it indicates that support policies have under-utilized the clean production approach.

Finally, some of those surveyed place importance on firms' use of self-regulation instruments for environmental performance. These instruments include the type of voluntary agreements between firms and government described above. Thus, the improvements that SMEs would like to see in the regulatory area include incentives outside the enforcement arena—measures based on cooperation rather than on monitoring and sanctions. Indeed, the firms place little importance on stronger enforcement or on using economic instruments for environmental regulation.

The second group of questions explored the SMEs' views on the possible incorporation of new instruments in the environmental policy arsenal.

Table 5.3 shows that the preferences of small business clearly favour promotional financing lines designed for environmental purposes, in addition to subsidies for completing the certification process.

Table 5.3
VIEWS OF SURVEYED SMES REGARDING POSSIBLE NEW ENVIRONMENTAL POLICY INITIATIVES

New policy initiatives	Degree of importance
Specific low-interest-rate lines of financing for environmental management	High
Subsidies for the environmental certification process	High
More environmental technology offerings in public institutions (INTI, CONICET, etc.) and/or in universities	Medium
Availability of information on environmental technologies at the local and international levels	Medium
Facilities for importing and/or purchasing environmental technologies	Medium
Support programmes for consulting, environmental audits, etc.	Medium

Source: Research Centre for Industrial Transformation (CENIT)/Economic Commission for Latin America and the Caribbean (ECLAC) survey cited in Néstor Bercovich and Andrés López, "Políticas para mejorar la gestión ambiental en las pyme argentinas y promover su oferta de bienes y servicios ambientales," *Medio ambiente y desarrollo series*, No. 96 (LC/L.2270-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

The firms surveyed also emphasize, though less emphatically, the importance of more proactive and consistent government efforts to make environmental technologies and information available, and to support consulting and technical assistance. Finally, they stressed the importance of more facilities for the purchase and importation of environmental technologies—a demand related to their universal interest in preferential lines of financing.

The survey also sought informants' opinions of private initiatives that are beginning to receive publicity in the country, which could contribute to improving environmental management in SMEs (Table 5.4). The firms consider a number of these private-sector initiatives useful and relevant, e.g., assistance provided by large firms to their SME clients or providers (cf. the EDENOR case described above), partnerships between SMEs to jointly address environmental management problems, and technical assistance provided by local or foreign institutions (e.g., GTZ and CEADS). Nevertheless, they assign less value to such private initiatives than to public-sector action.

TABLE 5.4
VIEWS OF SURVEYED SMES REGARDING PRIVATE INITIATIVES THAT COULD IMPROVE ENVIRONMENTAL MANAGEMENT IN SMES

Private initiatives	Degree of importance
Technology transfer and environmental–management–related assistance to SME providers and clients by large local firms	Medium
Partnership initiatives for SMEs to work jointly on environmental management	Medium
Agreements for environmental management assistance and support between local business groups and institutions and/or foreign institutions.	Medium
Technology transfer and environmental–management–related assistance to SME providers and clients by subsidiaries of transnationals	Medium

Source: Research Centre for Industrial Transformation (CENIT)/Economic Commission for Latin America and the Caribbean (ECLAC) survey cited in Néstor Bercovich and Andrés López, “Políticas para mejorar la gestión ambiental en las pyme argentinas y promover su oferta de bienes y servicios ambientales,” *Medio ambiente y desarrollo series*, No. 96 (LC/L.2270–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

5.2.3 General considerations for developing proposals

Studies on environmental management in Argentine SMEs provide ample evidence that regulatory pressure has been the crucial element leading SMEs to improve their environmental management. Less important but nonetheless significant factors include increased social and community pressure over the last decade, market mechanisms, such as burgeoning environmental requirements in export markets and among large firms to which local SMEs sell, and a general intensification of competition in the domestic market.

At the same time, complexity, overlap and lack of clarity in environmental regulation, along with weak enforcement, do much to explain the slow progress of Argentine SMEs in environmental management. Thus, the first element that needs to be addressed by public policy is a redesign of the institutional structure, in order to bring greater simplicity and consistency to standards and regulations. Reshaping the regulatory system in this way can serve to enhance rational, negotiated enforcement.

Other major factors have also played a role in the weakness of the system. These include lack of information on restructuring alternatives and technologies; the slow pace at which clean production, as one of many alternatives, has moved toward centre stage; the weakness of SME support policies; and the absence of specific lines of financing designed to meet the needs of SMEs.

The fact that SMEs’ endogenous capacities are generally limited—along with the fact that government has made no consistent effort to address this problem—is also an obstacle to clean production, since clean production measures go hand in hand with productive efficiency, quality control and a capacity to absorb and generate knowledge, either in–house or through associations with other agents and institutions.

Thus, it is important for public policy to highlight informational, technical and financial priorities, as well as incentives and support for environmental reengineering among SMEs. Above all, however, the key to overcoming SMEs’ accustomed resistance to environmental management measures is to organize environmental policy around clean production, and to integrate it with technological and industrial development policy (which also needs to be strengthened).

It is essential that policy be coordinated with private efforts and international cooperation, which, as indicated above, have been vital in supporting SMEs. Various key issues also emerge from the experiences and data described above, and should be taken into account in formulating policy to support SMEs in the environmental area. These include the following:

First, international experience in policymaking suggests that preference should be given to approaches that combine regulatory pressure with economic incentives, and that also make use of “voluntary initiatives” to encourage active cooperation within the public sector, SMEs and local communities. (The latter two of these—SMEs and local communities—have been insufficiently developed in Argentina, where, for example, there are no promotional lines of financing or tax incentives for SMEs to explore environmental management opportunities.) Furthermore, key elements in environmental policy designed to support SMEs normally include efforts to provide information, technical assistance and training. Also common are systems that differentiate between different sectors and regions, so that firms can undertake reengineering programmes based on their realities.

Second, environmental policy worldwide increasingly incorporates and emphasizes clean production—a fact that is particularly significant for SMEs. Policymakers are generally attempting to reconcile economic growth interests with environmental interests, uniting the two to achieve clean production objectives.

International experience shows, however, that most countries have failed to advance significantly in clean production, as a result of efforts that have been fragmented and uncoordinated instead of being integrated, as they should, in national programmes in which clean production is a priority. Moreover, environmental policies are sometimes stuck in an “end-of-pipe” model. Given a complex mix of interests, structures and commitments, this makes it difficult for policymakers to move in new directions.

In response, it is not enough to provide information, training and financing. Proactive and systemic policies, integrated in national strategies, are essential. In particular, it is important to overcome the flaw characteristic of many programmes, which consider environmental issues in isolation from the other needs of the industrial sector (productivity, quality, etc.). Such an approach impedes the emergence of synergies that can lead to both pollution reduction and increased competitiveness.

Third, while environmental regulations in Argentina, as indicated above, impose relatively demanding requirements on firms, there are serious problems of jurisdictional overlap, and insufficient provisions for scaled requirements that could make regulation of small firms more feasible. In addition, funds for enforcement are far from sufficient. These constraints diminish government’s ability to assess firms’ environmental situation, negotiate timeframes and conditions for—and eventually achieve—compliance.

Argentina’s regulatory system therefore requires considerable administrative and informational involvement from firms. However, there is no institutional capacity for verification and monitoring, nor is the system able to absorb feedback from firms and use it to refine regulatory instruments.

Thus, bureaucratic procedures and requirements must be simplified, institutions must be strengthened, and more emphasis must be placed on public–private dialogue. Public–private negotiation regarding environmental management is difficult, due to the multiplicity of public–sector entities involved, with their jurisdictional conflicts and consequent incompatibilities.

The scant attention given by the various levels of government to the issue of environmental management among SMEs is due, in part, to lack of material resources for verification, monitoring and promotion activities, as well as to the low political priority assigned to the issue. This latter factor seems to have been aggravated by the economic crisis of the last several years, resulting in a widespread, but mistaken perception that there is a trade-off between jobs and environmental management. This places enforcement authorities under pressure to ignore environmental problems in order to preserve jobs, under the assumption that enforcement may lead to business closures.

As argued above, however, it must be understood that this apparent trade-off derives, in good part, from the fact that environmental regulations fail to take account of the social, economic and technological limitations of both local firms and enforcement agencies. Thus, the issue is not simply tougher enforcement. Rather, the crucial challenge is to redesign the regulatory scheme.

The public sector needs to move beyond seeing this problem as an “ecological” one. It must instead approach the issue in terms of environmental efficiency and sustainable production. If the regulatory structure placed greater emphasis on an approach that integrated productive, social and environmental objectives, this would inevitably lead to reasonable timeframes for firms, and to environmental requirements that are based on an assessment of social priorities. Finally, if regulatory systems explicitly took account of firms’ technological constraints, as related to productive and environmental issues, and custom-tailored efforts to overcome them, fuller enforcement of standards would be possible, and the environmental impact of productive activities could be diminished.

A number of possible positive scenarios, with gains for both the public and private sector, are implicit here. They cannot be achieved, however, without comprehensive policies that support industry and innovation (through productive efficiency, technological excellence, quality, competitiveness, etc.) in tandem with environmental goals, so as to fulfil sustainable development objectives in the medium and long term. Only through greater emphasis on approaches involving clean production and technologies can conflict between environmental policy and competitiveness objectives be prevented.

Fourth, a review of major public and private initiatives to support environmental management among SMEs reveals a variegated picture. Some initiatives have proven effective, leaving behind important lessons; these are worth continuing and expanding. However, these initiatives are scattered and uncoordinated and share no common direction. Even within the public sector, action is fragmented and (in terms of the ambitions and the resources invested) of limited significance. Continuity, as well as interaction with private institutions, is clearly lacking.

The obstacles to better environmental practices among SMEs are substantial and diverse. To overcome them, a national programme must focus objectives, mobilize resources and choose effective measures. At the same time, it must be integrated with technological and industrial development policy, so as to provide consistency and make the path easier for SMEs. Unfortunately, Argentine technological and industrial policy has also been—and continues to be—weak.

Finally, the survey shows that SMEs believe that environmental regulatory structures must be simplified and adjusted to fit the realities in which SMEs operate. They also emphasize the need for public-sector initiatives to provide more and better information, make preferential financing available, grant subsidies for consulting services, audits and certification, and offer technical assistance. In short, what is needed is a system of comprehensive support for environmental restructuring among SMEs.

Following, in light of these realities, is an examination of a series of ideas and measures that could contribute to improving the repertoire of policies in use today.

5.2.4 Promoting environmental management among SMEs

Below is a list of the principal plans of action, both general and specific, shown by analysis to be necessary if public policy is to effectively support environmental management among SMEs.

To begin with, a broad and detailed assessment of the country’s industrial activity is needed. This would allow benchmark indicators to be established by region and sector, degrees of pollution to be determined, and poor resource use in individual sectors to be identified. Policies

could then be evaluated in terms of their ability to promote advances in environmental management among SMEs. This should make it possible to begin a systematic process of assessment and control.

In terms of the actual regulations, scaled requirements must be established, bureaucratic procedures must be simplified, enforcement authorities must be consolidated where possible, and regulatory requirements must be adjusted to the local social, productive and technological realities. This, in turn, would facilitate enforcement in the SME sector. Regulatory requirements must be predicated on broad-based cost-benefit analyses that take account of social, economic and environmental factors, and that include dialogue between the public sector, the business sector and civil society.

It is also important to identify priorities in environmental policy for the industrial sector. These must evolve with the changing realities. Such flexibility can lead to better use of scarce resources for monitoring and enforcement. Integrating productive development policy with environmental policy, while combining cleaner production with preventive measures, can improve competitiveness and environmental management simultaneously, eliminating the perception that these objectives are mutually exclusive. As a general rule, it is important for environmental and technology policy to address the environmental issue in two phases. The first involves minimizing effluents and waste; the second provides for treatment and remediation.

Thus, the entire policy arsenal must be reorganized. Priority must be placed on programmes and strategies involving cleaner-production tools, and clean production objectives must be given high priority, without abandoning pollution-reduction instruments. This entails a modification of standards, providing for greater permissiveness *vis-à-vis* firms that have expressed a commitment to clean production, etc. All of this is in line with current international trends in industrialized countries, Asia and even Latin America.

Tax benefits, in exchange for environmental management results, also deserve attention as a means of inducing SMEs to make the needed investments and assume the costs that may initially place them at a competitive disadvantage. This approach clearly requires developing the institutional capacity to assess the validity and compliance of projects.

The State can also establish conditionality or preferential criteria for bidding by SMEs capable of demonstrating that they are making efforts toward achieving clean production.

Another priority is to centralize and simplify SMEs' access to technical and regulatory environmental information.

Information systems and training in environmental technologies need to be strengthened. Benchmarking should be organized at sectoral and local levels, based on previous successes. An extension service and an information network should be created to instruct SMEs on how to proceed and what benefits to seek (tax incentives, loans, etc.), as well as to disseminate best practices for each sector, among other activities. INTI and its sectoral centres could play a central role in this effort. This would require that it train its technical staff, with the primary focus on clean production methods, so that the staff could, in turn, train technical personnel within firms. This technical assistance would follow the general model of environmental programs conducted—albeit in a fragmented way—by GTZ.

GTZ has played an important role, and is recognized for its efforts within the SME sector, which has benefited from these technical assistance programmes. Since the programmes involving German cooperation are slated to end soon, it would be beneficial to organize a public-private initiative to continue this type of work. The new initiative could take advantage of the experience and trained human resources generated by the previous programmes, while significantly expanding the scale of operations.

There should be incentives and support for the environmental development programmes carried out for their providers by some large firms, such as Ford and EDENOR. One type of

measure would be public recognition for these programmes, in hopes of extending their benefits to other productive networks, expanding the use of stricter environmental standards, transferring environmental know-how and –vitality important– focusing attention on clean production.

Strengthening and expanding the network of environmental consultants and facilitating access to environmental technical counselling on the part of SMEs is also important. Such a system would lower unit costs for groups of SMEs. It could be funded as part of the FONTAR technological counselling programme, and could receive operational support from INTI. A permanent line of action of this type would complement what is currently being offered by the Business Restructuring Support Programme (*Programa de Apoyo a la Reconversión Empresarial*, or PRE), operated by the Under-secretariat for Small and Medium Enterprise and Regional Development (*Subsecretaría de la Pequeña y Mediana Empresa y Desarrollo Regional*, or SSEPyMEyDR), and designed to co-fund technical assistance programmes (not only environmental, but other programs, as well) among SMEs.

International funding for environmental management can be increased by creating a single efficient interface at the local level. It could be placed, for instance, under the Secretariat of Industry (within SSEPyMEyDR), so as to encourage environmental issues to become a component of the SME–public sector dialogue. Clean production would need to be the central focus, among the more general challenges that firms face in respect to competitiveness.

It would thus be possible to evaluate the launch of a new line of financing specifically designed for environmental management among SMEs, under promotional conditions involving international backing. An alternative would be a revolving fund to absorb a portion of the risk that commercial banks assume in granting loans for SMEs to conduct environmental restructuring projects. Such a financing measure could be used to provide technical assistance, facilitate needs assessments, and aid in the preparation of business plans for SMEs (especially in critical regions and sectors), as well as providing support for implementation.

Some of the microcredit programmes currently operating in Argentina could shift their orientation to focus on environmental management projects, particularly in the smallest firms most in need of rapid restructuring. Such programmes could provide more rapid and simple access to small loans. Particularly relevant in this respect is the microcredit programme that has begun operations at INTI, which, unlike most microcredit programmes, is a public–sector programme. It is national in scope, provides relatively large loans (up to US\$5,000, at present), and receives technical support from INTI's specialized centres, some of which are directly concerned with environmental issues (Chidiak and Bercovich, 2004). This latter point is essential, for it is important that funding programmes include technical assistance, in order to facilitate, and reduce the cost of, environmental management improvements. The INTI programme is currently designed to provide general support to microenterprises. It would be desirable for it to create a special line of activity aimed at environmental management, and to obtain funds earmarked for such projects.

It is also important that environmental objectives be incorporated in policymaking so as to address issues of technological modernization. Subsidized lines of financing and FONTAR's nonreimbursable programme (which is part of the Secretariat of Science, Technology and Productive Innovation) could, in addition to other benefits, help technological modernization programmes dealing with environmental management.

FONTAR also has a tax credit programme, which has been reasonably successful in the last few years. This programme could place priority on environmental management objectives, earmarking specific funds for them. This would avoid the need for environmental management projects to compete with other technological modernization activities, and would convey a strong pro–environmental management message.

An assessment of past and present initiatives suggests that action is needed to create a national clean production programme (cf. the SAYDS–UNDESA initiative) that would mobilize financial resources and provide technical support, tax incentives and subsidies for environmental management. Proactive work to enhance awareness among firms would need to be undertaken sector by sector. The initial sectors must be selected carefully, evaluating their capacity to pollute and their ability to pull along other sectors in their wake.

Specific programmes compatible with the national programme must be created for each sector, since the sectors vary in terms of their awareness of, and information on, environmental problems; access to technical and management–related information; mix of pressures and sanctions to which they are subject (including regulatory pressure and enforcement, community pressure, the threat of lost markets, constraints on competitive capacity, dependence on export markets and public–sector demand, etc.); and potential benefits (penetration of new markets, community image, preferential status in bidding for public projects, etc.).

The aim should be to design and negotiate clear regulatory regimes that would take account of the special conditions under which SMEs’ operate, while still ensuring that they are subject to high standards. Negotiated programs for the reduction of emissions, effluent discharges and waste generation would be negotiated. Support and incentives would be provided, as well as flexibility in enforcement. It should be made clear from the outset that progress will be monitored. The sectoral competitiveness forums that have recently been created under the aegis of the Secretariat of Industry could be appropriate venues for this initiative, since they serve as opportunities for negotiation and consensus building between the public and private sectors.

The basic requirement, however, for such a programme to have a real impact is that it flow from political decisions at the highest level, that it have clearly defined objectives compatible with SMEs’ constraints and with their sustainable growth, and that all pertinent public agencies and private actors participate. In other words, a voluntary, fragmented programme relying exclusively upon the commitment of a second–tier agency will prove insufficient. Ideally, this programme should be merely one element of a national policy to support SMEs—though such a policy has yet to be formulated in Argentina.

Finally, policies to improve productive efficiency, quality management and technological capacity among SMEs will have a major positive impact on their ability to institute modern environmental management and advance toward clean production objectives.

5.2.5 Promoting the environmental goods and services offered by SMEs

It is clear, in view of the above information, that there is a lack of information on the local environmental industry and, in particular, on its SME component. Thus, research is clearly needed to identify gaps in the supply of EGSs, and to explore the possibility of filling them by means of efficient import substitution. More details are also needed regarding –among other things– the technological ability of small and medium EGS providers to meet not only today’s demands but those that may emerge in the future in a context of quantitative and qualitative growth in local demand.

The creation of specific policies for the SME sector –designed both to reinforce their advantages and to mitigate their disadvantages– would undoubtedly benefit firms working in the environmental sector, regardless of particular recommendations that might emerge for this segment. Not only would SMEs that provide EGSs find themselves working under improved competitive conditions, but the demand for EGSs on the part of SMEs would certainly increase.

Any measures to improve environmental management among SMEs (and in the productive sector overall) would be important in promoting the development of the specialized SME segment, since they would drive demand for environmental goods and services.

Advances in setting environmental management policy priorities, and in identifying restructuring needs in firms, by sector and region, could also benefit this segment of the local supply side.

In addition to creating the general framework described above, which could indirectly foster the development of SMEs offering EGSs, further direct and specific support measures need to be designed. Research shows that there is a reasonably large number of new providers, which, with the proper encouragement, could constitute the critical mass needed to form a dynamic, competitive local nucleus of SMEs.

The major weaknesses of these firms are in the areas of management (e.g., marketing), access to technology, updating/training, and capacity for innovation. One of the major deficiencies lies in the fact that local consultants lack up-to-date knowledge on solutions adapted to SMEs (e.g., in clean production and pollution prevention). This problem may even be limiting the growth of the environmental management market itself.

By implementing a national clean production plan that includes courses, seminars, visits to international trade fairs, etc., the public sector could encourage interaction and partnering among SMEs in the environment sector, helping them overcome problems of access to information, technology and training. In short, the public sector could play a more active role in training and structuring this segment to help it play a positive role both in meeting the need for environmental management and in developing a dynamic niche in the national SME economy, which has been signalling an interest in exportation to other countries in the region.

Interaction between this industry and the public sector could also facilitate solutions at other levels:

- Training could be provided, primarily through INTI's centres.
- Technology could be implemented with support from current FONTAR programmes.
- Technological development could be supported by applied research funded under the aegis of SECTIP. The research would attempt to select and adapt locally appropriate clean production technologies, with the process incorporating dialogue between private-sector firms and universities. Priority would be placed on support for clean technologies.
- Along with subsidizing environmental consulting (as mentioned above), INTI should train and accredit consultants as part of its relationship with clients. By subsidizing consulting services and ensuring their quality, this system would make it possible for specialized SMEs to expand their market.
- Access to foreign markets could be facilitated by creating export consortia supported by SSEPyMEyDR.

Finally, along somewhat different lines, it is worth mentioning the potential of some microcredit programmes to encourage the formation of small cooperative enterprises that collect and recycle urban solid waste.

It has been shown that microcredit schemes can play a crucial consolidating role in such situations. These schemes not only permit precarious, and often informal, enterprises to obtain rotating capital and financing for equipment and business premises, with consequent benefits in economies of scale; they also help these enterprises gain credibility when they are being evaluated in other contexts (other funding sources, partnerships, creation of cooperatives, etc.), thus helping them emerge from the marginal status typical of these firms.

The viability of these support programmes depends on the involvement of local government, not only because of the regulatory element involved, but also due to the importance of exploiting the capacity of such schemes to bring together social actors, technical advice and microcredit programmes in support of the objective.

This set of initiatives implies a comprehensive redefinition of the country's approach to environmental policy. This requires a prioritising of policies—assigning greater importance to environmental issues on the government agenda, while at the same time budgeting the necessary funds. At the same time, it calls for far greater coordination and cooperation among the various pertinent national, provincial and municipal entities—a significant challenge in a country such as Argentina.

Third, it requires coordination within the national public sector—between SAYDS and agencies involved in SME issues such as innovation and competitiveness.

Fourth, it requires greater cooperation between the public and private sectors, so as to collaborate and negotiate viable but effective commitments to better environmental management in the SME sector.

Fifth, a long-term approach is essential. Policies must possess continuity in order to have sufficient time to produce benefits.

Finally, the environmental issue must cease to be seen as a purely “ecological” one, and become part of overall economic development strategy—and, for the purposes being considered here, part of a strategy to strengthen the SME sector. This means not only that clean production must become a central criterion in promoting better environmental policymaking, but that action for clean production must be coordinated with activities in other areas bearing closely upon its concerns, such as technological and industrial development policy.

In such proposals, the budgetary needs, alone, may seem so daunting as to render them unworkable. However, a number of the initiatives proposed here are modest in their demands, and could begin to be adopted relatively quickly. Moreover, the institutional requirements—especially those relating to public–public and public–private cooperation and articulation, and to policy sustainability—are common to nearly all socially important areas requiring State intervention. Thus, they are part of the rebuilding of the State essential for Argentina in its current situation.

One further observation: Ambitious objectives need to be set—ones that take a comprehensive approach—if environmental policy is to move beyond the secondary position it currently occupies. Marginal fixes will not change the general state of environmental management in the SME sector. On the contrary, they will only prevent the majority of SMEs from exploring sustainable production, which must be promoted if the country's serious environmental problems are to be solved while at the same time improving the competitiveness of the SME sector.

In conclusion, one must ask what costs and benefits can be anticipated to accrue from the changes proposed here. The principal benefits would be social, given the prospective improvement in the environmental and economic performance of SMEs, with the segment presumably becoming not only “greener” but more efficient and more competitive.

At the national, provincial and municipal levels, not only would the State face the need for greater outlays to support environmental policies—and this in a context of already tight budgets; it would also be required to make serious efforts to improve coordination, increase its capacity to act, and become more institutionally sophisticated. At the same time, society as a whole would need to give higher priority to environmental issues than it currently does.

The private sector would also need to increase resources for environmental purposes. In the case of large firms, these funds would help clients and providers improve their environmental management. In the case of small firms, the funds would be required for the process of adapting

to legislative requirements, and to begin integrating environmental issues in the management of production and marketing.

5.3 Colombia¹⁸

This chapter proposes a public policy designed to encourage the demand for environmental goods and services on the part of Colombian SMEs. The underlying notion is that promoting demand would also stimulate the creation of EGS offerings to meet that demand. First, there will be an examination of legal issues that could arise were the proposal to be adopted; next will be a short history of the problems associated with environmental management among SMEs. Following this, the objectives of the proposal will be laid out, as well as the associated implementation strategies (including specific instruments) and design of monitoring mechanisms. In addition, a summary of the views of various actors in the sector will be given, along with a cost–benefit analysis of implementing the proposal. Finally, the related financial issues will be addressed.

5.3.1 The background of environmental management in Colombia

The elements of the legal framework crucial to this proposal are:

- The MIPYME law (Law 590 of 2000), which contains provisions to promote the development of microenterprises and SMEs.
- All of the articles of Law 99 of 1993, which established the Ministry of Environment, along with associated decrees, including the National Clean Production Policy adopted by the national government in 1997.

Small and medium enterprises (SMEs) in Colombia, as in other Latin American countries, are considered a priority sector for the management of environmental pollution. This is due not only to the amount of pollution they generate, but also to their low level of technological sophistication, their still undeveloped capacity for improvement, the fact that they are largely informal entities, and the circumstance that they are located primarily in residential areas. At the same time, Colombia's SMEs represent major potential for the country's productive base. The sector represents 40% of Colombia's GDP, and is responsible for 50% of jobs. In the wake of the economic crisis of 1999, it has, on the whole, been stronger than the large–business sector.

Within Colombia's SME sector, the following areas should be given priority, in light of their importance to the national economy and their impact on the environment: agriculture, industry (leather, wood, chemicals, foods, printing, textiles, metallurgy, other non–metallic mineral products) and land transportation.

In terms of environmental problems related to water, energy, waste, emissions and noise management, SMEs in the above–mentioned sectors will require assistance in defining and developing the environmental technology they need, and to aid them in implementation and certification. However, SMEs evince little actual demand for these services. This is due to the low priority they place on environmental management. Of approximately 25,000 SMEs identified, only some 10% have implemented any type of initiative to improve environmental performance.

For most SMEs, environmental management is not a significant management priority. There are a number of reasons for this, including the high degree of informality of the sector, the lack of emphasis on environmental issues within their markets (which are primarily local) and environmental authorities' lack of capacity for monitoring and enforcement. In some cases, non–compliance –as long as the violation remains unnoticed– can even constitute an advantage over

¹⁸ Based on van Hoof, 2005.

competitors with environmental management programmes. The apparent paradox here is not hard to explain. Given this situation, the apparent contradiction between the weak demand for EGSs on the part of SMEs vs. the strong need for these in terms of the public good—due to the fact that the sector is a vital element in any effective pollution –control effort– is easily appreciated.

With limited demand for EGSs by SMEs, their EGS offerings have also been slow to expand. The market began to develop after the enactment of Law 99 of 1993, which established the Ministry of Environment and the National Environmental System (Sistema Nacional Ambiental, or SINA). On the EGS supply side, there are currently approximately 40 consulting firms, 3 assistance programmes, 3 foundations and 45 private environmental services organizations to meet the needs of approximately 25,000 SMEs. The available technology is principally that provided by representatives and distributors of foreign firms. This reflects a general lack of appropriate national technology research and development efforts (though there are a few exceptions).

