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**recursos naturales e infraestructura**

**R**enewable energy and energy efficiency in Latin America and the Caribbean: constraints and prospects

Hugo Altomonte

Manlio Coviello

Wolfgang F. Lutz



NACIONES UNIDAS



Division of Natural Resources and Infrastructure

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## Summary

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In Latin America, energy efficiency and renewable energy offer great potential for reducing the negative effects of the ever-increasing rates of energy consumption associated with economic growth and the move towards more energy-intensive societal models.

Despite over two decades of discussions aimed at giving energy efficiency and renewable energy more prominent positions in the energy policies of Latin American countries, little has been achieved so far. The fact that these issues have not been integrated into energy policies reflects, to a certain extent, a failure on the part of public policy making and international cooperation to incorporate sustainable patterns of development.

One of the factors underlying this state of affairs has to do with the behaviour of society as a whole. This phenomenon has a number of different facets: (i) individual versus collective behaviour; (ii) a lack of political will on the part of Governments, which is often combined with a lack of knowledge, ideology, perceptions or a lack of public support and the predominance of a liberal economic doctrine that hampers sustainable development in the energy sector; (iii) the market power and dominance wielded by electricity, gas and oil companies; and (iv) changes in the organization of energy production chains, in conjunction with the introduction of pricing and fiscal policies applying to both electrical power and fuels that have various implications for energy efficiency and the market penetration of renewable energy.

This publication demonstrates that there are a number of cultural and institutional reasons for the “relative failure” of sustainable energy development in Latin America. These factors are true not only of Latin America but of the developing world in general. There tend to be three types of barriers to energy efficiency and renewable energy, which can be summarized as follows:

- **Economic:** In the case of renewable energy sources, the primary task is to achieve a competitive position in a liberalized energy market. For electricity generation, it has been shown that it will be difficult to make renewable sources competitive in the short run if the only points of comparison with conventional fossil fuel technologies are investment and the average cost of electrical power generation, i.e., if the externalities of conventional energy sources are not taken into account.
- **Financial:** There are four main types of steps that Governments should take to enable private financial agents or State enterprises to invest in energy efficiency and/or renewable energy sources: (i) establish clear and stable market mechanisms within the framework of a regulatory system designed to reduce investment risk (Based on the assumption that projects will need to become competitive at market prices, an attempt should be made to reduce market risk by concluding long-term purchase contracts with appropriate payment guarantees, such as those used in the PCH-COM programme for small hydroelectric stations in Brazil); (ii) serve as a vehicle for national development banks; (iii) establish systems for providing guarantees for credits extended to small and medium-sized enterprises; and (iv) pass legislation that will free business enterprises from the risks posed by the legal or tax contingencies that currently hamper their operations.
- **Political:** Once energy efficiency and renewable energy sources are recognized as a political priority, the fundamental question is whether public-sector action is required to solve the problem and, if so, to what extent. Political acceptance of the idea that energy resources should be used efficiently does not automatically mean that the State must intervene in the energy sector. The general idea is that State intervention is justified if the costs of intervening (real cost plus externalities) are less than the costs of not intervening. If the costs of intervening are less than those of inaction, Governments should assess the extent to which intervention is politically feasible. In seeking to generate support from social and economic stakeholders, coalitions should be formed to support such policies by involving social interest groups that advocate the aims of the proposed intervention. This is what has happened in Europe, where environmental considerations have become increasingly important and public demands have resulted in political intervention and programmes.

The findings of this study indicate that energy efficiency and renewable energy sources have not been mainstreamed into the energy policies of most Latin American countries. Three different avenues of research were used. The first was to analyse the situation from an “agenda-setting” approach; the second was to examine the discourse of the officials responsible for energy policy; and the third, and perhaps most important, was to look at the public funds allocated to agencies, programmes and other activities relating to the promotion of energy efficiency and renewable energy. In this last connection it was found that, with few exceptions, State budget appropriations and the amount of public funds allocated to public and/or private specialized agencies for the promotion of energy efficiency and renewable energy is marginal and, in some instances, non-existent.

The above notwithstanding, the National Commission for Energy Conservation (CONAE) of Mexico is a case that merits further mention. With a 2001 operating budget of US\$ 6.3 million, CONAE succeeded in saving an estimated US\$ 360 million worth of energy, that is, 57 times its

budget. Another outstanding example is the National Electricity Conservation Programme (PROCEL) in Brazil. Using US\$ 318 million in authorized investments between 1995 and 2000, PROCEL achieved savings of more than 10 TWh in electricity consumption, thereby averting the need for more than US\$ 1.5 billion in investments.

The following measures are considered necessary in order to mainstream policies on efficient use and renewable sources of energy:

- Separating actions and policy instruments for efficient energy use from those relating to renewable energy. It would seem appropriate to design converging instruments and actions but they should at the same time be autonomous and independent, inasmuch as the strategic objectives and actors on which such policies are intended to have a timely and positive impact are completely different. In addition, the measures relating to pricing policies, fiscal incentives, regulations and market structure which Governments can implement are different as well.
- Integrating regulatory instruments and the national energy policy as part of a comprehensive approach. A regulatory framework or law cannot be effective unless they are firmly grounded in the country's energy policy and are backed up by an institutional structure that serve their purposes, together with a range of appropriate instruments, programmes and funds. The point of discussion should not be whether or not it is appropriate to pass legislation but rather which concrete issues warrant legislation and what would be the best way of designing and applying it.
- Establishing a medium-term horizon for the achievement of results. In many cases, there has been a lag between investments in energy efficiency programmes and the production of tangible results. This would appear to suggest that programmes for promoting energy efficiency and renewable sources involve substantial lead time and thus medium- or long-term time horizons for the achievement of visible results.
- Building upon existing international agreements on climate change and renewable energy sources. Governments should take advantage of forums such as the Latin American and Caribbean Initiative for Sustainable Development, which was presented and adopted at the first special meeting of the Forum of Ministers of the Environment of Latin America and the Caribbean. Such forums could provide an opportunity to expand the agenda for discussion to include issues that encompass the design of a joint regional proposal aimed at identifying a strategic positioning for Latin America with regard to the different future scenarios for the global carbon market, with or without ratification of the Kyoto protocol.

The Latin American and Caribbean Initiative and its possible related activities can open up an important opportunity for the countries of the region, since it is the first concrete effort to coordinate and harmonize the different approaches and interests of the countries of the region in terms of sustainable energy sources with a view to a synergetic and mutually beneficial exploration of the possible opportunities that would arise within those various future scenarios.



## Introduction

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Sustainable energy options have traditionally been marginalized, but the reasons for this have changed over the last 30 years. During the 1970s and 1980s, governments and international financial institutions were mainly concerned to expand the energy supply in the interests of economic and social development. This was the era of guided planning, State control and ownership of an energy industry that was coordinated from the centre, and major infrastructure projects such as dams, power stations, transmission lines and rural and urban electrification. In practice, little thought was given to energy efficiency or decentralized generation from renewable energy sources.

In the 1990s, the new energy-sector paradigm for governments was organizational efficiency. This was inspired by the economic policy of the Washington Consensus<sup>1</sup> and backed by international financial institutions, and it resulted in the privatization of formerly State-owned energy firms and in full or partial deregulation of energy markets in most of the Latin American countries. Once again, final-user energy efficiency and renewable energy sources were not a priority of policy makers, whose main objectives were: (i) at the macroeconomic level, to balance the public-sector accounts by eliminating the financial deficits of State enterprises; (ii) at the sectoral level, to make systems more reliable, improve production efficiency, bring in private-sector financing and protect consumer interests. The general approach was to reverse the integration of the

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<sup>1</sup> The set of political and ideological objectives known as the Washington Consensus consists of five main pillars: macroeconomic stabilization, the market as a synonym for efficiency, State subsidiarity, a greater role for the private sector and new forms of participation in the international financial system.

industry. Privatization was pursued in the interests of sectoral efficiency, regulatory and commercial functions were separated and, subsequently, a business focus was introduced instead of the public service culture that had prevailed under the previous model.<sup>2</sup>

In different periods, then, but particularly in the 1990s, the financial aspect became the driver of reform as prices and tariffs generally were adjusted and enterprises were incorporated as an essential preliminary to privatization. However, a number of efforts were made “on the ground” to promote energy efficiency, often with international assistance. The best known examples include the energy conservation programmes of the National Commission for Energy Conservation (Comisión Nacional para el Ahorro de Energía-CONAE) in Mexico, the National Electricity Conservation Programme (Programa Nacional de Conservação de Energia Elétrica-PROCEL) in Brazil, the Energy Saving Programme (Programa de Ahorro de Energía-PAE) in Peru and programmes financed by multilateral banks and under the bilateral cooperation arrangements of the European Commission.

Only a few of these programmes have achieved substantial results, and then often only in particular sectors or niches. One general problem encountered was and is the lack of a “facilitating environment” that would enable such programmes to fulfil their potential. There seem to be two essential reasons for this: the absence of an appropriate political, regulatory and institutional framework and poor implementation of existing programmes and legislation.

One essential precondition is the “political will” to take energy efficiency and renewable energy sources seriously. While energy efficiency and renewable energy are at least partially integrated into mainstream energy policies in Europe (and in the OECD countries generally), the same is not true of Latin America. It has to be asked why this “political will” is lacking, or why the societies of Latin America —and hence energy policy makers there— are not really interested in energy efficiency and renewable energy.

The aim of this study is to analyse the success or failure of efforts to mainstream energy efficiency and renewables into the energy economy and energy policies in the light of different factors that include: the general policy framework, dominant paradigms and priorities, socio-economic indicators, the organization of societies and markets, demography and political culture.

To this end, the first chapter looks at the determinants of consumption functions in the light of three different theoretical approaches, and considers the economic, financial and regulatory barriers to the spread of renewables and energy efficiency. The second chapter is a comparative analysis of energy intensity patterns in Latin America, which are compared with those of the developed countries with a view to encouraging improvements in energy productivity both in manufacturing industry and in society at large.

The third chapter summarizes the results attained by the energy efficiency and renewables programmes implemented in different countries of the region. The fourth chapter, lastly, offers proposals for improving energy efficiency and renewable energy policies.

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<sup>2</sup> See F. Sánchez Albavera and H. Altomonte (1997).

# **I. Energy consumption and obstacles to energy efficiency and the use of renewable sources**

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## **A. Energy demand and consumption**

In seeking to ascertain the determinants of consumption patterns as factors that explain or condition energy efficiency and the extent to which renewable sources are used, demand can be analysed from three points of view:

- The first approach will consider whether there is any scope for influencing the pattern of demand and, if so, how and with what policies and instruments. This issue can be considered either in general terms or with a more specific focus on the situation in the Latin American countries. For these countries, the OLADE/ECLAC/GTZ energy and sustainable development project has suggested appropriate policies and instruments.<sup>3</sup>

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<sup>3</sup> OLADE/ECLAC/GTZ Energy and Sustainable Development in Latin America and the Caribbean project. See particularly OLADE/ECLAC/GTZ (2000) and OLADE/ECLAC/GTZ (1997).

- The second approach will look at political agenda-setting and design, i.e., will consider whether there are sustainable energy policies in Latin America or not, and whether there are countries that have mainstreamed such policies into their energy policy framework and/or initiatives to change existing situations.
- The third approach will explore situations where energy efficiency and renewable energy policies and programmes do exist, considering whether they have been implemented successfully or not and what indicators are used to define success and failure.

## **1. The determinants of demand**

It seems best to base the analysis and study of demand on two foundations: (i) a critical appreciation of Wilhite's postulates (2000) regarding the "construction of energy demand" and (ii) an empirical analysis of the actual achievements of energy efficiency policies both in the industrialized countries and in Latin America.

It is necessary to ascertain whether the level of energy consumption can be influenced by traditional instruments based on individual behaviour and technological solutions, or whether consumption behaviour is really autonomous and associated with prevailing lifestyles.

There is also a need for better qualitative and quantitative knowledge of the factors underlying the "relative success" of policies and instruments in the industrialized countries as compared with the "relative failure" in developing countries generally and Latin America in particular.

It is likewise important to demonstrate the validity of the conclusions reached by the OLADE/ECLAC/GTZ project as regards the prospects for "moving the energy system forward so that it can raise its productivity, become fairer and less vulnerable, produce fewer emissions, use natural resources in a more balanced way and more sustainably over time and make even greater use of renewable resources".<sup>4</sup>

As for other relevant factors such as urbanization, there is a need for more thorough research into the effects that the concentration of people and economic activities in urban areas has on the development of sustainable energy supply and demand patterns, particularly as regards decentralized energy systems working in conjunction with the commercial operations of energy companies.

Regarding the lifestyles that predominate in urban areas, it is necessary to ascertain whether they actually are an obstacle to the attainment of sustainable energy consumption patterns and the spread of decentralized energy supply options (based on renewable energy). This requires more thorough study of the concept of lifestyle as a determinant of energy consumption and consideration of different options to see if there are any realistic alternatives to an energy-intensive lifestyle like that of the West.

## **2. The political agenda**

According to the literature, there are several factors that determine whether an issue moves to the centre of national debate and on to the political agenda. While the inclusion of subjects on the agenda may result from the concerns either of society (by social class or groups) or of government, the interaction of these two actors may depend on (i) the nature of the subject and its effects on society as a whole or certain groups in it only, and whether it is perceived as chiefly a

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<sup>4</sup> Op. cit.

technical issue or as an ethical, political and social one; (ii) the political system: liberal, pluralistic, totalitarian or corporatist.

The factors determining whether an issue reaches the agenda may be cultural, political, social, economic or ideological. It seems that both the ideological context and the institutional one are crucial in determining whether certain subjects reach the agenda (Howlett and Ramesh, 1995). Agenda-setting theories include King, Hofferbert and Simeon's funnel-of-causality model, Cobb, Ross and Ross's policy initiation models and Kingdon's windows-of-opportunity model.

Empirical observation reveals that, with few exceptions, Latin American countries do not have sustainable energy policies and there are virtually no initiatives afoot to change this, since the contexts within which policy operates prevent the subject from reaching the political agenda.

It is therefore interesting to analyse these contexts, not only as they are now, but in their historical development and the alterations they may undergo as the factors referred to above change in future. Analysis of the few successes that have been achieved should serve, therefore, to confirm the specific explanatory capabilities of the different models.

A good approach seems to be to use the agenda-setting theories mentioned above to consider how energy efficiency and renewable energy have (or have not) been mainstreamed into the energy policies of the Latin American countries.

Regarding the "lack of political will", it is important to ascertain whether the reasons for this have to do with ignorance, ideology, social perceptions or lack of public support, and to what extent the predominance of liberal economic doctrine hinders or helps sustainable development in the energy sector.

It is necessary, likewise, to identify the cultural and institutional reasons for the "relative failure" of sustainable energy development in Latin America and to determine whether this is something specific to the region or is a developing world phenomenon.

Again, it is particularly crucial to understand how far the power or dominance exercised over the market by electricity, gas and oil companies has hindered and is hindering the spread of demand-side management and decentralized power generation based on cogeneration and renewable energies.

Latin America's contribution to the problem of global climate change is small, as the region produces only 5% or so of world greenhouse gas emissions. As against this, Latin America suffers from severe pollution problems in large cities and many poverty-related local environmental problems in the countryside. This opens up another interesting field of analysis since, on the face of it, it might be concluded from these observations that (i) the "driving force" behind energy efficiency policies should be local pollution problems rather than the problem of global climate change, and that (ii) poverty elimination or reduction is essential for preventing environmental damage so that more sustainable energy consumption patterns can be fostered.

During the 1990s, the Latin American energy sector experienced an unprecedented influx of foreign capital, first because of foreign direct investment associated with the privatization of State enterprises, then later because of new projects and the modernization and restructuring of privatized companies (Altomonte, 1998). While a stable regulatory framework is an important condition for attracting further foreign investment, investors generally prefer less demanding environmental standards.<sup>5</sup> The question is whether regulatory agencies in the Latin American

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<sup>5</sup> By and large, foreign investors and businesses in the energy sector are in favour of regulation insofar as it makes their activities easier. Some businesses that still stick to the "public service" approach in their home countries seem less keen on applying this philosophy in their Latin American markets.

countries are willing or able to regulate effectively so that operators are required to comply with their environmental and social obligations.<sup>6</sup>

Again, it is important to look more closely at the influence exerted on the energy policies of Latin American countries by multinational energy companies and, more generally, by the globalization process, to gauge how far energy efficiency and renewable energy issues have really been incorporated into these policies.

One of the most important debates is that which concerns the role of international cooperation (both multilateral and bilateral) in encouraging energy efficiency and renewable energy and the mainstreaming of these into the energy policies and systems of the Latin American countries; likewise, there is a need to evaluate the role of international organizations, among them IMF, the multilateral banks and UNFCCC, in energy sector organization.

Generally speaking, there are too few actors with an interest in environmental issues, which makes it difficult to create coalitions to pursue these. In Latin America, the problem seems to be compounded by institutional weaknesses (including the lack of intermediate organizations) and a culture which does not encourage the pursuit and creation of consensus among public-sector, private-sector and civil society actors.<sup>7</sup> Against this background, it is worth asking what influence the United Nations Framework Convention on Climate Change and the flexible Kyoto mechanisms will have on energy efficiency and renewables policies, programmes and projects in Latin America.

### **3. Energy efficiency programmes and institutional frameworks**

With this last analytical approach, the central question is whether the institutional frameworks that generally exist in the Latin American countries are conducive to the implementation of energy efficiency policies and programmes. It is important to distinguish between institutions, which are society's ground rules, and organizations, which act within the rules set by institutions. North (1990) maintains that organizations are created and develop as a consequence of the institutional framework and drive institutional change through their interaction with this framework.

The right approach, therefore, is to orient the discussion of success or failure in the implementation of energy efficiency and renewables policy by the "institutional economy" theories originally formulated by North. Here we shall analyse three aspects on this basis:

- It becomes more important to have efficient institutions as transaction costs rise. The promotion of efficient energy use and, to a lesser degree, renewable energy sources entails large transaction costs.
- Efficient institutions are vital when the information available is incomplete, as is characteristically the case with the promotion of energy efficiency and renewables.
- The third aspect is whether or not the institutional framework provides incentives for organizations whose business it is to foster energy efficiency and renewable energy.

It will be important to ascertain the quality of implementation of existing energy efficiency and renewable energy programmes in Latin America and to identify the factors involved. Comparative analysis with programmes in other areas, such as the environment, is also important.

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<sup>6</sup> It seems that so far Latin American policy makers have not been willing to subject operators in the market to conditions that would strengthen energy efficiency and renewable energy obligations.

<sup>7</sup> The existence of a strong middle class, which is generally supportive of environmental issues, has been a key factor in the acceptance of these issues by policy makers in Europe. Citizens who are able and willing to make the connection between their environmental concerns and their daily lives are a crucial factor in bringing environmental issues into policy-making. The rise of the

Notwithstanding, the claim that “the shortcomings in actual implementation of efficient energy use and renewable energy policies, laws and programmes in Latin America are due to the ineffectiveness of institutional frameworks” needs to be examined critically. There may be other reasons that need to be identified and examined, for example economic factors, which may include the comparative pricing of different energy types and the treatment of externalities, among other things.

In the view of many authors, both the centralized organization of some governments in the region and the high level of poverty in most countries<sup>8</sup> are an obstacle to implementing decentralized energy options such as energy efficiency and renewables. Meanwhile, energy companies in Latin America do not seem genuinely interested in energy demand management. It is therefore worth asking whether, in cases where they are actually involved in this, this might not be for publicity purposes or because it is a condition of funding by international institutions such as GEF, for example.

In many of the region’s countries, the lack of grass-roots democracy and civic participation and culture often means that decision-making in the energy sector is left entirely in the hands of central government and energy companies. This being so, a crucial issue is the potential role of the so-called “information society” in terms of how effective it might actually be in involving citizens more actively in decisions affecting their energy supply and consumption. It is widely believed that democratic reforms and the information society could foster the decentralization of the energy sector and the development of intermediate organizations based on strengthened democratic institutions. This is the focus of the European Commission’s foreign policy towards Latin America (European Commission, 2000).

Lastly, it needs to be asked whether, in Latin America, the lack of a sense of “community” and a culture of consensus is blocking acceptance of legal rules and the emergence of voluntary agreements among governments, economic actors and consumers.

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green movement and the subsequent inclusion of environmental issues on the agendas of mainstream political parties in Europe illustrate this well.

<sup>8</sup> That is, the priority that has to be given to meeting basic needs, combined with the high cost of efficient and renewable technologies.

## II. Obstacles to the spread of sustainable energy use

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On the whole, the obstacles to the implementation of energy efficiency and renewable energy measures are well documented. Lutz and others (2001) and Laponche and others (1997) divide these obstacles into five types: technical, economic, financial, legal and institutional. This approach, focusing on specific obstacles, often forms the basis of government policies, programmes and other measures to promote efficient energy use and renewables. It has supposedly resulted in successful policies for efficient energy use and renewables in the industrialized countries.

In Latin America, as in other regions of the developing world, there is no such successful experience, at least not on the scale of Europe, Japan and, to a lesser extent, the United States. One explanation may be that the countries of the South, being less developed economically, are not in a position to involve themselves with policies and programmes of this type (something normally put down to a lack of political will), given their other priorities and the constraints on their economic and financial resources.

In this paper, it is economic, financial and political obstacles that are viewed as the greatest constraint on the spread of sustainable energy uses in the region.<sup>9</sup>

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<sup>9</sup> Issues of a regulatory and institutional nature will be dealt with specifically in Chapter V.



## A. Economic obstacles

In the particular case of renewable energy sources, the primary task for the future of the industry involved with these is to attain competitiveness in the liberalized energy market. For electricity generation, this objective will not be easy to achieve in the short term if investment and average generating costs are the only points of comparison between technologies using conventional fossil fuels and those using renewable sources.

It is clear that the costs of renewables are substantially higher than those of fossil fuels. Thus, for example, it costs twice as much to generate 1 kWh from biomass as from natural gas, and the investment required is three times as great per MW installed (table 1).

**Table 1**  
**AVERAGE GENERATING COSTS AND INVESTMENT**

Technology	Average generating cost <i>(United States cents/kWh)</i>		Average investment <i>(United States cents/Watt)</i>	
Gas combined cycle	3.5	(3.0-4.0)	0.6	(0.4-0.8)
Coal	4.8	(4.0-5.5)	1.2	(1.0-1.3)
Nuclear	4.8	(2.4-7.2)	1.8	(1.6-2.2)
Wind	5.5	(3.0-8.0)	1.4	(0.8-2.0)
Biomass (25 MW combustion)	6.5	(4.0-9.0)	2.0	(1.5-2.5)
Geothermal	6.5	(4.5-8.5)	1.5	(1.2-1.8)
Small hydroelectric plants	7.5	(5.0-10.0)	1.0	(0.8-1.2)
Photovoltaic	55.0	(30.0-80.0)	7.0	(6.0-8.0)

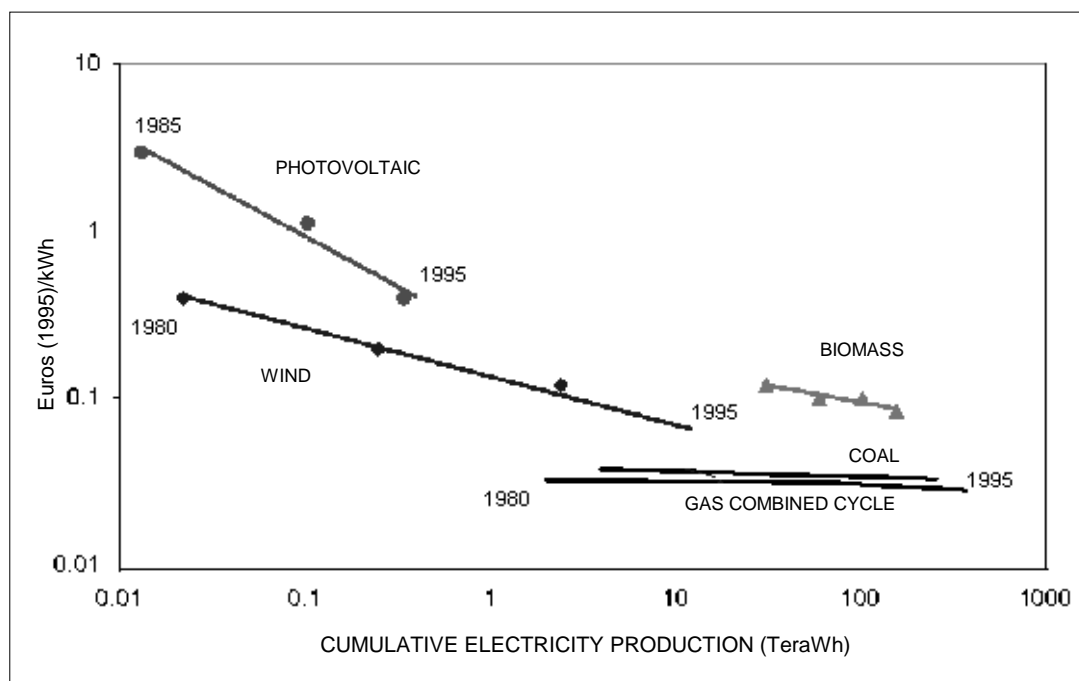
**Source:** "Fuentes renovables de energía: análisis del entorno internacional y propuestas para su penetración sostenida en los países de América Latina y el Caribe", Recursos Naturales e Infraestructura series, ECLAC (at press).

Various authors anticipate a large reduction in the costs of renewables over time as the industry moves along the learning curve. This curve represents the concrete outcome of the "learning by doing" process as a particular technology is applied on an industrial scale. For mature technologies, the learning curve is normally horizontal.

The experience of the European Union in this area (see figure 1) is promising, but there is clearly a long way to go before "competitive economic equilibrium" with fossil fuels is reached. In Europe at least, the situation seems to be that the cost of wind energy has dropped and generating capacity has risen enormously, while in the case of photovoltaic energy the unit cost has fallen by much more than power output has risen.

From the economic point of view, therefore, the question is how far the costs of renewables can actually be brought down, and over what time period.

Figure 1  
ELECTRICITY TECHNOLOGIES IN THE EUROPEAN UNION (1980-1995)



Source: "Fuentes Renovables de Energía: análisis del entorno internacional y propuestas para su penetración sostenida en los países de América Latina y el Caribe", Recursos Naturales e Infraestructura series, ECLAC, at press.

## B. Financial obstacles

As has been amply demonstrated by the success of some recent experiences in industrialized countries,<sup>10</sup> the role of governments and proactive public policies is of vital importance in helping companies tap the financing sources available.

In Latin America, of course, this role ought to be very different from what it was in the past, when efforts to promote the development of alternative sources were confined solely to information and demonstration projects and no steps were taken to implement mechanisms that would actually have fostered permanent, systematic economic activity in this field.

Gomelsky (2003) suggests that there are four essential functions which governments ought to perform so that private-sector financial agents or State enterprises can invest in clean technologies. These are:

- Use the regulatory framework to establish clear, stable market mechanisms that help lower the risk investors are required to take on. This means that investors can work with lower rates of return, so that more ventures can be financed and the providers of credit lines have the necessary guarantees. Setting out from the basis that projects ought to attain competitiveness at market prices, the need is for pricing mechanisms to be clear and stable and for market risk to be reduced by means of long-term energy procurement contracts with appropriate payment guarantees, as is shown by the example of the PCH-COM programme for small hydroelectric stations in Brazil.

<sup>10</sup> Particularly Germany, Italy and the Netherlands.

- Act through domestic development banks to provide a vehicle for channelling international resources, setting up joint credit lines with multilateral or bilateral financial institutions which will be operated by the domestic banking system.
- Create guarantee systems for bank financing provided to the small and medium-sized enterprises that are usually the ones implementing clean technology projects.
- Draft and enact legislation to free companies in this sector from the risks posed by the legal or tax contingencies that currently hamper their operations because of inconsistencies with current tax laws, something that in turn makes it harder for them to draw on venture capital and other financing sources.

Within the general framework thus created by governments, companies working with clean technologies will be able to tap into financing from multilateral and bilateral organizations operated by the private-sector banking system in the form of special credit lines. Subsequently, their own banks will gain greater knowledge of this business and will feel more confident and enthusiastic about financing operations of this kind from their own resources.

International capital too may flow in larger quantities to the countries in the area when their economies recover and country risk levels are lower.

Good intentions aside, however, the fact is that public- and private-sector organizations, particularly in developing countries, have gradually become less enthusiastic about applying to international funds for cofinancing of their renewable energy programmes, owing to the complexity and delays involved in drafting proposals and, in many cases, the small likelihood that these will be approved.

The efforts made by the European Commission to include the private sector (through its Synergy, Alure and Save programmes, among others) have not yielded satisfactory results. The leverage of public-sector resources under these programmes has barely exceeded a ratio of 1:1. This is mainly because the time horizon for financial support under these programmes (two or three years) is too short to meet the temporal and financial needs of private investors.

The need now is to identify new public-private partnership mechanisms so that public resources, both international and local, can be used more efficiently and effectively.

A major effort should be made to refocus attention away from project-based structures and towards business-based ones in order to create new confidence in the viability of initiatives once the public support stage is over.

The concept of “risk versus return”, in fact, is probably the main factor preventing the renewables sector from opening up to greater public- and private-sector investment and thence to the implementation of operational projects, not just in Latin America, where the problem is very far-reaching, but also in the developed countries.

The greatest risks for private investment in renewable projects are political uncertainty and the commercial hazards involved in renewable resource exploration activities and the industrial development of plants to turn these resources into energy.

Politically, private investors cannot be confident about the permanence of particular regulations or the extent to which commitments agreed by governments and State agencies will be honoured (legal security).

Commercial risks are basically connected with the availability and reliability of information, i.e., the quantity and quality of the resource: wind, sunlight, timber, cane products, organic residues, geothermal steam, etc. This information is used to gauge the characteristics of the

“potential renewable business” and thence the financial viability of investments, and its reliability is crucial in determining whether the margin of investment risk is acceptable.

The ultimate objective is therefore to have enough relevant information available to be able to determine the design characteristics of an electricity generation plant, including aspects such as its working life, generating capacity, the reliability of resource availability and the sustainability of operating yields.

Foreign investors currently have a variety of mechanisms available for covering political risks. These are normally administered by specialist agencies in developed countries: export agencies, the Overseas Private Investment Corporation (OPIC) in the United States, multilateral agencies (Inter-American Development Bank and World Bank guarantee programmes such as the Multilateral Investment Guarantee Agency, or MIGA) and private-sector insurance companies (American International Group Inc. and MBIA Inc., among others).

As the market stands at present, however, there are no mechanisms covering the commercial risks associated with exploration and implementation of renewable projects. The countries of the region should jointly endeavour to create a regional instrument that can respond effectively to this pressing need.<sup>11</sup>

### C. Political obstacles

In Latin America, “lack of political will” is often cited as one of the main reasons for the shortcomings of public policy-making in this area. If it is the case that governments in Latin America lack this political will, though, the question arises as to why this is the case.<sup>12</sup>

Can the “lack of political will” be put down to ignorance or is it rather that the subject is deliberately avoided owing to the predominance of non-interventionist economic paradigms? Or is it instead that the instruments needed to turn this will into practical action are lacking? Is Latin American society ready to develop a sustainable development culture? What does public opinion have to say?

It is important to note at the outset that political will for public-sector intervention must be rooted in the perception of a problem. In the area of energy, typical problems include:

- a shortage of energy resources;
- the effects of the energy bill on the balance of payments;
- damage to the environment;
- social demands concerning energy prices or environmental protection;
- ideological convictions;
- international pressures and agreements concerning, for example, trade, regulations and emission cuts.

Once the subject has been recognized as a political priority, the fundamental question is whether public-sector action is required to solve the problem and, if so, to what extent. Political acceptance of the idea that energy resources should be used efficiently does not automatically mean that the State must intervene in the energy sector. The general idea is that State intervention is

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<sup>11</sup> For more details of this argument, see the document “Fuentes renovables de energía: análisis del entorno internacional y propuestas para su penetración sostenida en los países de América Latina y el Caribe”, Recursos Naturales e Infraestructura series, ECLAC (at press).

<sup>12</sup> See Hugo Altomonte, “Presentación Seminario RIES”.

justified if the costs of intervening (actual cost plus externalities) are less than the costs of not intervening.

Once the need for State intervention has been demonstrated, governments need to gauge how politically feasible it is. It is probable that few public authorities are willing to intervene in the market unless they are assured that there is substantial support for this in society. In seeking to generate support from social and economic stakeholders, coalitions should be formed to support such policies by involving social interest groups that advocate the aims of the proposed intervention.

Here, social support, as manifested by public opinion, obviously plays a very important role. An interesting example of this is the way environmental considerations have gained greater and greater importance in Europe and social demands in this area have translated into political programmes and action (Correljé, 1998).

Looking at the experience of many European countries (see box 1) and analysing the Latin American situation, it may be concluded that Latin America is still at a stage of development characterized by growth in individual consumption and thus in energy use.