Thus, the background of environmental management in SMEs includes low demand for EGSs on the part of SMEs, and limited offerings of EGSs appropriate to their needs.

To turn these two inter-related challenges into opportunities for development requires comprehensive, complementary strategies. They must utilize concepts and action designed to change the thinking of businesspeople and other actors who influence the EGS market for SMEs.

This policy proposal could be useful to the Ministry of Industry, Commerce and Tourism, and to the Ministry of Environment, Housing and Land Development (Ministerio de Ambiente, Vivienda y Desarrollo Territorial, or MAVDT). It is designed with Colombia's SMEs in mind, and would involve private-sector entities such as the Colombian Association of Small and Medium Industry (Asociación Colombiana de la Pequeña y Mediana Industria, or ACOPI) and other business groups that include SMEs, such as chambers of commerce, large clients and providers of SMEs, consultants, EGS firms, NGOs, the National Administration of Economic Solidarity (Departamento Administrativo Nacional de la Economía Solidaria, or DANSOCIAL), the autonomous regional corporations (Corporaciones Autónomas Regionales, or CARs), environmental authorities in large cities, the Colombian Institute of Technical Standards and Certification (Instituto Colombiano de Normas Técnicas y Certificación, or ICONTEC), technology development organizations and universities.

5.3.2 Objectives of the proposed policy

The general objective of this policy is “to contribute to improving the environmental performance, economic development and competitiveness of Colombia's SMEs by promoting and supporting the sector's environmental management”.

The specific objectives are linked with two inter-related fields of action. One involves actors in the SME sector that directly influence the thinking of businesspeople in regard to implementing environmental management measures. The other consists of designing and providing EGSs adapted to the economic and technical capacities of the sector's firms.

Implementation of the proposed environmental management policy in the SME sector would:

- promote the adaptation of environmental management as an element of competitiveness strategy for Colombian SMEs;
- strengthen the domestic supply of EGSs for Colombian SMEs.

5.3.3 Strategies and instrumental activities

The strategies associated with this policy will shape its implementation, defining the priorities, instrumental activities and actors involved. The strategies complement each other, and are to be evaluated over time and modified to maximize their effectiveness in attaining the specified objectives.

Strategy 1: Establish appropriate environmental regulations focussed on prevention

The purpose of this strategy is to promote compliance with environmental regulations on the part of SMEs, by strengthening monitoring and enforcement in a manner consonant with the realities under which SMEs operate.

The problem with current oversight mechanisms is their limited coverage and effectiveness. A number of factors are responsible for this, including the great number of SMEs and the limited operating capacity of environmental authorities. In Bogotá alone, there are over 15,000 firms, with barely 30 individuals responsible for their oversight. The result is that systematic monitoring and enforcement generally focus on large firms, leaving SME enforcement oversight to cases where complaints are received from the community. Though this situation is not universal in Colombia, it does reflect a trend.

Another factor is the typical informal status of SMEs, which leads them to locate in residential areas, and means that they tend not to be registered with chambers of commerce. This makes it difficult for environmental agencies, and even for the community, to identify them as sources of pollution. There is also a general lack of knowledge about environmental legislation among SMEs. According to the CINDAMER survey (2001), 97% state that they are unaware of, or do not have problems with, environmental regulation.

At the same time, police attitudes and environmental agency administrative procedures, rather than promoting gradual improvement of environmental performance, generate resistance among SMEs. Moreover, non-compliance may also be a function of SMEs' technological backwardness.

To address these issues, environmental laws and regulations must be publicized –with emphasis on the obligation to comply– and solutions consonant with SMEs' potentials must be provided, i.e., information on how to comply. Dissemination could include events for awareness building, training, and distribution of informative material through channels accessible to SMEs (business groups, chambers of commerce, etc.). The purpose is to obtain agreements from SMEs on gradually coming into compliance with environmental regulations. Environmental authorities could also create an SME service centre to provide information and advice, emphasizing a preventive approach to pollution, perhaps with modifications to and simplifications of the related forms.

At the same time, the community must be informed on the general issues of environmental impacts and risks associated with business activities. This will help provide the knowledge needed for people to form opinions and lodge complaints on polluting enterprises when appropriate. In addition to carrying out information campaigns, environmental authorities should provide reporting channels, such as offices where claims and complaints may be lodged, as well as programmes to provide recognition for firms that distinguish themselves for their environmental performance.

The following instrumental activities are suggested as part of implementing the strategy of “establishing appropriate environmental regulations focussing on prevention”:

- Publicize environmental regulations and solutions among SMEs, with an emphasis on prevention, with environmental authorities working with unions, business groups, chambers of commerce and environmental “windows”.
- Environmental authorities provide SME service centres that offer information and advice, negotiate agreements on gradual compliance and self-management, and take measures to simplify bureaucratic procedures and forms, with both environmental authorities and business groups participating in implementation.
- Disseminate information on the impacts and risks associated with business activities, in order to educate the community. Develop programmes that provide recognition for firms that distinguish themselves for their environmental performance, with environmental authorities, business groups and consumers’ groups participating.

Strategy 2: Strengthen articulation among the actors involved in environmental management in the SME sector

The purpose of this strategy is to strengthen links between the different actors involved in promoting environmental management in the SME sector, in order to ensure effective action by public and private entities, leveraging impacts and creating synergies.

Environmental management in the SME sector includes different private-sector interests and actors: environmental authorities, business groups, chambers of commerce, universities, subnational governmental entities, specialized consultants, NGOs, etc. Conditions within the firm play a fundamental role in implementing and providing recognition for environmental management. SMEs in which conditions are favourable to these changes stand to benefit in various ways from environmental management.

To take advantage of these synergies between the public and private sectors, however, mutual understanding is required. Especially in the case of public institutions such as environmental agencies, there is a clear bias in favour of command and control schemes, which are inadequate tools for promoting environmental management in SMEs. One way to overcome this barrier is to train the relevant public servants to think in terms of business culture. Such training would be designed to stress the government employee’s role as an ally of firms-supporting firms’ efforts at environmental improvement, rather than acting as a mere enforcer.

Efficient promotion of environmental management in SMEs requires consistency in the messages they receive. Thus, success will be greater if the activities of the different entities involved have the same objective and exploit synergies. Notable in this respect are initiatives such as the Inter-institutional Agenda for the Support of Environmental Management in Business in Bogotá. DAMA heads this effort, which includes ANDI, ACOPI, the Bogotá Chamber of Commerce, FENALCO, and the Labour Council (Consejo Gremial). Its focus is environmental management in Bogotá (DAMA, 2002). The implementation of similar mechanisms in other metropolitan areas, such as Medellín, Cali, Barranquilla, Bucaramanga, and other departmental capitals, would enhance efforts to promote environmental management among SMEs.

In this connection, the following instrumental activities are suggested in implementing the strategy to “strengthen articulation among the actors involved in environmental management in the SME sector”:

- Promote business culture training programmes for public employees, especially in environmental agencies such as the Ministry of Environment, Housing and Land Development, and in health agencies.
- Work to coordinate inter-institutional agendas at the regional level, including regional environmental authorities; regional chapters of business groups such as

ANDI, ACOPI, FENALCO and other sectoral organizations; chambers of commerce; universities and subnational governmental entities.

Strategy 3: Promote and strengthen environmental “windows” with a focus on pollution prevention

The objective of this strategy is to strengthen environmental “windows” and assistance programmes in environmental management, expanding the scope of this type of comprehensive programme to include other regions of the country.

A clean production environmental “window” is a comprehensive programme to assist SMEs through awareness activities, training, and support in implementing pollution prevention solutions designed to increase competitiveness and diminish firms’ environmental impact. Such approaches are known as environmental efficiency and/or clean production approaches.

Colombia’s environmental “windows” date from 1996, when Bogotá’s Technical Administration for the Environment (Departamento Técnico Administrativo del Medio Ambiente, or DAMA), created the ACERCAR programme as a pro-active mechanism to prevent and control pollution in the SME manufacturing sector. The principal objective of the programme was to provide firms with information on environmental management in business.

Other similar initiatives are the environmental “window” carried out by the NGO Codesarrollo, in Medellín (1997–1999); the Cúcuta environmental “window” (1999–2001), the Eco-profit programme of the Regional Cleaner Production Node of Bucaramanga (2001–2003), the FENAVI-FONAV environmental “window”; and the regional cleaner production nodes.

In their initial phase, these programmes focused principally on promotional material, manuals and guides for good practice, along with business assessments related to compliance with environmental regulations. Programmes such as ACERCAR Phase IV and Eco-profit, have made progress in developing methodologies that connect environmental management with elements of business competitiveness. This approach, known as environmental efficiency, or cleaner production, has produced important changes in SMEs’ thinking concerning the need for environmental management.

Firms’ adoption of cleaner production practices and technologies is based on prevention concepts that are less costly to implement than treatment solutions, creating a win-win situation for the firm and the environment. For effective use, the concept must be rooted in the SME’s business culture. This requires a process of assistance that begins by building awareness, and continues with training and technical assistance to produce ongoing improvement in the firm, with an emphasis on actual implementation in individual firms. It is important that such activities not be limited to the awareness and assessment phases only.

In organizing and designing new environmental “windows,” it is important to involve actors from business, such as business groups and chambers of commerce, as well as universities and research institutions. These latter organizations have credibility in the SME sector, thus facilitating the programme’s acceptance and impact. In addition, the participation of the regional environmental agency, as the firms’ principal partner in dialogue on environmental matters, will enhance the project.

Another important factor for the credibility of the “windows” is their economic and financial solvency. As a guideline, some of the operational activities (information, awareness building and training) should receive outside funding, lifting the burden for this part of the process from the shoulders of SMEs. Other activities, such as individual assistance, would receive subsidies of between 50% and 80% of the costs of consulting services. This outside funding may represent investments by entities such as chambers of commerce, revolving abatement funds

provided by regional environmental agencies, international cooperation agencies, multilaterals and parafiscal funds from business groups.

For continuity, environmental “windows” should function over the medium to long term (i.e., 5 to 10 years). In the initial phase, they should focus principally on information and awareness building, in order to increase SMEs’ level of commitment, providing incentives for implementing and contracting environmental services to improve environmental performance and increase competitiveness.

Below is a summary of instrumental activities for the strategy of “promoting and strengthening environmental windows with a pollution–prevention focus”:

- Guarantee the continuance of the ACERCAR environmental “window” and the Eco–profit programme in Bucaramanga for the next three years, through fundraising and agreements with other actors. The entities responsible for this would be the chambers of commerce, ACOPI, other business groups, DAMA, the Corporation for the Protection of the Bucaramanga *Meseta* (Corporación para la Defensa de la Meseta de Bucaramanga, or CDMB), the Inter–American Development Bank (IDB) and organizations with operational capacity, such as the regional cleaner production nodes, chambers of commerce, universities, productivity centres and NGOs.
- Promote the creation of new environmental “windows” in medium–sized cities such as Pereira, Manizales, Armenia, Neiva, Yopal, Ibagué, Cartagena, Santa Marta, Barrancabermeja, Cúcuta, Popayán, Pasto and Villavicencio, and in their areas of influence. The means of promotion would be a programme to transfer knowledge and working methods regarding the effective operation of regional environmental “windows,” with an emphasis on implementing cleaner production among SMEs, and on fundraising. The chambers of commerce, regional environmental authorities, universities and cooperation agencies active in the regions would be responsible for promoting these new environmental “windows” .

Strategy 4: Promote environmental management clusters among SMEs

The objective of this strategy is to promote cooperation and integration between SMEs and large firms by forming clusters, or networks of businesses, that exploit synergies to promote and strengthen environmental management. Clusters, or networks of businesses, are geographic or sectoral concentrations of businesses and institutions in a specific area of activity. The firms in a cluster communicate, collaborate and compete pro–actively in the search for both local and global changes (ETG, 2003).

An initial mechanism for creating clusters is to involve large firms that are direct clients of SMEs in promoting and strengthening SMEs’ environmental management. As direct clients with needs, they become an important motivating factor for the SMEs. For the large firms, which are leaders in environmental management, this mechanism also enhances their own competitiveness. Their importance in promoting environmental management for SMEs results from the financial resources and/or technical capacity that they bring to training programmes and/or group certification processes.

Firms that would be logical candidates for this mechanism in Colombia include those in the food, automotive, textile, chemicals, oil, flower–growing and palm–growing sectors. The firms selected should have implemented environmental management systems and/or be affiliated with programmes of the Colombian Council for Sustainable Development (Consejo Colombiano para el Desarrollo Sostenible, or CECODES) and the Comprehensive Accountability Programme.

Another cluster scheme is the eco–park, which is a group of manufacturing and/or services firms located in the same geographic area that undertake joint projects to improve their

economic and environmental performance. Collaboration creates collective benefits greater than the sum of benefits that the firms could generate working individually to optimise their environmental performance (DAMA, 2003).

As a result of Decree 619 of 2000, DAMA began the process involving formulating plans, conducting feasibility studies, and carrying out designs for the ASCOPRO Eco-efficient Industrial Park, a process culminating in the inauguration of the first eco-park in Colombia. It houses 87 graphic arts SMEs, which share wastewater treatment infrastructure and other facilities to improve their environmental performance and competitiveness (ACERCAR, 2003).

This type of cluster is especially effective when there is a strong threat (not necessarily environmental) to the existence and competitiveness of a group of firms in a specific geographic area (Cote and Cohen, 1998). It also provides an alternative to zoning regulations. Following these criteria, the sectors deserving consideration in Colombia include the meat products sector in Guadalupe, the Puente Aranda industrial corridor and the tanneries of the San Benito district in Bogotá, the tanneries of La María in Quindio and the recycling cluster, among others. All of these sectors are strategically appropriate for this mechanism. A key factor in the success of such projects is coordination and dialogue among the different parties involved in the conceptual stage, e.g., subnational governmental entities, environmental authorities and business groups.

Another opportunity for promoting environmental management through clusters is to place the issue on the work agenda of existing programmes such as Compite Colombia, which grew out of the country's Productivity and Competitiveness Policy, and is a part of the 1999–2009 Strategic Export Plan overseen by the Ministry of Industry, Commerce and Tourism. The programme promotes the competitiveness of productive clusters through agreements to facilitate interaction among all actors. To date (January 2004), 30 agreements with different clusters have been signed as part of the Compite Colombia programme.

For the development of productive clusters, as well as the creation and establishment of eco-parks, it is essential to promote partnership among the firms involved, as a first step toward creating trust among the participants. This opens the door to potential synergies due to economies of scale. As a means of promoting the basic principles of partnership, as well as explaining different organizational schemes for carrying them out, DANSOCIAL should play a leading role.

To summarize, the instrumental actions for the strategy to “promote environmental management clusters in SMEs” are as follows:

- Promote the conception and development of programmes to improve SMEs' environmental management, taking advantage of their role as providers to large firms that are leaders in environmental management. This initiative would be led by the chambers of commerce, business groups, ICONTEC, CECODES, Comprehensive Accountability and specialized NGOs.
- Promote the design and development of eco-parks and/or environmental infrastructure shared by groups of SMEs whose existence and competitiveness are in jeopardy. Candidates for new clusters are recycling and meat products firms. The principal subnational governmental entities involved in implementation would be the municipal governments in the five principal cities, along with their corresponding environmental agencies.
- Integrate the issue of environmental management in the Ministry of Industry, Commerce and Tourism's existing programmes (Colombia Compite) for productive clusters and competitiveness, in order to take advantage of synergies.
- Promote partnership as a first step to building trust among the actors in a cluster. DANSOCIAL should play the leading role here.

Strategy 5: Promote the development of environmental technologies suited to SMEs

The objective of this strategy is to promote research in universities and technology centres to strengthen the development of appropriate environmental technology that is within the reach of SMEs. This includes instruments to assess, monitor and/or prevent the pollution generated by productive processes, under cost–benefit conditions that make them feasible for SMEs.

This strategy is an attempt to address the limited availability of environmental technologies for SMEs due to the factors described above, which result from the fact that the supply of such technologies is not adapted to the needs and capacities of SMEs. For the technologies to be appropriate to SMEs, they must be suited to their production volumes and purchasing power, and must be flexible and easy to use.

The current situation clearly shows that this problem has not been solved by Colombia’s various programmes, policies and institutions devoted to promoting scientific and technological research, such as the National Environmental Research Policy, adopted in December of 2001 by the Ministry of Environment, Housing and Land Development, the National Planning Department (Departamento Nacional de Planeación, or DNP) and the Colombian Institute for the Development of Science and Technology (Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología, or COLCIENCIAS), which emphasizes articulation between the National Environmental System and the National System for Science and Technology (Minambiente 2000). This policy has no strategy for developing environmental technologies appropriate to SMEs.

Moreover, the National Network of Technological Development Centres, which includes most areas of industry, has only one facility devoted to developing environmental technology, and it does not focus on SMEs, while its other sectoral centres do not emphasize environmental technology.

In response to the challenge that this situation represents, it is important that strategies to promote environmental technology research for SMEs be incorporated in existing policies and programmes, such as the National Policy for Environmental Research and the national science and technology programme. Another contribution would be to incorporate cleaner–production concepts in the training and applied research programmes of the National Learning Service (Servicio Nacional de Aprendizaje, or SENA) and the regional universities. Notable in this connection is an experiment of the Universidad de los Andes, in Bogotá. It involves transferring a course for training in cleaner production, accompanied by practical projects, to five other Colombian universities. In a three–year period, this has led to approximately 100 projects in firms (Van Hoof, 2003b). As such programs –along with SENA’s occupational training programmes– spread to more regions, research in environmental technology will increase.

Following are proposed instrumental actions for implementing the strategy to “promote the development of environmental technology appropriate to SMEs”:

- Incorporate strategies to promote the development of environmental technology designed with SMEs in mind, under the National Environmental Research Policy, with dissemination and appropriation handled through the National Network of Technological Development Centres. Participating entities would include the Ministry of Environment, Housing and Land Development, the Ministry of Industry, Commerce and Tourism, COLCIENCIAS and the National Planning Department.
- Promote the incorporation of cleaner production modules in SENA’s occupational training programmes, with support from the Ministry of Environment, Housing and Land Development.

- Promote the incorporation of cleaner–production research and training programmes in the curricula of regional universities, with participation, again, by the Ministry of Environment, Housing and Land Development and the Ministry of Industry, Commerce and Tourism.

Strategy 6: Support the funding of environmental management initiatives in the SME sector

The objective of this strategy is to make economic resources available to help SMEs acquire environmental goods and services, promoting environmental management initiatives in the sector.

Given its size and resources, SMEs' financial priorities usually begin with their obligations to providers and to the production, distribution and marketing of their products. Thus, investment for improving environmental management tends to take lower priority than immediate needs such as working capital. This is even more critically the case if investment in environmental management is seen as a form of spending, i.e., if there is a lack of awareness of the opportunities environmental management offers to optimise processes, reduce consumption of raw materials and other inputs, etc., all of which can improve a firm's cost structure.

In addition to the low priority that SMEs place on environmental management, their limited access to commercial credit is also a major issue. Their difficulty meeting requirements of financial institutions for collateral or other loan guarantees, added to the administrative procedures involved, make loan approval a lengthy process. And while environmental lines of are available in the market, there is little knowledge of their existence, not only among businesspeople, but even in the banking world.

Alternatives for funding environmental management initiatives among SMEs include lines of credit with special facilities, i.e., with regard to interest rates and repayment periods. The IFI–DAMA line, designed for SMEs in Bogotá, is one example. It offered discounted effective interest rates that were lowered (by as much as 5%) based on the amount of environmental impact the proposed project would mitigate. This preferential rate was subsidized by the environmental agency (DAMA). After the dissolution of the Institute of Industrial Development (Instituto de Fomento Industrial, or IFI), however, this line of credit ceased to exist. Funding schemes to replace the benefits that it offered need to be created by restructuring the current financing lines oriented to SMEs, while at the same time making alternatives of this type available at the national level through BANCOLDEX and the Ministry of Finance.

Though there are no revolving funds at the national level, they are an interesting option, in that they can provide incentives for preventing pollution by allowing firms that receive funds to amortize their loans with the savings that result from implementing the prevention measures. The benefits of this scheme are leveraged insofar as it is articulated with an environmental “window”, as has been demonstrated in Mexico's Fund for Pollution Prevention Project (FIPREV) (CCA, 2003).

A third funding source is multilateral entities, as seen in the CYGA and GAP programmes, which are supported by the IDB, as well as by the World Bank through the International Financial Corporation (IFC) and the Andean Development Corporation (CAF). These programmes primarily finance assistance, rather than providing funds directly to firms. A similar programme is the Colombian Fund for the Modernization and Technological Development of Microenterprises and SMEs (Fondo Colombiano de Modernización y Desarrollo Tecnológico de las Micro, Pequeñas y Medianas Empresas, or FOMIPYME), whose objective is to co–fund projects, programmes and activities for the technological development of microenterprises and associations of SMEs, NGOs, business organizations, technology parks, economic solidarity organizations, etc.

Along with these financial mechanisms, Colombian legislation (Article 158–3 of the Tax Statute) provides tax advantages for improving environmental performance, e.g., a discount on the value-added tax (VAT) on machines, equipment and inputs used to improve the environment, and an income tax discount for environmental management that goes beyond the mandatory standards. There is also a discount on the property tax for Bogotá enterprises that locate in areas recognized as environmentally efficient, in industrial parks, or under conditions that fall within DAMA’s concept of low environmental impact (DAMA Resolution 1325 of 2003).

Based on the above, the following instrumental actions are proposed to implement the strategy of “supporting the funding of environmental financing initiatives in the SME sector”:

- Create lines of credit to provide incentives for environmental management, with special conditions for SMEs, e.g., preferential interest rates, extended repayment periods, and guarantees. It is proposed that these alternatives be available nationwide. The participation of BANCOLDEX, environmental agencies and financial institutions will be needed.
- Create revolving funds with an emphasis on financing pollution prevention projects, with the idea that the savings achieved as a result of implementing environmental measures can be used to repay the loans. Business groups should participate in developing and implementing this scheme. In the particular case of the agricultural sector, some extrabudgetary funds could be used. BANCOLDEX, financial entities, environmental authorities, chambers of commerce and extrabudgetary funds could play a role in implementing this scheme.
- Arrange funding from international cooperation agencies and multilateral institutions that concentrate on technical assistance, as an alternative to direct disbursements to firms. GTZ, the IDB, CAF and the World Bank have experience in this area.
- Educate SMEs on tax benefits, and encourage them to take advantage of them. Entities to be involved in this educational activity include regional environmental authorities, the Ministry of Environment, Housing and Land Development, and chambers of commerce.

5.3.4 Goals, indicators and monitoring

Two types of monitoring instruments need to be associated with the policy:

There must be indicators to reflect impact, so as to measure the effectiveness of the policy. Such indicators include the number of SMEs that adopt environmental management measures as part of their competitiveness strategy, and the number of programmes and firms contributing to the supply of environmental goods and services designed for the country’s SME sector.

Monitoring involves two main phases: measuring achievement of goals, and carrying out updating and adjustments:

- *Measuring achievement of goals.* The institutions involved in the strategies are to be responsible for evaluating and reporting on progress achieved, as measured by the indicators set forth in this proposal. Annually, the ministries that have formally adopted the policy will be responsible for ensuring progress toward the established goals.
- *Updating and adjustments.* Similarly, the ministries that formally adopt the policy will be responsible for updating and adjusting the policy in coordination with the other actors involved.

5.3.5 Social and environmental costs and benefits

Cost–benefit estimates are based on fieldwork and consultation with other actors. In addition to estimating costs and benefits for the first two years of implementation, goals and indicators must be considered.

The estimated costs of implementing the policy total approximately US\$35.9 million for the first two years. This is to be covered by the different actors involved.

The environmental benefits are to be described qualitatively. The first evaluation would take place after two years, with necessary adjustments then being made. This process would be repeated throughout the period during which the policy is in effect, with at least 10 years needed for full implementation. The principal benefits of the proposed policy include improvement in the quality and availability of natural resources (water, soil, air), minimization of waste and improved waste management. It should be noted that the benefits depend on comprehensive implementation of the strategies. Thus the total benefit can be greater than the sum of the individual benefits of each strategy.

There will also be benefits in terms of the competitiveness of the firms, job creation, regional development, etc. However, these benefits will be affected by factors outside the environmental arena, which is the specific focus of the policy.

5.4 Chile¹⁹

Developing a policy approach to sustainable development in SMEs must take account of two important areas. The first involves the sector’s environmental externalities, and the importance of partnership as the principal strategy for improving SMEs’ environmental performance. Designing a platform for cooperation would enhance the sustainability of processes that the sector wishes to implement, as well as bring SME management in touch with the need to confront the issue of future environmental constraints and opportunities, which even today represent a challenge for them. Bringing this concept to practice, though important for the sector’s sound and harmonious development, is a long–term project, mostly because of the cultural change it implies. It requires identifying new market niches, potential productivity gains, and opportunities for technological change (know–how). Ongoing training programmes would help, especially considering the country’s role on the international scene, where units that internalise the concept of globalisation have a high probability of success–i.e., of producing “more with less” (environmental efficiency), of not polluting the environment, and of becoming participants in a social network.

In this context, the importance of various forms of partnership lies in the fact that they facilitate flexibility and promote economies of scale, complementarities and economies of scope, positive externalities and leadership opportunities, performance comparisons, and more–rapid learning and building of trust. Also of the greatest importance is the resulting enhanced reputation, which opens doors to new markets. Finally, partnerships encourage ongoing change.

The second area of concern for developing policy to encourage sustainable development in SMEs relates to the realities inside SMEs. Training is of particular importance here, in order to foster the “entrepreneurial talent” that is essential if the sector is to become more competitive. This is intimately linked with the know–how that a firm possesses and can use to internalise the principles of clean production and environmental efficiency as an integral part of corporate sustainability, and to become more flexible in adapting to both national and international requirements, in cases where there is a desire to move into foreign markets.

¹⁹ Based on Sepúlveda, 2005.

These are new approaches to a problem that predates current SME policies and instruments in Chile—though it is certainly true that the policies and instruments in place today have not worked well, and require major modification. To solve the problems that have so far resisted solution, consistent policies with broad support are essential. This view is contrary to the orthodox, prevailing view in Chile, which is that the SME sector, except insofar as it is a purely social concern, should be left to the forces of the market, so that the most capable succeed. Notwithstanding this prevalent view, a sustainable SME sector that has a presence in alternative export and EGS markets can only be achieved if non-traditional policies are developed. Thus, current policies—especially the least effective ones— must be reshaped, and attempts must be made to follow lines of action similar to those proposed in this document. Thus, both new instruments and changes to current policy and instruments are to be recommended.

The proposals in this study are an endeavour to stimulate debate rather than to provide a text containing definitive answers. It is hoped that they will trigger a process of building awareness and promoting contact among all stakeholders, so as to subsequently establish short-, medium- and long-range approaches to define more concretely the policy lines needed to promote environmental management and performance among SMEs.

5.4.1 Political, legal/regulatory and financial framework

Chile's Clean Production Policy and associated instruments

The clean production approach, enunciated in Chile's Clean Production Policy (Política de Producción Limpia, or PPL) in both its 1997–2000 and 2001–2005 versions, represents a national intention which, though not explicit, is reflected in concrete action to introduce the environment–SME issue and move SMEs toward compliance with standards, a goal they will eventually have to confront. Implementation of the policy has been relatively slow to address the realities of the SME sector through its specific instruments, even considering some of the principles on which it is based, which include the following:

- Authorities should certify compliance with voluntary agreements; this certification would help firms in promoting their products—a development that has not occurred in Chile. This would include, for example, the use of preferential criteria for government procurement of goods and services, whether regional or local (i.e., “green” procurement).
- Clean technologies should be implemented in less-advanced firms that need to improve their productive capacity and modernize for competitive purposes (i.e., principally SMEs).
- The main criteria used to group firms should be geographic rather than by sectoral.

Chile's Clean Production Policy eliminated the voluntary agreements scheme, imposing instead the so-called Clean Production Agreement, described as a uniting of wills. Thus, no firm belonging to a given sector and category of activity is obliged to sign an agreement, even when the industry group to which it belongs adopts it. Once a firm decides to participate, however, it has duties and rights specified in the agreement—an arrangement well adapted to the country's precarious regulatory system. The system allows for what might be termed “benevolent enforcement”, which the policy's promoters in the Ministry of the Economy (MINECON) and CORFO have called “preventive enforcement”. In this scheme, the regulator helps participating firms (which ipso facto have demonstrated greater openness to environmental improvements than have other firms) in meeting the standards (Borregaard, Leal and Sepúlveda, 2002).

Technical assistance and financing are important elements of the Clean Production Policy. Though, in practice, all technologies (hard and soft) related to clean production are

available in the marketplace, SMEs face obstacles in terms of both information and adaptation, primarily because of the seeming disproportion between effort expended and results achieved.

a. instruments

CORFO has a series of technical support instruments (co-financing that partially covers the cost of specialized consulting services) and financial instruments (long-term loans) for SMEs in remote areas. These instruments are designed to support technological development and innovation, improve business management, expand access to a variety of services in the financial market, as well as promote productive development in regions and emerging sectors. However, SMEs have sharply criticized the way in which these instruments have been implemented. The complaint is that transferring funds to the public and private banking sectors makes the funding unattractive for the great majority of SMEs, for two reasons. First, few SMEs meet all of the banking requirements; and second, banks put more effort into promoting their own products, directed at “more profitable” clients, than products that are of potential interest to SMEs.

More specifically, CORFO has defined clean production as a priority strategic approach. In the context of productive modernization, it has created a line of action to support environmental measures. This line includes three instruments. The first is the Technical Assistance Fund for Clean Production (*Fondo de Asistencia Técnica de Especialidad Producción Limpia*, or FAT-PL); the second is the Programme for Clean Production Management Support to Firms (*Programa de Apoyo a la Gestión de Empresas en Producción Limpia*, or PAG-PL); the third is the Programme for the Support of Environmental Preinvestment (*Programa de Apoyo a la Preinversión en Medioambiente*, or PIMA). Some other instruments, though not specifically designed for environmental purposes, can be adapted and applied to environmental management and clean production. These include the Partnership Development Projects (*Proyectos Asociativos de Fomento*, or PROFO), the Programme for the Support of Business Management (*Programa de Apoyo a la Gestión Empresarial*, or PAG) and the Providers’ Development Programme (*Programa de Desarrollo de Proveedores*, or PDP).

A study by Borregaard, Leal and Sepúlveda (2002) indicates a direct relationship between the use of these instruments and the presence of SMEs in the industry groups studied (ASIMET A.G., ASIQUIM A.G. and CCHC). The most frequently used instruments were PROFO, FAT, PAG and PDP—especially PROFO, which was used by 48% of firms signing a clean production agreement. The least used was Line B-14. Though B-14 could be quite attractive to SMEs, its implementation has lacked flexibility, due to a series of bureaucratic obstacles (see Table 2). FAT-PL emphasizes only environmental assessment, leaving room for an instrument designed to support implementation. However, few SMEs can undertake the level of investment needed for implementation. Thus, a line of credit designed for implementation is needed.

It can be assumed that CORFO’s instruments are intimately involved in SMEs’ environmental efforts. At the 2002 National Small Business Conference (*Encuentro Nacional de la Pequeña Empresa*, or ENAPE), however, SME management was critical of the lack of efforts to promote the use of these and other support instruments (an apparent failure to publicize them on the part of government). This was corroborated by leaders of major industry groups (ASIMET A.G., ASIQUIM A.G. and CCHC), who stated that it was a mistake to transfer the funds to private banking institutions for implementation of the instruments, since banks publicize their own products and services much more vigorously than they do these other instruments—and SMEs are at a definite disadvantage in competing for the traditional products and services.

b. Legislation and regulations

From an environmental perspective, the framework is established by the General Environmental Law (Law 19300/1994) as modified by Law 19372/1995; supreme decrees 745/1993, 146/1997, 144/1961 and 48/1984; resolutions 1215/1978 and 15027/1994; and finally, decrees 4/1992, 19057, 59/1998 and 812/1995.

Other pertinent bodies of law are decree 830 on the tax code; decree 824 on the income tax, and decree 825 on the sales and services tax.

c. Financial framework

The Production Development Corporation (*Corporación de Fomento a la Producción*, or CORFO) offers Chilean firms a range of instruments for financing their productive activity. Among these are loans and guarantees. The CORFO investment loan programme for medium and small enterprises provides financing for long-term investment in fixed assets and the associated working capital required. It has special lines for environmental investment and investments in regions other than the Metropolitan Region. Its lines include CORFO Investment Loans, CORFO Environmental Investment Loans and CORFO Regional Investment Loans. Through the financial system, CORFO also has lines for SME leasing arrangements; financing of working capital through factoring; guarantees for investment projects; and agricultural insurance premium subsidies.

CORFO's environmental investment funds are made available through commercial banks. They take the form of loans and leasing operations, and are earmarked to finance long-term investments by medium and small enterprises designed to foster cleaner production and compliance with environmental standards. The loans or leasing operations have a cap of US\$1 million per firm. Up to 30% of the amount can be used for working capital needed to implement a project. The funds are granted in development units (DUs) or US dollars, at a fixed interest rate. Repayment periods range from 3 to 12 years, with grace periods of up to 30 months. Payments are made semi-annually. The beneficiary firm is required to contribute funds equivalent to at least 15% of the total investment.

5.4.2 Conditions for establishing a policy

Based on a general analysis, and employing the ideas of Orozco and Ruiz (2002), one may state that designing policy and instruments to improve environmental management in SMEs and promote the EGS market must take into account the following points (which appear below in arbitrary order):

- a. Government must have the will to incorporate environmental SME policy in the framework of national environmental policy, and in the general policy framework, focusing on formulating criteria that incorporate and harmonize environmental issues with sustainable economic development goals and objectives.
- b. There must be technical studies (documents, reports) to help identify vacuums, and to design and implement new development instruments, primarily instruments to eliminate barriers that prevent access to credit and financing.
- c. Collaborative networks are needed, principally to deal with issues such as financing, access to technology and information, new markets, etc.
- d. The geographic dimension needs to be taken into account as a variable in designing specific policies and instruments, i.e., the diversity and specific characteristics of SMEs in a given area must be considered.

- e. The technical capacity of SMEs must be enhanced, so that they can gain a clear conception of the environment/management relationship.
- f. Mechanisms to publicize positive experiences in environmental management must be created, so as to encourage the development of environmental protection capacity at the local level and in civil society.

The above ideas, though general, are a basis on which to contextualise the policy proposal by establishing general guidelines that can be translated into concrete objectives—and then, to the extent possible, into strategies and instruments to achieve them.

5.4.3 Setting policy objectives

Since the SME sector is complex and subject to change, setting more concrete objectives requires the participation of all stakeholders (some of whom have been cited above). What is proposed here is an approach based on general objectives. It is a response both to analysis of the information so far presented in these reports, and to information from the first and second phases of the project. It is hoped that the proposal will provide a starting point for more thorough debate, and that it will suggest goals, indicators and specific activities capable of unfolding over time, while stimulating concern for a periodic review of the ideas, since the policy's target sector is a dynamic and volatile one.

One possible general objective would be to “define and create the conditions needed to implement an environmental SME policy, which, through its instruments, would develop and support concrete proposals to improve environmental management, as well as support the development of EGSs in the sector at the national and local levels” .

Possible specific objectives include:

1. To propose the basic lines of a policy to provide credit and financing for SMEs.
2. To design and implement a platform for cooperation, designed to develop and strengthen public–private and private–private partnerships.
3. To promote clean production principles as an approach to improving environmental management among SMEs.
4. To support and propose development instruments or complements to existing ones that explicitly support SMEs' environmental activities beyond the initial assessment phase.
5. To implement local entities specializing in the SME/environment issue.
6. To periodically discuss and circulate the objectives and advances of the policy, its scope and results, at both the national and international levels.

The objectives of the policy proposal described and explained here contain two dimensions. The first focuses on eliminating all barriers that prevent SMEs from competing more efficiently in the market. These include barriers to credit, to financial and non–financial instruments, to training and information, and to state–of–the–art technology. The second dimension involves promoting and supporting the supply and demand of environmental goods and services among, from, and directed toward SMEs, as one essential factor in structuring a growing environmental market at the national and local levels—with the latter being the level at which SMEs encounter both potentials and constraints.

Such efforts reflect an attempt to increase the competitiveness and environmental and social performance of SMEs, principally by supporting environmental management—specifically, by revising the Clean Production Policy (perhaps re–orienting it directly to SMEs), and emphasizing prevention over corrective “end–of–pipe” measures, which become necessary only insofar as preventive measures are not in place.

For each specific objective, the corresponding strategic actions are as follows:

1. *Propose the basic approach for a policy to support credit and financing for SMEs*

Here, the objective is to establish a development–banking sector for SMEs. This should be comprised of financial and non–financial services that contribute to improving the sector’s financial health. Assessing microcredit and eliminating barriers to first–tier financing should be priorities for the first phase of shaping SME finance policy.

According to Román, there is increasing support for transforming CORFO, or part of it, into a second–tier bank, so that one of its central functions would be financing for the SME sector (Román, 2005). Thus, with a simple decision by its board, CORFO could turn its financial intermediation office into a second–tier development bank, which would oversee various lines of financing instruments.

SMEs require a specific financing platform providing them access to the sums needed to improve their production processes. Thus, it is important to reduce the transaction costs involved in small–loan operations and, as indicated, for the new entity to assume the functions of a second–tier bank, including “wholesale” raising of funds in credit and capital markets. To explore this idea further, one could follow the suggestions of Held (2000), who specifies that a policy designed to promote SME loans and financing should:

- a. establish a high–level office within the Ministry of the Economy, with responsibility for defining, supervising and evaluating support policy;
- b. create a system to increase credit and financing opportunities for SMEs through banking, via:
 - a “second–tier” bank within CORFO, and
 - development measures on the part of BancoEstado.

Some of the most important actors here would be: the Ministry of the Economy/CORFO, CONUPIA, industry groups of both big business and SMEs, Banco Estado, BanDesarrollo and microenterprises.

2. *Design and implement a platform for cooperation that strengthens public–private and private–private partnerships*

The objective here is to design and implement a platform for cooperation by forming alliances with domestic and international business organizations, as well as governmental entities, to provide sustainability, formal status and continuity to technical assistance activities involving training and advisory services, marketing, dissemination, access to information, technology and non–financial instruments.

Promoting partnership and productive links at all levels, along with ongoing evolution of the repertoire of support instruments, use of up–to–date criteria, and a tangential role for the State, must be basic elements of an approach to disseminate and provide the information needed for the various stakeholders to achieve greater coordination.

Business organizations, which represent the interests of their members, have formal procedures for channelling and publicizing the concerns of their participants, albeit with a degree of bureaucratic clumsiness. The equilibrium point will be reached when businesspeople at the grassroots level (SMEs, professional associations, industry groups) take an active role and come to view bilateral cooperation as a positive alternative for development in the environmental market, both nationally and locally.

Moreover, public–private cooperation in enforcement is important insofar as action is oriented to creating joint plans to improve productive practices (taking advantage of manuals and guides available in the country).

The important participants in this process will be associations such as ASIMET A.G., ASIQUIM A.G., CCHC and CORMETAL, in addition to CORFO and the National Clean Production Council, SOFOFA, CONUPIA, AEPA and Fundación Chile.

3. *Promote the principles of clean production as an approach to improving environmental management among SMEs*

Here, the objective is to create awareness of clean production principles and the associated instruments among appropriate target groups, as a comprehensive approach to addressing environmental challenges. It is important to publicize the benefits of clean production agreements (which derive from reducing production costs and gaining the cooperation of enforcement entities in the process).

The second version of the clean production policy (2001–2005) places emphasis on instruments available to all types of businesses, focusing explicitly on SMEs, which, in many cases with the aid of their industry groups, have gained access to various instruments. PROFO and the environmental FAT programme are the instruments used most.

Dissemination of clean-production success stories through talks, workshops and/or seminars can make SME management aware of the principles, tools and benefits of this approach. Most important, it can impel them to adopt preventive approaches as a means of reducing costs and increasing productivity in the short and medium term. The country's international policy, which includes cooperation agreements primarily in the area of trade, provides a context in which complying with environmental standards—with variations based on the particular location—can lead to new international and domestic business opportunities for SMEs.

The important actors to consider here are the Clean Production Council, CONUPIA, industry groups with experience in this area (ASIMET A.G., ASIQUIM A.G. and CCHC), enforcement agencies (SESMA, SISS) and other entities (e.g., Fundación Chile and AEPA).

4. *Propose, promote, and increase SMEs' access to support instruments, or sets of such instruments, to assist firms in addressing environmental issues*

The objective here is to create or expand support instruments with uses beyond simple environmental assessment. They must create the venues and conditions needed to improve SMEs' access to private (or first-tier) banking services, overcoming the intrinsic characteristics of SMEs that make this difficult. Mediators or intermediary technical entities (organizations, experts) capable of opening the door to banking institutions, or of helping to bring SME projects to the operational stage, could contribute to solving the financial problems, enabling SMEs to address environmental issues in a second phase. The instruments must also promote uniformity in the administrative and accounting techniques of SMEs, i.e., they must strengthen the management process as a foundation for confronting environmental issues.

The environmental problems for which SMEs are responsible can be addressed in two ways. One is to support prevention and treatment at the source, the other is to create a specialized enterprise to address the problem. In the former case, the support instruments employed must be designed for direct use once the assessment has been made. This means increasing access to small loans, so that SMEs have the wherewithal to invest in new, clean technologies. The other alternative is for the instruments to support SME clusters and/or partnerships based on similar activities or geographic proximity, helping them to address common problems by creating a specialized enterprise. Though PROFO was designed for this purpose, SMEs have little familiarity with its resources and requirements.

The important actors here are the National Clean Production Council, banking institutions (BancoEstado, Banco del Desarrollo), CONUPIA and industry groups, and municipalities, among others.

5. *Create local entities specializing in SMEs and the environment*

Here, the objective is to make tools (technology and information) available to SMEs in specific geographic areas nationwide where access to such tools is a problem. This can be accomplished by implementing clean production centres run by regional/municipal governments and R&D entities (universities or others), in partnership schemes that link the local environmental market with the larger world, disseminate information (success stories) and provide training and financing. The first step includes familiarizing SMEs with clean-production success stories, and bringing SMEs and CORFO into closer working contact with universities and related institutions. Certain existing arrangements could spur the interest of SMEs that are currently unaware of the benefits of clean production. Ideally, over time the centres would become specialized institutions serving as a focus for both human and financial resources, while providing a context for SMEs to come together and address environmental issues.

The implementation of local clean production centres would give SMEs better access to technology, information, training and funds for environmental action. At the same time, this would: improve local market conditions and encourage transactions for environmental goods and services, within the technical, economic, social and cultural constraints of specific geographic areas; promote an atmosphere favourable to SMEs by making it easier for them to form clusters in which they can produce high-quality products and obtain training; and make it easier for SMEs to form partnerships with large firms or municipal governments.

The important actors here are CORFO, the National Clean Production Council and Fundación Chile, industry groups, financial institutions, research and training firms and/or institutions (APYME-USACH, CIDERE Bío-Bío, regional universities, Fundación Chile), SME industry groups and AEPA.

6. *Periodically discuss and publicize the objectives of the policy, its scope, and its implications at the national and international levels*

Here, the objective is to position the policy as part of a high-level debate, in which the participants are decisionmakers in their respective organizations. This would provide a means of validating the policy and providing sustainability and coverage to the associated actions. It also provides a complement to strategy “b” (presented in the next chapter), by attempting to create the conditions, within business circles and among partnerships involving SMEs and large firms, conducive to support for environmental management among SMEs. Not only would this help address environmental issues among export firms (which are important players, given their compliance with international environmental requirements), but also within firms that produce in, and for, the domestic market. The participation of senior management, consisting primarily of managers in large firms, leads to networks, information sharing and business opportunities.

It is to be hoped that the process of policy design and implementation will be governed by transparency, with participation by all stakeholders. Dissemination of information on actions, both to SMEs and to large domestic firms, must serve as the starting point for achieving a successful social impact. Meanwhile, international dissemination could foster new business with foreign firms, provided that improvements are made in financing and credit conditions for SMEs involved in EGS transactions.

The important actors here are SOFOFA, CONUPIA, CORFO, the Congressional SME committee, the Ministry of the Economy, and the General Secretariat of the Presidency—CONAMA.

5.4.4 Related strategies

Considering the factors described earlier, the lack of credit for SMEs could initially be mitigated by greater security in the national and international economies. This would lower the risk for lending institutions, and could be expected to lead to improvement in the legal/institutional frameworks in which they operate. This, however, is a long-term issue, and there is little sign that short-term efforts are underway (e.g., more publicity for the banking and State institutions that specialize in serving SMEs, such as BancoEstado with its SME and microenterprise department; BanDesarrollo Microempresa, within the Banco del Desarrollo; and CORFO's Office of Financial Intermediation).

Finally, general strategies to promote the objectives presented in the foregoing section, designed to provide opportunities for EGS providers, should:

a. *Promote partnerships with large firms, corporations and industry groups*

The Ministry of the Economy, through CORFO and industry groups (CONUPIA, ASIMET A.G., etc.) should assist in arranging partnerships between SMEs and large firms. Such partnerships are beneficial to SMEs, particularly in terms of access to technology, know-how, experience, knowledge of the market, and access to information. At the same time, they are beneficial to large firms in that SMEs represent an entree to local markets. Thus, partnerships with industry groups and/or corporations give SMEs varied opportunities, including access to networks and contacts through which they can develop new business, as well as acquire training, technology and information.

b. *Promote the incorporation of SME environmental policy in corporate sustainability policy*

There must be efforts, through the participation of all stakeholders, to ensure that all objectives and initiatives of the proposed SME environmental policy enjoy majority support. SMEs themselves can be expected to promote the policy, due to the benefits of improved sustainability they can be expected to produce.

c. *Offer goods and services that satisfy the demand for protecting the environment throughout the process, beginning with extraction of a natural resource and concluding with its final disposal*

This strategy is closely linked with the process of establishing partnerships with academic and/or research institutions. Considering, moreover, that the Chilean economy is based on natural resource extraction, SMEs could meet needs for new technologies and/or processes at a small scale, in order to support more sustainable natural resource management, waste disposal and treatment, re-use of waste material, etc.

d. *Identifying vacuums in the environmental market*

This strategy is designed to meet needs in the environmental goods and services market that cannot be met by foreign firms. Research is needed regarding unmet demand in the domestic market. The professional expertise of individuals must be exploited, as well as the knowledge of SMEs that provide specialized technical services and/or state-of-the-art technologies.

e. *Offer an “environmentally compatible” product*

Here, the objective is to supply the market products recognized as non-harmful to the environment. Considering the potential for marketing abroad, it is important that this recognition be provided by both international and national organizations. Thus, it would be interesting to reconsider the use of the “environmental seal of approval” for SMEs that produce environmentally non-harmful EGSs, recyclable products, and products and services whose

production does not negatively impact the environment. The seal would certify that any resource extraction involved in producing the company's products has met certification standards, or that the process is compatible with the health of the immediate environment.

f. Use formally recognized marketing channels

One way of strengthening the EGS market is for marketing channels to first define their products, sources and means of intermediation, and then to systematize their transactions so as to record quantities, destinations, and monetary amounts involved. The website "*Chile Compra*" represents an important advance in this respect. On this site, the government presents requirements, calls for bids and requests for cost estimates for goods and services, including environmental goods and services.

g. Promote pollution prevention as a central sustainability strategy for SMEs

While there is much to be desired in SMEs' assimilation of the concept of prevention, a degree of progress is reflected in the rising figures for the use of FAT and of PROFO's instruments, which are provided in the framework of Chile's Clean Production Policy. Moreover, the country's number of specialized consultants has been increasing, signalling a desire to professionalise environmental advice to SMEs, and reflecting a trend toward associating environmental management with increased productivity.

Prevention, as conceived here, involves systematic efforts to reduce negative environmental impacts and the associated economic consequences. It also means facilitating access to information regarding legal requirements and enforcement procedures, as well as emphasizing self-regulation on the part of firms.

5.4.5 Features of the proposed instruments

A number of important premises are associated with these tools or instruments, which are designed primarily to support management.

First, the tools should focus on improving business management, since the deficiencies of the capital market –often blamed (justifiably) on such problems– are one of the central impediments to the development and modernization of SMEs. The instrument must facilitate public intervention, while ensuring that it is more pertinent, timely and coordinated; promote needed change and avoid perpetuating the situations that brought about the problems, by confronting the problems at their cause; employ methodologies that prevent being imprisoned by special interest groups; and develop conditions that make it possible to reach performance agreements with beneficiaries.

Second, it is essential that the instruments be visible, identifiable and accessible. This involves major efforts at decentralization and requires participation by the greatest possible number of stakeholders. It is important to ensure that the instruments produce trust, continuity and transparency (cf. Landerretche, 2002).

Landerretche proposes basic criteria for designing, utilizing and evaluating instruments and programmes to support SMEs, and states that they can be fit into a more advanced phase of environmental policy, provided that the policy is designed to contribute to increasing SMEs' productivity, efficiency, competitiveness and accountability to the community. The basic criteria are:

- relevance: clear policy objectives designed to achieve specified results within the framework of the proposed policy;
- horizontality: private-sector demand as a determining factor in allocating support funds;

- time constraints: entry conditions (access) and exit horizons compatible with the objectives;
- transparency: clear explanation of the costs and benefits of the instruments;
- participation: participation by stakeholders, essential if the proposals are to be formally adopted and recognized;
- support through demand or supply: designed to overcome barriers preventing the emergence of private-sector demand for EGSs;
- commitment by beneficiaries: assumption by participants of clearly specified commitments and responsibilities;
- feasibility of evaluation: accessibility of the development, design and economic impact of instruments, once the methodology is specified;
- strengthening of public coordination: “one-stop shopping,” where possible, avoiding the temptation to create new instruments, institutions, or laws, which should only occur when there is clearly a vacuum.

These criteria offer a framework for more thorough discussion of how to effectively implement the instruments selected. They are simply a guideline for potential instruments to be created, in the framework of the proposed policy, and an attempt to contribute to their evaluation in institutional, legal, financial and cultural terms, so as to ensure applicability in the short and medium term.

5.4.6 The instruments

Following is an outline of the instruments associated with the policy proposals and objectives outlined above, taking care to focus on the causes of the problems identified in this report.

Instruments associated with the specific objective “Propose the basic lines of a policy to provide credit and financing for SMEs”

Credit for SMEs suffers from high interest rates (generally double those offered to large firms), short repayment periods and highly demanding guarantee requirements. This reflects the fact that first-tier lending institutions (banks) view SMEs as a high-risk sector. This perception, however, is not entirely supported by the actual delinquency rate for SME loans. Moreover, there is no evidence that SMEs’ have inadequate access to financing in Chile. What is clear is that there is not yet a venture capital industry in the country. The lack of knowledge and technology needed to serve the sector also explains the creation of barriers to exclude SMEs. This situation impedes SMEs from making investments, stunting their economic growth and general welfare. If macroeconomic conditions are favourable, access to financing changes radically.

All of this indicates that economic conditions are capable of promoting or inhibiting firms’ evolution in the market. Within a market economy, a business environment suitable for microenterprises and SMEs is one that permits them to achieve sustained economic growth on the basis of private-private and public-private market contracts with low transaction costs (León de León de Cermeño and Schreiner, 1998). Beyond these measures, there is an urgent need to modernize financial systems and business sectors so as to lower the cost of financial intermediation –an achievement which in turn would reduce the gap between lending and borrowing rates, leading to a decline in interest rates. Meanwhile, the high costs of collateral recovery, along with the costs associated with increased perception of risk, are decisive factors preventing SMEs’ from obtaining credit and financing. Spreads in Chilean bank rates have steadily declined, from 6.8% in 1990 to 3.4% in 1997.

The instruments described below do not include financing commissions or committees, primarily because such mechanisms are already under analysis by the Public-Private Committee

for Support to Microenterprises and SMEs, a forum that includes most of the relevant stakeholders.

The following instruments are suggested:

a. Financial advice and training programme

Description: This programme focuses on professionalising the financing and accounting activities of SMEs, in order to enhance their dealings with banks. The objective is to provide the basic conceptual and practical elements involved in business planning, finance, and international and national markets, thus increasing the ability of SMEs to locate financing for their projects, regardless of the type of project.

This instrument seeks to provide the technical elements necessary for SMEs to develop projects that are attractive to financial entities (first-tier commercial banks). The process moves from developing a good idea to creating a business plan and conducting a technical/economic assessment. Properly carried out, this helps the representative of a financial institution to move in a streamlined way through the first phase of the financing process.

Institutions: The Technical Cooperation Service (*Servicio de Cooperación Técnica*, or SERCOTEC) is designed to support initiatives that improve the competitiveness of SMEs and microenterprises, while strengthening their management capacity. Under the proposed policy, SERCOTEC would be responsible for managing the overall programme. Thus, SERCOTEC would function as the programme's funding source. Stakeholders could fund programme assistance through the National Training and Job Service (*Servicio Nacional de Capacitación y Empleo*, or SENCE). The programme activity itself could be conducted by the USACH's APYME programme, or some other specialized entity.

In this connection, the government has created a website (www.redsercotec.cl) on which businesspeople can pose questions on different issues addressed on the site. The questions are answered by a trained team within two days.

Justification: Consultants specializing in SMEs believe that professionalisation is important for dealing with banking institutions. While it is certainly true that SMEs have limited access to credit and financing, the causes relate more to the SMEs themselves than to banks' requirements. Unless an SME can develop an attractive project, estimate profitability, and provide a clear and realistic business plan, it has little chance of success.

b. Microcredit

Description: Microcredit is a financing instrument designed to provide small loans to microenterprise for projects that generate new income and jobs for the poorest segment of the population. Its purpose is to allow individuals or groups, excluded from the usual financing circuits due to their specific characteristics, to obtain working capital at low cost. This is considered the principal financing instrument within the microfinance area.

Institutions: There have been various evaluations of Latin American microcredit programmes. Most indicate that incentives are needed to induce institutions that carry out microfinance activities –as well as dedicated microfinance institutions (not only banking institutions, but NGOs)– to expand their services. To this end, the State should provide incentives through the microenterprise unit at the BancoEstado (BancoEstado Microempresa, www.beme.cl), complemented by the activities thus far overseen by BanDesarrollo Microempresas within the Banco del Desarrollo, and by some cooperatives such as “Liberación,” which have conducted experimental programmes in Valparaíso and Concepción.

Justification: As indicated in this report, SMEs and the great majority of microenterprises are often excluded from financing because of their risk profiles. The specific causes are varied, and can be either internal or external. However, microcredit operations (focused specifically on microenterprise rather than on SMEs) are also a financing resource for SMEs, since their timeframes are compatible with the accounting practices and economic life cycles of SMEs. The fact that the burden of transaction costs and guarantees has gradually been shifted to beneficiaries, thus diminishing the risk to lenders, is a positive development.