#### Box 1

#### ENERGY VERSUS ENVIRONMENT: THE EUROPEAN EXPERIENCE

In Europe, environmental considerations have been taking on greater and greater importance, and in some countries in Northern Europe environmental aspects and effects—such as sulphur emissions and other negative environmental impacts resulting from energy use—are regarded by society as problems of the first order. Consequently, environmental issues have gradually been gaining ground in society as a whole and have not only been included in the agendas of the more traditional political parties (and not just those of the “green” parties) but have been addressed with political programmes and specific action plans.

In the rich countries, a growing percentage of the population perceive their quality of life as a combination of economic prosperity and good environmental living conditions, and this concern with environmental issues has been the result. It can be argued that this increased concern is related to the relative decline of polluting industries and the growing importance of the service sector in the economy, in that “smokestacks” are no longer associated with economic growth and social welfare.

The “new industries”, by contrast, are sited in environmentally clean areas, and thus help increase social pressure for a “clean” environment.

This development contrasts with the situation in the countries of Southern Europe, where national economies still rely on less productive industries. In these countries, concern about the environment—and about energy saving—is less prevalent in the population as a whole. The ability to acquire “luxury” goods that consume a lot of energy (such as cars, household electrical appliances and air conditioning and heating equipment) represents “success” in society.

Consequently, in those countries where the watchword is “economic growth first, the environment second”, energy saving goals are less politically feasible. Because of their institutional, political and social structures, furthermore, it is not easy to create coalitions to pursue environmental issues. Owing to their recent entry into the European Union, indeed, these countries are concerned above all with issues like economic restructuring and international competitiveness.

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**Source:** Prepared by the authors on the basis of ECLAC/European Commission (2002): “Energy Technology Market Mechanisms in Europe in the Framework of the OPET Network”, annex 15, Informe final: Proyecto CEPAL-Comisión Europea “OPET-Mercosur”, August.

### **III. Patterns of energy consumption: an open debate**

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The term “demand-side management” has replaced the “energy conservation” of the late 1980s as a catch-all term for the science and politics of energy demand reduction. The social sciences dealing with energy long confined themselves to analysing the behaviour of the final consumer, with energy analysts viewing human action as central in the control of energy systems, and thence in the saving and efficiency processes.

As this technical and empirical view of energy consumption mechanisms has been corrected by incorporating social variables, the ability to measure and analyse energy consumption in the real world has undoubtedly been enhanced.

#### **A. The behaviour of energy consumption and demand**

Wilhite and others (2000) emphasize a greater role for the social view of energy, proposing an “extended research agenda” to meet the needs both of communities concerned about climate change and of those concerned about demand-side management, whose common objective is to reduce the amount of energy consumed in the interests of social sustainability.

In terms of sociological analysis, theories of behaviour are strongly rooted in psychology and the study of human understanding and action. Conversely, the concept of demand refers rather to the development of markets, the social and technical construction of needs and the development of expectations as to what constitutes a “normal way of life”. Energy demand, consequently, is the outcome of interaction among the social, cultural and technological contexts in which humans beings or individual lives develop.

**Box 2**

**SOCIAL ANALYSIS OF BEHAVIOUR: THE “GREEN CONSUMER” IN EUROPE**

In the search for ways of influencing the intrinsic motivations of consumers, research into the social “marketing” of environmental protection has largely focused on the dynamic of personal ethics and the group identity normally termed “green consumerism”. The personal interests of individuals, their feeling of irrelevance when it comes to environmental protection and their low expectations of cooperation from others have been identified as the greatest obstacles to environmentally responsible behaviour among consumers of goods and services, particularly energy.

According to Moisander (2000), however, it is objectively impossible to arrive at a unitary definition of what environmentally responsible consumption is, as this varies depending on the elements of behaviour involved. Some consumers, for example, might be reluctant to use public transport, but would be willing to engage in energy-saving behaviour in other areas, thereby making up for the lack of environmental correctness in their attitude towards transport.

It is logical, therefore, to draw a distinction between more or less green consumers, because different people can be green for different reasons (family security, physical well-being or ideological, religious or political convictions).

In any case, it is important to grasp that a rigorous environmentalist approach to consumption is difficult to adopt in European societies, where the tendency is towards greater convenience and comfort, and thus towards higher consumption. In all events, the European experience with “green consumers” shows that there is still a long way to go before this social category becomes a real force in the Latin American countries.

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**Source:** Prepared by the authors on the basis of Moisander (2000).

According to Wilhite, energy consumption is determined not so much by individual consumer behaviour as by lifestyle patterns that are more collective in nature. It is emphasized that individual choice in industrial societies is limited by the way these have been shaped: cities, water and energy supply systems, building and product design, etc. Individuals can influence what happens at the end of the chain, but the scope for major changes in energy use is constrained by the primary systems in which individual lives are led.

One consequence of changing lifestyles is the increasing demand for household electrical equipment, homes, cars, etc., not only in quantitative terms but qualitatively as well. Qualitative changes are manifested in increased scale: refrigerators with a larger volumetric capacity, wide-screen televisions, faster, more powerful computers, bigger and more comfortable homes, larger vehicles with four-wheel drive, etc. All this suggests a basic premise: what these items do is convert energy into services, and it is the services individuals are interested in, not the energy.

Grasping the “how and why” of rising demand for services, then, is essential to an understanding of socio-technological changes and the development of infrastructure, equipment, routines and habits, and thence to sounder planning of energy efficiency instruments. And if this “social perspective” on demand provides a more accurate conceptual overview of energy use, then

policy analysis will be capable of exploring a larger number of reasons and causes and identifying a broader range of possible actions: policy design, instruments and initiatives.

One thing that Wilhite does not mention, meanwhile, is that buildings, household electrical equipment and cars are becoming more and more efficient, owing to technological developments, State intervention and consumer preferences.

Thus, two opposing forces are at work, so it could be argued that improvements in the efficiency of appliances are no more than a corrective to enormous growth in the demand for energy.

The phenomenon whereby improvements in energy efficiency are accompanied by rising energy demand is known as the “rebound effect”. That is to say, efficiency improvements result in lower usage costs for consumers, inducing them to use more appliances, buy a larger car or spend the money they have saved on energy-intensive activities or applications (Elfrink, 2002).

There is no doubt that the general drift in developing countries and most of the Latin American ones is towards more intensive consumption patterns, implying not only higher energy consumption in households but also greater demand for industrial goods, resulting in turn in rising energy demand for manufacturing processes. These trends are borne out by econometric studies (Balabanoff, 1994; Gately and Huntington, 2002).

It is important to emphasize that the theory of energy demand being “constructed” in accordance with lifestyles, i.e., as a result of socio-economic developments that transcend the idea of “individual behaviour”, shows parallels with the ideas put forward by Illich in 1974. According to Illich, industrialization necessarily results in excessive energy consumption that is incompatible with the objectives of social equity and environmental protection.<sup>13</sup>

Illich’s thesis that society should place limits on energy consumption and rely on low-energy technology and muscle power seems unrealistic. It does draw attention to an essential feature of modern societies, however: it is hard to imagine “sustainable” socio-economic development without strong growth in energy demand.

In a number of forums dealing with energy and poverty, ECLAC has argued that for the poverty reduction targets set in the millenium goals to be achieved, Latin American societies will need to consume more energy, but more efficiently.<sup>14</sup>

To summarize the novel socio-economic approach of Wilhite and others, energy demand is “constructed” in accordance with socio-economic development, with less scope for traditional public-sector intervention, i.e., intervention focused on individual consumer behaviour and technological solutions. One possible conclusion from this point of view is that State intervention should concentrate on more fundamental development issues rather than persisting with a specific sectoral policy for energy efficiency and the promotion of renewable energy sources.

## B. Energy intensity in Europe

The application of government demand-side management and energy conservation programmes in European Union countries has decoupled GDP growth to some extent from growth

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<sup>13</sup> “It has recently become fashionable to insist on an impending energy crisis. This euphemistic term conceals a contradiction and consecrates an illusion. It masks the contradiction implicit in the joint pursuit of equity and industrial growth. It safeguards the illusion that machine power can indefinitely take the place of manpower. To resolve this contradiction and dispel this illusion, it is urgent to clarify the reality that the language of crisis obscures: high quanta of energy degrade social relations just as inevitably as they destroy the physical milieu.” (Illich, 1974).

<sup>14</sup> GVEP Conference, Santa Cruz, July 2003.



in energy demand. This decoupling might not be due only to efficiency programmes, however, but is often the result of other effects such as structural changes in the economy, shifts in social behaviour, etc.

Notwithstanding the effects of programmes to encourage rational energy use, in fact, the decoupling of energy demand from GDP in Europe seems to be primarily a consequence of structural changes in the economies of member States, i.e., the gradual replacement of energy-intensive industries by services and industries that are intensive in know-how and technology. In the European Union as a whole, energy intensity has dropped by 20% over the last 20 years as a result of energy policies designed to diversify supply and improve energy use by eliminating waste and increasing efficiency.

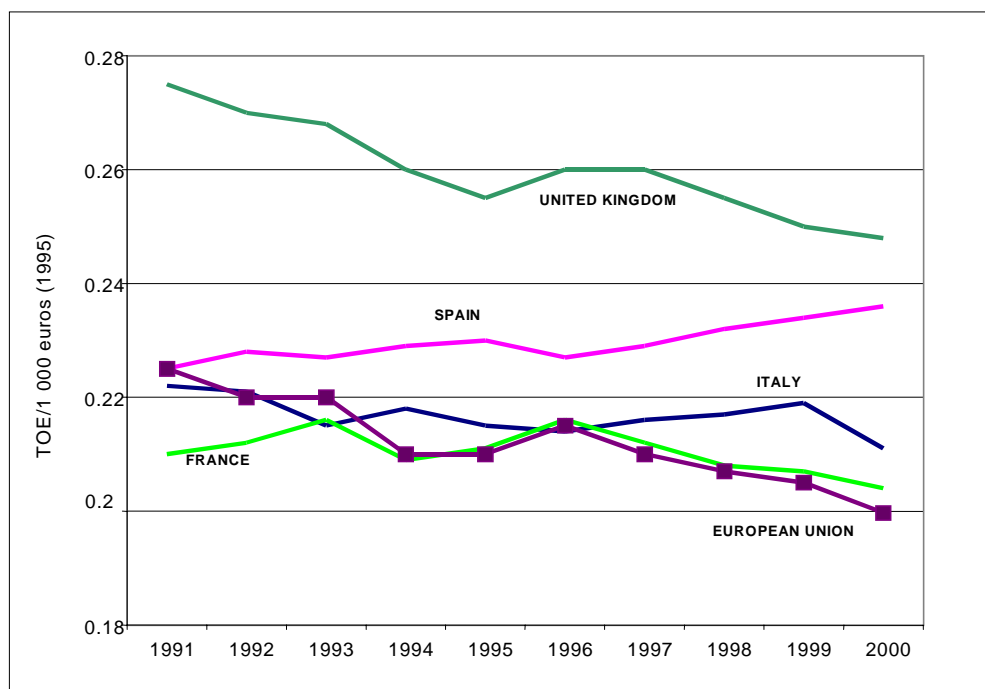
## 1. Primary energy intensity in Europe

Primary energy intensity (primary EI) is defined as the ratio between a country's primary energy consumption and its gross domestic product (GDP).

Primary intensity in the European Union (EU) fell by 9.6% from 1990 to 2000, the decline being more evident in the second half of the decade. After the 1993 crisis, annual growth in real GDP in the European Union was also higher than in the preceding years, so that during this period GDP growth was accompanied by declining primary intensity, confirming that it is possible and viable to sustain economic growth whilst reducing energy consumption.

The indicator for Spain is of interest, as it followed the opposite tendency to that of the other EU countries from 1996 until the end of the decade. This was due to a high rate of primary energy consumption growth over the last four years (figure 2).

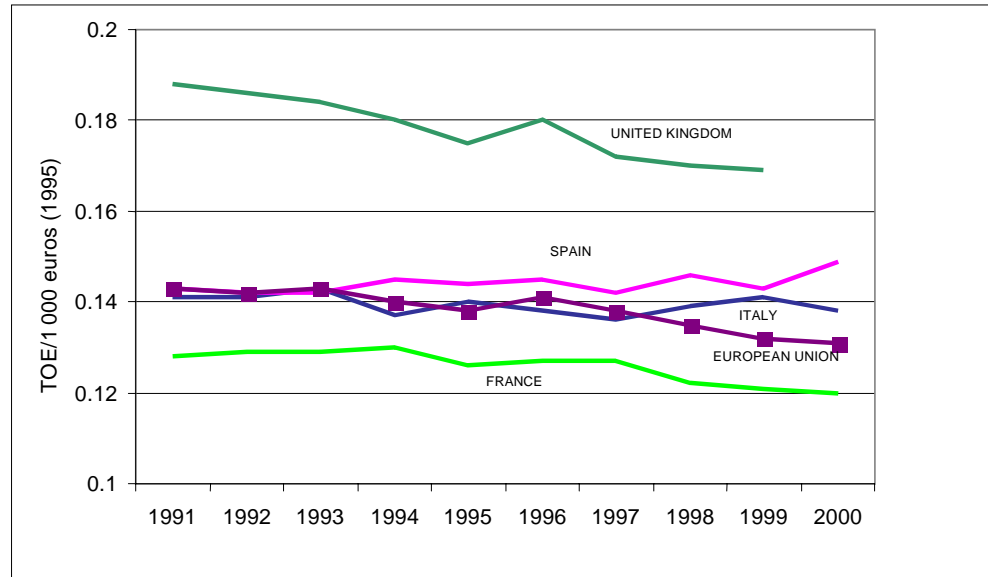
Figure 2  
PRIMARY ENERGY INTENSITY IN EUROPEAN UNION COUNTRIES



Source: Prepared by the authors on the basis of information from IDAE Bulletin No. 5 of 2003.

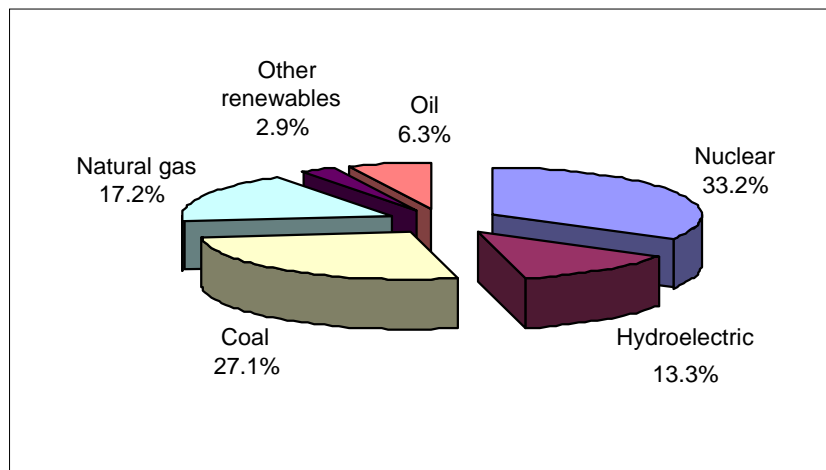
Where final energy uses (final EI) are concerned, the European Union also reduced energy intensity in the 1990s, especially in the last four years (figure 3). This downward trend is common to all the member countries, which include France, Italy, Germany and the United Kingdom. This can be explained as the result of more efficient electricity generation thanks to the rising share of natural gas and renewable energy sources in total electricity production (17.2% and 2.9%, respectively, in 2000: see figure 4), along with the steady growth of cogeneration.

**Figure 3**  
**FINAL ENERGY INTENSITY IN EUROPEAN UNION COUNTRIES**



Source: Prepared by the authors on the basis of information from IDAE Bulletin No. 5 of 2003.

**Figure 4**  
**ELECTRICITY GENERATION IN THE EUROPEAN UNION, 2000**



Source: Prepared by the authors on the basis of Eurostat information.

In the period 1991-2000, however, the production structure of the European Union as a whole became more energy-intensive than it was at the beginning of the decade, particularly in France and the United Kingdom. It is therefore reasonable to say that the reduction seen in the final intensity indices of those countries would have been greater had the shift towards more energy-intensive sectors —particularly industry— not occurred, partially offsetting improvements in energy efficiency.

Spain once again goes against the trend. Despite a gradual shift of production and value-added towards less energy-intensive sectors, the country's final EI indicator rose, although not by as much as primary EI.