On the negative side, microcredit is not necessarily relevant to all SMEs, given that it is focused on microenterprise and is designed to support subsistence rather than growth and change, whereas growth and change are precisely what SMEs projects are designed to achieve. Indeed, small enterprises are always attempting to invest and become medium enterprises, while medium enterprises wish to increase their productive capacity, sales and personnel to become large firms with access to more of the benefits of the banking system, as well as access to larger markets.

In order to bring about a more complete development of this instrument, notwithstanding the problems, the following factors are vital:

- Develop an appropriate regulatory framework.
- Reduce financial costs and guarantees.
- Lower transaction costs.
- Disseminate information on access, and on the impact that microcredit can have, and has had, on SMEs.
- Increase the management capacity of beneficiaries.
- Disseminate information on technology (increasing the visibility of potential benefits) among beneficiaries.

Chile has had little experience in this area. Research conducted by the Universidad Católica del Norte, along with success stories from Melipilla, Antofagasta and Valparaíso, point to a lack of information, a failure to systematize existing information, and poor performance by microfinance institutions, particularly in terms of self-sufficiency –i.e., the ability to achieve present objectives without compromising future ones. This concept of self-sufficiency, in turn, can be narrowed to the question of “financial self-sufficiency,” i.e., whether the net return on capital from a subsidy is equal to or greater than the opportunity cost of the funds placed in the market.

Finally, microcredits do not contribute to raising income levels or living standards, though they do contribute to a firm’s survival. Thus, they are considered a subsistence tool (Romani, 2002) rather than an instrument for growth and/or change. This casts doubt on whether they will gain acceptance and broad use among SMEs, though it is conceivable that the lowest segment of the small–business sector may show interest in them.

c. **Green credit**

Description: This is essentially a banking instrument designed to finance environmental improvement projects of SMEs. The projects must be technically and economically evaluated by CORFO or another authorized specialized institution.

As Román (2000) and Held (2002) argue, this should be preceded by efforts to eliminate the barriers facing SMEs –including inadequate dissemination of information– and address the problem of transaction costs (Figure 1), i.e., minimize the number of banking personnel involved in the financing process.

Institution: Banco Estado would be the first–tier institution responsible for managing and delivering funds for environmental projects of SMEs. Projects would be subject to technical and economic evaluation by CORFO’s technical staff. At the same time,

BanDesarrollo Microempresas could participate on the microenterprise side, managing smaller amounts for specific projects, in order to generate environment–related jobs.

Justification: Given CORFO’s record of past debtors, it is highly unlikely that its financial intermediation office will become a second–tier bank providing credit to any SME that requests it. Moreover, even if this were possible, it would create a sense of paternalism ultimately harmful to SMEs themselves in their efforts to become competitive in domestic and international markets—an environment in which the professional expertise of the partners and the talent and creativity of the entrepreneurs are vital factors. The process of “natural selection” normally carried out by the market would be undermined by subsidies in the initial stages.

“Green credit” is justified as an attempt to discriminate in favour of SMEs that have made efforts to implement environmental improvements, as well as those that have succeeded in presenting technically well–developed projects that can be expected to produce social and environmental benefits in the medium and long term.

d. **Microleasing**

Description: With this type of instrument, the firm (microenterprise or small business) specifies the equipment desired and the preferred vendor, and the financing entity purchases it. Such instruments, whose use has been studied in some countries, oblige businesses to amortize all (or nearly all) of the original costs of the lessor’s acquisition, in addition to paying interest. The arrangement gives the firm (lessee) the right to purchase the equipment at the end of the lease period at a predetermined price, which is almost always nominal and cannot be cancelled without the consent of the lessor.

Risk, an important element in all financing, is thus limited to situations in which the client fails to pay—under which circumstances the equipment can be confiscated.

Institutions: As in the case of microcredit, the State should begin a “white march” to implement this instrument through Banco Estado Microempresas –though NGOs or other organizations such as BanDesarrollo Microempresas are also possible candidates.

The suggestion proposed is that the superintendencies adopt a rigorous definition of financial microleasing, but not prevent any financial institution that wishes to do so from entering the field. Similarly, tax authorities should contribute by adopting the same definition of financial microleasing, and providing corresponding tax treatment under the tax code.

Justification: The justification for this instrument is based on the increasingly specific technological requirements of microenterprise and SMEs as they attempt to meet both management and environmental challenges. The instrument can help them compete in the market, while reducing the cost of emissions and/or solid waste management.

Instrument associated with the specific objective: “Design and implement a platform for cooperation to develop and strengthen public–private and private–private partnerships”

a. **Programme to support SME partnerships**

Description: This instrument seeks to support the formation of productive clusters, both vertical (purchaser–provider) and horizontal (one product/service complementing another product/service), based on knowledge of the productive sector and on geographic factors. It focuses on developing local poles of production, encouraging the absorption of local labour to reduce migration to dense population centres, and promoting more integral use of natural resources. In short, the extraction or procurement of raw materials or inputs, as

well as the waste produced through processing, can be managed locally, generating business, primarily in the area of environmental goods and services.

The following factors are necessary:

- culture or values based on teamwork;
- good leadership, either individual or institutional;
- shared vision of the future;
- common objective;
- availability of, and access to, the human, technical, financial, etc., capacities needed to achieve the objective;
- commitment, on the part of participants, to the group and the objective;
- responsibility in fulfilling commitments;
- simultaneous experience of similar processes.

All of these elements are developed through serious dialogue to create the framework of trust required for any human undertaking to develop and prosper.

Institutions: The Production Development Corporation (CORFO) has ample experience in promoting business partnerships, given that this is the best means of maximizing the social benefits of the resources dedicated to each project. In addition, CORFO possesses the financial and human resources to carry out any activity involved in providing support to business—in this case, the SME sector. Partnerships between CORFO, municipal government, and industry or business groups will provide CORFO the local base for stimulating transactions in the environmental market.

Justification: Although CORFO has an instrument (namely, PROFO) to meet this need, it is rarely used by SMEs, since (as mentioned earlier) it is not specifically designed for this sector. Its main drawbacks are its timeframe, which businesses consider to be too limited, the fact that it does not finance physical investments, and the difficulty of finding a good manager (Berry, 2002). In addition, the programme is not SME-friendly, given the technical capacity needed to develop a project capable of meeting the institution's criteria. The proposed instrument, in addition to incorporating features designed for the sector, should also take account of local characteristics.

According to Angelelli, Ariano and Guapatín (2003), “clusterisation” is an effective mechanism to improve the competitiveness of microenterprises and SMEs by providing gains in productivity and quality, since it promotes learning, technology transfer and specialization. One example of this is the Integrated Territorial Programme, “*Santiago: Puerta Sur*,” in San Bernardo, a municipality within the Metropolitan Region.

Instruments associated with the specific objective: “To support and propose development instruments or complements to existing ones that explicitly support SMEs’ environmental activities beyond the initial assessment phase”

FAT-PL currently provides for the environmental assessment phase and the implementation of solutions involving “soft” technologies—changes in layout, production lines, etc. Considering the multiplicity of environmental problems found in SMEs, the programme's scope needs to be expanded to cover implementation and execution of specific projects to procure pollution-reducing clean technologies. To this end, the following has been proposed:

a. **FAT–PL. “Hard” technologies, implementation/execution and monitoring/evaluation phases**

Description: This is a complement to the instrument currently being implemented. However, since the current one covers only the assessment phase and the implementation of “soft” technologies, the instrument proposed here should cover design, implementation and monitoring/evaluation of “hard” technologies for SMEs. The instrument seeks to provide the sector with a comprehensive product in a relatively short time, with results that can be seen in the short term (no more than one year).

In this phase, the instrument should provide funding for specialized SME/environmental consulting for developing all phases of a hard–technology project, beginning with the assessment –consisting of identifying deficiencies, and determining how to remedy them; next, evaluating technical and economic aspects of the proposed project(s); and finally, implementing the measures, with support from CORFO. Following implementation, monitoring and evaluation should be carried out—a process for which the SME itself can assume responsibility.

FAT–PL could finance certain amounts –through microleasing or microcredit, in the case of small amounts earmarked for procuring specific fixed assets, or by submitting proposals to banking institutions or to CORFO itself (through either FONTEC, foreign direct investment, or other mechanisms).

Institutions: To date, the National Clean Production Council, under CORFO, has been responsible for overseeing the support instruments associated with implementation of the Clean Production Policy throughout the country. Thus, it would be the most appropriate institution to assume responsibility for implementing this instrument.

Justification: A number of professionals from industry groups with experience implementing instruments that are part of the Clean Production Policy agree that, while an assessment of a firm’s environmental situation is important, solutions—and the financing to implement them—are equally important.

b. **Entity to conduct technical/economic analysis of SME environmental projects**

Description: The entity (office), a public entity if possible, will serve to bring together monetary and human resources to evaluate the risks associated with innovative environmental projects submitted by SMEs. The purpose of the instrument is to support economic/financial evaluation of such projects by conducting a strictly technical study. At the same time, the entity (office) could be in direct contact with banks or other financial institutions whose database would streamline the process of seeking funding.

Institutions: What is needed is an office (preferably within CORFO) capable of bringing together a professional staff expert in dealing with risks associated with environmental projects designed by SMEs. The instrument seeks to provide high–level consulting services for this type of project. Since many of these will be based on innovative ideas, financial entities will overestimate the risk involved. These projects therefore require special treatment.

The experience of BanDesarrollo Microempresas, which began as an independent entity associated with the Banco del Desarrollo and eventually became a subsidiary of it, is instructive. It uses the facilities of the parent institution, taking advantage of its coverage and staff, which has training in SME issues. BanDesarrollo Microempresas attracts microentrepreneurs, provides them information, trains them, creates a financial and legal file for them, and brings them to the point of receiving funds, which are then provided by the Banco del Desarrollo itself. In this system, guarantees are not an obstacle, since amounts are low and the microentrepreneur’s account executive creates conditions

allowing the bank to take legal action to attach the assets of the firm's legal representative in the event of non-payment.

Justification: As has been pointed out by various researchers, there is no formal arrangement in Chile for specialized professionals to make a thorough examination of ideas and/or projects of SMEs. To date, the staff of BanDesarrollo Microempresarios devotes itself primarily to risk analysis for microenterprise projects.

It has also been shown that banks tend to classify businesses in two large groups, using both size and risk as criteria (Held, 2002). One of the factors that characterizes the SME sector is its high credit-risk profile.

5.4.7 Conclusions

Any policy to support environmental improvements in SMEs must adopt an integrated approach. For example, to access the current development funding system, firms must have the capacities and resources to identify and articulate their needs, as well as the ability to articulate them in language, timeframes and modalities acceptable to development institutions. Thus, access to the system comes at a cost, and firms must invest some of their capacity, time and money to obtain support from the system. The universe of potential beneficiary firms is divided, therefore, into those that have such resources and capacities (and consequently can gain access to the system, provided that they receive thorough and timely information on available instruments), and those that do not. The latter remain excluded from the system, unless provisions are in place to assist them in dealing with the development institutions and in developing strategic skills. Thus, interventions aimed only at subsidizing demand, while ignoring these differences and making no attempt to build capacity among the sector's most disadvantaged, ultimately increase disparities in the productive structure (Berry, 2002), rather than offering tools to provide for effective management.

In this respect, an environmental support policy for SMEs is closely tied to business development support for the sector. The goal is to frame the principal financial, cultural and environmental problems in a way conducive to providing a comprehensive response. Though economic and financial issues are of primary importance, environmental issues can yield dividends if they are recognized and internalised as a means for SME management to reduce production costs. This has been demonstrated by the initial results of the clean production agreements.

Implementation of the second version of the Clean Production Policy (2001–2005) has had important results, leading to a wide range of analyses. One of the first points to consider is whether the policy is capable of including SMEs, given the diversity of the sector. Those most familiar with the issues believe that by making certain elements of the policy more flexible, particularly those relating to enforcement and the dissemination of results, SMEs would more likely enter into clean-production agreements. Framework agreements or integrated land programs (*Programas Territoriales Integrados*, or PTI), such as those in the municipality of San Bernardo or the Metropolitan Region, where the programmes are designed to strengthen firms' local presence, could serve as a model.

The environment is but one of many problems facing SMEs. The most serious problem for SMEs is lack of financial resources, making it difficult to plan beyond a one-year time horizon. Part of the focus of the proposed policy is on changing the internal dynamics of SMEs (primarily through training of management and workers), as well as on improving the conditions surrounding SMEs, i.e., the way in which they present themselves to, and are viewed by, banking institutions, funders and community. Another important element is the emphasis on partnerships between SMEs and large firms, as well as among SMEs within a given geographic area. Such partnerships can fuel an environmental market with the potential to expand beyond the original

geographic area or group of firms. This, however, requires a commitment by the State, through local governments, at either the provincial or municipal level, in addition to participation by industry groups capable of disseminating information among their members and strengthening the process.

The foregoing provides a basis for envisioning a number of criteria and parameters that could assist in defining an environmental development policy for SMEs, while laying the foundation for developing an environmental market, since it is collective participation of public and private actors that will determine the true scope of the policy.

5.5 Mexico²⁰

This section presents proposals for policies and instruments to improve the environmental management of Mexico's SMEs. It begins with a set of strategic instruments, and then discusses the institutional, legal, financial (especially microcredit) and cultural factors vital to maximizing the chances of success. The third subsection sets forth the management instruments firms need in order to meet the requirements of the proposed policies, while the fourth provides a cost-benefit analysis. Finally, a set of indicators, of potential use in assessing and monitoring advances made by SMEs in transitioning to cleaner-production methods, is presented.

In terms of the approach to shaping specific proposals, there are two alternatives. The first is to identify horizontal policies (applicable to all economic sectors) without exploring sector-specific factors. The other is to examine the features of an individual sector in order to determine the most appropriate instruments for reducing pollution created in that sector. This study adopts the latter approach, since it has greater potential for creating lasting impact. Identifying horizontal policies would simply produce an already familiar list of measures for SMEs (improve access to credit, expand the supply of technology, etc.). While these are necessary, greater impact can be achieved by selecting the most polluting sectors in a given geographic area and formulating specific programmes to address the local circumstances.

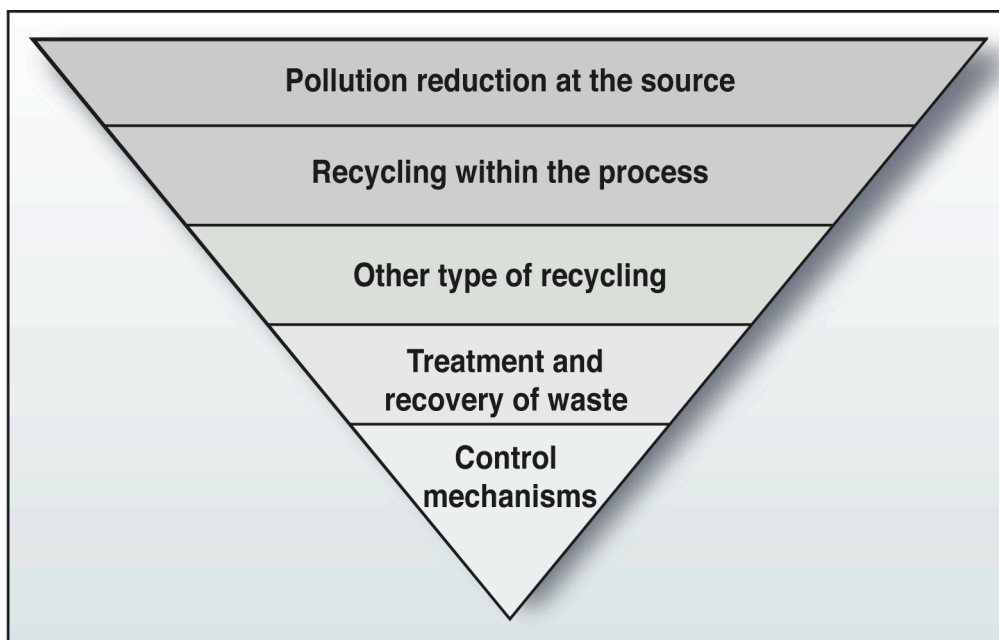
Thus, policies and instruments for improving the environmental performance of SMEs must be based upon the characteristics of particular industries and on local conditions. To begin, a general scheme designed to provide guidelines for the formulation of strategies, without reference to any particular industry, is presented. Next, the scheme is demonstrated through application to specific sectors, examining two of the most polluting sectors identified in the first stage of the project: brick manufacturing and the leather tanning and finishing industry.

²⁰ Based on Romo, 2005.

5.5.1 Proposed policies and instruments

In designing strategies to reduce and control pollution caused by a particular activity, it is helpful to follow what some have called a hierarchy of pollution prevention measures (Stapleton Glover and Davis, 2001). This hierarchy, presented graphically in Chart 5.2, is based on the idea that, in assessing opportunities for pollution reduction, it is best to begin with measures near the top of the inverted pyramid, and then move downward, with enforcement measures representing the last option.

CHART 5.2
HIERARCHY OF POLLUTION PREVENTION MEASURES



Source: David Romo, “Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano,” *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269–P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

The rationale for this scheme is the following: measures to reduce pollution at their source involve changes in the production process, changes which, in addition to reducing the contaminants released into the environment, generally increase the efficiency of the firm, and thus can generate economic benefits. Control mechanisms, on the other hand, do not change processes, but aim simply to control discharges into the environment through “end-of-pipe” equipment, which, while entailing costs, provides no economic benefits or improvements in plant efficiency. Intermediate measures include recycling, and treatment or recovery of waste.

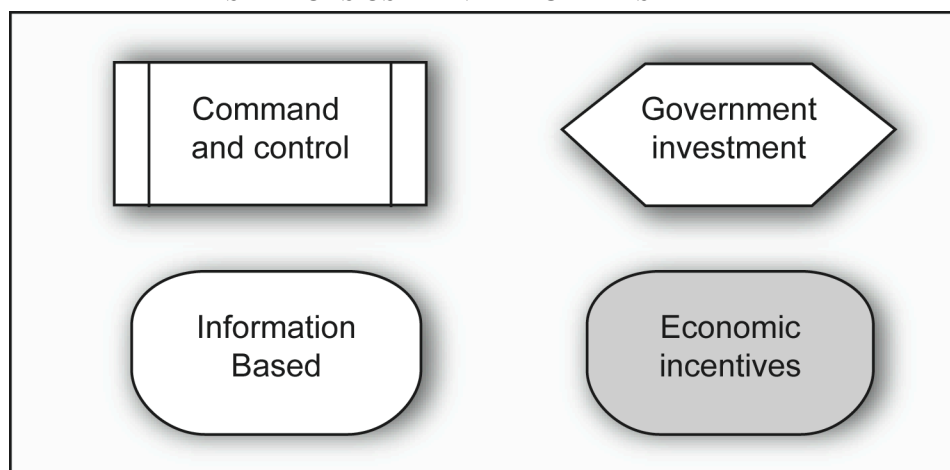
5.5.2 General scheme

In creating a general scheme for formulating strategies to improve SMEs’ environmental performance, the four types of instruments identified at the beginning of this chapter are invoked: command and control instruments, economic incentives, government investment, and information-based instruments. Choosing among these will depend on various essential features of the particular industry and local circumstances. For the purposes of this study, the following features are examined:

1. visibility of pollution and understanding of its effects;
2. opportunities for reducing pollution at the source;
3. nature of the pollutants;
4. geographic location of the polluting plants, and degree to which the sector's producers are organized in industry groups;
5. degree of aggregation of producers in the sector within business groups or associations;
6. SMEs' placement in the value chain;
7. degree of industrial concentration in the sector; and
8. administrative and institutional capacity.

Following is a discussion of the importance of each of these variables, with recommendations for policy instruments associated with each. Through this type of comprehensive examination of the variables, and instruments to address them, one can establish a general strategy to improve SMEs' environmental performance for a given area of activity, under specific conditions. To facilitate the presentation, a flow chart is provided (Chart 5.3). It uses the symbols presented in the preceding chart, where each of the four possible types of instrument is associated with a particular symbol.

CHART 5.3
SYMBOLS USED IN THE CHARTS



Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

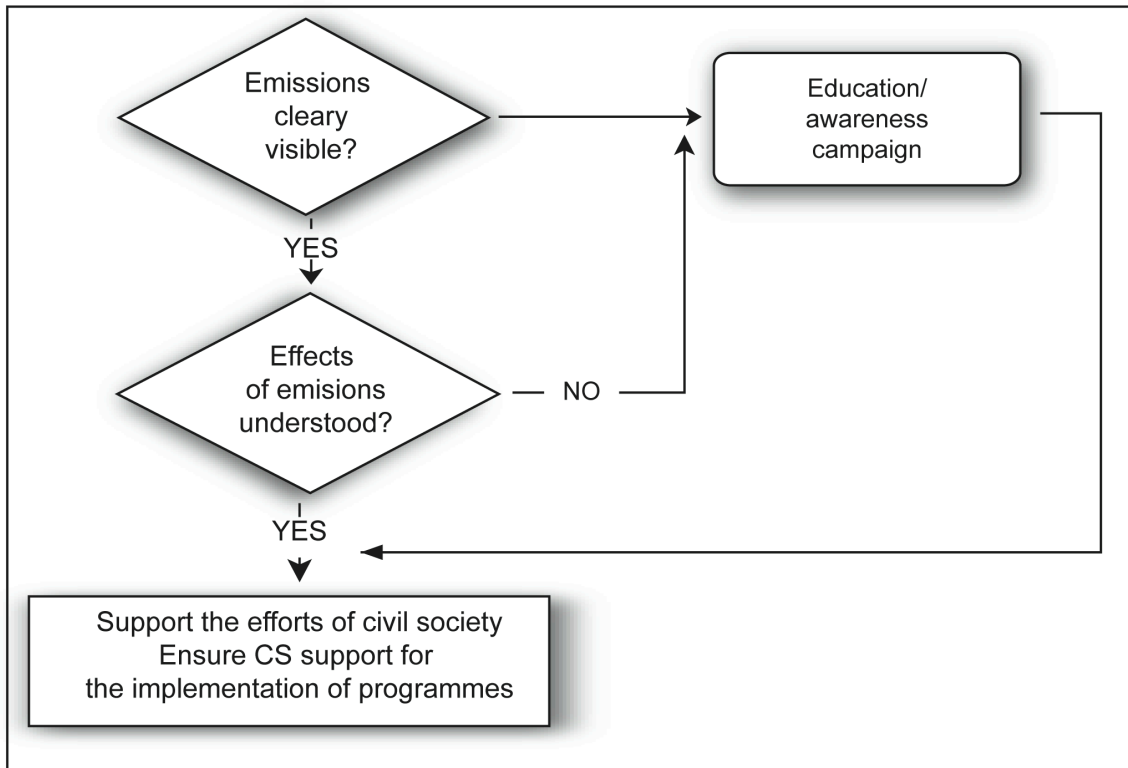
Once the importance of the principal variables to be considered in formulating a strategy to improve SMEs' environmental performance have been identified and discussed, application of the scheme to two highly polluting sectors of the Mexican economy—brick manufacturing and leather tanning and finishing—is presented.

TABLE 5.5
VISIBILITY OF POLLUTION AND UNDERSTANDING OF ITS EFFECTS

<p>Importance:</p> <p>Emissions that are clearly visible can be a catalyst for change if the community directly affected by them begins to press for pollution reduction measures or, even, for the source of the pollution to be relocated. Brick manufacture is an example of highly visible atmospheric pollution. In cases where emissions are not as visible, it is vital for the community to understand the ways that pollution affects people’s health and the surrounding ecosystem. Tanneries are an example of this second type of industry. Though their emissions and waste are not as visually striking as those of brick manufacturers, their impact on health, through the effluents they release, is equally serious.</p> <p>Implementing programmes to reduce pollution involves actors with varying interests and differing degrees of power. By gaining the support of an essential actor, such as the community, the chances of success are enhanced, providing a counterweight to the power and resistance posed by producers.</p> <p>Policy instruments:</p> <p>The obvious instruments for this variable are information–based instruments–either programs to publicize firms’ environmental performance, or educational programmes to create awareness of the effects of pollution, through the use of pamphlets, informative talks, or support for NGOs that conduct such activities.</p>

Source: Prepared by the author.

CHART 5.4
VISIBILITY OF POLLUTION AND UNDERSTANDING OF ITS EFFECTS



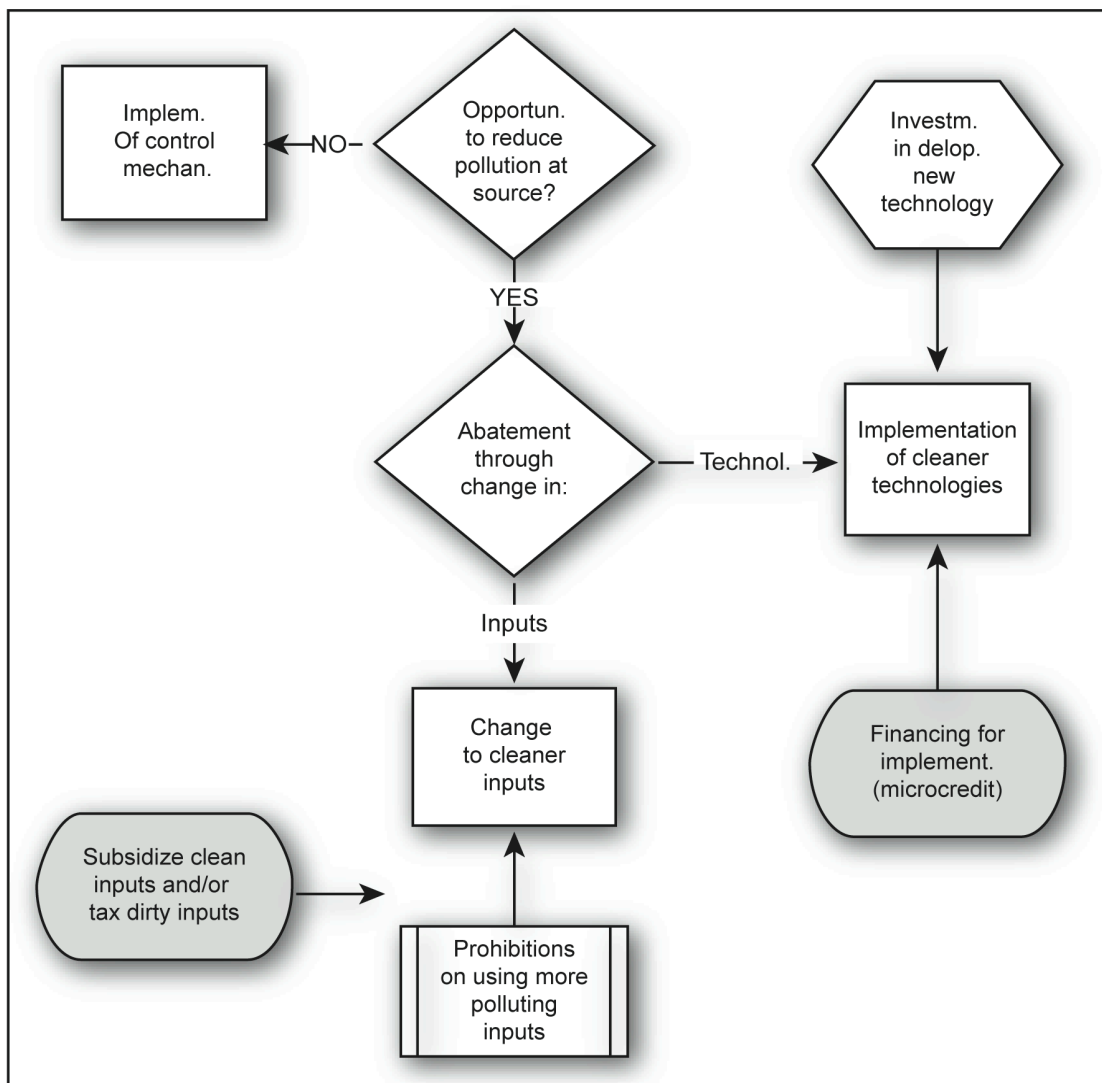
Source: Prepared by the author.

TABLE 5.6
OPPORTUNITIES FOR REDUCING POLLUTION AT THE SOURCE

<p>Importance:</p> <p>The importance of this variable is obvious. It involves exploring existing opportunities in the production process to reduce the discharge of pollutants either by changing inputs or by instituting cleaner technologies. As indicated above, such measures are at the top of the hierarchy of pollution prevention alternatives.</p> <p>Policy instruments:</p> <p>Once substantial opportunities to reduce pollution at the source have been identified, a range of instruments is available to encourage change. These may be economic (subsidies or taxes to accelerate the shift to cleaner inputs; accessible funding for new technology), command and control instruments (prohibitions on the most polluting inputs) or government investment (to develop new, more environment-friendly technologies).</p>
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Source: Prepared by the author.

CHART 5.5
OPPORTUNITIES FOR REDUCING POLLUTION AT THE SOURCE



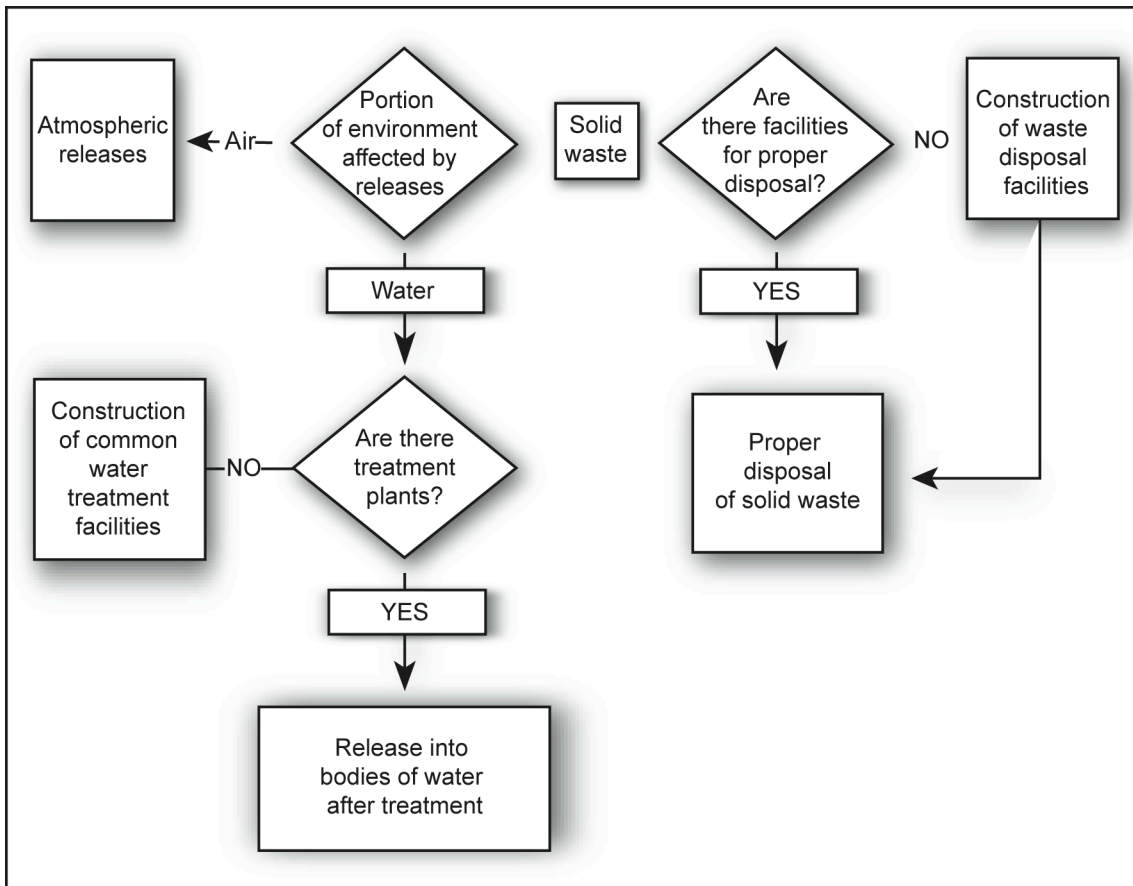
Source: Prepared by the author.

TABLE 5.7
NATURE OF THE POLLUTION

<p>Importance:</p> <p>It is important to consider the nature of the pollution (i.e., the portion of the environment affected by the releases), since this will influence treatment opportunities. For example, atmospheric emissions are primarily a result of production processes: reducing them depends on individual firms' installation of proper control mechanisms. Water emissions and solid waste, on the other hand, can also be addressed by creating infrastructure to be used simultaneously by a number of SMEs.</p> <p>Policy instruments:</p> <p>The principal policy instruments here take the form of government investment, either for water treatment or for proper disposal of solid waste. The latter will not be examined in detail here, since the type of disposal chosen (recycling, incineration, or containing the waste) will depend on the nature of the waste and the particular circumstances surrounding it (e.g., hazardous waste requires special kinds of infrastructure). Though not indicated in the chart, it is also important to consider the use of command and control measures to relocate plants, so that they can use common infrastructure.</p> <p>This, again, requires government investment, since creating the infrastructure for proper treatment of polluting emissions is costly, and difficult for individual SMEs to manage. Providing common facilities can benefit a number of firms simultaneously, even if, as is often the case, they have to pay a fee for use.</p>

Source: Prepared by the author.

CHART 5.6
NATURE OF THE POLLUTION



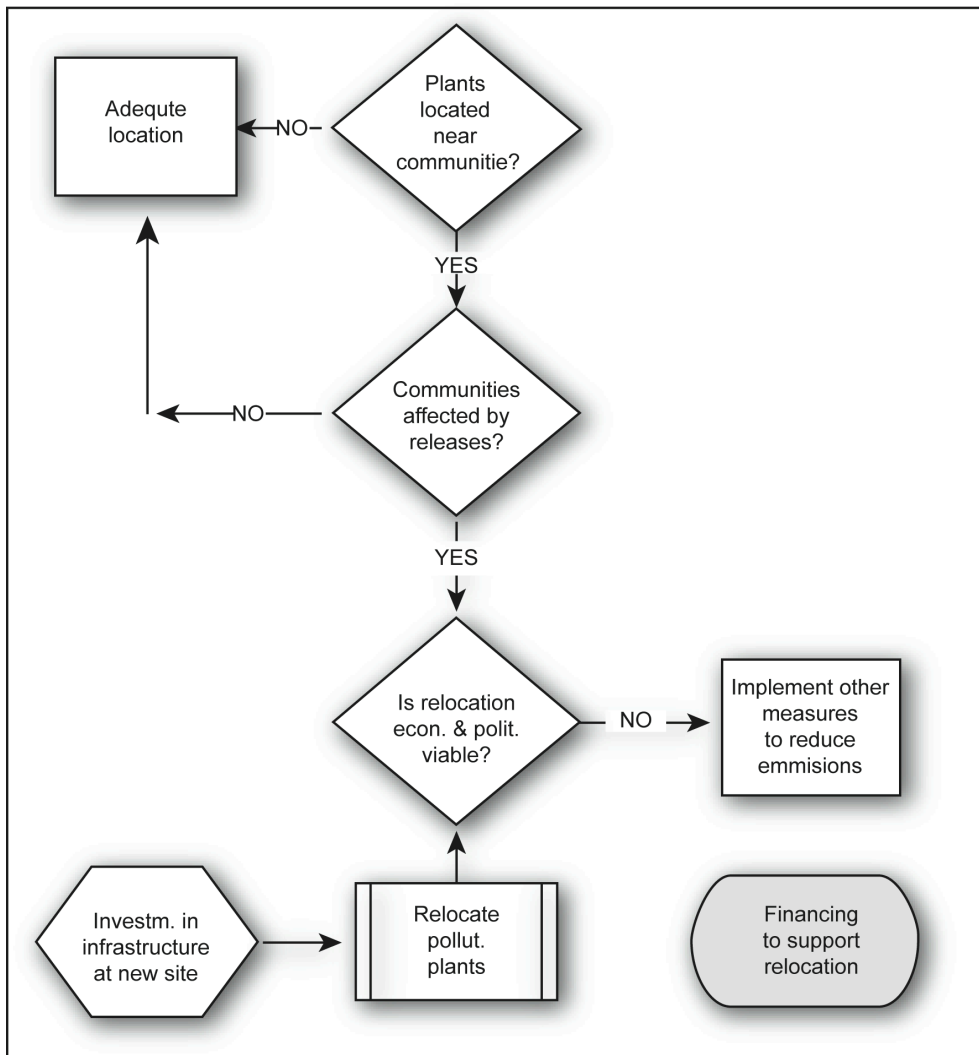
Source: Prepared by the author.

TABLE 5.8
GEOGRAPHIC LOCATION OF POLLUTING PLANTS

<p>Importance:</p> <p>This relates to the proximity of polluting plants to communities that may be affected. The situation is often relevant for microenterprises and SMEs, since producers tend to live close to their plants, or even produce at home. While relocating plants will reduce their impact on community health, it is also critical to judge whether relocation is economically and politically feasible. If it is not, the ultimate effect will be to antagonize the people involved.</p> <p>Policy instruments:</p> <p>If relocation is feasible, it should be carried out through command and control measures in order to ensure compliance. Such measures need to be supplemented by government investment, so as to create the common infrastructure needed in the new location, and in order to provide economic incentives for making financing accessible to producers.</p>

Source: Prepared by the author.

CHART 5.7
GEOGRAPHIC LOCATION OF POLLUTING PLANTS



Source: Prepared by the author.

TABLE 5.9
DEGREE TO WHICH THE SECTOR'S PRODUCERS ARE ORGANIZED
IN INDUSTRY GROUPS

Importance:

The fact that producers are organized in industry groups can facilitate the implementation of programmes designed by government agencies, since the industry organization can act as an intermediary, helping to promote the idea and disseminate the relevant information. It must not be forgotten, however, that a strong, united producers' group can present strong resistance to proposed change if it remains unpersuaded and refuses to lend its support to the scheme. Industry groups can play this role, but there is always a danger that their leaders will be more concerned about reducing regulations than addressing long-term objectives of environmental sustainability.

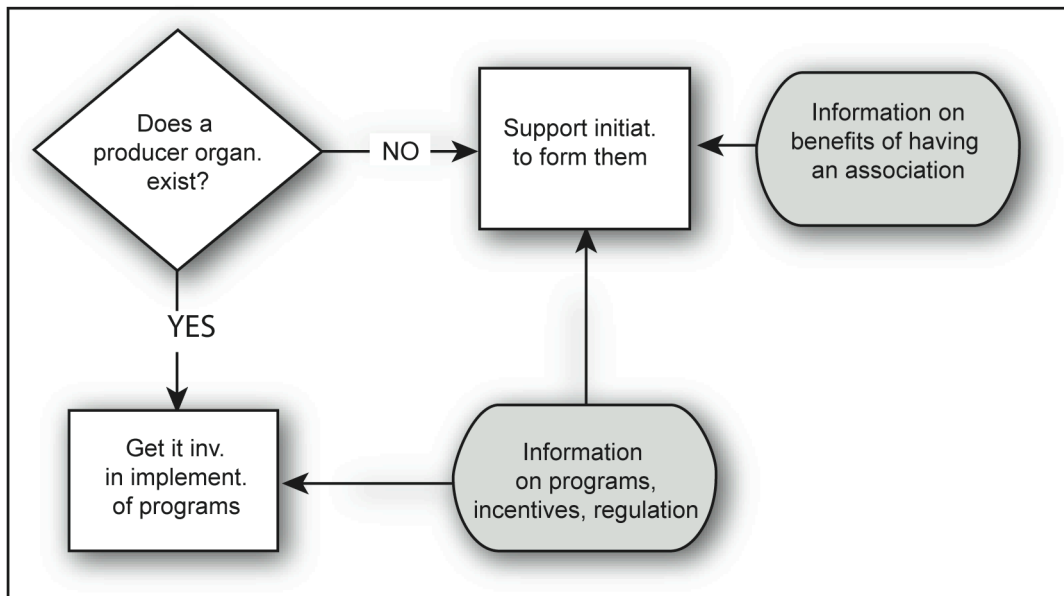
The more competitive a sector (i.e., the more fragmented the market), the more important it is to have such groups support the measures, since it is more practical to disseminate information through a single channel than to contact a large number of small producers individually.

Policy instruments:

The policy instruments here are limited to information-based ones. The information disseminated should cover available support and incentives, as well as the benefits of having an association represent the sector.

Source: Prepared by the author.

CHART 5.8
DEGREE TO WHICH THE SECTOR'S PRODUCERS ARE ORGANIZED
IN INDUSTRY GROUPS



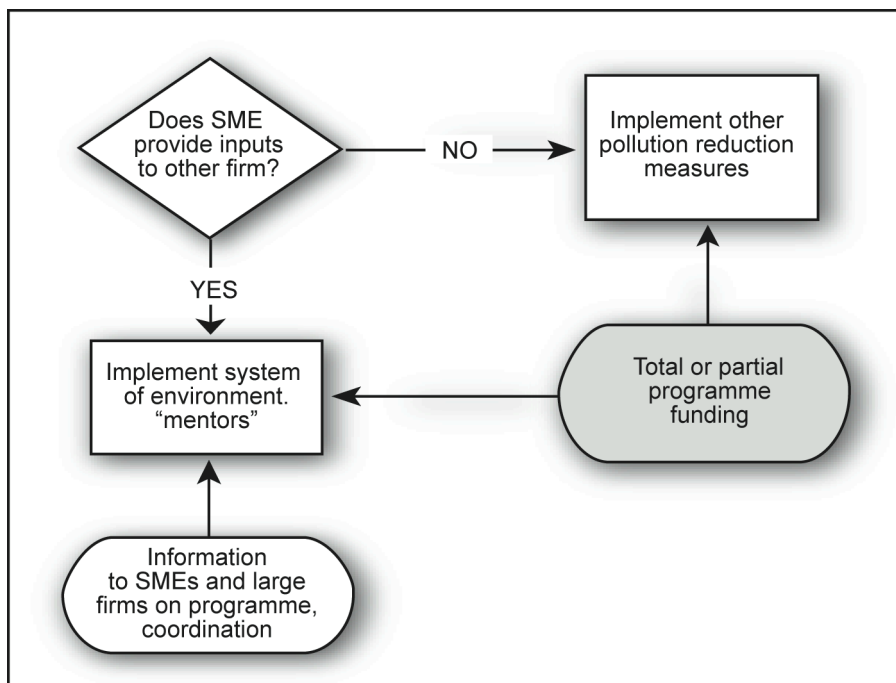
Source: Prepared by the author.

TABLE 5.10
LOCATION OF THE SME IN THE VALUE CHAIN

<p style="text-align: center;">Importance:</p> <p>If all or part of the output of a small or medium enterprise is sold to another firm, which regularly uses this output as inputs, it may be possible to create a programme by which the client company provides advice to its provider SMEs on implementing environmental management systems. This is particularly feasible if the “mentor” firm is a large, or even multinational, firm, since these companies have extensive technological and financial capacities.</p> <p>This type of initiative can be seen in Mexico (see World Bank, 1998), and there is great potential for expanding such programs. However, SMEs that function as providers of goods and services to large firms and multinationals will have already reached a certain level of technological capacity: without it, they would be unable to meet the quality, quantity and time requirements of large firms. Implementing environmental management systems may be relatively easy in such cases. Generally, however, the country’s SMEs lack these capacities.</p> <p style="text-align: center;">Policy instruments:</p> <p>Government can play two roles in programs of the type described above, namely, coordination and financing. The first involves information-based instruments for all actors involved—SMEs, large firms and, where relevant, international organizations. The second requires designing financing schemes to implement the programme and cover some or all of the costs (e.g., for training, paying consultants).</p>
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Source: Prepared by the author.

CHART 5.9
LOCATION OF THE SME IN THE VALUE CHAIN



Source: Prepared by the author.

TABLE 5.11
DEGREE OF INDUSTRIAL CONCENTRATION IN THE SECTOR

Importance:
This variable is basic, because the more competitive the markets in which the firms operate (i.e., the greater the number of producers, and the less price-setting power each possesses), the more pressure they experience to hold down costs, even if this involves major environmental impacts. Greater resistance to clean technology can also be expected if the initial investment is perceived as reducing the competitiveness of the product produced, due to the need to raise its price.
Policy instruments:
Implementing a program to improve SMEs' environmental performance in highly competitive markets (e.g., brick manufacturing) has two implications: Command and control instruments will probably be needed to encourage change among the greatest possible number of producers. Otherwise, those not joining the programme will have an advantage, since they will not incur the costs of making changes. Accessible financing schemes must be developed for small producers, so that they can obtain the resources to make changes. Microcredit can be a viable alternative for microenterprises and SMEs that lack access to commercial credit. Both of these measures may, and probably will, be used, regardless of the degree of industrial concentration in a sector. However, the less concentration exists, the more important command and control and financing instruments will be in achieving a successful transition to cleaner production methods. Absent such instruments, the firms that opt for change in a competitive market will probably be penalized (at least initially) by the investment required to make the necessary changes, which in turn may affect the price of the product and consequently make it less competitive.

Source: Prepared by the author.

A chart is not included for this variable, since it does not directly involve any particular instruments, but simply affects the amount of emphasis placed on instruments that, to one degree or another, will almost inevitably be employed.

TABLE 5.12
ADMINISTRATIVE AND INSTITUTIONAL CAPACITY

Importance:
Once a strategy has been designed to improve SMEs' environmental performance, the next step is to implement it. The success of the strategy will depend largely on the institutional capacity needed to implement the instruments in the operations of relevant actors. The most important elements of this capacity are:
capacity to monitor compliance with programs;
capacity to enforce regulations and command and control instruments, and to resist pressure from producers;
capacity to administer and efficiently finance small producers when this is part of the strategy;
capacity to involve the different relevant actors (producers, associations, municipalities, consulting and research entities, and NGOs) and to create a support network to implement the strategy.
The level of these capacities will ultimately determine the strategy's success or failure.
Policy instruments:
This variable does not require policy instruments, as such; it does, however, require efforts to restructure and strengthen the institutional apparatus where necessary. In this regard, relevant questions include the following:
Is there a clear definition of responsibilities for the different government agencies involved?
What is the input of each level of government (federal, state, municipal) and what is the nature of the relationship between them (cooperation, confrontation, lack of communication)?
How can existing institutional infrastructure (universities, consulting and research entities) be exploited to achieve the objectives?
Is there adequate coordination among these institutions, and an atmosphere of mutual trust?

Source: Prepared by the author.

No chart is included for this variable, since it does not directly involve the use of instruments, but rather depends on creating the institutional environment needed to foster the success of the proposed strategies.

5.5.3 The leather tanning and finishing industry

Table 5.13 analyses each of the eight variables identified in the foregoing section in relation to the leather tanning and finishing industry. The strategy elements for improving the sector's environmental performance appear below.

TABLE 5.13
PRINCIPAL FEATURES OF THE LEATHER TANNING AND FINISHING INDUSTRY

1. Visibility of pollution and understanding of its effects:

The principal substances discharged into the environment by the leather industry are liquid effluents and solid waste. These are not as visible as, for example, the smoke produced by the brick manufacturing industry. In addition, the releases of tanneries are not concentrated near the source, but rather are discharged into the drainage system, where they are dispersed among other effluents. Thus, it becomes difficult to identify tannery firms responsible for high levels of pollution.

Even when, due to odours or to the colour of surface water, the population in surrounding communities is aware of contamination released by tanneries, there is as yet little understanding of the effects of this pollution.

2. Opportunities to reduce pollution at the source:

The leather tanning process includes two basic operations: producing the wet blue and finishing. The first of these involves removing undesired substances from the hide (hair, meat, fat) and treating it in a chromium bath to prevent it from decomposing. (The bath gives the hide a blue colour, which is the origin of the term used.) The finishing involves dyeing and other final operations. The two operational phases can be separated. Thus, a firm may specialize in one of the two. The wet blue process is by far the more polluting of the two phases, generating roughly 90% of the water pollution associated with leather tanning.

There are opportunities for reducing this pollution at the source through changes in the inputs used and by modifying the process to make more efficient use of inputs and reduce the residues released. Such measures include: (a) using biodegradable enzymes in place of other chemical products; (b) using alkalis to precipitate the chromium, then treat the sludge with sulphuric acid and recover the chromium; (c) recycling the chromium bath for multiple use (after instituting the appropriate chemical procedures).

There are also various ways of treating the residues, including sifting with a coarse screen, filtering, sedimentation, treatment of wastewater with activated carbon, and drying and disposal of sludge.

3. Nature of the pollution:

The principal waste from leather tanning are liquid effluents and solid waste. The pollutants generated are the result of the soaking and washing phases, and also include hair, dyes, fats and chemical products used in the different phases of the process—90% of which remain in the leather, while the rest become residues of one sort or another. Each ton of raw leather is estimated to produce only 200 kilograms of leather, and requires 50 cubic meters of water for the process. The wastewater from the processing (which is often discharged into municipal drainage systems without adequate treatment) contains high quantities of suspended solids, and manifests a high biological demand for oxygen. The principal contaminants involved are compounds of sulphur, salt, and chromium III, dissolved and suspended solids, and solid waste impregnated with the chemicals used in the process.

Some residues of the tanning process are considered hazardous under environmental norms, and therefore come under the federal government's enforcement authority. This alone substantially increases the operating costs of tanneries, since it means that the waste must (in theory) be deposited in the country's single hazardous waste site in the state of Nuevo León. The lack of proper infrastructure for the disposal of the waste (sanitary landfills) is common knowledge, and clandestine landfills are thus a major problem.

4. Geographic location of polluting plants:

The great majority of small and medium enterprises in this area of economic activity are family operations, and are located near (or within) major population centres. Thus, relocation of the plants is one possible alternative. This would have the dual benefit of reducing the population's exposure to the pollution and siting the plants in locations where they could benefit from common infrastructure for treating the liquid effluents, as well as for solid waste collection and disposal.

5. Degree to which the sector's producers are organized in industry groups:

Given the economic importance of the activity in the cities where it is concentrated (e.g., León and Guadalajara, which were analysed in the second stage of the study, as reflected in Romo Murillo, 2004a), producers are organized in specific groups to lobby for their interests and disseminate information among the members of the groups (on training, financing sources, regulatory changes, etc.).

6. Location of the SME in the value chain:

The industry produces an intermediate good that serves as an input for other industries, especially clothing and shoes. The firms acquiring the cured leather are also usually small, however, and lack the technological capacity and knowledge to implement environmental improvement programs with their suppliers.

(continues)

Table 5.13 (conclusion)

7. Degree of industrial concentration in the sector:

The leather tanning and finishing industry is characterized by low market concentration, as shown by available Herfindahl index figures (0.00 in 1985, 0.00 in 1988, and 0.00 in 1993) and the CR–4 index (12.3 in 1993 and 22.3 in 1998).

8. Institutional and administrative capacity:

In the cases analysed in the second stage of the study, the municipalities and states involved had specific environmental departments. However, their capacity to monitor and enforce regulations for the industry varied widely.

Even where regulations governing pollution from this industry have been in place for years (e.g., requirements for sedimentation tanks, proper solid and hazardous waste handling, and wastewater treatment), they are generally ignored, because of the economic importance of the activity and the political power wielded by this group of producers.

Source: Prepared by the author.

Having described the principal features of the industry, an examination of the lines of action to be included in a general strategy for the sector is now presented:

- According to previous studies, the lack of concrete results in reducing pollution in the sector is due to ineffective enforcement and lack of pressure from environmental groups and neighbourhood organizations, as well as to lack of interest on the part of the producers. Thus, a campaign is needed to educate people about the pollution and its health effects. This need is even more urgent here, where the pollution is not visible, than in the brick industry, where it is. To implement such a program, it is important to identify NGOs interested in health issues, to help publicize information on the effects of the pollution, in addition to simply involving the health sector.
- Numerous opportunities exist for reducing pollution in the tanning process, as well through the treatment of effluents. By working with local universities and other technological, consulting and research entities (both local and regional), better, low-cost, easy to implement alternatives could also be identified.
- It is important to be in touch with the industrial chamber, involving it in every stage of the process, so that it can serve as an intermediary with producers. Its infrastructure can also be used for more effective dissemination of relevant information.
- There are potential synergies with chemical companies that provide certain types of inputs. For example, the adoption of cleaner technologies could be beneficial to providers of enzymes or alkalis used in precipitation of chromium.
- The formulation and use of microcredit schemes to fund the investment required for implementing less polluting production methods should be encouraged.
- Since the principal pollutants are liquid effluents and solid waste, infrastructure for proper treatment is essential in minimizing the environmental impact of the industry. However, building such infrastructure is prohibitively costly for a firm. Thus, government investment is essential.
- In connection with the foregoing point, it should be noted that relocation of plants can be a desirable means for maximizing benefits to the greatest possible number of plants. Such measures, however, can be expected to generate strong resistance. Any attempt to relocate without the agreement of the parties and adequate funding will only create hostility on the part of producers (and in the population that is directly dependent on their economic activity). Thus, this option should only be considered when an appropriate alternative location is available, and when the amount and terms of funding needed to achieve the relocation have been assured.

- In today's competitive market, industry associations wield considerable economic and political power, and enforcement of existing regulations is generally lax. Unless there is strong commitment on the part of agencies responsible for enforcing regulations and implementing the necessary command and control measures—when necessary, without the blessing of the business association—the success of any programme will be subject to the producer's will, thus condemning the scheme to failure.
- A registry of plants would be helpful in monitoring the industry and assessing the programme's progress.

5.5.4 Institutional, legal, financial and cultural issues

The foregoing sections provided a general outline of proposed strategies to reduce pollution from SMEs. Below is a description of the four basic elements crucial to ensuring the practical success of the strategies.

- a) Insofar as **institutions** are concerned, it is important to consider the role of government, industry groups, academic institutions, research and consulting entities, and nongovernmental organizations in implementing strategies to improve SMEs' environmental performance.
- b) In terms of **legal aspects**, the primary issue is the nature of environmental regulation, as well as the role of different levels of government in enforcement, and the impact of the regulatory scheme on SMEs.
- c) The **financial** issues relate to the availability of, and SMEs' access to, funds for the investments needed to reduce the environmental impact of productive activity. Given the difficulty small businesses face in obtaining conventional financing, special emphasis should be placed on the potential of microcredit programmes.
- d) Finally, the **cultural** aspect includes idiosyncratic factors not related to institutions, regulations or financing, but having to do with the behaviour and perceptions of individual businesspeople capable of decisively affecting the success of a pollution reduction programme.

Institutional factors

Four types of institutions play a role in implementing strategies to improve SMEs' environmental performance: (a) governmental institutions (i.e., agencies responsible for environmental issues at the three levels of government); (b) industry groups; (c) academic, research and consulting entities; and (d) civil society (whose position is often expressed through NGOs).

At the federal level, institutional infrastructure is well defined, with an oversight agency with ministerial rank responsible for environmental affairs (SEMARNAT), and various deconcentrated organizations responsible for specific environmental areas. At the state, and especially municipal, levels, however, the importance placed on environmental issues varies markedly. One way of assessing the importance a state assigns to environmental issues is to consider the type of institution responsible for the state's environmental affairs. Currently, 25% of Mexico's states have a secretariat of environment or ecology, 31% have a secretariat responsible for environmental issues, along with other concerns (urban planning, infrastructure, etc.), while, in the remaining 19%, environmental issues are not reflected in the name of the secretariat with administrative responsibility for environmental concerns (Belausteguioitia et al. 2001).