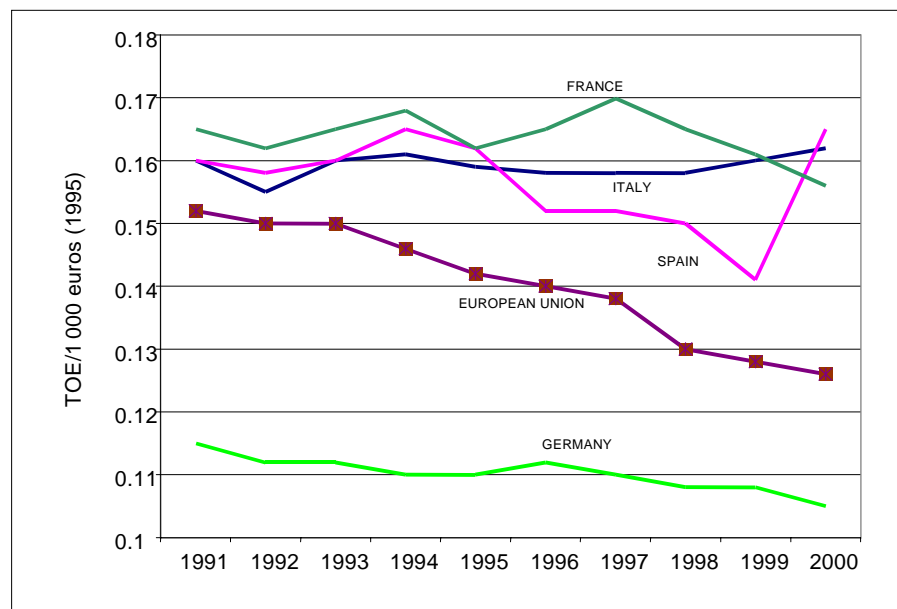
One of the reasons for this behaviour is a gradual shift from fossil fuels to electricity in the coverage of final demand. Electricity is a secondary energy source whose generation requires high consumption of fossil energy, even though it is efficient in final use. Again, the primary intensity indicator is affected by the greater or lesser role of hydroelectric generation in the year concerned, falling in those years when hydroelectric output rose because the transformation efficiency of these plants in the calculation is close to 100%.

## 2. Energy intensity in European industry

Energy efficiency in the industrial sector of the European Union improved by about 21% between 1990 and 2000. As already mentioned, structural changes in EU industry in the first half of the 1990s partially offset efficiency improvements, as industrial production and value-added shifted towards more energy-intensive sectors (figure 5).

During the second half of the 1990s, structural changes reinforced energy efficiency improvements so that the intensity indicator declined by 2.6% a year.

Figure 5  
ENERGY INTENSITY IN INDUSTRY



Source: Prepared by the authors on the basis of information from IDAE Bulletin No. 5 of 2003.

### 3. Energy intensity in the European residential sector

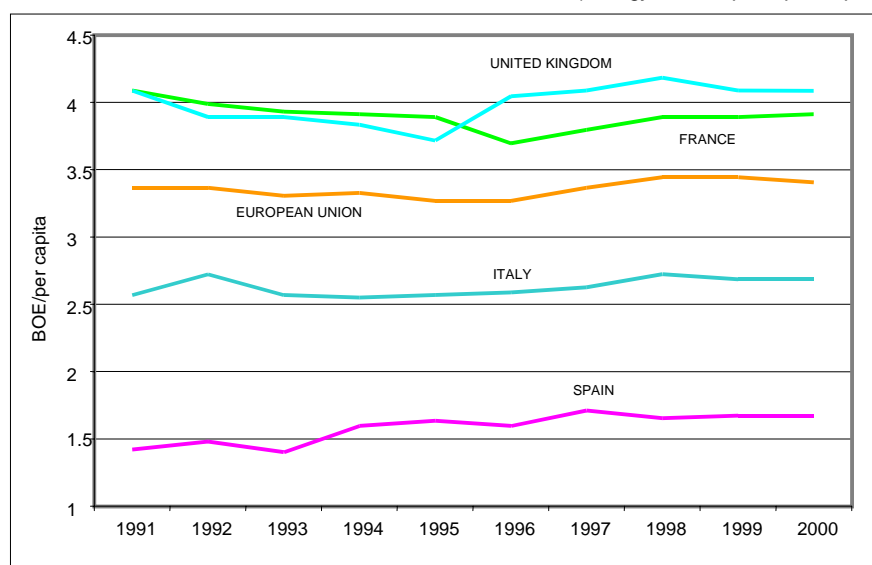
Residential energy consumption depends on growth in household numbers, the weather, building characteristics, operating conditions and functioning, and the output of heating and lighting systems.

Figure 6 clearly shows the importance of the “weather factor” for residential energy intensity, as the behaviour of the indicator is consistent with the different latitudes of countries in the EU.

It is also interesting to note that residential EI in Europe has not shown obvious improvements in the last decade, something that suggests “energy-efficient behaviour” has not yet been fully taken on board by the average European citizen.

Nonetheless, the current EU campaign to promote decentralized energy production systems based on renewable energies and higher-yielding central or urban heating or refrigeration systems ought to help bring down consumption per household over the medium term.

**Figure 6**  
**RESIDENTIAL ENERGY INTENSITY**  
(Energy consumption per capita)



**Source:** Prepared by the authors on the basis of information from IDAE Bulletin No. 5 of 2003.

### C. Energy intensity in Latin America

Latin America and the Caribbean have significant scope for pursuing efforts like those seen in Europe. One of the inputs for the ECLAC/UNEP paper “The sustainability of development in Latin America and the Caribbean: Challenges and opportunities” (October 2001) shows how the energy-intensity indicator has developed in relation to per capita output in Latin America.

During the period 1970-1980 a desirable trend was seen, with economic growth being accompanied by lower energy use per unit of output (lower energy intensity), indicating efficiency gains and improved use of energy resources. This trend was reversed during the period 1980-1985

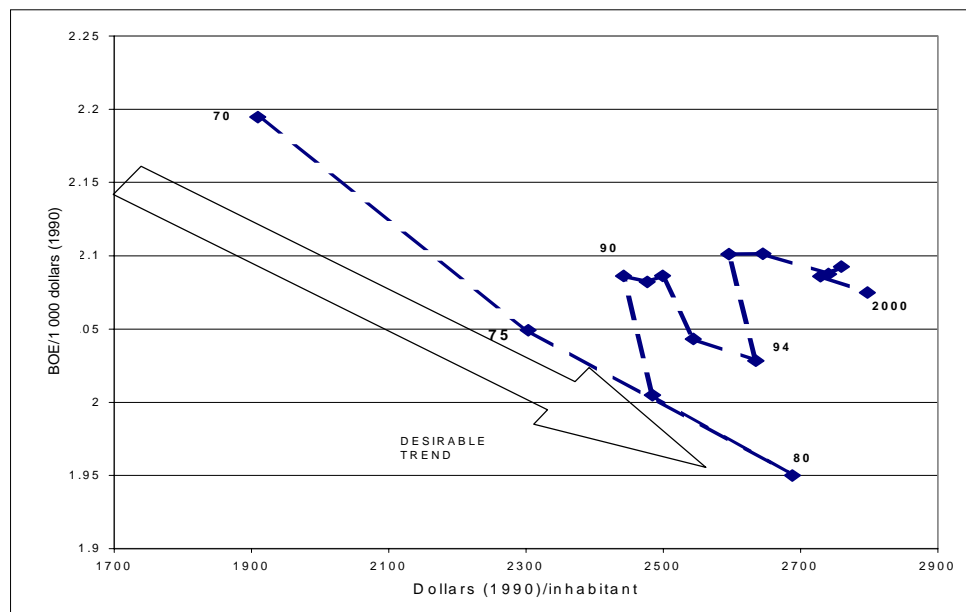
(fall in per capita income and rise in energy intensity), and the tendency was once again negative between 1987 and 1990, indicating that the economic downturn of the 1980s was not accompanied by better energy use. In the first three years of the 1990s the trend was reversed again, with rising income but a stable trend in energy intensity (figure 7).

Compared to the progress made with energy intensity by the industrialized countries after two decades, the achievements of the Latin American and Caribbean countries have been modest, and in some periods the trend has actually been adverse.

The energy intensity situation in Latin America is certainly a complex one: the size and sectoral consumption trends of countries such as Haiti or Honduras cannot be compared with those of Mexico or Brazil. In the last decade, furthermore, some countries have made profound structural changes in their energy sectors by opening up and liberalizing markets, this being the case with Chile, Argentina, Peru, Bolivia and Guatemala. By contrast, countries such as Brazil, Mexico, Cuba and Venezuela have retained centralized control structures and State enterprises have a strong presence.

Figure 7

**PATH OF ENERGY INTENSITY VERSUS PER CAPITA INCOME IN LATIN AMERICA AND THE CARIBBEAN, 1970-2000**



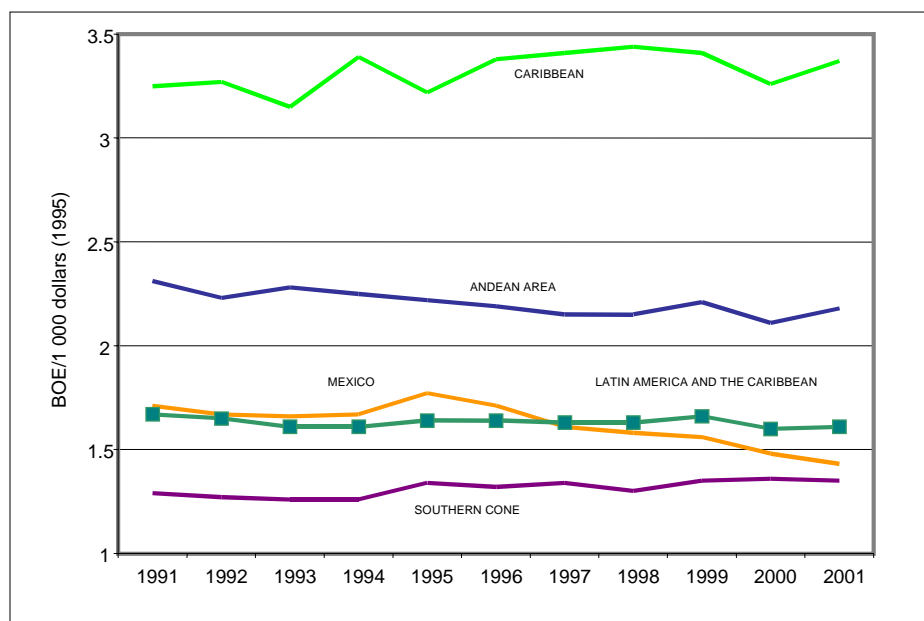
**Source:** ECLAC/UNEP: "The Sustainability of Development in Latin America and the Caribbean: Challenges and Opportunities" (October 2001).

Accordingly, the analysis of energy intensity trends (final, industrial and residential) that follows will subdivide Latin America into five subregions, grouping together countries that resemble one another in the general framework and behaviour of their energy sectors.

## 1. Final energy intensity in Latin American countries

The EI of final consumption in the different subregions shows tendencies that are quite similar, but large differences in absolute index values (figure 8).

Figure 8  
FINAL ENERGY INTENSITY, BY SUBREGION



Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

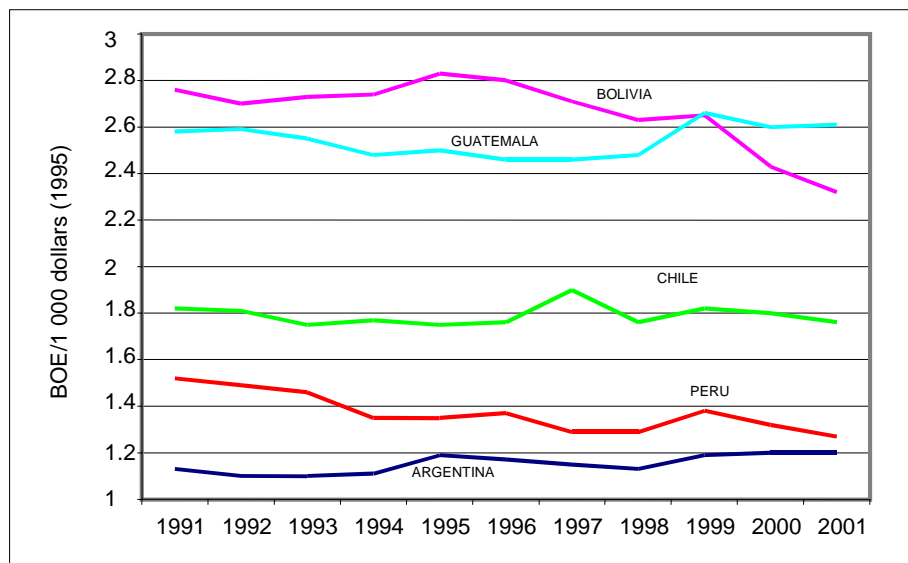
The Caribbean emerges as the region with the highest final EI, owing mainly to intense usage of appliances that consume large amounts of energy (air conditioning and refrigeration equipment) and low efficiency. Although there were some variations over the decade, there is no sign of any substantial alteration in the index for the Caribbean.

The Southern Cone region, by contrast, shows the lowest absolute values. This is due to the use of more advanced energy technologies and equipment in production processes.

Only Mexico shows a significant reduction in final EI after 1995; the fact that it was at this time that the Mexican Government implemented the ambitious national energy-saving programme led by CONAE could be one of the factors underlying this positive trend. What can be affirmed is that the reduction in Mexico's final EI was closely connected to a structural change in the EI of industry (see next paragraph), as industrial production and value-added shifted decisively towards less energy-intensive sectors and small and medium-sized industry (which is less energy-intensive) expanded.

In the group of countries that have experienced substantial structural reforms in the energy sector, quite efficient behaviour is to be found in Bolivia, where a virtuous reduction in final EI began in 1996 with the entry of natural gas into the consumption matrix. The pattern seen in Peru was similar, but less pronounced (figure 9).

Figure 9

**FINAL ENERGY INTENSITY: COUNTRIES WITH STRUCTURAL ENERGY REFORMS**

Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

An almost unchanging trend was seen in Chile and Argentina, where profound energy system reforms to create a more open model have apparently failed to transfer efficiency gains in the operations of companies and markets to the consumer level. The worst performer in this group is Guatemala, where the indicator has risen sharply since 1998.

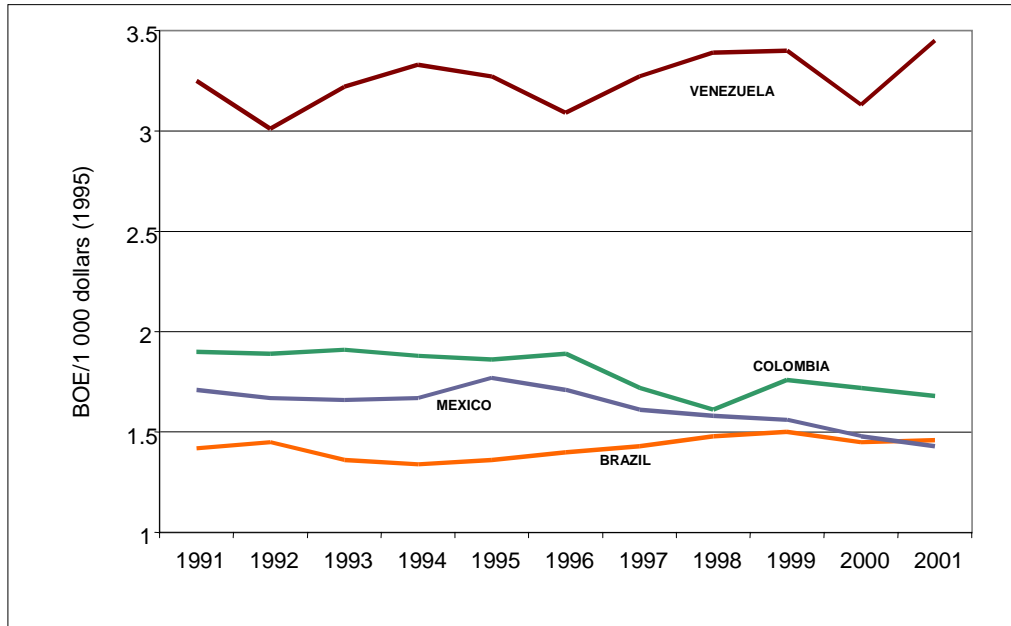
In the group of countries that have not gone through structural reforms in the energy sector, the behaviour of final EI is clearly not homogeneous. In absolute terms, Venezuela has one of the highest indicators in the world and the country's behaviour is erratic, irrespective of any kind of efficiency measures.

Final EI in Brazil began to climb alarmingly in 1992, but this came naturally to an abrupt end with the 2001-2002 energy crisis (this is outside the period covered by figure 10). As mentioned earlier, Mexico's final EI began to fall in 1995.

It is interesting to compare the trend of final EI in Latin America with that in the EU. Because the information available for Europe is in euros, while for Latin America the reference currency used is the United States dollar, each region's index has been used for the purposes of comparison, with 1991 taken as the base year.

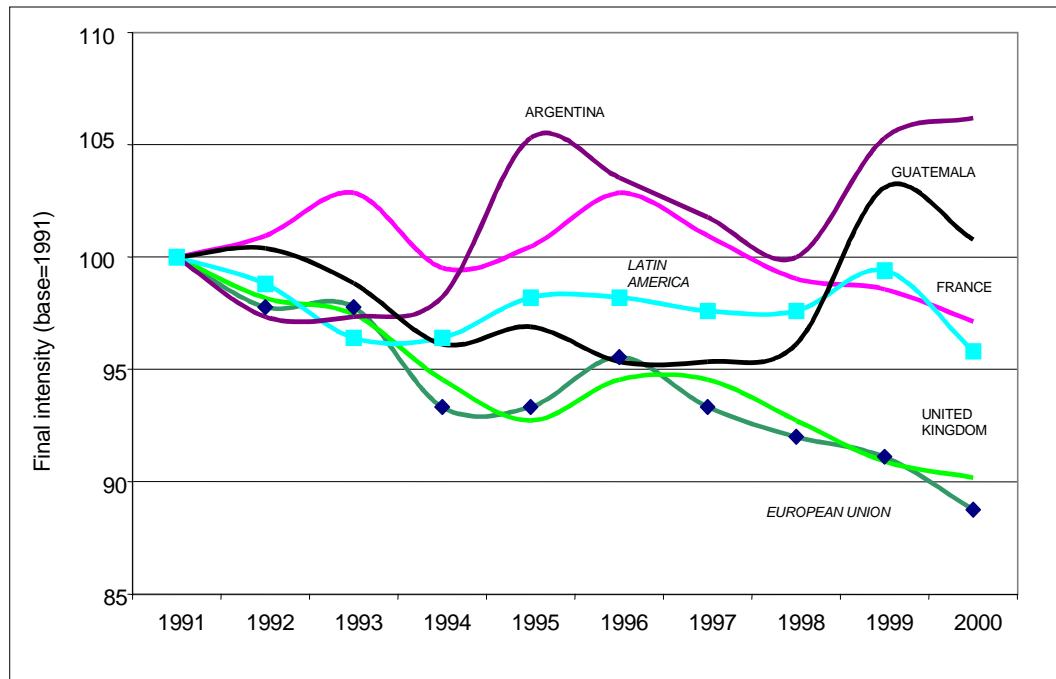
It is striking that, with the exception of the fall in 2000, the tendency of the Latin American region and its countries does not show any significant improvement over recent years. This is in contrast to the EU, where there is an obvious downward trend in energy consumption per unit of output in many countries, particularly since 1996 (figure 11).

**Figure 10**  
**FINAL ENERGY INTENSITY: COUNTRIES WITH PARTIAL ENERGY REFORMS OR NONE**



Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

**Figure 11**  
**EUROPE VERSUS LATIN AMERICA: COMPARISON OF FINAL ENERGY INTENSITY**



Source: Prepared by the authors on the basis of SIEE/OLADE (2003) and Eurostat (2003) data.



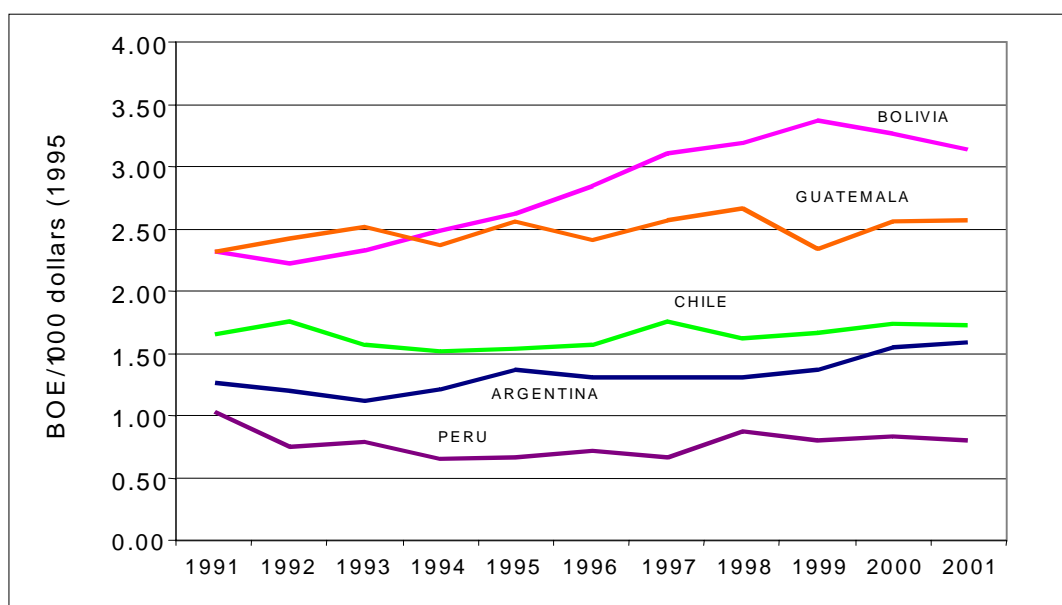
## 2. Energy intensity in the Latin American industrial sector

Analysing the energy intensity of industry (industry EI) in the countries where there have been energy reforms, it is interesting to note the inverted trend of Bolivia with respect to final EI between 1995 and 1999, indicating higher energy consumption (and lower efficiency) in Bolivian industry, with the indicator resuming a downward tendency only when natural gas began to be used in production processes.

Argentina, Chile, Peru and Guatemala confirm the final EI tendency already identified, which indicates that energy market liberalization in those countries has not had the effect of passing on structural and energy efficiencies to industrial EI either (figure 12).

Figure 12

### ENERGY INTENSITY IN INDUSTRY: COUNTRIES WITH STRUCTURAL REFORMS



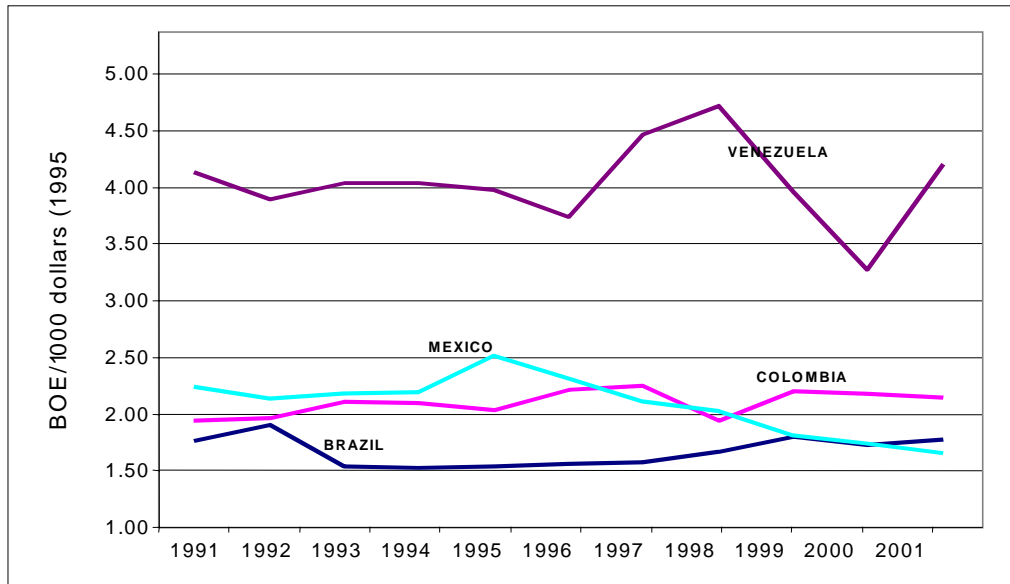
**Source:** Prepared by the authors on the basis of data from the ECLAC Statistical Yearbook (2003) and SIEE/OLADE (2003).

Among the group of countries that have not experienced major changes in their energy systems and markets, the indicators for the different countries are once again very heterogeneous.

Venezuela's indicator is again very volatile and extremely high in absolute terms, confirming the inefficiency of the country's production processes where energy use is concerned. In Mexico, industrial EI mirrors the positive trend of final EI. This would seem to show that, in Mexico, the greatest efficiency gains have been achieved as a result of positive structural changes in manufacturing industry and the activities of energy conservation programmes, which took effect in 1995. The behaviour over time of industrial EI indicators in Brazil and Colombia is also very similar to that of final EI (figure 13).

Figure 13

**ENERGY INTENSITY IN INDUSTRY: COUNTRIES WITH PARTIAL REFORMS**



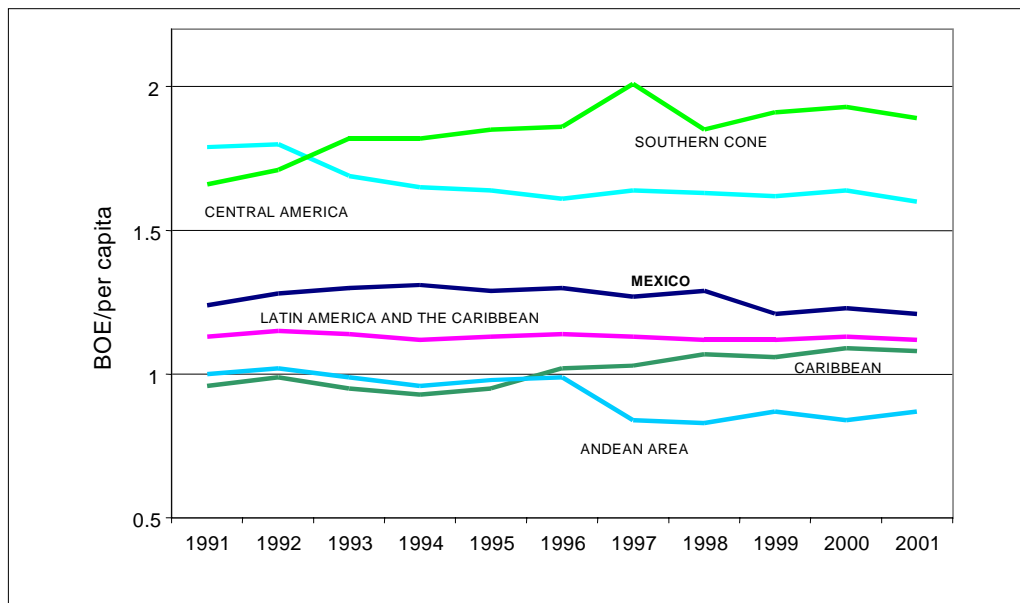
Source: Prepared by the authors on the basis of data from the ECLAC Statistical Yearbook (2003) and SIEE/OLADE (2003).

**3. Energy intensity in the Latin American residential sector**

At the residential level, the trend of energy consumption in the region is almost unchanging; only in the Caribbean and the Southern Cone can any significant rise be detected. In the Andean Community, the indicator has remained stable since the large decline seen in 1996 (figure 14).

Figure 14

**RESIDENTIAL ENERGY INTENSITY (CONSUMPTION PER CAPITA), BY SUBREGION**



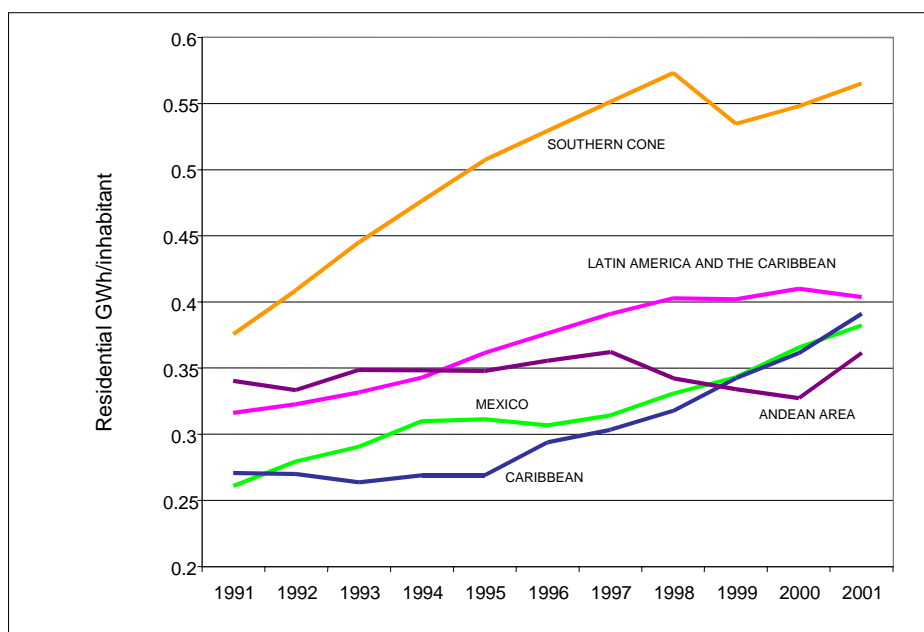
Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

If the comparison is made with the equivalent index for the European countries, it transpires that only in Spain is the absolute level of residential consumption close to that of Latin America, being less than two barrels of oil equivalent per capita, but with a rising tendency. In the EU (and the other large countries in that region) there is a tendency for residential consumption to rise. The highest values are found in the United Kingdom, where consumption is over four barrels of oil equivalent per inhabitant owing to higher energy use for heating purposes.

The impression of relative stability in the trend of total residential energy consumption in Latin America changes considerably when only household electricity consumption is considered (figure 15).

In all the subregions except the Andean area, the residential electricity intensity indicator has risen sharply. This is particularly true of the Southern Cone countries, where values are very high and continuously rising. This clear upward trend is borne out by country-level analysis.

**Figure 15**  
**RESIDENTIAL ELECTRICITY CONSUMPTION PER CAPITA, BY SUBREGION**

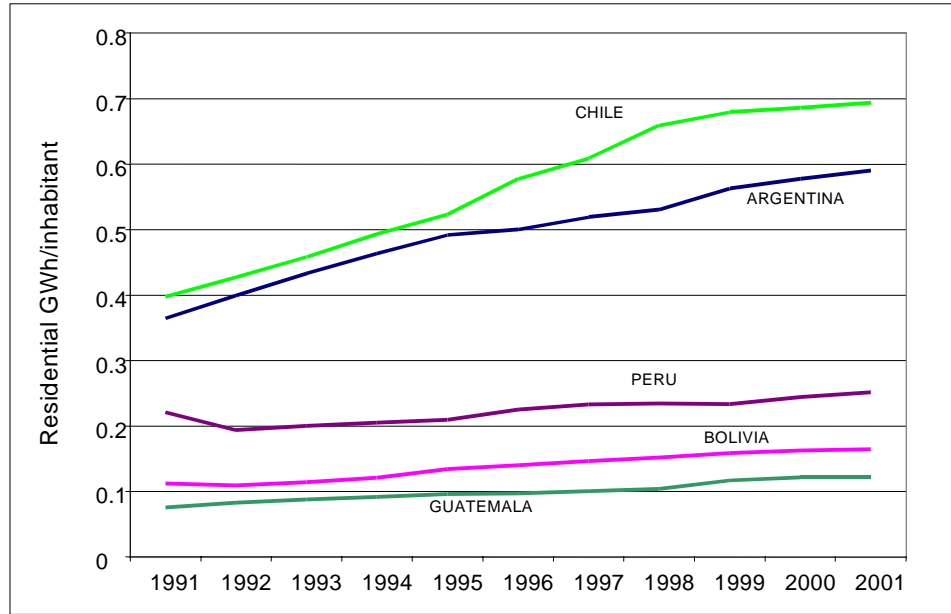


**Source:** Prepared by the authors on the basis of SIEE/OLADE data (2003).

In the countries where major energy reforms have taken place, the rise in the residential EI indicator is universal and constant, particularly in Chile, where consumption per inhabitant has reached absolute values similar to those of the industrialized countries and is indicative of a degree of inaction where energy saving and conservation are concerned. Chile is highly dependent on external energy sources, and the country's weakness in terms of energy security should be treated as a critical national priority (figure 16).