At the municipal level, the situation is more diverse. Since government agencies are needed to enforce prohibitions, monitor violations and oversee procedures for funding investment in new technologies and environmental infrastructure, among other key functions delineated in the proposed strategies, the absence of such agencies or of the financial and human resources needed for them to operate effectively will condemn the proposed initiatives to failure.

As indicated earlier, industry groups play a vitally important role, serving as intermediaries, disseminators of information and promoters of change. The greater the number of firms, and the more dispersed, the more important it will be to work with such groups to ensure the success of the programme. Moreover, as a result of recent changes in Mexico's legislation, firms are not obliged to belong to any business association, as was previously the case. This increases pressure on the business groups to provide services and information, as well as programmes with tangible benefits to members, in order to maintain or increase their membership.

While there are academic, research and consulting entities throughout the country that provide advice on technological issues, most have no specific SME orientation, and cultural and financial barriers can prevent them from acting collaboratively in designing and disseminating new technologies. In this connection, it is not only desirable, but essential, to establish and consolidate a network of regional centres for environmental management among SMEs. The existing infrastructure of three major systems, described below, is available for this purpose.

The Regional Centres for Business Competitiveness (Centros Regionales para la Competitividad Empresarial, or CRECE)

Have been providing support to microenterprises and SMEs since 1996 to solve technical problems by funding consulting services. CRECE offers a range of services, including comprehensive consulting, business training, group consulting, feasibility studies, market studies and sectoral analyses. The firms are required to cover only a percentage of the total cost of consulting services, with this percentage varying based on the size of the firm. During 2002, CRECE operated 105 offices, and was present in all of the states, providing direct specialized services to 10,268 microenterprises and SMEs. CRECE's offices are funded principally by the federal government, but are administered by the private sector.

The National Committee for Productivity and Technological Innovation (Comité Nacional de Productividad e Innovación Tecnológica, or COMPITE)

Was created in January 1997 to provide specialized courses and quality certification for microenterprises and SMEs. It provides: (a) intensive courses to increase productivity in manufacturing enterprises; (b) workshops for monitoring and ongoing improvement; (c) ISO 9000 (quality) consulting; and (d) training in quality issues. It has nearly 40 technical and administrative employees, and 200 outside consultants, 60 of the latter in the workshop programme, and the remainder in the quality programme throughout the country. The workshop programme includes consultants who inspect clients' businesses free of charge, though the firms pay half the cost of the course. In 2002, COMPITE provided consulting and specialized training on 13,590 occasions, representing a 10.8% increase from the previous year.

The SEP–Conacyt system

Has nine exact and natural science centres, and eight specializing in technological development. The centres have had increasing contact with small businesses. Those that have worked most with microenterprises and SMEs are, according to de Maria and Campos, 2002:

- The Research and Advisory Centre on Leather and Shoes, in Guanajuato;
- The Advanced Technology Centre, in Querétaro;
- The Industrial Engineering and Development Centre, in Querétaro;
- The Electrochemical Technology Research and Development Centre, in San Juan del Río;
- The Applied Chemistry Research Centre, in Saltillo;
- The Mexican Corporation for Materials Research, in Saltillo; and
- The Technology and Design Research and Assistance Centre, in Jalisco.

As can be seen, these three institutional networks are spread throughout the country, and provide an excellent base on which to expand the supply of environmental goods and services to the SME segment. This, however, calls for introducing the environmental component in the institutions' strategic lines of development, which, in turn, means hiring consultants and experts with experience in environmental matters, as well as incorporating environmental issues in the portfolio of services.

The institutional structure described above is essential for increasing the chance of success for the proposed strategy. Institutional isolation, which leads to reduced impact and duplication of efforts, must also be addressed. In this regard, the experience of the Netherlands is of note. There, rather than taking actions directly aimed at SMEs, the government's strategy was focused on encouraging the formation of networks in which intermediary organizations would act as the agents of change. De Bruijn and Lulofs (2001) categorize the functions of each agent in these institutional networks as follows:

Persuasion

An agent attempts to influence firms' motives and objectives with regard to environmental performance. The agent must convince the firms of the importance of environmental factors, and the benefits associated with better environmental management.

Support

An agent takes measures to increase the resources available to companies (whether in the form of advice or financial support) for improvements in environmental performance.

Coercion

An agent contributes to changing businesses' motives and objectives through pressure or coercion, made possible by the agent's position of power.

The basic assumption of the Netherlands' network-based approach is that in tandem with the enhanced relationships between network agents and firms, the latter will develop more positive attitudes toward changes needed to improve environmental performance and toward the associated activities. Thus, providing services through these networks can encourage demand from SMEs. For the present purposes, the major Dutch institutional actors, along with their functions, are shown in Table 5.14. In the Netherlands, industry groups proved to be the most proactive and influential.

TABLE 5.14
INSTITUTIONAL ACTORS AND THEIR FUNCTIONS

Actors	Functions		
	Persuasion	Support	Coercion
Federal, state or municipal regulatory agency	X	X	X
Industry groups	X	X	X
Networks of technological institutions (1)	X	X	
Other private consultants		X	
Civil society (NGOs)	X		X

Source: David Romo, "Crédito y microcrédito a la pyme mexicana con fines ambientales: situación y perspectivas," *Medio ambiente y desarrollo series*, No. 98 (LC/L.2281-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), April 2005.

(1) CRECE, COMPITE, SEP-Conacyt system and local universities.

Legal issues

Three legal factors must be considered in attempting to increase the effectiveness of the strategies: (a) decentralization of environmental responsibility; (b) strengthening of local capacity to deal with the new responsibilities; and (c) creation of a simplified regulatory regime for SMEs.

The General Law on Ecological Equilibrium and Environmental Protection (*Ley General del Equilibrio Ecológico y Protección al Ambiente*, or LGEEPA) assigns different environmental responsibilities to each of the three levels of government, as shown in Table 5.15. As may be seen, all three levels are involved in enforcing environmental laws, regulations and standards. As CESPEDES (2000) notes, and as discussed in the section above, there is a problem at the state and municipal levels, in that environmental policy does not have an adequate place in the administrative structure. The problem is most acute at the municipal level, due to the lack of available personnel with environmental expertise. At the federal level, the administrative centralization of some problems has inhibited the development of local management capacities. Belausteguigoitia et al. (2001) explain three factors responsible for the federal government retaining principally responsibility for environmental functions: (a) Mexico has a tradition of centralism; (b) certain aspects of environmental management require a regional approach that crosses state borders; and (c) environmental issues have played a secondary role in state and municipal priorities.

TABLE 5.15
ENVIRONMENTAL RESPONSIBILITIES OF FEDERAL, STATE AND MUNICIPAL GOVERNMENT

Federal
Formulate and conduct environmental policy.
Apply environmental policy instruments. Take regulatory action to preserve and protect ecological and environmental balance for federal assets and in federal areas.
Address issues that affect the ecological equilibrium of the national territory but arise within the territorial jurisdiction of states, or in areas not under the jurisdiction of any state.
Address issues arising in the national territory that affect areas within the jurisdiction of other states or areas outside the jurisdiction of any state.
Issue official standards.
Conduct regulation and control activities involving hazardous materials and waste.
Carry out prevention measures and control environmental emergencies and contingencies, in accordance with civil-protection policies.
Establish, regulate, manage and supervise federal protected areas.
Design, enforce and evaluate general land and maritime zoning programmes.
Assess the environmental impact of works that require such assessment, and issue corresponding authorizations.
Regulate the sustainable use, protection and preservation of natural resources under its authority.
Establish air pollution regulation.
Support the use of technologies that reduce pollution from all sources, in coordination with states and municipalities.
Establish provisions for the sustainable use of energy resources.
Conduct regulation to protect the environment from pollution by noise, vibration, thermal energy, light, electromagnetic radiation and odours that jeopardize ecological equilibrium and the environment.
Promote societal participation in environmental issues.
Create and make available to the public the National Environmental Information System.
Issue recommendations to federal, state and municipal authorities for promoting compliance with environmental legislation.
Supervise and promote compliance with LGEEPA.
Address issues affecting the ecological equilibrium of two or more federative entities.
Regulation of effects on ecological equilibrium and the environment deriving from activities related to nationally owned subterranean resources.
Carry out other responsibilities assigned to the federal government by LGEEPA or by other legislation.

(continues)

Table 5.15 (continuation)

States
Formulate and conduct state environmental policy.
Apply the environmental policy instruments provided for in local legislation. Preserve and restore ecological equilibrium and protect the environment on state property and in areas of state jurisdiction insofar as not specifically assigned to the federal government.
Carry out prevention and control of atmospheric pollution generated by fixed sources that function as industrial establishments and mobile sources not under federal authority.
Regulate activities not considered to represent high environmental risk.
Establish, regulate, manage and supervise protected natural areas provided for in local legislation, with the participation of municipal government.
Regulate systems for the collection, transport, storage, handling, treatment and final disposal of non-hazardous waste.
Carry out measures to prevent and control pollution due to noise, vibration, thermal energy, light, electromagnetic radiation and odours that jeopardize the environment or ecological equilibrium, from stationary sources that function as industrial establishments and from mobile sources not under federal authority.
Regulate sustainable use. Prevent and control pollution of water under state jurisdiction, as well as of national water resources assigned to the state.
Design, expedite and implement environmental zoning programmes covering all or some of the territory of a state, with the participation of the municipalities involved.
Prevent and control pollution generated by the exploitation of non-federally controlled rock deposits or products using pulverized rock, which may only be used in the manufacture of construction or decorative materials.
Address issues relating to ecological equilibrium or to the environment within two or more municipalities.
Participate in handling environmental emergencies and contingencies, in accordance with civil-protection policies.
Supervise enforcement of official Mexican standards relating to responsibilities 3, 6 and 7 of the states.
Carry out state policy to provide information and dissemination regarding environmental issues.
Assess the environmental impact of works or activities not expressly assigned to the federal government, and issue the corresponding authorizations.
Exercise functions regarding preservation of ecological equilibrium and environmental protection that the federal government transfers to the state.
Design, implement and evaluate the state environmental protection programme.
Issue recommendations to the relevant environmental authorities regarding enforcement of environmental legislation.
In coordination with the federal government, address issues that affect the ecological equilibrium of two or more subnational governmental entities when so requested by the entities involved.
Address other issues of ecological equilibrium and environmental protection assigned to the state by LGEEPA or by other legislation, that are not expressly assigned to the federal government.
Address other issues regarding preservation of ecological equilibrium and environmental protection assigned by LGEEPA or by other legislation, that are not expressly assigned to the federal government.

(continues)

Table 5.15 (conclusion)

Municipalities
<p>Formulate and conduct municipal environmental policy.</p> <p>Apply environmental policy instruments provided for in local legislation. Preserve and restore ecological equilibrium and protect the environment on municipal property and in areas of municipal jurisdiction not specifically assigned to federal or state governments.</p> <p>Enforce legal provisions for prevention and control of atmospheric pollution generated by stationary sources that function as commercial or service establishments, as well as mobile sources not under federal jurisdiction, with the participation of the state government and in accordance with state legislation.</p> <p>Enforce legal provisions for prevention and control of effects on the environment caused by the generation, transport, storage, handling, treatment and final disposal of solid and industrial waste not considered hazardous.</p> <p>Create and manage environmental conservation areas within population centres, urban parks, public gardens and similar areas provided for in local legislation.</p> <p>Enforce legal provisions relating to the prevention and control of pollution in the form of noise, vibration, thermal energy, light, electromagnetic radiation and odours that jeopardize ecological equilibrium and the environment, from stationary sources that function as commercial or service establishments, as well as supervising enforcement of provisions applicable to mobile sources not under federal authority.</p> <p>Enforce legal provisions relating to the prevention and control of pollution of water discharged into drainage and sewer systems in population centres, as well as in national bodies of water for which the municipality has responsibility, with the participation of state government and pursuant to local legislation.</p> <p>Design and expedite local environmental zoning programmes to define the different ecological areas located in the area; regulate soil use outside of population centres to protect the environment; establish environmental regulatory criteria for the protection, preservation, restoration and sustainable use of natural resources within population centres.</p> <p>Preserve and restore ecological equilibrium and protect the environment in population centres from the effects of sewer systems and street cleaning, markets, supply centres, cemeteries, trails, local traffic and transportation, where such responsibility is not assigned to federal or state government.</p> <p>Participate in addressing issues that affect the ecological equilibrium of two or more municipalities involving sources that produce environmental effects in their area.</p> <p>Participate in handling environmental emergencies and contingencies in accordance with civil protection policies.</p> <p>Supervise enforcement of official Mexican standards that fall under categories 3, 4, 6 and 7 of municipal responsibilities.</p> <p>Formulate and conduct municipal policy for information and dissemination of environmental issues.</p> <p>Participate in environmental impact assessments of works or activities under state authority when they are within the municipality's jurisdiction.</p> <p>Design, implement and evaluate the municipal environmental protection programme.</p> <p>Address other issues of ecological equilibrium and environmental protection assigned to the municipality by LGEEPA or by other legislation, where not expressly assigned to federal or state government.</p>

Source: Juan Carlos Belausteguigoitia, Gustavo Merino and Ricardo Samaniego, *La inserción de la gestión ambiental en las políticas sectoriales de Latinoamérica y el Caribe: el caso de los sectores energético e industrial en México*, Mexico City, Centro de Investigación en Políticas Públicas, Instituto Tecnológico Autónomo de México, 2001 cited in David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

In theory, states and municipalities are in the best position to obtain information on environmental problems and local conditions, and thus be able to address them most effectively. However, the lack of local institutional capacity, in practice, sometimes makes decentralization counterproductive. In addition, states and municipalities are, at times, understandably reluctant to accept new responsibilities if not accompanied by additional financial resources.

Thus, progress must be achieved in giving states and municipal governments more environmental responsibility, leaving to the federal government those problems that go beyond subnational territorial limits.

It must also be recognized, however, that decentralization –in situations where there is a lack of local institutional and human capacity to address the new commitments– leads only to the fragmentation of environmental regulation, thus making it less effective. The following measures could help to strengthen administrative and institutional capacity in order to better handle growing environmental responsibilities:

- Establish an environment department or secretariat with its own staff for inspection and supervision.
- Establish a network of such departments at the state, regional or even national level, to share experiences and reduce the costs of learning.
- Conduct an assessment at the state or municipal level to identify the major industrial activities, and ascertain their effects on the environment. The results of these studies would also determine the profile of the professional staff required.

Thus, federal programmes to strengthen local institutional capacities must continue before the process of decentralizing environmental responsibilities can progress further. One such programme is the Environmental Institutional Development Programme (*Programa de Desarrollo Institucional Ambiental*, or PDIA), which, in principle, will make the decentralization process more effective and improve intergovernmental coordination. The PDIA is administered by the General Office of Environmental Policy and Regional and Sectoral Integration, and is conducted with the support of the SEMARNAT offices within the states. Its principal objectives are to support the improvement of state environmental management, provide financial support to develop states' capacity to assume the environmental responsibilities and functions transferred to them by the federal government, and support state governments in procuring equipment, conducting studies, and providing training.

The PIDA supports projects in five areas: (a) regulation, including the creation or updating of state environmental legislation; (b) organization, including strengthening of state environmental agencies; (c) planning; (d) funding; and (e) strengthening information, monitoring and evaluation systems.

As decentralization advances, we find ourselves facing a situation in which there are cumbersome bureaucratic procedures (often involving redundant or duplicative procedures), and little coordination between municipal, state and federal authorities. The consequent regulatory burden entails high administrative costs for SMEs, given their scale. In addition, the combination of complex regulations and lax enforcement encourages SMEs to simply ignore the regulations. It is therefore imperative to create a simpler environmental regulatory regime for SMEs.

Three principles should guide the regulatory reform: (a) simplified, realistic requirements; (b) a one-stop system for obtaining permits; and (c) public recognition of firms. The following specifics should be taken into account in attempting to simplify the regulatory structure (Brugger Rubino and Wells, 1999):

- Reformulate regulatory requirements, based on a determination of needs and of what can reasonably be achieved.
- Encourage an approach emphasizing pollution prevention rather than control, one that integrates all elements of the environment subject to polluting releases.
- Avoid the establishment of mandates for the use of specific technologies, since this tends to discourage technological innovation; the best technology will often be based on local conditions.
- Include “carrots” as well as “sticks” in the regulatory scheme, in order to reward firms that go beyond minimum compliance, using public recognition and other incentives, such as fewer inspections, tax incentives, etc.

- Simplify regulations in such a way that federal, state and municipal permits are consolidated in a single procedure (and, analogously, consolidate regulations regarding different elements of the environment).

In regard to consolidating environment-related bureaucratic procedures to avoid multiple permit, licensing and authorization requirements (see above), the Single Environmental License (*Licencia Ambiental Única*, or LAU) programme is of note. As the central instrument of the so-called Integrated Environmental Management and Regulation System for Industry (*Sistema Integrado de Regulación y Gestión Ambiental de la Industria*, or SIGR), LAU coordinates different environmental authorizations affecting industry under federal jurisdiction. It sets operating conditions and can establish obligations in connection with certain activities or geographic locations. It provides one coordinated process covering water, wastewater discharges, atmospheric emissions and generation of hazardous waste. New establishments can take advantage of this, as well as establishments that are changing activities, processes or technologies, or are relocating.

The first three years of this instrument's application have been disappointing. As of August of 2000, only 244 LAU licenses had been granted. Reasons for this include lack of information, incentives and promotion, and the fact that the procedure was available only to firms whose activities fell under federal air pollution jurisdiction (SEMARNAP, 2000a). This scheme of coordination could be broadened, through agreements with the states, to cover activities under local jurisdiction, whereupon municipal governments would contribute to expanding its use to SMEs through state government.

Financial issues

As has been well recognized in the literature, one of the major limitations on the technological modernization of SMEs is their lack of access to financing. Implementation of cleaner production techniques to improve the environmental performance of this industrial sector is no exception. This does not mean that there is a complete absence of initiatives to fund environmental projects; examples include the Environmental Improvement Programme managed by Nacional Financiera, and the Fund for Pollution Prevention Projects (*Fondo para Proyectos de Prevención de la Contaminación*, or FIPREV). However, these initiatives either are not designed specifically for SMEs or have had limited impact.

Some of the major problems of financing such projects in the SME segment, as well as their causes and possible solutions, are shown in Table 5.16.

There are significant language barriers between the financial sector and the community attempting to encourage cleaner production. The financial community continues to emphasize control technologies, and is unaware of the economic benefits of cleaner production. Thus, small business remains excluded from traditional modes of financing, and microcredit schemes become a viable alternative for financing improved environmental performance, especially among SMEs and microenterprises.

While conventional loans focus on different types of formal enterprises and those with salaried employees, microcredit is designed for low-income entrepreneurs with rudimentary family firms, often outside the formal economic system. Microcredit is particularly important for Latin America, where there are more sustainable microfinance institutions –i.e., institutions that have made a subsistence activity into a profitable one– than in any other region (IDB, 2001).

TABLE 5.16
PROBLEMS, CAUSES AND POSSIBLE SOLUTIONS TO FINANCING ENVIRONMENTAL IMPROVEMENT PROJECTS AMONG SMES

Problem	Causes	Possible solutions
Difficulties associated with technical and financial evaluation of proposed investments for environmental improvements.	Lack of understanding, in the financial sector, of the opportunities offered by environmental improvement projects. Lenders lack techniques to evaluate this type of investment proposal. Inadequate financing for SMEs' needs: limited funds, collateral requirements, little experience in risk analysis, and generally scant use of bank credit as a source of financing.	Improve capacity of technical assistance providers and environmental management consultants in preparing financing proposals. Make greater use of local or foreign experts who can provide assistance in the assessment process. Design specific bank financing schemes for SMEs. Establish microcredit schemes for the most excluded SME segment.
Environmental improvement investment projects not considered creditworthy. Lack of specific lines of credit or schemes for environmental improvement projects.	Firms lack familiarity with finance and knowledge of how to prepare attractive proposals. Financial system still focused on collateral as a condition for credit. High interest rates due to financial and economic instability.	Provide training to firms to help them create proposals attractive to the financial sector. Promote specific credit schemes for environmental improvement investments. Include this type of project in bank portfolios.
Lack of proper setting for implementation of environmental improvement projects.	Political and institutional framework inadequate to encourage implementation of such projects. Lack of demand in industry for environmental improvement projects. Perceived risk of new technology. Industrial community not familiar with the concept.	Promote the concept of environmental efficiency and its economic benefits. Implement strategies that encourage SMEs to adopt cleaner processes and technologies.

Source: Prepared by the author on the basis of Weslyne Ashton, Andres Luque and John R. Ehrenfeld, "Best practices in cleaner production promotion and implementation for smaller Enterprises," Report prepared for the Multilateral Investment Fund and Inter-American Development Bank, Washington, D.C., 2002.

Initially, microcredit opportunities were concentrated in the field of social and rural development, sectors where poverty and exclusion are of greater concern. The basic objective of microcredit programmes is to generate self-employment and income alternatives for the most needy, by providing loans to low-income individuals with few assets who, therefore, lack collateral for loans from conventional financial institutions. Microcredit originated at the Grameen Bank, in Bangladesh. Its experience was then replicated in other countries, including several in Latin America.

However, this does not imply that this approach cannot be applied to the industrial sector, particularly in connection with environmental management and improvements. In Mexico, such an approach has been used in the brick manufacturing enterprises of Ciudad Juárez, where, in 1991, the Mexican Federation of Private Health and Community Development Associations (*Federación Mexicana de Asociaciones Privadas de Salud y Desarrollo Comunitario*, or FEMAP) obtained 800,000 pesos from the Businesses in Solidarity programme to convert furnaces to propane through the use of small loans to brick producers. A similar situation occurred in the city of Saltillo, where a trust was established, with funds from the federal, state and municipal governments, to help producers restructure.

Microcredit is of great potential importance in Mexico, given the emphasis that the present administration has placed on the development of the SME sector. One of the major

programmes in this strategic line is the National Programme for Microenterprise Financing (*Programa Nacional de Financiamiento al Microempresario*, or PRONAFIM). The object of PRONAFIM is to enable jobless individuals to undertake some form of economic activity, or to expand or improve an existing business. By mid-2003, the programme had benefited 190,848 persons since its inception in June of 2001. Through PRONAFIM, the government provides lines of credit for microfinance institutions throughout the country, so that they, in turn, can provide money to interested parties once project proposals have been evaluated.

The amount of the loans ranges from 700 to 20,000 pesos, with interest rates varying based on the amount of the loan, ranging from 2% to 6% monthly. Another purpose of the programme is to encourage microenterprises to join productive chains in association with small and medium enterprises. For individual requests, the requirements are that the requestor be a natural person of recognized moral rectitude, who does not have access to a commercial bank loan, lives in a rural or urban area with high levels of marginalisation, has a verified business project and (if available) a population registry single identification number.

Not all microcredit programmes, of course, are coordinated by the government. There is a large and growing number of civil society organizations dedicated to providing working capital to the most disadvantaged sectors of the population.

For example, FEMAP (mentioned above), which played an important role in the effort to reduce pollution from brick manufacturing in Ciudad Juárez, provides small loans to microenterprises, and offers technical assistance in the areas of sales, production, costs and management principles.

Microcredits are intended for the poorest and most vulnerable members of society, who are most often the ones involved in activities in the informal sector of the economy. This description of the target population may, however, exclude a number of small and medium enterprises, either because they are in a position to apply for a bank loan (under one of the special schemes provided by commercial banks, as described below), or because they do not fit the category of extreme marginality. Sectors such as brick manufacturing (an activity carried out informally by urban residents under marginal conditions) would be ideal targets for the creation and expansion of microcredit to finance improvements in firms' environmental performance.

Finally, commercial banks have begun to develop financing schemes designed for the needs and conditions of SMEs. One such is the scheme offered by Santander-Serfin in partnership with Nacional Financiera and the Ministry of the Economy, known as Banca PYME. The principal difference between this and other schemes is that it involves no mortgage guarantee requirement, though a co-signer is required. The interest rate is approximately 16% annually, and the loans may be used for either working capital or fixed assets. The amount of the loans ranges from 50,000 to 1,000,000 pesos. The programme requires the borrowing firm to be formally established, thus failing to address the problem of microenterprises in the informal sector.

Cultural factors

It is essential to address the cultural barriers to programmes designed to increase environmental efficiency in industry. According to UNEP (1999), 50% of the waste produced by a firm can be prevented by simple management measures and minor process changes, and over 65% of the barriers to the implementation of cleaner production techniques relate to human motivation and attitudes, not to economics. Among these first obstacles are: the need to learn a new technology; lack of familiarity with, or interest in, the effects of pollution on the health of workers and their families; and highly competitive markets with attendant pressure to reduce costs, even if this means generating more pollution. Given these motivations, it is often necessary for authorities to use coercive measures as a catalyst for change (e.g., prohibiting the use of

certain polluting inputs, and imposing administrative sanctions, including closing establishments that violate environmental standards).

Hauschnik (2001) examines existing obstacles to the adoption of cleaner production methods by microenterprise and SMEs, and concludes that “it is necessary to overcome not only technical and economic obstacles, but also cultural obstacles of a social and business nature, which, in most cases are insuperable”. According to Hauschnik, the principal obstacles, in addition to the ones cited above, include: (a) confusion about terminology and methodology; (b) the involvement of multiple regulatory agencies; (c) mistaken perceptions regarding environmental issues –with firms viewing environmental concerns as a “luxury” involving costly solutions and no economic benefits; (d) fear of change; and (e) the absence of a culture of questioning the status quo.

Various factors can motivate, and encourage acceptance of, change: (a) regulatory pressure, including the threat of imposing standards; (b) community pressure, provided that it is based on adequate information; and (c) pressure from clients that demand products with characteristics necessitating cleaner production methods (e.g., lead-free paints).

In recognition of the importance of cultural factors, and with the certainty that any environmental improvement programme that ignores them will ultimately fail, the strategies proposed, to date, include measures to stimulate a change of culture. These are based on disseminating information, and on involving producers’ groups as intermediaries in dealing with firms. Table 5.16 shows the principal cultural problems and their possible solutions in the framework of the proposed strategies.

The current situation, in which the predominant features are a lack of financing, information, skills and experience, combined with a high degree of uncertainty, leads to risk aversion on the part of small business and a consequent negative effect on technology investment. Thus, it is important to encourage demonstration effects. The successful introduction of new production techniques and organizational or administrative practices reduces the perceived risk associated with such innovations, while promoting its adoption by other firms. Currently, prior to the adoption of a particular production method or type of machinery, potentially interested firms are provided little information on the costs and benefits involved in the innovation, and therefore view the changes as entailing a high level of risk. As information is disseminated regarding the costs and benefits of the innovation, uncertainty is reduced, and the probability of adoption increases. This effect is addressed in several of the recommendations given in the table below.

TABLE 5.17
CULTURAL OBSTACLES TO THE IMPLEMENTATION OF ENVIRONMENTAL IMPROVEMENT PROJECTS AMONG SMES

Problem	Possible solutions
Confusion regarding terminology and methods	Ensure that educational campaigns on the effects of pollution for health and the environment include definitions of the basic concepts of clean production. Channel basic information through producers' associations to increase the likelihood and efficiency of dissemination.
Mistaken perception of environmental issues	In promotional activities, emphasize the economic (not only the environmental) benefits of implementing pollution prevention measures. Make clear and emphasize the link between environmental measures and competitiveness. In developing projects, give priority to those with the greatest potential to educate producers, clarify the objective of environmental efficiency, help develop institutional capacity and influence the overall value chain.
Fear of change	Take advantage of success stories. Publicize them widely, in order to increase the probability of replication. Seek to make those projects that are implemented easily replicable. In order that the multiplicity of regulatory agencies will not inhibit change, efforts must be made to create a simplified regime for SMEs. Provide SMEs with information on four fundamental factors (preferably through producers' associations): assistance and advice on environmental problems and regulatory compliance; tools for better environmental management; success stories and experiences of specific relevance to a firm's sector; trends and scenarios for future market opportunities.