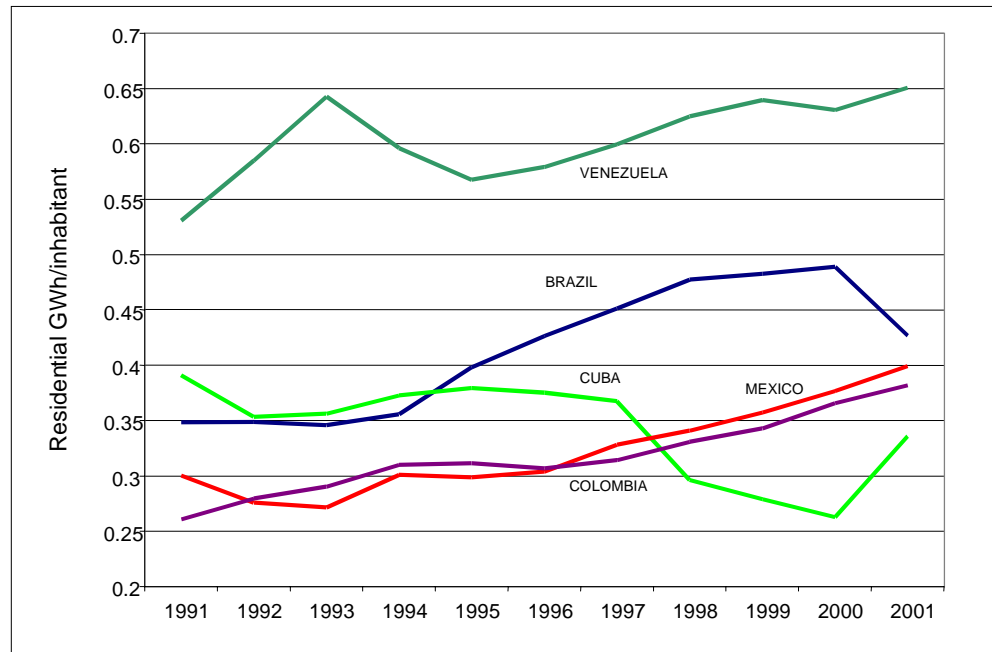
A similar trend is seen in the non-reform countries; once again, Venezuela shows no positive trend towards electricity economy. In Brazil, the effects of the electricity crisis can be seen as early as 2000. The decline that began then resulted in an average 20% reduction in use by the country's inhabitants, who grasped the looming energy supply problem very early on and responded accordingly by undertaking far-reaching voluntary economy measures (figure 17).

**Figure 16**  
**RESIDENTIAL ELECTRICITY CONSUMPTION PER CAPITA: COUNTRIES WITH STRUCTURAL ELECTRICITY REFORMS**



Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

**Figure 17**  
**RESIDENTIAL ELECTRICITY CONSUMPTION PER CAPITA: COUNTRIES WITH PARTIAL ELECTRICITY REFORMS**



Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

It is interesting to note that in Mexico, despite the major publicity campaign run by CONAE between 1996 and 1999 to encourage residential electricity saving, the residential EI indicator has risen steadily, probably showing that:

- Mexicans have not been greatly influenced in their daily lives by the public information campaign mounted by the Government.
- The downward trend in final EI seen in Mexico since 1995 is chiefly due to far-reaching structural changes in Mexican industry.

## **D. Other analytical approaches to consumption patterns**

The OLADE/ECLAC/GTZ Energy and Sustainable Development in Latin America and the Caribbean project (1994-2001) presents a more comprehensive and differentiated vision of sustainable development than Wilhite's proposal. The objective of the project is to attain a "conceptual appreciation to provide a basis for review of energy policies so that these can be mainstreamed into a general sustainable development policy", and it introduces a typification of energy sustainability based on indicators relating to:

- economic development (energy self-sufficiency, resilience, energy productivity);
- social equity (electricity and basic needs coverage), and
- the availability of natural resources and the state of the environment (environmental impact of energy use, use of renewable energy, extent of fossil fuel resources).

The sustainability patterns derived from these indicators suggest differing degrees of progress and types of energy sustainability and development situations, indicating the areas in which government intervention is required. Considering the three aspects of sustainability (economic development, equity and natural resources/environment), the "multidimensional approach" suggested by the project has something in common with the "socio-economic approach" of Wilhite and others, who argue that State intervention should be focused on several policy areas since it is not enough just to tackle the "symptoms": the very basis of State policy needs to be reorientated.

One of the conclusions of the OLADE/ECLAC/GTZ project is that sustainable development is not only desirable but possible: "There are opportunities for moving the energy system forward so that it can raise its productivity, become fairer and less vulnerable, produce fewer emissions, use natural resources in a more balanced way and more sustainably over time and make even greater use of renewable resources."

On this basis, what are proposed are "energy policy guidelines for sustainable development" in the areas of rational energy use, energy diversification, use of renewable energy resources and energy integration. In accordance with the three main objectives, a multidimensional approach is recommended with details of the instruments, functions and processes of the State and other public- and private-sector actors. The project does not deny, but rather affirms, that specific instruments can be used to influence energy demand (consumption patterns) and the way energy is generated (production).

Acceptance of this view, which represents a kind of intermediate position between the strictly socio-economic approach and the traditional approach focusing exclusively on individual behaviour and technological advances, would entail recognition that there is a wide range of possible measures that can be taken to promote more sustainable energy development.

Even if the premise that it is feasible to influence patterns of energy consumption in the direction of more sustainable development is accepted, however, there is still the question of why the Latin American countries have not been very successful in devising and implementing energy efficiency and renewable energy policies. This discussion should concentrate on (i) ideas about political will or the lack of it; (ii) the prospects of achieving political legitimacy for and creating coalitions to support these policies; (iii) institutional problems; (iv) ideological preferences; (v) cultural factors, and (vi) the ability of governments to cope with complex policies of this kind.

According to authors like Harrison (1999), many of Latin America's problems, such as centralization, authoritarianism, populism, corruption, favouritism and, above all, inequality have their origin in values that are intrinsic to the continent's Iberian Catholic culture, which produces inappropriate perceptions of work, education, merit, community, ethics and authority. In other words, according to that author, until Latin America frees itself from the impediments of the Iberian Catholic tradition, there is little hope of it developing a participatory democratic culture with a democratic form of capitalism that brings benefits to the whole of society.<sup>15</sup> Considering that sustainable energy development depends heavily on the existence of participatory democratic structures and transparent, decentralized administration, Harrison's theories do not give much cause for optimism.

This culturalist, doctrinaire approach attributes the failure of public policy in Latin America solely to cultural factors, a view over which the present study at least seeks to cast some doubt. While cultural aspects are certainly important to the extent that they determine preferences for and types of State intervention or non-intervention, it seems an oversimplification to attribute the success or failure of such intervention solely to the way the public authorities, citizens, economic agents and other actors go about things, as determined by the culture of the country analysed. In addition, the effects of globalization on deregulation and privatization processes in Latin America's energy sectors are creating a tension between traditionalism and modernity which is of no small importance.

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<sup>15</sup> The author cites Spain as an example of a country that has moved on from an authoritarian, corporatist culture by opening up to the values of democratic capitalism, chiefly as a consequence of European Union membership. He vehemently contradicts the tenets of dependency theory and other ideologies that blame Latin America's problems on external factors.

## **IV. The results of energy efficiency and renewable sources programmes in Latin America**

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### **A. Brief summary of the current state of reform**

If the reasons for the “successes and failures” and the future prospects of energy efficiency and renewable sources programmes are to be understood in their context, it is necessary to consider the way energy sector reforms were gone about in Latin America. They combined measures of different kinds. OLADE/ECLAC/GTZ<sup>16</sup> state that these measures can be divided into three groups: (i) those affecting the legal status of companies and/or property rights; (ii) those introducing changes in the way production is organized in the sector or some of its energy chains, and (iii) those determining the functions of the different actors and regulating the workings and development of production subsystems.

Changes in the productive organization of energy chains have had significant consequences for energy market regulation and/or deregulation. As will be seen later, in some countries and for some sources these affected only a limited number of links in the production chain, while in other cases they affected the whole industry. In conjunction with the introduction of pricing and fiscal policies for

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<sup>16</sup> OLADE/ECLAC/GTZ, “Energy and Sustainable Development in Latin America and the Caribbean: Guide for Energy Policymaking”, Version II (at press).

both electricity and fuels, these changes can be expected to impact energy efficiency and renewables penetration in different ways.

## **1. Coordination and operating methods and the regulatory framework**

The restructuring process concluded with a set of provisions that constituted a new regulatory framework laying down functions and operating rules in the sector. This group of measures includes: laws establishing the institutional framework, regulations governing actors' rights and obligations, pricing and investment provisions, and oversight and jurisdiction provisions governing enforcement of the rules.

The different coordination methods are generally matched by different forms of regulation: (i) direct State control; (ii) negotiated regulation; (iii) technical regulation (applicable generally to a large number of actors), and (iv) a greater role for market mechanisms through competition (see table 2).

Each of the coordination methods entailed —and will undoubtedly continue to entail— certain variants in the public energy policy-making apparatus which the countries of Latin America will have to retain, especially as regards pricing and investments to promote energy efficiency and renewable sources programmes. In the case of conventional energy sources such as fossil fuels and electricity generated in large power stations and distributed over networks, it has been shown that with these internal reorganization processes and given the process of globalization, the State should restrict itself, now and in future, to indirect methods of influencing: (i) overall supply and demand and (ii) prices, using fiscal instruments such as taxes and subsidies, thereby accepting a subsidiary role in investment decisions when these are handled primarily by local or foreign private-sector actors.

Even when the coordination method is dominated by market mechanisms, however, there is a place for oversight and direct intervention (and thus explicit regulation), especially where environmental policy is concerned. Here, the number of externalities involved, high transaction costs and the difficulty of establishing exhaustive property rights clearly make the exclusive use of market mechanisms inappropriate. There is therefore scope for formulating and implementing active energy efficiency and renewables policies.

## **2. Similarities and differences in sectoral production organization and competition in energy markets**

To gauge similarities and differences in the electricity subsector, the natural gas production chain and the upstream oil sector, the most significant aspects are:

- ownership: State, mixed or private-sector;
- organization: monopolistic and integrated, partially integrated, or vertically disintegrated with different degrees of horizontal separation and concentration of supply;
- functioning: central control, negotiated regulation, independent and technical regulation, competition.



**Table 2**  
**CHARACTERISTICS OF COORDINATION METHODS AND ENSUING REGULATION**

	<b>Central control</b>	<b>Sole purchaser</b>	<b>Regulated integrated system</b>	<b>Open market</b>
Characteristics	All decisions taken by the State on the basis of normative centralized planning and political prioritization of implementation by State enterprises.	Leaves room (within an energy production chain) for outside private companies to produce and deliver energy to the integrated State enterprise, which acts as the sole purchaser. This system is also known as partial liberalization.	Provides greater autonomy for privately owned or mixed companies and public-sector organizations overseen by provinces or municipalities. The State acts as regulator and can give priority to technical and economic considerations, but always with a quantum of political judgement. The characteristic of this method is the lack of market competition. The State is closely involved in investment decisions and pricing.	Method that seeks to realize the benefits of market competition. For this, regulatory principles and changes in the organization of production and institutions need to generate potential for competition.
Regulations	Confined to creating institutional barriers to entry, laying down certain technical characteristics for sectoral products and services and apportioning responsibilities within the State apparatus itself.	Investment characteristics may vary in accordance with the terms of reference laid down by the State. In cases where outside involvement is based on bidding, there is an element of competition for a specific market. The State can set business terms, and usually provides some guarantee to make the business attractive. Regulations lay down entry conditions and the rights and obligations of new entrants as regards their participation in the relevant energy production chain.	They may be technical or negotiated in nature and the rationality prevailing in the system will be primarily development- or profit-driven depending on the institutional nature of enterprises. Although enterprises are public, however, their activities are likely to be more commercially oriented than in the previous stage.	In the case of energy types that are transported and distributed over networks (electricity and natural gas), strict separation and demarcation of functions is required, as is the principle of unrestricted access to installations to avoid discrimination. In some cases vertical integration may be allowed to continue, subject to virtual (accounting) separation and bidding mechanisms for transactions. In the case of links that have natural monopoly characteristics (transport, distribution), regulation is based on technical and economic criteria and there are certain rules that promote competition as far as possible (commercial bypass, competition by market, competition by comparison or reference).

**Source:** Prepared by the authors on the basis of Altomonte (2001).

In the case of electricity and, to a lesser extent, natural gas, which are not marketable because they have to be transported and distributed over networks, the introduction of market mechanisms entails a complex institutional and regulatory construction process. As table 2 demonstrates, creating the scope for competition in these cases requires vertical and horizontal segmentation of the three main processes (production or generation, transportation, distribution and marketing), strict operational demarcation of these functions and the principle of unrestricted network access for third parties. Reducing concentration in the production or generation and distribution links is also necessary if the idea is to bring some degree of competition to the markets concerned.

With electricity, owing to technological considerations (scope for using high-yield equipment even on a small scale, such as open-cycle gas turbines, and particularly combined-cycle ones) and the predominant thinking among potential private investors (high rates of return and rapid recovery of investment), the availability of low-cost natural gas is another precondition for real competition in the generating market.

### **3. Electricity systems<sup>17</sup>**

There are few instances in which no substantial change has taken place either in the method of coordination or in the ownership of assets. Again, it is highly likely that in several of the countries the partial liberalization already implemented is only an intermediate stage on the way to greater private-sector involvement and perhaps a more significant role for the market. In some countries in the open market situation, the scope for competition in generating is severely constrained by the absolute size of the market. Considering the regulatory frameworks now in place, Venezuela, Brazil and Ecuador should be in the open market situation. Albeit to differing degrees, however, institutional transformation is not yet complete and the role of the market is not great (table 3).

In the particular case of electricity systems, the aim of introducing competition or opening up market access requires the production structure to be reorganized in way that entails vertical segmentation of generation, transport and distribution, some degree of horizontal separation in generation and distribution and the establishment of the following regulatory principles: (i) freedom of entry into (and exit from) the generating business (at least where conventional thermal generation is concerned) and (ii) unrestricted access by third parties to the transport and distribution networks. In countries whose electricity markets are small (viz, less than 5,000 MW peak power demand), vertical segmentation of processes and horizontal separation of generation and distribution would certainly mean giving up economies of sequence (or vertical integration), scale and scope (or horizontal integration).

## **B. Evaluation of energy efficiency and renewable energy programmes**

A general overview of the most important and best known programmes in Latin America reveals that, in different areas and to differing degrees, a number of countries have developed plans for mainstreaming energy efficiency and renewable sources programmes, either together or separately (see table 4, which also shows the organizations responsible and the legislative situation).

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<sup>17</sup> Taken from Altomonte, 2001.

**Table 3**  
**ELECTRICITY REFORMS AND MARKET SIZE**

Installed generating capacity (MW)	Central control		Regulated integrated system		Sole purchaser		Open market		
	Integral part of State	Some commercial freedom	Single integrated structure	Different business units	Integrated distribution	Disintegrated distribution	Vertical integration allowed	Vertical segmentation required	
0-500	Cuba	Haiti	Barbados Granada	Costa Rica  Ecuador <sup>a</sup>  Venezuela <sup>a</sup> Brazil <sup>a</sup>	Suriname Guyana Jamaica Honduras Trinidad and Tobago		Nicaragua	Bolivia  Guatemala  Argentina	
500-1 000									Panama El Salvador
1 001-2 000		Uruguay							
2 000-5 000		Paraguay							Peru Dominican Republic Chile Colombia
5 000-10 000									
10 000-20 000 >20 000							Mexico		

**Source:** Adapted from H. Altomonte and F. Sánchez, “Las reformas energéticas en América Latina” and from OLADE/ECLAC/GTZ, op. cit. and OLADE/ECLAC/GTZ (Project) (2000), “Energía y Desarrollo Sustentable en América Latina y el Caribe: Guía para la Formulación de Políticas Energéticas”, Quito, Ecuador, July, p. 37.

<sup>a</sup> On the basis of the approach embodied in their regulations, these countries ought to be included in the open market coordination method. Their position in the table reflects the situation during the current stage of transition.

Table 4

## ENERGY EFFICIENCY PROGRAMMES IN LATIN AMERICA

Country	Programme	Run/financed by Period	Main priorities and achievements	Specific energy efficiency legislation
Argentina	Rational Energy Use (Utilización Racional de Energía-URE) Programme	Energy Secretariat of the Ministry of the Economy, Works and Public Services, National Office for Efficient Energy Use / European Commission 1992-1999	Institutional development Energy efficiency and energy management in industry Demonstration projects in the areas of municipal lighting and urban transport Initiation of Resolution 319/99 of May 1999, bringing in compulsory energy efficiency labelling for domestic appliances (not yet implemented)	Energy efficiency bill was proposed in 1999
	Edesur S.A.	The Global Environment Facility (GEF) has been financing energy efficiency projects since 1999	Strengthen infrastructure at a later stage, particularly for efficient lighting	
Brazil	National Electricity Conservation Programme (Programa Nacional de Conservação de Energia Elétrica-PROCEL)	Electrobrás/government funds/international donors Since 1985	Voluntary labelling programme for domestic appliances and electric motors PROCEL seal of approval Education and training Public services: public lighting and buildings, municipal energy management Since 2001, PROCEL has been working in parallel with the CTEnrg sectoral energy fund	Law 9991 of July 2000 concerning investments in energy efficiency research and development by energy companies  Law 10295 of October 2001 on National Policy for the Conservation and Rational Use of Energy (Política Nacional de Conservação e Uso Racional de Energia)
Colombia	Programme for the Rational and Efficient Use of Energy and Other Non-Conventional Energy Forms (Programa de Uso Racional y Eficiente de la energía y demás formas de energía no convencionales-PROURE)	Ministry of Mines and Energy, Mining Energy Planning Unit (UPME)	Energy efficiency standards and labelling	Law 697 of October 2001 concerning the promotion of rational and efficient energy use and renewable energy sources
Costa Rica	National Energy Conservation Programme (Programa Nacional de Conservación de Energía-PRONACE)	Ministry of Environment and Energy, Sectoral Energy Office (DSE). Since 1994	Various subprogrammes, including: Education and information Programme to improve the energy efficiency of equipment, including compulsory energy labelling and an import tax waiver for efficient equipment Compulsory energy efficiency programme for large users Fuel substitution and promotion of renewable energy sources	Law 7447 of December 1994 concerning the regulation of rational energy use

**Table 4 (conclusion)**

Country	Programme	Run/financed by Period	Main priorities and achievements	Specific energy efficiency legislation
Chile	Energy Conservation and Rational Use (Conservación y Uso Racional de la Energía-CUREN) Programme	National Energy Commission (CNE)/European Commission 1992-1997	Energy audits and pre-investment studies in industry and commerce Municipal lighting Public information campaigns CNE activities once CUREN wound up: Development of regulations setting energy certification standards for residential, commercial and administrative buildings Voluntary technical standards for household electrical appliances and industrial plant	No
Ecuador	Energy Saving Programme (Programa de Ahorro de Energía-PAE)	Ministry of Energy and Mines, Alternative Energy Office (DEA)	Energy efficiency campaigns in the residential, industrial, service and public sectors Campaigns aimed at public buildings Standards and labelling Education and awareness measures	No
Mexico	Programmes run by: National Commission for Energy Conservation (Comisión Nacional para el Ahorro de Energía-CONAE)	Ministry of Energy Since 1989 GEF funds to promote efficient lighting	Minimum energy efficiency standards for a wide range of appliances and equipment Energy efficiency programmes in different sectors of the economy and the public administration	No
	Electricity Conservation Trust (Fideicomiso para el Ahorro de Energía Eléctrica-FIDE)	Federal Electricity Commission (Comisión Federal de Electricidad-CFE) Since 1990 Cofinancing by Inter-American Development Bank (IDB) since 1998	Public information, education and training Energy audits and technical assistance Commercialization of CFLs FIDE seal of approval for appliances that exceed the minimum efficiency standards	
Peru	Energy Saving Project (Proyecto para Ahorro de Energía-PAE)	Ministry of Energy and Mines, in coordination with Ministry of Education	Emergency energy conservation campaigns: National campaign 1994-1996, resulting in a 100 MW reduction in electricity demand at peak hours and stabilization of residential electricity demand Various educational energy conservation campaigns, a campaign to replace 750,000 incandescent lamps with CFLs and occupational and primary-school training since 1996 Energy efficiency standards for domestic appliances Design of the Medium- and Long-Term Energy Efficiency Plan (Plan de Eficiencia Energética a Mediano y Largo Plazo-PEEMLP), 1998	Law 27345 of September 2000 concerning the promotion of efficient energy use

Source: Prepared by the authors on the basis of information from the countries.

The most important programmes include: CONAE and FIDE in Mexico, PROCEL in Brazil, PAE in Peru, PRONACE in Costa Rica and PROURE in Colombia. There are also some programmes that have been initiated and supported by bilateral cooperation agencies in Europe, such as CUREN in Chile and URE in Argentina.

It is interesting to observe the historical development of these programmes, and to see how energy policy paradigms have changed in the countries concerned. Thus, a number of programmes undertaken with European cooperation culminated, after different stages of activity and changes of government, in outcomes that were sometimes tangible, sometimes less so.

In Mexico, CONAE and FIDE are high-profile programmes of national and international significance. They have a long history, going back to 1989 and 1990, respectively, and appear to have been successful. Both CONAE and FIDE have benefited from substantial international funding.

Between 1995 and 2000, CONAE implemented energy programmes that resulted in savings of close to 21.9 billion KWh and a reduction in system demand growth of 1,000 MW. These results fed through into environmental benefits, as the emission of 18 million tons of pollutants (98% of this CO<sub>2</sub>) was avoided (table 5).

**Table 5**  
**CONAE (MEXICO): ENERGY SAVINGS AND ECONOMIC EQUIVALENT**

<b>CONAE (MEXICO) savings achieved</b>	<b>1999</b>	<b>2000</b>	<b>Cumulative 1995-2000</b>
Energy (gwh)	5 800	6 784	21 900
Economic equivalent of energy saved (millions of dollars)	286.3	376.3	1 024
Capacity needs obviated (mw)	748	1 000	1 000
Emissions avoided (millions of tons)	5	6	18

**Source:** Prepared by the authors on the basis of data available on the CONAE web site.

In 2001, the operating budget of CONAE was about US\$ 6.3 million, while the economic equivalent of the energy saved because of its activities in that year can be put at about US\$ 360 million. This represents “leverage” of 57 times its budget.

The current problem of CONAE is that the Government has proposed spending cuts for all departments of State in 2003. The plan is to cut the CONAE budget by over 40% from the 2002 level, reducing it to US\$ 37.4 million or less. This could undoubtedly undermine the operating capabilities of CONAE, which in just nine months in 2002 attained 91% of its targets for the year:

- save 1,400 gigawatt-hours (GWh) of electricity by applying national energy efficiency rules (NOM) to household electrical appliances;
- save another 350 GWh through programmes aimed at specific sectors;
- provide technical assistance to 3,800 firms;
- train 4,000 people and provide information to 15 million Mexicans.

In Brazil, the PROCEL programme was launched by the Federal Government in 1985 and has been run since 1991 by Electrobrás, in coordination with the public-sector electricity companies. PROCEL has promoted efficient electricity production and consumption with funding from Electrobrás, the Reserva Global de Reversão (RGR) and international organizations.

PROCEL has taken on a leading role in the Brazilian voluntary labelling programme for domestic appliances and electric motors. Below are some indicators for the results achieved by PROCEL in the period 1995-2000.

**Table 6**  
**PROCEL (BRAZIL): RESULTS**

<b>PROCEL (BRAZIL): results</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
Investments approved (millions of dollars)	30	50	122	50	40	26
Energy saved (additional generation-GWh/year)	572	1970	1 758	1 909	1 862	2 300
Peak demand reduction (MW)	103	2934	976	532	418	640
Capacity needs obviated (MW)	135	430	415	440	420	530
Investment obviated (millions of dollars)	270	860	830	880	840	1 060

**Source:** Prepared by the authors on the basis of data available on the PROCEL web site.

It is clear that the best-performing year was 1997, which coincided with the peak level of investments generated by PROCEL programmes (the equivalent of US\$ 122 million at the exchange rate for that year of US\$ 1 = 1 real) and the peak contribution of Electrobrás to programme operating costs.

Since 1998 the operating and financial capacity of PROCEL has been declining appreciably. The 2001 energy crisis thus found PROCEL in a weak position both politically and financially, just when there was a need for strong government action in the form of urgent energy efficiency policies and programmes.

In the wake of the 2001 electricity crisis, the current role of PROCEL is unclear owing to shifts in the Brazilian energy sector, the change in the functions of Electrobrás and the new approach to State intervention (Laws 9991/00 and 10295/01).

The history of State intervention to promote efficient energy use in Peru began with a joint effort by the Energy and Environmental Conservation Centre (Centro de Conservación de Energía y del Ambiente-CENERGIA), established in the early 1990s with international assistance from UNDP, the European Commission and the Spanish Government, and the Energy Saving Programme (PAE) of the Ministry of Energy and Mines. After a period during which the two institutions coexisted without coordination, CENERGIA gradually lost public support and effectively became a consultancy. PAE was recently integrated into the Ministry of Energy and Mines.

In Costa Rica, the National Energy Conservation Commission (Comisión Nacional de Conservación de Energía-CONACE) was created under Executive Decree No. 23335-MIRENEM of 6 June 1994 with the main objective of coordinating institutional energy conservation activities. The main legal framework for energy conservation in Costa Rica, however, is provided by Law 7447 (Ley Reguladora del Uso Racional de la Energía), published on 13 December 1994.

The Act gave responsibility for the Rational Energy Use Programme to the Ministry of Natural Resources, Energy and Mines, now the Ministry of Environment and Energy, placing it in charge of programme design, coordination and supervision. The first part of the Act obliges large energy consumers to implement in-house energy conservation programmes.

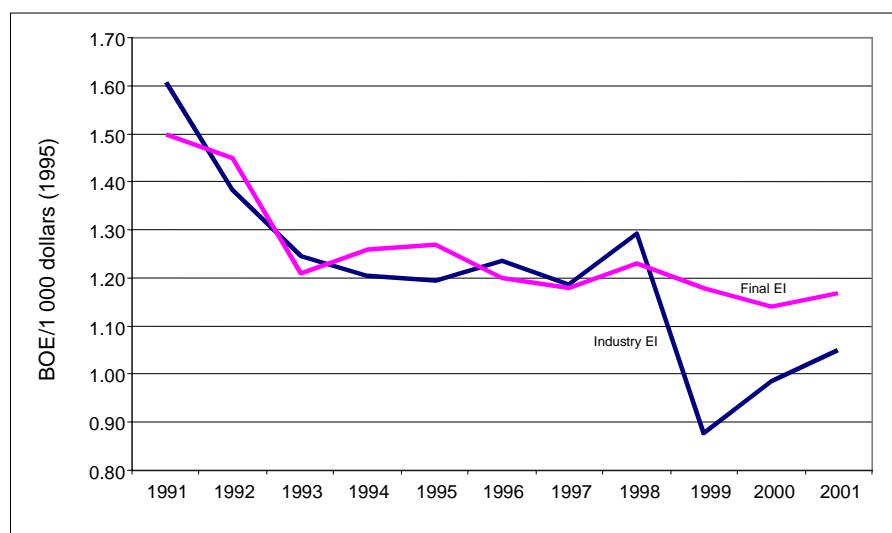
Executive Decree No. 26129-MINAE of 9 July 1997 sets out its internal regulations, which establish that CONACE is to draw up an Energy Conservation Programme (Programa de Conservación de Energía-PRONACE) including all energy conservation projects currently being

implemented or at the project specification level. The main objective of PRONACE is to “reduce the rate of energy demand growth without prejudicing economic development, Costa Ricans’ standard of living or the environment, while assuring an effective and efficient supply”.

The programme includes activities that fall into six different areas of action: (i) user information; (ii) equipment and installations efficiency improvements; (iii) demand substitution and management; (iv) legislation; (v) subsector energy conservation, and (vi) intersectoral coordination.

PRONACE is a long-term plan (1999-2015) combining different energy conservation measures. The estimative basis from which PRONACE sets out is that the economic potential for energy saving by 2015 is 2,103 GWh and 382 MW of electrical energy and 605 million litres of petroleum derivatives. Since the perspective is long-term, it is too early to attempt to evaluate the outcome and effects of the plan.

**Figure 18**  
**COSTA RICA: FINAL AND INDUSTRIAL ENERGY INTENSITY**



**Source:** Prepared by the authors on the basis of data from the ECLAC Statistical Yearbook (2003) and SIEE/OLADE (2003).

As figure 18 shows, however, the trend between 1991 and 2001 was downward for both final and industrial EI in Costa Rica. It is difficult to relate this tendency to PRONACE activities, however, since objective, up-to-date information is lacking. The industrial EI trend shows a sharp decline in 1999 owing to a large fall in consumption (18%) and an increase in industrial activity (20%), a tendency that was reversed the following year as consumption grew moderately and aggregate values remained stable.

It is far too early to estimate the results of the PROURE programme in Colombia, which is being initiated following the adoption of Law 697 of October 2001 concerning the promotion of rational and efficient energy use and renewable energy.

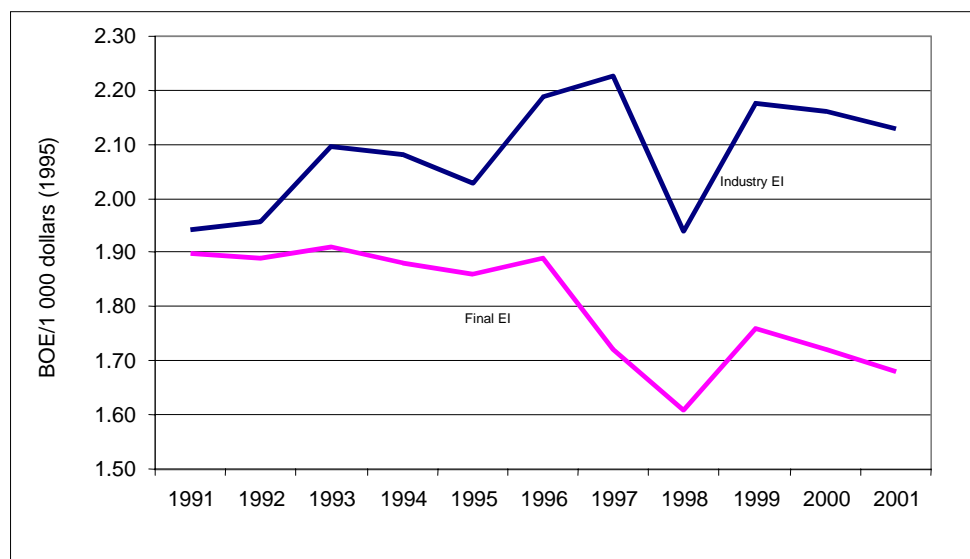
This law created the Programme for the Rational and Efficient Use of Energy and Other Non-Conventional Energy Forms (Programa de Uso Racional y Eficiente de la energía y demás formas de energía no convencionales-PROURE), which is to act within the purview and under the coordination of the Ministry of Mines and Energy and whose objective is gradually to implement programmes to bring the entire energy chain into permanent compliance with minimum energy efficiency levels. Under this law, public service enterprises that generate, supply and market gas



and electricity will have a special obligation to operate rational energy use programmes for users, considering the technical and financial aspects of this and advising users on programme implementation.

Analysing the time trend of the final and industrial EI indicators, it is possible to conclude that there is a need in Colombia for intervention in the form of energy efficiency and conservation policies, particularly in the industrial sector, where the trend is upward. As regards final EI, there seems to have been an improvement since 1996 (figure 19).

**Figure 19**  
**COLOMBIA: FINAL AND INDUSTRIAL ENERGY INTENSITY**



**Source:** Prepared by the authors on the basis of data from the ECLAC Statistical Yearbook (2003) and SIEE/OLADE (2003).

### C. Policies for energy, energy efficiency and renewables

As discussed in previous sections, the Latin American countries have not generally mainstreamed energy efficiency and renewables into their energy policies. This statement needs to be examined in the light of empirical observations and the agenda-setting theories referred to. Empirical research should include, for example, analysis of the countries' policy documents (energy forecasts, white papers). Where such documents exist, they generally deal with working plans for the expansion of energy systems, particularly electricity. Efficient energy use and renewable energy are often discussed in separate chapters or annexes to the document, and are not directly linked to the issue of rising energy demand.

Another interesting approach would be to analyse the pronouncements of those in charge of energy policy (public statements, speeches at seminars, etc.). Experience indicates that in the vast majority of cases these pronouncements deal with energy supply issues, but only in relation to conventional sources: "So many millions of dollars have been invested in power stations..."