Source: David Romo, "Crédito y microcrédito a la pyme mexicana con fines ambientales: situación y perspectivas," *Medio ambiente y desarrollo series*, No. 98 (LC/L.2281-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), April 2005.

5.5.5 Management instruments

The ultimate purpose of the instruments associated with a policy is to change the behaviour of economic agents (firms) to achieve the desired objective –in this case, changing the environmental performance of SMEs. The change is achieved through strategy's impact on institutional arrangements, environmental regulations, availability of credit, and a variety of cultural factors. Faced with new obligations, rights, rewards and sanctions, small firms will modify their behaviour if they believe that change is in their best interest.

Once businesses decide to implement cleaner production methods, they may choose different management instruments to produce the desired change. The object of this section is to briefly explore some of the choices that various institutions offer small business for this purpose. A number of the options here are based on a combination of five available alternatives:

1. **Changing inputs.** This alternative consists of reducing or eliminating the use of raw materials that have the potential to pollute. It includes purification and using alternative materials.
2. **Changing technologies.** This involves changes in process and/or equipment in order to reduce the quantity of waste generated.
3. **Improving maintenance.** This alternative includes procedures and administrative or institutional changes capable of minimizing waste.
4. **Changing the product.** This involves changes in the composition or characteristics of the final product so as to reduce the waste generated during its manufacture.

5. **On-site reutilisation.** This alternative consists of recycling or re-using waste materials as a substitute input in the initial phase, or a subsequent phase, of the production process. Some specific key management instruments for implementing cleaner production initiatives, which make use of the above alternatives, are described below (UNEP, 1999).

Toxicity assessment

This determines a chemical substance's potential to cause harm based on its toxicity. The information in the Safe Materials Data Sheets and in the International Chemical Safety Programme can be used as a basis for evaluating the dangers a substance poses to human health and to the environment. If the dangers are deemed unacceptable, an alternative substance can be chosen.

Environmental audit

This is a management tool that includes systematic, documented, periodic and objective assessment of a firm's environmental performance. It can help to identify aspects of operations that require immediate attention, and provide early warning of potential problems, so as to work toward their solution.

Waste audit

This is a detailed report on the waste produced by an industry, plant, process or particular operation. It requires the creation of a materials inventory, on the basis of which the origin, quantity and composition of waste can be identified so as to find options for reducing it. This can also increase knowledge of the processes involved and contribute decisively to increasing plant efficiency.

Energy audit

This process identifies the costs and physical quantities of the energy inputs used in each stage of the industrial process, in order to pinpoint inefficiencies and areas of poor administrative or organizational procedures, and propose measures to correct them.

Risk audit

This tool identifies all vulnerable or dangerous elements of a plant's operation. The principal activities associated with it are to identify possible losses of material in the production process, evaluate potential losses associated with particular risks, identify measures to minimize materials losses, implement the appropriate measures, and monitor the changes produced.

As may be seen, these instruments can be implemented separately, and their relevance is not limited to SMEs. Other comprehensive initiatives have been used with greater success, given that they were designed specifically for Mexican SMEs at all economic levels. These are discussed briefly below.

Profitable environmental management (PREMA)

GTZ, in collaboration with the National Chamber for Industrial Transformation (*Cámara Nacional de la Industria de la Transformación*, or CANACINTRA) conducts an industrial competitiveness and environmental management project. As part of the strategy, training and advice are provided to groups interested in increasing their firms' environmental efficiency, through profitable environmental management workshops. The workshops, held by the German technical cooperation agency, GTZ, are a business development tool specifically designed for microenterprises and SMEs, and are intended to promote their ongoing improvement, environmental efficiency and competitiveness. Profitable environmental management (PREMA) is composed of three modules: (a) efficient use of raw materials to increase productivity, minimization of waste and negative environmental impact, and cost reductions in the short term; (b) good management practices; and (c) an introduction to cost management incorporating environmental criteria, including a systematic analysis of the flow of raw materials, leading to a reduction of the costs associated with waste generated in production (GTZ, 2002).

One of the basic components of this method is co-consulting, in which each of the participants in the workshop becomes a consultant for the other participating firms, and contributes to proposing solutions in an atmosphere of teamwork. Thus, the programme's philosophy is not to focus on consulting for each firm's specific problems, but rather to provide the tools for each firm to identify inefficiencies in production and eliminate them through teamwork.

The methodology of the Mexican Cleaner Production Centre (Metodología del Centro Mexicano de Producción Más Limpia, or CMPL)

The CMPL approach includes five phases for identifying potential areas of improvement in a firm's environmental performance:

1. **Planning and organization.** This phase includes involving management and gaining its support for the project, establishing the team to lead the project, setting goals and identifying obstacles and solutions.
2. **Pre-Evaluation.** In this phase, a flow-chart of the process is developed, entry and exit of materials are measured, and cleaner production goals are set.
3. **Evaluation.** This consists of creating a materials inventory, generating cleaner production options and selecting the most appropriate ones.
4. **Feasibility study.** This tool comprises preliminary assessment, technical assessment, economic assessment and environmental assessment of the options identified, in order to select the most feasible ones.
5. **Implementation.** The final phase includes preparing the cleaner production plan, implementing the cleaner production options, supervising and assessing progress, and ensuring the continuity of clean production activities.

This approach is widely used in pollution prevention projects. De Bruijn and Hofman (2000), for example, describe its use in the Netherlands, where (in slightly modified form) it is called PRISMA (the Dutch acronym for Project for Success in the Pollution Prevention in Industry). As the authors note, however, given the need for extensive consulting time, a simplified version was created for SMEs. The simplified method is called "quick-scan". As the name suggests, this involves a quick review of the flow of materials to identify opportunities for reducing pollution. The implementation of this technique takes only a few days, and dramatically reduces the costs of the programme.

5.5.6 Cost–benefit analysis of the proposed strategies

The use of cost–benefit analysis to evaluate environmental regulation has been on the increase in the last few years in the industrialized countries. In developing countries, however, it is still rarely used. Cost–benefit analysis comprises four phases (Fiorino, 1995):

1. Identify the proposed policy’s expected effects on the society, and classify them as costs or benefits.
2. Assign monetary values to each of the categories.
3. Calculate the monetary flows associated with the costs and benefits in terms of present value, using the appropriate discount rate to take into account the effect of time.
4. Compare the costs and benefits to select the alternative with the greatest net benefit (if the effect of various policies is being compared) or to determine the economic efficiency of a policy (if assessment of an existing policy is the object).

Table 5.17 provides a general view of the costs and benefits associated with a strategy of this kind. Since the costs and benefits are not linked to a specific industry or geographic location, the intention is simply to illustrate the type of concepts that need to be considered in such analysis. The following two sections present the costs and benefits associated with the proposed strategies for the brick manufacturing sector and the leather tanning and finishing sector.

TABLE 5.18
COSTS AND BENEFITS ASSOCIATED WITH A STRATEGY TO IMPROVE THE
ENVIRONMENTAL PERFORMANCE OF SMES

Costs	
Direct	
<i>Tangible</i>	<p>Costs associated with the new technology to be installed.</p> <p>Cost of constructing the infrastructure required (treatment plants, sanitary landfills, etc.).</p> <p>Costs of operating the infrastructure built as a part of the programme.</p> <p>Administrative costs of the programme, including creating environmental departments within municipal governments (or increasing the budgets of existing ones), providing more personnel for verification and monitoring, etc.</p> <p>Consultants' fees for developing new technologies or implementing changes.</p> <p>Campaign to educate the population (paying promoters, printing and distribution of pamphlets, etc.).</p> <p>Subsidizing financing (where applicable).</p> <p>Direct costs of relocating plants (land purchases, construction, etc.).</p>
<i>Intangible</i>	<p>The time of the workers who implement the changes in the firm.</p>
Indirect	
<i>Tangible</i>	<p>Indirect costs associated with plant relocation (e.g., transportation over a greater distance).</p> <p>Reduced sales for, or closure of, firms that sell polluting inputs.</p>
<i>Intangible</i>	<p>Loss of jobs due to closing of plants unable to meet the programme's requirements.</p> <p>Hostility of producers (and the population economically dependent upon them) to forced relocation, thus jeopardizing implementation of future programmes.</p>
Benefits	
Direct	
<i>Tangible</i>	<p>Reduction of costs by diminishing the amount of waste lost in production.</p> <p>Reduced consumption of inputs (water, electricity, fuel) as a result of more efficient use.</p> <p>Improved competitiveness for the firm, reflected in better sales due to access to new markets and the ability to attract new clients.</p>
<i>Intangible</i>	<p>Improved health (and life expectancy) of the population exposed to the pollution.</p> <p>Improved standard of living among the population.</p> <p>Improved public image of the firm and the industry, due to better environmental performance.</p> <p>Improved perception of the firm by regulatory authorities and the financial sector.</p>
Indirect	
<i>Tangible</i>	<p>Increased sales for, or creation of, firms providing inputs needed for the new technologies.</p> <p>Growth or creation of firms providing environmental goods and services.</p>
<i>Intangible</i>	<p>Improved understanding of the production process, which may lead to implementation of other, independently designed improvements in a firm's operations.</p> <p>Aesthetic improvement in landscape by eliminating or reducing visible pollution sources.</p> <p>Increased recreational opportunities.</p> <p>Less danger to the region's wild plants and animals.</p> <p>Greater participation of civil society in other environmental problems as a result of the educational campaign.</p> <p>Strengthening of producers' associations turns them into channels of important information, capable of facilitating the implementation of future programmes.</p> <p>Transfer of technological and administrative knowledge, in cases where SMEs participate in environmental mentoring programmes with large firms.</p>

Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

Brick manufacturing

Blackman and others (2000) conducted one of the first studies to estimate the costs and benefits associated with strategies for reducing pollution from brick manufacturing. The authors concentrated on a single pollutant (suspended particles of less than 10 microns, or PM-10) and a particular category of effects (human mortality rates) from brick manufacturing in Ciudad Juárez. The study included three basic phases: modelling of the atmospheric dispersion of pollutants, modelling of the health effects, and assigning monetary values to the effects identified. Most of the benefits the programmes identified result from preventing premature deaths. Thus (as might be expected), the most important parameter is the statistical value of a life, for which the following discrete distribution was used: US\$1.9 million (33%), US\$3.8 million (34%), US\$7.5 million (33%). The average number of deaths predicted for Ciudad Juárez as a result of uncontrolled emissions from brick manufacturing is 14 per year. The authors conclude that for the four strategies studied (improved furnaces, use of natural gas as a fuel, plant relocations and establishment of no-burn days), the benefits are greater than the costs.

This study, however, did not consider indirect costs and benefits, the fact that the principal parameters are subject to a high degree of uncertainty, and the fact that many are not specific to the geographic area examined. Studies such as this one, which follow a traditional cost-benefit analysis process, are therefore of questionable utility.

Table 5.18 shows the costs and benefits associated with implementation of the general strategy proposed in section 3.1.2 for improving environmental performance in the brick industry. Examination of the table shows that the benefits of the programme would not be concentrated in better economic performance for the producers, but (as Blackman et al., 2000, conclude) in a substantial reduction in the incidence of respiratory diseases within the exposed population, with a consequent reduction in the mortality rate.

The brick industry, then, is special, in that introducing new, less polluting technology does not necessarily translate into immediate or clear economic benefits for the producers, as occurs in the great majority of SME pollution prevention projects. This only highlights the importance of encouraging change in the greatest possible number of plants, with the support of the producers' associations, and with decisive command and control measures (such as prohibiting the most polluting fuels) and strict enforcement.

TABLE 5.19
COSTS AND BENEFITS ASSOCIATED WITH A STRATEGY TO IMPROVE THE ENVIRONMENTAL PERFORMANCE OF SMES IN THE BRICK INDUSTRY

Costs	
Direct	
<i>Tangible</i>	Educational campaign on the effects of emissions (paying promoters, printing and distributing pamphlets, etc.). Fees to consulting or research entities to develop new technologies (less polluting furnaces and identification of appropriate fuels). Installation of new equipment. Creating and managing entities to provide funding under preferential conditions for brick producers implementing the new technology. Direct costs of plant relocation if this measure is used (land purchases, construction, funds for financing producers, etc.). Administrative costs of the programme, including creation of environmental departments within municipal governments (or increasing the budgets of existing departments), more personnel for verification and monitoring, etc.
<i>Intangible</i>	The time of the workers who implement the changes in the firm.
Indirect	
<i>Tangible</i>	Indirect costs of plant relocation if this measure is used (e.g., transportation over a greater distance). Reduced sales for providers of polluting fuels.
<i>Intangible</i>	Hostility of producers (and the population economically dependent upon them) to forced relocation, which can jeopardize the implementation of future programmes.
Benefits	
Direct	
<i>Tangible</i> <i>Intangible</i>	Possible improvement in brick manufacturers' economic performance. Lower incidence of respiratory (and other) diseases in the population exposed to the pollutants. Reduction in deaths due to respiratory diseases. Improved public image for the plants and the industry in general as a result of better environmental performance.
Indirect	
<i>Tangible</i> <i>Intangible</i>	Increased sales for providers of the new, clean fuel used by producers. Increased participation by civil society in other environmental problems, as a result of the education campaign. Establishing or strengthening brick manufacturers' associations turns them into channels of important information, capable of facilitating the implementation of future programmes. Increased atmospheric visibility and aesthetic improvements in landscape as a result of reduced smoke. Lower risk of contaminating nearby agricultural land with heavy metals and other chemicals contained in the smoke from brick furnaces.

Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

Leather tanning and finishing

In contrast to the situation in the brick industry, described in the foregoing section, pollution prevention projects in the tanning industry have clear economic benefits for the producers, though the time required for a return on investment varies. Table 5.19 shows the results of some leather industry projects financed by the Fund for Pollution Prevention Projects (Fondo para Proyectos de Prevención de la Contaminación, or FIPREV). Such evaluation of projects is limited in scope, since it includes only direct, tangible costs and benefits. The table shows the results of implementing two technologies to reduce emissions in this industry in a total of 33 firms (most of them in the city of León). Both environmental and economic benefits are

clearly present. Table 5.20 shows the costs and benefits associated with the proposed general strategy to improve the environmental performance of the tanning industry.

TABLE 5.20
COSTS AND BENEFITS OF PROJECTS FUNDED BY FIPREV IN THE TANNING INDUSTRY

Firms supported	Technological change implemented	Credit authorized (thousands of pesos)	Estimated environmental benefit; Reduced consumption of:		Estimated economic savings (thousands of pesos/year)
			Chemical products (tons/year)	Water (m ³ /year)	
32	Re-use of baths and enrichment of spirits	7 332	2 320 (a)	115 840	8 792
1	Change of boilers from diesel to LP gas	166	(b)	2 451	94

Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano", *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

(a) The following chemicals were no longer discharged into the drainage system: lime, amines, sodium sulphide, sodium sulphate, ammonium sulphate, sulphuric acid, chromium, basifier, desiccant and oropon, among others.

(b) Changing the boilers prevents the emission of large quantities of chemicals, including carbon dioxide, sulphur, sulphur oxide and nitrous oxide.

TABLE 5.21
COSTS AND BENEFITS ASSOCIATED WITH A STRATEGY TO IMPROVE THE ENVIRONMENTAL PERFORMANCE OF SMES IN THE LEATHER TANNING INDUSTRY

Costs	
Direct <i>Tangible</i>	Educational campaign regarding the effects of emissions on health and environment. Payment to consulting and research entities for development of appropriate pollution prevention technologies. Implementation of the new technology. Construction of the infrastructure needed (treatment plants, sanitary landfills, etc.). Costs of operating infrastructure built as a part of the programme. Administrative costs of the programme, including the creation of environmental departments within municipal governments (or increasing the budgets of existing departments), more personnel for verification and monitoring, etc. Direct costs associated with relocating plants if this measure is used (land purchases, construction, etc.).
<i>Intangible</i>	The time of the workers who implement the changes in the firm.
Indirect <i>Tangible</i>	Reduced sales for providers of polluting inputs used less as a result of the new technology. Indirect costs associated with plant relocation (e.g., transporting workers to a more distant location).
<i>Intangible</i>	Hostility of producers (and the population economically dependent upon them) to forced relocation, which could jeopardize implementation of future programmes.
Benefits	
Direct <i>Tangible</i>	Reduction of costs as a result of less waste in the production process. Reduced consumption of inputs (water, chemicals, etc.) due to more efficient use.
<i>Intangible</i>	Improved health (and life expectancy) in the population exposed to the pollutants. Better public image for the firm and the industry as a result of improved environmental performance.
Indirect <i>Tangible</i>	Increased sales for, or creation of, firms providing inputs needed for the new technologies. Growth or creation of firms providing environmental goods and services.
<i>Intangible</i>	Reduced pollution of water and agricultural land due to liquid effluents. Better understanding of the production process, reflected in improvements in other aspects of firms' operations. More participation by civil society in other environmental issues as a result of the educational campaign. Increased recreational opportunities. Less danger to the region's wild plants and animals. Strengthening the producers' associations turns them into channels for important information, thus facilitating the implementation of future programmes.

Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

5.5.7 Proposed indicators for assessments and monitoring of progress

Designing and implementing a system of indicators related to sustainability plays a central role, since only analysis of a set of critical variables can permit assessment of the success (or degree of progress) of the strategies implemented. In Mexico, efforts to develop indicators at the national and state levels have already been made, primarily by the Private-Sector Research Centre for Sustainable Development (*Centro de Estudios del Sector Privado para el Desarrollo Sostenible*, or CESPEDES, 2001) and the Secretariat of the Environment and Natural Resources

(SEMARNAT, 2000b). One example of a regional study is the SEMARNAT study (1997) concerning Mexico's northern border.

In order to maximize the use of such indicators, they should be *easy to measure* using available data, *objective* (i.e., not subject to different interpretations by different people), *relevant* (genuinely indicative of something in the system studied) and *easy to understand* (even for people without experience in the environmental area).

An indicator helps in understanding one's current status, the direction in which one is headed, and how far one is from attaining one's goals. A good indicator also provides warning of potential problems before they reach the crisis stage, and helps to recognize the best strategy for solving them. Thus, the creation of indicators serves three main objectives:

1. To make comparisons between political or geographic entities in order to determine relative progress or lags in progress.
2. To measure indices periodically and use them to identify trends, determine progress toward sustainability and warn of potential crises.
3. To establish environmental priorities.

The principal methodological efforts to calculate sustainability indicators have been conducted by the Organization for Economic Cooperation and Development (OECD, 2001) and the United Nations Commission on Sustainable Development (UNCSD) (United Nations, 1996). Both propose a scheme known as pressure–state–response (PSR). This scheme (originally designed by *Statistics Canada* in 1979 and subsequently adapted by OECD and UNCSD) is based on the recognition that human activities create pressure (P) on the environment, modifying the quantity and quality, i.e., the state (S) of natural resources. Society, in turn, responds (R) to such changes with general and sectoral policies (both environmental and socioeconomic), which constitute feedback affecting human activity and the pressures generated by it.

In this section, the PSR scheme is used to propose certain indicators that reflect useful and relevant information on the environmental performance of firms, and on the effectiveness of efforts to improve it. Not surprisingly, the level of aggregation used to calculate the indicators will vary (municipal, state, national) depending on the use to which they are to be put. However, it is recommended that they be aggregated on the smallest scale possible (municipal), in order to reflect the progress of specific programmes. The indicators presented in Table 5.21 are general, and are not designed in relation to any specific industry.

TABLE 5.22
INDICATORS FOR ASSESSMENT AND MONITORING OF PROGRESS

1. Pressure	
11. Demographic pressures	Demographic growth. Growth of economically active population.
12. Economic pressures	Economic growth.
13. Environmental pressures	Discharge of industrial wastewater. Generation of hazardous waste. Atmospheric emissions of pollutants.
2. State	
21. Environmental quality	Water quality (surface and ground). Air quality. Number of non-regulated dumps (hazardous waste or other).
22. Health	Patients admitted to hospitals for respiratory diseases. Mortality due to respiratory diseases. Patients admitted to hospitals for gastrointestinal diseases. Population directly exposed to pollution from the sources in question.
3. Response	
31. Institutional capacities	Existence of a specific department for environmental issues within a municipal government. Budget and personnel for environmental monitoring and supervision. Number of environmental NGOs. Number of consulting and research entities with easy access to authorities and businesses. Average schooling of population and producers. Number of times sanctions were applied to plants violating environmental standards. Number of complaints received from the population.
32. Environmental infrastructure	Volume of treated wastewater as a proportion of the total volume of water discharged by the industry. Number of solid waste sanitary landfills that are in compliance with standards. Installed capacity for hazardous waste handling, in relation to the total generation of hazardous waste.
33. Programmes to promote environmental efficiency	Percentage of plants in the industry that have implemented some method for preventing or controlling pollution. Number of courses held on environmental efficiency in the industry (and number of people trained). Budget for implementation of pollution prevention programmes.

Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February 2005.

As may be seen, there are three types of pressure variables: demographic, economic and environmental. The demographic growth variables reflect the increasing number of inhabitants who may need jobs. For many, creating an SME, either formal or informal, will be one option to consider. Similarly, a higher rate of economic growth increases the demand for goods and services, with a consequent stimulus for the creation or expansion of SMEs. The environmental pressures relate primarily to the quantity of pollutants released into the environment as wastewater, solid waste and atmospheric emissions. This last group of variables will likely be difficult to quantify, due to lack of environmental monitoring. However, as efforts to measure emissions advance, strategies to improve the industry's environmental performance will improve, and understanding of their effects will also improve.

The object of the "state" variables is to measure the impact of the pressure variables on environmental quality and overall health of the population. Environmental quality is measured in terms of concentrations of pollutants in bodies of water and in the atmosphere, as well as by the number of clandestine solid waste dumps. Health effects are approximated by recording the number of individuals suffering from respiratory diseases (caused by air pollution) and

gastrointestinal diseases (caused by water pollution), in addition to the deaths associated with these diseases.

The response indicators involve three types of factors: institutional capacity, environmental infrastructure, and programs to promote environmental efficiency. This set of variables reflects efforts to reduce the effect of the pressure variables on the state variables. Compared to the previous set of indicators, these are relatively easy to measure and implement.

5.5.8 Opportunities for SMEs in the environmental goods and services market

This section identifies a number of development opportunities in the EGS market in which SMEs could play a role. In addition to identifying such opportunities, policies and instruments with the potential to encourage the supply of EGSs from SMEs are presented.

Despite the small size of the Mexican EGS market, its growth will be of vital importance if the country's industrial sector is to develop sustainably. As noted by Muñoz Villarreal (n/d), the EGS market is not a well-defined economic sector, but brings together a number of activities that have in common the fact that they contribute to improving the environment, or help to minimise the environmental impact of human activities.

Thus, the environmental industry may be defined as providing equipment and services for: (a) pollution control; (b) pollution reduction; (c) clean-up; and (d) waste handling.

According to a definition originally proposed by the European Commission, the environmental industry comprises firms “that produce goods and services designed to measure, prevent, limit, minimize or correct environmental damage to water, air, soil, as well as problems related to waste, noise and ecosystems.... The classification system encompasses... cleaner technologies and... technologies and products which reduce environmental risk and minimise pollution and resource use” (OECD). For present purposes, the environmental goods and services market is disaggregated into the following areas of activity:

1. **Drinking Water and wastewater treatment:** Equipment for municipal and industrial water management and treatment; treating water to make it potable; sewerage systems; and wastewater treatment. This is the most important segment of the environmental industry in most countries and regions, including Mexico. It includes sales and distribution of a range of equipment.
2. **Solid waste management:** Equipment for the management and recycling of industrial, hospital and municipal solid waste, including products for hazardous waste management, collection, transport and final disposal.
3. **Control of atmospheric pollution:** Activities that provide products, systems, equipment and services to reduce, treat and eliminate discharges of gases and polluting suspended particulate matter.
4. **Soil remediation:** Activities that contribute to responding to environmental disasters, and to restoration and clean-up of contaminated soils through physical, chemical and biological processes.
5. **Energy savings and alternative power generation:** Products and services related to energy efficiency, renewable energy and the replacement of private transportation by public transportation.
6. **Protection against noise pollution:** Products, systems and services that contribute to reducing noise, ranging from acoustical barriers produced by construction firms to equipment designed to control the noise and vibration produced by industrial and engineering operations.

7. **Other environmental services:** A range of services provided by:
- consultants and advisors who conduct studies and training on environmental impact and risk, land use, safety and emergencies;
 - auditors and certifiers.
 - laboratories offering analysis of water, waste, soil and sludge, emissions monitoring, etc.

As noted (CPIA, 1997) by the Commission to Promote Environmental Investments (*Comisión Promotora de Inversiones Ambientales*, or CPIA), the dynamics of the environmental market are shaped by four sets of variables: (a) the regulatory and institutional apparatus; (b) growth trends in the economy; (c) management, information, knowledge and financial systems; and (d) the extent to which the national economy is open to and integrated in global markets (principally those of industrial countries).

Developing environmental regulation can be expected to have a positive effect on the expansion of these markets by stimulating demand for the environmental goods and services needed for compliance. Also driving growth of the market are worsening environmental problems (in particular, water quality in natural bodies of water, and hazardous waste disposal) and lags in environmental infrastructure and monitoring capacity. However, the growth and consolidation of the EGS market require that the financial sector recognize its opportunities for profitable business. Banking institutions need consultants with expertise in environmental issues who have the capacity to evaluate proposals in this area.

Pioneering firms will enjoy an initial advantage by capitalizing on market niches in metropolitan areas, as well as in rapidly growing environment-friendly markets such as natural products, certified organic agriculture, ecotourism, renewable energy, energy efficiency and certified forest products.

Independent of the size of the environmental market today, the dimension of the problems associated with water, soil and waste management in Mexico means that it will represent a large potential market. Similarly, the standards in these areas continue to evolve, and requirements that have been established have led to the emergence of niches in the EGS market (Muñoz Villarreal, 2003), including:

- equipment, inputs, laboratories and other providers of water quality analysis services;
- specialized services to produce the environmental impact and risk studies required for certain infrastructure and industrial construction;
- auditors and providers of measuring equipment for firms participating in voluntary environmental audit schemes coordinated by the Federal Environmental Protection Agency (*Procuraduría Federal de Protección al Ambiente*, or PROFEPA);
- equipment and service providers for vehicle inspection in cities with high indices of atmospheric pollution;
- service providers for the analysis of hazardous waste.

Table 5.22 shows the factors that shape the growth trends in the principal segments of the environmental market, while Table 5.23 shows estimates of opportunities for investment in environmental infrastructure in Mexico. Such opportunities are substantial (nearly US\$14.5 billion by 2010), particularly in the area of urban and industrial water treatment and, as a close second, in the area of management and disposal of industrial hazardous waste.

Table 5.24 shows estimates of the demand for environmental studies and services, including environmental impact assessments, risk analyses, environmental zoning studies, environmental audits and a variety of analytical services. As can be seen, the CPIA projections call for annual growth in demand of 3%. Since relatively little investment is required to begin a

business in these areas, they represent a particularly attractive option for small firms that have the human capital and experience in environmental issues needed to conduct such studies.

TABLE 5.23
MAJOR TRENDS IN MEXICO'S EGS MARKET

Water
<p>The market for the provision of potable water and the treatment of wastewater is the segment of the EGS market showing the greatest potential. It includes providing equipment as well as designing, constructing and operating facilities. The market is expected to grow in the coming years, due to the need to modernize and rehabilitate existing infrastructure.</p> <p>The driving forces for the growth of this market come from:</p> <ul style="list-style-type: none"> acute water shortage in some areas; loss of competitiveness for industries in areas with water shortages (e.g., Querétaro and Guanajuato); an ambitious programme to strengthen enforcement; implementation of the Drawbacks Programme (<i>Programa de Devolución de Derechos</i>, or PRODDER) to promote municipal infrastructure. <p>Constraints on development of this market come from:</p> <ul style="list-style-type: none"> low rates and numerous exceptions granted for water fees; social and political factors that limit rate adjustments; few alternatives for the re-use of treated water.
Soil and waste
<p>The growth of this market will be significant, but will depend largely on adjustments to the current regulatory framework and on effective enforcement, especially in terms of industrial hazardous waste and soil remediation.</p> <p>The driving force for the development of this market comes from:</p> <ul style="list-style-type: none"> international commitments on industrial waste, based on the Basel, Rotterdam and Stockholm agreements; the North American commitment (Canada, Mexico and the United States) to develop a Registry of Emissions and Transfer of Contaminants (RETC); an urgent need for hazardous waste disposal facilities; a high number of contaminated sites that require soil remediation; greater social pressure to clean up sites affected by mining and oil activities. <p>Constraints on development of this market come from:</p> <ul style="list-style-type: none"> the fact that soil erosion is the result of complex social and economic factors; social resistance to nearby waste-handling facilities; inadequate waste regulations and incomplete soil remediation regulations; poor enforcement capacity; lack of government incentives for the minimization, re-use and recycling of waste.
Air
<p>The segment of the EGS market dedicated to reducing polluting atmospheric emissions is already mature, and may be expected to undergo a reorientation to clean technologies (i.e., not limited to control technologies). The demand for vehicle inspection and leak elimination is expected to continue growing.</p> <p>The driving force for development of this market comes from:</p> <ul style="list-style-type: none"> regulation at the federal, state, and even municipal, levels; strong social pressure to improve air quality; growing capacity to enforce existing regulations. <p>Constraints on development of this market come from:</p> <ul style="list-style-type: none"> growing political and economic constraints on additional reductions in the energy sector; continued poor capacity for verification in the SME segment; the fact that investments in control equipment may limit the adoption of cleaner technologies.

(continues)

Table 5.23 (conclusion)

Energy efficiency and renewable energy
<p>The renewable energy market continues to be small, despite various experimental projects, particularly in the area of wind energy and photovoltaics. The demand for EGSs designed to increase energy efficiency will continue to grow, though the pace of the increase will depend to a large extent on government's commitment to include this line of strategy in energy planning.</p> <p>The driving force for development of this market comes from:</p> <ul style="list-style-type: none"> an increasing national demand for energy; a need to diversify energy sources; an increasing perception of the importance of renewable energy in reforming the electrical sector; the fact that regulatory changes covering transmission and interconnection agreements between electrical companies and independent producers facilitate the use of renewable energy sources; high potential for the installation of wind and solar plants in various parts of the country; the existence of local capacity for the research and manufacture of certain components. <p>Constraints on development of this market come from:</p> <ul style="list-style-type: none"> existing regulatory restrictions relating to electrical energy; lack of government incentives to drive the development of renewable energy; the highly politicised nature of the debate on reform of the electrical sector.
Risk, noise and vibration
<p>The future of the segment providing equipment and services to minimize environmental risks such as noise and vibration is uncertain, though accidents and the adverse impacts of industrial activity on the environment are in its favour.</p> <p>The driving force for development of this market comes from:</p> <ul style="list-style-type: none"> growing social pressure to improve the safety performance of industrial plants; enforcement of legislation governing high-risk activities. <p>Constraints on development of this market come from:</p> <ul style="list-style-type: none"> the fact that the impact of noise and vibration is currently not considered important.

Source: Carlos Muñoz Villarreal, "Bienes y servicios ambientales en México: caracterización preliminar y sinergias entre protección ambiental, desarrollo del mercado y estrategia comercial," n/d, unpublished and David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano," *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February, 2005.

TABLE 5.24
INVESTMENT OPPORTUNITIES IN ENVIRONMENTAL INFRASTRUCTURE IN MEXICO

Activity	Total investment by 2010 (millions of US dollars)	Annual operating cost (millions of US dollars)
Urban wastewater treatment	5 551	946
Industrial wastewater treatment	2 436	473
Municipal solid waste management and final disposal	728.7	1 249
Hazardous industrial waste management	3 365	5 760
Management of biological/infectious hospital waste	14.4	73.5
Public systems for atmospheric emissions control	368.5	99.8
Wind power generation	1 000	–
Photovoltaic power generation	1 000	–
TOTAL	14 463.6	8 601.3

Source: David Romo, "Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano", *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February, 2005.

TABLE 5.25
ANNUAL DEMAND FOR ENVIRONMENTAL STUDIES AND SERVICES IN MEXICO

	1995	2000	2005	2010
Environmental impact studies (1)	1 200	1 391	1 613	1 870
Risk studies (1)	250	290	336	390
Environmental zoning studies (1)	40	46	54	62
Environmental audits (1)	500	580	672	779
Analyses (2)	500	580	672	779

Source: David Romo, “Políticas e instrumentos para mejorar la gestión ambiental en la pyme y promover la oferta de bienes y servicios ambientales: el caso mexicano”, *Medio ambiente y desarrollo series*, No. 95 (LC/L.2269-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), February, 2005.

Annual growth of 3% is expected.

(1) Number of studies.

(2) Number of tests.

Finally, a number of recommendations are offered to stimulate the participation of SMEs in the Mexican environmental goods and services market:

- Fill regulatory gaps (e.g., in soil remediation and hazardous waste management), in order to create a regulatory framework that encourages demand for EGSs and helps develop the market. A solid, well-enforced regulatory framework is one of the most effective ways of encouraging development of the EGS market, since it creates a need for firms to acquire advisory services, equipment and appropriate infrastructure.
- Sectors with economies of scale should be avoided by SMEs, since large firms clearly have a great advantage in those areas.
- Establish information systems to make it possible to evaluate the market and provide sectoral assessments, especially regarding the fastest growing niches. The data should make it possible to identify growth trends, investment needs and barriers to the entry of new firms in each segment. Information reduces uncertainty, which encourages investment.
- Successfully undertaking the activity indicated in the foregoing item requires progress toward consistent definitions and categories for the EGS market.
- SMEs must specialize and be flexible in their operations, which means subcontracting services when necessary or advantageous. Subcontracting has the advantage of creating a network of SMEs that serve the environmental market and reinforce each other. Alternatively, SMEs can join the value chain of larger service enterprises.
- Networks of consulting and advisory centres such as those described here should be exploited, once they include environmental development lines. These centres can provide training for new firms and can conduct the sectoral studies referred to above.
- Create a list of SMEs offering EGSs. Here, the primary objective is to establish an up-to-date access point for EGSs. The information should be easy to access and available through industry groups.

5.6 Comparative country analysis

This section describes the third and final part of the project, and presents a comparative analysis of policies and proposals to improve SMEs' environmental management, while encouraging EGS supply and demand in all four countries.

The goal here is to provide a regional view of the phenomenon by adopting a horizontal approach to the issues and assessing them both in terms of factors common to the countries and factors specific to each. The base studies for this were carried out by specialized consultants in each country.

Finally, this document also reflects information from the third project meeting held in May 2004 in Mexico City. The meeting was attended by the authors of the studies, as well as by environmental authorities, business representatives and academics from all four countries, as well as experts from various international organizations involved in environmental policy. A discussion was held regarding the proposed policies emerging from the studies.

SMEs in the four countries share the following characteristics:

- They generate high levels of pollution.
- They have poor environmental management.
- They represent little demand for EGSs.
- They represent no significant supply of EGSs.

Shared needs

- To link industrial development of SMEs with environmental development processes.
- To coordinate SME strategies with existing clean production policies (especially in Argentina and Chile).
- To articulate different political, economic and business actors around common value chains and strategies.
- To design horizontal policies.
- To provide SMEs access to information.
- To provide SMEs access to consulting and advisory services.
- To invest in technology for SMEs.
- To create effective environmental management policies for SMEs.

Funding and microcredit: common characteristics

- SMEs are typically informal, family managed and traditional, and have little capacity to create proposals for sustainable projects.
- Sectors that appear to represent high financial risk are not eligible for credit.
- Microcredit is a viable alternative for microenterprises, but not for SMEs.
- There is a need to create, and provide incentives for, second-tier banks.

Cost-benefit analysis of the policies

All four countries have multiple problems in social, economic and political areas. Regional comparison is difficult, since analysis of the different countries reveals very different situations.

Costs

- Economic costs include investment, relocation, administration, and the cultural costs of adapting to change.
- Chile incurs “development” costs in favouring industrial parks over housing, and the State incurs “opportunity” costs by investing in SMEs rather than in other policy areas.
- Mexico faces probable increases in unemployment because of the changes produced by relocation and adoption of new technology.
- Providers will sell less of today’s polluting inputs, which will affect their revenue.

Benefits

- Environmental benefits include improvement in the environmental management of SMEs, and reduced environmental impact.
- Economic benefits include cost savings and job creation.
- Health benefits include improved health and quality of life.
- Chile will enjoy social benefits by strengthening the partnership phenomenon and increasing environmental awareness.
- In Mexico, the public image of firms will improve, and social participation will increase.
- In terms of sectoral production (brick manufacturing and leather tanning), Mexico will reduce the number of deaths, increase sales, improve agricultural land, reduce consumption of inputs, and open channels of communication with producers.

Principal conclusions and recommendations

Common factors

- Encourage a cultural change among SMEs that will make them more competitive and environment–friendly. These two changes should not be seen as “luxuries,” but as a necessity for SMEs’ production methods.
- Strengthen partnerships among SMEs, between SMEs and large firms, and between SMEs and actors in the international arena.
- Adequate environmental regulation is needed, and it must link industrial policies with environmental policy in the SME context.
- Greater dissemination of experience and information is needed.
- Differentiated financing for microenterprises and SMEs is needed.
- Second–tier banks must be developed.
- SMEs must become part of the market’s value chains.
- The State must continue playing a key role in investment, and in monitoring and command and control measures.

Argentina

- Development policy provides different treatment for SMEs based on size.
- Proposals must be framed in the context of cleaner production policy.
- Microcredit is a viable alternative.
- The current legal framework is adequate for the environmental management that needs to be developed among SMEs.

Colombia

- The necessary legal framework is already in place.
- Co–funding and cooperation must be strengthened.
- The EGS market has possibilities of emerging in key sectors: sanitation systems, solid waste management, slaughterhouses.

Chile

- Proposals must be framed in the context of cleaner production policy.
- The necessary legal framework is in place.
- What is needed is development leverage, rather than financing or microfinancing.

Mexico

- Development policy provides different treatment for SMEs based on size.
- Microcredit is a viable alternative.
- The current legal framework is adequate for the environmental management that needs to be developed among SMEs.
- Co–funding and cooperation need to be strengthened.
- The EGS market has possibilities of emerging in key sectors: brick manufacture, textiles and leather.

6. Critical factors for development of the environmental goods and services sector, and lessons learned from the national case studies

This chapter summarizes the main critical factors and specific problems involved in developing a more sustainable SME sector with better access to EGS markets. It covers all four countries studied—Argentina, Colombia, Chile and Mexico.

As the foregoing chapters have shown, SMEs are not well positioned in relation to the EGS market, though there are ways to enhance their capacities. This document focuses on identifying and analysing the critical factors in play, leaving the question of solutions for other studies associated with the project.

The analysis examines two types of critical factors emerging from the national studies, *macro* and *micro* factors.

The *macro* factors identified as relevant for the four countries are: the crisis in the SME sector; weak regulation of the sector; implications, for the SME sector, of national development strategy; lack of institutional strength to support SMEs; conditions in domestic and international markets in which SMEs must place their products; and the weakness of support at the local or municipal level.

The *micro* factors include: cultural barriers in small and medium enterprises; technological barriers to the sector's development; financial barriers (particularly lack of access to credit); and the weakness of support instruments.

The summary below reflects the situation of the countries' SME sectors, with their different types of products, the varying intensity of their environmental impact, their differing capacities for insertion in national and international environmental goods and services markets, and other factors. While there are many similarities, conditions in the four countries manifest themselves in different ways, based on information compiled in the present national studies.

An examination of critical factors leads to the conclusion that environmental issues are difficult to manage in the SME sector, and that serious problems stand in the way of sustainability. Original approaches, drawing on resources of both the public and private sectors,

are needed. Partnership and collaboration appear to be the best ways not only to achieve greater sustainability and competitiveness, but to remedy the sector's critical situation.

6.1 Macro Factors

6.1.1 First critical macro factor

The crisis in the SME sector

The national studies and summaries begin by pointing to a grave crisis in the SME sector, resulting from various structural, as well as circumstantial, factors. This situation must be the starting point for any analysis of the sector in the countries under consideration. The second phase of the study, which examined the supply of environmental goods and services, shows that the sector has little capacity to provide such products—another sign of the sector's critical condition.

Finally, the studies propose policies and instruments for developing a more sustainable SME sector in response to these deficiencies. The crisis within the sector is the first critical factor working against genuine progress toward more sustainable (i.e., clean and environmentally efficient) development, and toward successfully placing the sector's products in the environmental goods and services market.

Conclusions

First critical macro factor: The crisis in the SME sector

1. The SME sector, in all four countries studied, is in crisis.
2. The crisis is detrimental both economically and socially, since this sector has considerable importance in the countries' productive structures.
3. In the context of today's globalisation, where the role of the private sector is crucial, the formation of entrepreneurial capacity is essential—and the crisis in the SME sector makes it more difficult to encourage entrepreneurship.
4. There is no "environmental crisis" in the SME sector. Rather, the SMEs' environmental crisis is part of their more general crisis, which is economic (specifically, financial) and social (labour-related). The crisis is one of sustainability.
5. In general terms, the currently available instruments have not successfully addressed the SME crisis.

6.1.2 Second critical macro factor

Weak regulation

One recurrent theme throughout the project was criticism of existing regulation. Despite differences of perspective, there was consensus on the fact that regulations have been unsuccessful in changing the behaviour of SMEs in terms of both environment and natural resources. All of the countries studied have regulatory problems, and none has an adequate framework for dealing specifically with SMEs.

Conclusions

Second critical macro factor: Weak regulation

1. All four countries have industrial environmental regulations that affect SMEs, though the degrees of enforcement and development vary, with Mexico and Colombia being the most developed.
2. There is a tendency toward comprehensive enforcement of environmental regulations, with little attempt to discriminate in favour of SMEs.
3. The tendency is to use command and control mechanisms. Only Colombia (e.g., water rates) and Mexico employ economic instruments. At present, the effectiveness of such measures cannot be demonstrated. Indeed, as the case of Colombia illustrates, such instruments would seem to be contradictory to principles of direct regulation.
4. All of the countries have instruments to promote a more sustainable SME sector, but these have limited use and are largely ineffective.
5. None of the country studies reveals a favourable attitude regarding the current state of regulation. Demand for change is a common theme in all of the countries.

6.1.3 Third critical macro factor

Sustainable development strategy

A country's general development strategies, especially those that have been designed (explicitly or implicitly) to encourage productive growth, have a crucial effect on the SME sector. In some countries, the nature of the overall development strategy has conspired against SMEs, which have failed to reap some of the benefits associated with liberalization, new markets, currency values, low tariffs, free trade agreements, etc.

SMEs have not always been able to compete with large firms, which are better equipped to adapt to competitive conditions, have greater negotiating power and possess the capital to modernize. Many governments' policy commitments concerning global environmental demands, and market globalisation in general –to mention only two recurrent phenomena in the current field of development– have at times had a detrimental effect on the SME sector.

Thus, there is a schism between national socioeconomic development strategy and the realities of the highly diverse SME sector, which faces a range of difficulties in trying to compete for opportunities.

Conclusions

Third critical macro factor: Sustainable development strategy

1. While all four countries' environmental policies address industry, including SMEs, implementation of the policies varies widely from country to country.
2. To one degree or another, all emphasize the sustainability of the SME sector. Thus, the issue has shifted from a purely environmental one (strict enforcement of standards and other instruments) to one that takes account of economic –and, to a lesser extent, social– factors.
3. Nevertheless, these policies have not yet freed themselves from the vestiges of views present when environmental issues were first incorporated in the public agenda. This lag is responsible for current problems in policy, particularly in regard to command and control mechanisms, which SMEs are ill-equipped to address.

4. While all of the countries have some type of institutional structure for environmental issues, their effectiveness varies. The existence of a ministry or secretariat, which ostensibly is a response to the policy importance of environmental issues, is not always accompanied by true decisionmaking power, or by sufficient resources to implement regulations and controls. In Chile, where there is a single coordinating commission, sustainability policy has been more feasible. As in other countries, however, it has been handicapped by a lack of continuity, and a frequent failure to enjoy priority in the changing national economic and social context.
5. Only in Mexico is there an institutional structure exclusively dedicated to SMEs (Colombia has also shown some progress in this direction). This structure, however, does not always take sufficient account of environmental considerations. Argentina is in the process of creating an entire environmental sustainability system for industry, with specific provisions for the SME sector.

6.1.4 Fourth critical macro factor

Institutional weakness

The fourth critical factor relates to institutions, and is linked with the critical factors described above. A number of schemes have been devised to bring public policy into closer alignment with the needs of SMEs, either by direct action or through intermediaries or operators. Many of these schemes have been valuable and have shown results that could be characterized as successful. Such examples, which are worthy of emulation, are detailed in other documents.

There is substantial consensus, however, that institutions providing support of various types to SMEs—in terms of technological development, financial legislation, management capacity, labour management, environmental management, opening of markets, etc.—are weak and limited, and have inadequate technical and economic resources. Ultimately, they are ineffective, or only partially effective, in their approach to their clients, i.e., SMEs.

Thus, institutional development is a critical factor for success, requiring either the reinforcement of existing structures or the creation of new ones. It is fundamental if SMEs are to gain a more substantial foothold in the emerging environmental goods and services markets.

Conclusions

Fourth critical macro factor: Institutional weakness

1. All four countries' institutions have insufficient capacity to affect the relationship between SMEs and the environment. Their inability to deal with the issue is a general source of complaint among the actors involved.
2. Nevertheless, despite considerable experience and discussion, there is no consensus that creating new institutions is the answer (except in Chile, where an Under-secretariat for SMEs was established).
3. The most serious institutional vacuum appears to be the inability to carry out enforcement and control of SMEs, an activity which, due to the sector's specific characteristics, requires a special approach.
4. Successes that have been achieved have been the result of efforts by organizations functioning as intermediaries between government and SMEs.
5. Municipal/local authorities appear to be weak in all of the countries, in terms of their capacity to support the environmental management efforts of higher levels of government, and in the ability to create mechanisms to deal with a sector which, despite its essentially local nature, authorities find difficult to control.

6.1.5 Fifth critical macro factor

The market context

Today, markets constitute the fundamental setting for public policy aimed at encouraging the development of productive sectors. Producers, particularly private-sector producers, are primarily interested in placing and selling their products; from their perspective, nothing else comes close in importance. When international markets come into play, the issue becomes much more complex.

Thus, the market is one of the most critical factors in guiding policy or business management toward a more sustainable SME sector, since the current requirements of global markets generally impose stricter and more precise conditions than do national regulations, in terms of production conditions and the goods and services offered.

This is, in other words, a typical sustainability problem. Bringing SMEs into the environmental goods and services markets, or into environmentally demanding markets, requires measures far beyond controlling pollution or promoting energy efficiency. Market policies, investment in technological renovation, and competitiveness are all a part of the equation.

Conclusions

Fifth critical macro factor: The market context

1. All four countries' assessments reflect a general weakness of SMEs as suppliers for the environmental goods and services market.
2. Domestically, there is insufficient supply (in quantity and quality) for SMEs to gain a foothold in these markets. The major reason for this is widespread weakness in regulation. Stronger regulation could stimulate these markets.
3. In Colombia, Chile and Mexico, the supply (both from domestic and international providers) is limited. Even if greater demand were present, SMEs would not be in a position to respond, except in very specific areas.
4. While Argentina has sufficient demand, which the country's productive system is largely capable of satisfying, only export-oriented firms have sufficiently high requirements. Moreover, lax enforcement of the laws keeps demand low.
5. Contrary to what might seem to be the case, markets are not yet a factor in creating stronger and more sustainable success to the SME sector as a provider of environmental goods and services. For the present, the market acts more as a barrier than an incentive, and to the extent that opportunities exist, they are exploited by large firms.

6.1.6 Sixth critical macro factor

Weakness at the local level

One recommendation that has arisen repeatedly in forums and debates on environmental management during the last few years is that international organizations and national bilateral cooperation institutions (both governmental and nongovernmental) develop mechanisms for action at the local level (typically, municipalities and related administrative divisions). At this level (so goes the thinking) there is greater chance of achieving concrete environmental successes.

And indeed, the local level is precisely the context in which SMEs operate –generally spread throughout a local area– and the environmental impact of firms is local: felt directly by

communities located near productive sites. While a single firm may contribute only slightly to a given form of pollution, firms' contribution, in the aggregate, can be significant, with serious consequences for the surrounding local communities.

Thus, the capacity to address the problem at the local level has generally been seen as a major weakness. Nevertheless, the local level has also been regarded as one of the areas with great potential for collaboration between communities, firms and local/municipal governments, one in which cooperative (non-confrontational) mechanisms can be promoted to resolve specific problems affecting a range of social actors.

Conclusions

Sixth critical macro factor: Weakness at the social level

1. Despite awareness that local (municipal) government is key to creating a more sustainable SME sector, the local level continues to be a relative vacuum in terms of environmental policy in the countries studied.
2. The local level provides opportunities for a wide range of initiatives, based on concrete problems demanding priority funding.
3. The local level has also provided opportunities for partnership initiatives between large firms and SMEs designed to improve competitiveness, quality and sustainability. In this context, the role of local government remains limited by its failure to assume responsibility for environmental problems.
4. Federalism has acted as a brake on these efforts, with the power of state or provincial governments conspiring against greater responsibility at the municipal level.
5. Overlapping regulatory requirements are a major constraint on these efforts, and have become a problem in Mexico.

6.2 Micro Factors

6.2.1 First critical micro factor

Cultural barriers

This factor was mentioned repeatedly throughout the project and, with varying emphases, is considered important as an element that encourages microentrepreneurs and small and medium businesses to internalise the concepts of sustainable development and environmental management.

The issue goes beyond business, which is not the only party responsible for cultural barriers to a more proactive environmental attitude. Studies have revealed cultural patterns in government organizations, whereby employees tend to resist dealing with environmental issues, both as a result of traditional work arrangements that they cannot or do not wish to change, and for reasons of personal ideology or based on perceptions of professional advantage/disadvantage.

Nor are large firms always in the forefront of efforts to achieve sustainability or competitiveness. Often, particularly when they have enjoyed the advantages of a protectionist tradition, they remain conservative in many respects. As studies and surveys have shown, ideology and culture in small business has a tendency to imitate patterns in large firms.

Conclusions

First critical micro factor: Cultural barriers

1. Significant cultural barriers (education, ideology, prejudice, fear) in all of the countries impede a commitment to addressing the issue of sustainable development. Most of the issues analysed here are involved in one way or another, since they all relate to a world view that shapes thinking and action.
2. Though part of SME culture, these barriers are also present in many traditional large firms, whose thinking influences other businesses.
3. Cultural change is mentioned repeatedly in the countries studied, and is a necessary, but not sufficient, condition for significant progress, since it is only one part of the complex of problems affecting the SME sector.
4. Some countries are attempting to develop a “new SME” –more modern, more active in state-of-the-art areas such as telecommunications, clean energy and products, specialized consulting, etc., i.e., more reliant on new cultural patterns.
5. Given that public policy is not ideally suited to targeting cultural issues, business itself must mobilize to confront this issue through its organizations.

6.2.2 Second critical micro factor

Technological barriers

This factor is closely related to the foregoing one, since traditionalism and inertia often block businesspeople’s interest (especially among SMEs) in undertaking the technological renewal required for modern development. This is the case, quite apart from economic or financial problems, or lack of information, which also must be addressed if technological change is to occur.

Many factors are linked with this particular micro barrier, which is highly dependent on the context in which an SME operates. Technology is one component of the pressure created by quality-related rules and environmental regulations, market demands, availability of information, access to credit for modernization of production and operations, etc.

Conclusions

Second critical micro factor: Technological barriers

1. An SME sector that is more sustainable and better able to compete in the environmental goods and services market cannot exist unless it is oriented to better technological solutions.
2. End-of-pipe and clean production solutions can coexist, especially since the latter are not always available.
3. Technological change in individual firms is not enough. There must be public policy mechanisms to stimulate broader efforts at the sectoral and local levels.
4. The lack of technology information available to SMEs places them in a poor position to find solutions.
5. When it comes to collaborative efforts to establish a more sustainable and competitive SME sector, other barriers, such as cultural and financial ones, are also part of the problem.

6.2.3 Third critical micro factor

Financial barriers

Here, elements related to financing—a key component of success in the EGS market for SMEs—are examined. The problem is common to all of the countries studied. Recognized as a crucial factor in developing the sector, it has been addressed (with differing nuances) at the policy level.

Conclusions

Third critical micro factor: Financial barriers

1. Financing is clearly one of the most frequently cited issues in relation to the problems of SMEs, and is pointed to as the primary reason for the sector's worsening state.
2. The financial crisis is a major obstacle to sustainable development and modernization of SMEs in all of the countries, since, despite new regulations and market opportunities (especially foreign), it impedes progress.
3. While all of the countries are actively considering policies to finance the SME sector, there is scepticism concerning the effectiveness of the policies.
4. Instruments for financing more sustainable activities are infrequently used in the countries, due to weak regulation, generally accompanied by lack of interest on the part of producers.
5. In collaborative efforts to carry out the financial adjustments needed to ensure a more sustainable and competitive SME sector, other barriers, such as cultural and technological ones, are part of the problem.

6.2.4 Fourth critical micro factor

Weak instruments

Here, a number of concrete cases, in which both regulatory and development instruments have operated effectively to support SMEs, are examined. Though such instruments are often feasible, this area of action remains largely unexploited.

The choice of instruments, which vary in type—based on regulation, technological change, soft credits and funds, certification, etc.—is dictated by the various factors discussed above.

Conclusions

Fourth critical micro factor: Weak instruments

1. Though varying in their degree of development, instruments exist in all four countries. Some have succeeded, while others have failed.
2. The question of instruments is clearly secondary to the major issues, such as adequate regulatory frameworks (laws, institutions), setting of appropriate objectives for the instruments (access to international markets, compliance with environmental norms, increased competitiveness, overcoming crises), etc.
3. While instruments may not be the solution—given the complex problems facing SMEs—there is clearly a need for them. General regulations are not sufficient, as shown by experience in various countries in which, despite an abundance of rules,

enforcement is unfeasible, thus leading to a situation in which SMEs are devalued by the public at large and by business sectors that do comply.

4. There is an enormous need for comprehensive policies that encourage sustainability through an integrated approach to economic, social and environmental issues.
5. In this respect, it is the local level that is most lacking in rapid, articulated and decentralized policy instruments aimed at giving the SME sector a better environmental profile and making it more competitive, particularly in environmental goods and services markets.

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