Another way of gauging the position of energy efficiency and renewable resources on the political agenda is to examine the public funding allocated to institutions, programmes and other activities related to the promotion of energy efficiency and renewable energy. In most of the

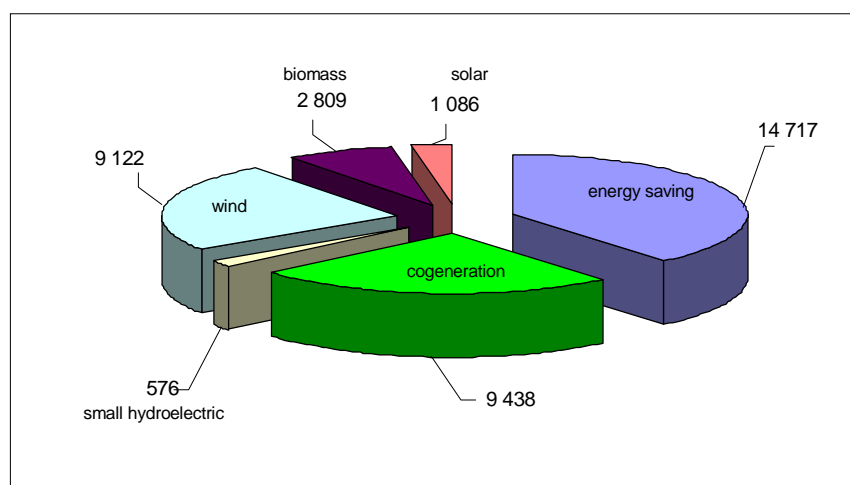
region's countries, with just a few exceptions, State budget allocations and public funding for specialist institutions promoting energy efficiency and renewable energy in the public and/or private sector are marginal and in some cases non-existent.

International experience with the promotion of energy efficiency and renewable sources shows that permanent, concrete results cannot be achieved in the medium and long term unless budgetary allocations are substantial and sustained over time. This is illustrated by the experience of countries such as the United States and Spain, which have made significant progress in these areas thanks to large injections of public-sector capital. To take the United States, in the 2003 fiscal year the Office of Energy Efficiency and Renewable Energy, an agency of the Department of Energy responsible for promoting renewable sources through measures that range from technological development to promotion and information policies, received a budget allocation of US\$ 370 million.

Where Europe is concerned, there can be no doubt that the Institute for Energy Saving and Diversification (Instituto para la Diversificación y Ahorro de la Energía-IDAE) in Spain has been achieving far-reaching results, thanks to annual budget funding of about US\$ 72 million, on top of a similar amount raised from sales of products and services.

In 2001, the programme to promote renewable energy use and efficiency in small and medium-sized enterprises (PYME-FEDER programme) financed 50 national projects, investing US\$ 37.7 million; 64% of these funds went into rational energy use projects and 36% into renewable resources (figure 20).

**Figure 20**  
**IDAE 2001: INVESTMENT BY TECHNOLOGY**  
(Thousands of euros)



**Source:** Prepared by the authors on the basis of information from IDAE Bulletin No. 5 of 2003.

For 2003, under the General State Budget Act, the King of Spain has authorized the Instituto de Crédito Oficial (official funding agency) to provide additional support for PYME-FEDER activities up to a limit of 145 million euros.

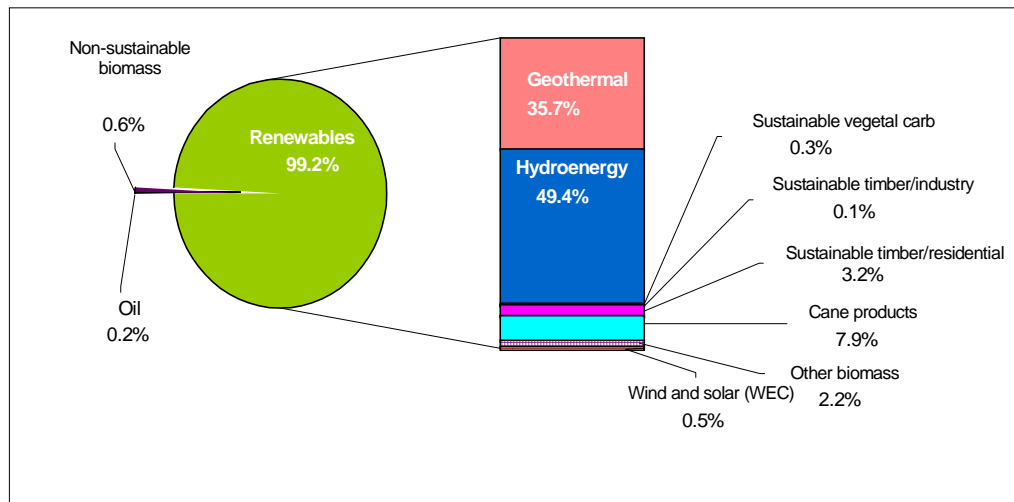
The situation is very different in the Latin American countries which, with the exception of Brazil and Mexico, have not provided substantial funding for long-term rational energy use programmes or initiatives. Furthermore, as was seen earlier, Brazilian budget allocations for

PROCEL have been falling substantially over the last three years and CONAE in Mexico could see its budget cut by 40%.

Of the Latin American countries that have a strong policy focus, however, Costa Rica stands out for its environmentally oriented policies and its success in mainstreaming energy sustainability into national policy. This orientation has already yielded results, as the current structure of the sector and its energy matrix make Costa Rica a “sustainable energy use” country.

Figure 21, which breaks down the total primary energy supply in Costa Rica, shows that 99.2% of the energy supply is of a renewable/sustainable type, with geothermal generation accounting for over a third, hydroelectric dependency not exceeding 50% and a very small share for fossil fuels. The figures are flattered, however, by the exclusion of crude oil imports owing to the temporary closure of the country’s refineries and the decision to import oil derivatives, as these are sources which do not form part of the primary energy supply.

**Figure 21**  
**COSTA RICA: TOTAL PRIMARY ENERGY SUPPLY, 2000**



**Source:** Taken from the document “Sostenibilidad de la Oferta de Energía Primaria en los países de América Latina: el aporte de las fuentes renovables”, ECLAC/GTZ project, 2003.

## D. Legislating for energy efficiency and renewable energy

The ECLAC/European Union project on the Promotion of Efficient Energy Use in Latin America addressed the need to create legal frameworks to promote energy efficiency and renewable energy. As a result of this project, which was implemented in the period 1998-2001, energy efficiency bills have been submitted to the parliaments of Argentina, Colombia and Peru.

While in Argentina the initiative did not go beyond the bill stage, the relevant laws were enacted in Colombia and Peru, although the scope of the original proposals was altered. In Venezuela, the draft bill for the promotion of energy efficiency was submitted in October 2002.

In the case of the efficient energy use act in Peru (Law 27345 of 5 September 2000), the original idea of creating an efficient energy use fund was discarded, and the requirements originally planned for energy labelling were replaced by formulas that placed fewer obligations on government and economic actors. The general thrust of the Peruvian law is to establish an enabling

legal framework for activities that on the whole are voluntary rather than compulsory, including: labelling, measures to promote demand-side management by energy supply companies, and consumer incentives in the form of energy pricing.

In Colombia, Law 697 of 3 October 2001, which promotes rational and efficient energy use and alternative energy sources, among other provisions, stipulates the creation of the Programme for the Rational and Efficient Use of Energy and Other Non-Conventional Energy Forms (PROURE) and specifies the powers and obligations of different actors, including the obligation for public service companies to promote rational energy use among their customers, the creation of research, education and information programmes and the establishment of government incentives.

Rather as in Peru, the Colombian law does not incorporate some of the further-reaching proposals originally made, such as the creation and financing of an organization to promote rational energy use, the creation of an energy efficiency fund and the introduction of tax incentives. However, the Colombian Government is currently working on the regulations and institutional structure through which the Act is to be implemented.

In Brazil, Law 10295 on National Policy for the Conservation and Rational Use of Energy (Política Nacional de Conservação e Uso Racional de Energia) came into force in October 2001. The bill was first submitted in 1993. Law 10295 stipulates that the government has authority to (i) lay down minimum mandatory energy efficiency standards for household appliances and equipment that consume energy and (ii) develop mechanisms to promote energy efficiency in buildings. Technical standards and secondary legislation will be required for the provisions of these two measures to be implemented.

Where the promotion of renewable energy sources is concerned, Brazil has unquestionably taken a major step recently with the establishment of the PROINFA programme under the provisions of Law 10438/2002.

In the course of 2002 and 2003, the ECLAC energy group advised the Brazilian Ministry of Mines and Energy (Department of Energy Development) on the preparation of PROINFA regulations.

Law 7447 of December 1994 concerning the regulation of rational energy use in Costa Rica was probably the first law of this kind in Latin America. The Costa Rican act and associated regulations (Supreme Decree No. 25584 of the Ministry of Environment and Energy) provide for both regulatory and incentive instruments. Its most important provisions are: (i) the Compulsory Programme of Rational Energy Use (Programa Obligatorio de Uso Racional de la Energía), which obliges “macroconsumers” of energy<sup>18</sup> to implement rational energy use projects; (ii) oversight of equipment and installations that affect energy demand; (iii) a compulsory labelling system, and (iv) an import tax waiver for efficient appliances. The regulatory framework of Costa Rica was evaluated as part of the ECLAC/European Commission project referred to (Sotela, 2000).

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<sup>18</sup> Consumers using 240,000 kWh, 360,000 litres of petroleum derivatives or the equivalent of 12 TJ a year.

## Box 3

## THE PROINFA PROGRAMME IN BRAZIL

In April 2002, the Brazilian Parliament passed Law 10438 which, among other provisions, created the Programme of Incentives for Alternative Electricity Sources (Programa de Incentivo a Fontes Alternativas de Energia Elétrica-PROINFA). The programme is to be implemented in two stages:

STAGE I: provides for 3,300 MW of renewable energy (wind, biomass and small hydroelectric stations) to be brought on stream before the end of 2007 through a system of subsidies and incentives that draws on an Energy Development Account funded by a percentage increase in final user bills (low-income sectors are exempt). Under PROINFA rules, the programme will be operated by Eletrobrás, which will buy energy at pre-set preferential prices ("economic values" for each of the three sources) and will market "renewable" electricity. Definitive "economic values" will be published at the end of October 2003 and will have a reference value floor of 80% of the national average supply tariff. Contracts between Eletrobrás and the "renewable" generator may be signed up to 24 months from publication of Law 10438, will have a duration of 15 years and will be applicable only to plants that begin producing before 2007. The Banco Nacional de Desenvolvimento Econômico e Social (BNDES) will make special financing programmes available for renewables projects that are eligible for PROINFA.

STAGE II: once the target of 3,300 MW has been met, PROINFA will be developed with a view to increasing the share of electricity produced by the three renewable sources to 10% of annual consumption, a target that is to be met within 20 years. In Stage II, PROINFA renewable generators will be required, before 30 December each year, to issue a number of Renewable Energy Certificates proportional to the amount of clean energy produced by the plant.

Source: Prepared by the authors.

Taking all this into account, it can be concluded that:

- Motivating the political authorities to legislate for efficient energy use and renewable energy appears to be a very complex task. The ECLAC/European Commission project referred to was successful insofar as it resulted in energy efficiency bills being drawn up in four Latin American countries. In two cases (Colombia and Peru) the bills have been enacted, in one (Venezuela) it is still at the draft stage and in the fourth (Argentina) it never got through to the legislative process. Efforts to encourage energy efficiency legislation in Chile have come to nothing so far because the project has not had the continuity needed for the process to be carried through to completion.
- As the example of Brazil shows, an energy supply crisis can transform the situation very suddenly.
- Only a few countries in the region (Costa Rica is one of them) have taken a concerted structural approach to the issue of sustainable development.
- Another vital point: the existence of an energy efficiency law does not in itself ensure that the corresponding programmes and measures will actually be implemented. If energy efficiency laws are to play a central role in creating conditions that encourage efficient energy use in Latin America, a great many further steps need to be taken so that efficiency makes real inroads into the market. These steps include activities such as the search for consensus among the government, energy firms and consumers, real enforcement of laws and regulations, and implementation of specific programmes and effective oversight mechanisms.

## **E. International cooperation in the area of energy efficiency and renewables**

Many programmes to promote efficient energy use and renewable energy in Latin America have been supported, and indeed initiated, by international cooperation agencies. Even now, international cooperation is playing an important and even central role in the promotion of sustainable energy options in Latin America.

There are many cooperation schemes and programmes, and these have been evaluated over time. Mention should be made of the programmes run by multilateral banks such as the World Bank and IDB, specific programmes such as ESMAP, the ALURE programme of the European Commission and bilateral cooperation initiatives such as those of Spain, Holland and Germany's GTZ.<sup>19</sup>

It is difficult to give an overview, let alone an assessment of the results achieved by this array of programmes and projects. It does seem worth analysing some representative programmes, however, as part of the proposed research. A key research focus in this context must be to evaluate what programmes have achieved in terms of their impact on national energy efficiency and renewable energy policies.

There can be no doubt that some of the largest energy efficiency programmes in Latin America, such as CONAE and PROCEL, would have been impossible to implement, or at least would not have had the same scope, if a substantial contribution had not been made by multilateral banks. Smaller-scale initiatives, such as the support given to CENERGIA in Peru and the initiation of work on energy efficiency standards and labelling systems in the Andean countries, supported by organizations such as the European Commission, UNDP and the Spanish Government, have helped raise the profile of energy efficiency and sustain a groundswell of interest in the subject.

The results of other bilateral programmes, such as CUREN in Chile and URE in Argentina, have not been so clear. Some regional programmes carried out with European support, such as the ALURE programme and different projects carried out in partnership with OLADE, need to be evaluated more thoroughly. The research should also include the few cases where programmes have been financed out of countries' own domestic resources, such as the Energy Saving Programme (PAE) in Peru.

It would also be interesting to analyse the reasons for the "failure" of some programmes designed to develop markets for energy efficiency and renewable energy services, such as the Sustainable Markets for Sustainable Energy (SMSE) programme operated by IDB.

In recent years, the World Environment Fund (WEF) has taken on an important role in the promotion of energy efficiency and renewable energy sources in Latin America, with an emphasis on promoting efficient energy use in different sectors, rural electrification using renewable energies and pilot projects to promote different types of renewable energies.

In the near future, if the Kyoto Protocol actually comes into force, flexible mechanisms can be expected to play a very important role in the promotion of efficient energy use and renewable energy sources in Latin America. In 2002, the World Bank Prototype Carbon Fund (PCF) contracted for the emissions reductions yielded by the 25 MW hydroelectric river plant at Chacabuquito in Chile. Other PCF pilot projects are being prepared in Brazil, Colombia, Costa Rica and Nicaragua.

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<sup>19</sup> For an initial assessment of European cooperation, see OPET Mercosur Working Paper No. 2: EU Energy Cooperation with Mercosur Countries, July 2002.

A central question is whether future emissions trading schemes under the Kyoto Protocol, focused on specific projects, can move energy policies in the Latin American countries towards a comprehensive vision of sustainability.

The outlook for future emissions trading schemes may be complicated by the question mark hanging over implementation of the Kyoto Protocol in the near future. At present, only ratification by Russia is lacking for the necessary threshold (55% of countries) to be reached so that the Protocol can come into full operation.

Ratification now depends on the Russian Parliament and the priority it gives the Protocol on its own political agenda. Considering the complexity of the world political situation and the position with different negotiations on other matters that are more serious and pressing for Russia, the likelihood of that country's Congress ratifying the Protocol in the immediate future might seem to be fairly small.

Consideration therefore needs to be given to alternatives to Kyoto that could be designed to further the implementation of global measures to mitigate climate change and implement "global carbon credit markets". If the Kyoto Protocol is not ratified, the most likely scenario, in the view of many analysts, is that different long-term bilateral or multilateral carbon markets of considerable size, each with its own rules, might be generated almost simultaneously, but independently of one another.

In this case, it is most likely that at least three large markets would be created: (i) one led by the European Union; (ii) another operated by the United States and countries such as Australia that have not ratified Kyoto, and (iii) one linked to the Japanese market. In this scenario, the countries of Latin America would have the opportunity to play a strategic role, as they would be in a position, for example, to participate selectively in the three markets, to which they would bring tremendous credit generation potential as regards both energy (renewable sources and energy efficiency) and land use (forestation, reforestation).

An effort would thus seem to be required to coordinate and harmonize the different approaches and interests of the Latin American countries in relation to climate change, so that the countries can engage in joint, synergetic discussion of the region's possible role either if Kyoto is ratified or, as seems more likely, if it is not.

It is this very coordinating function that the important Latin American and Caribbean Initiative for Sustainable Development, presented and approved at the First Special Meeting of the Forum of Ministers of Environment of Latin America and the Caribbean, is intended to perform.<sup>20</sup>

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<sup>20</sup> Johannesburg, South Africa, 31 August 2002. See UNEP/LAC-SMIG.I/2.

## **V. Proposals for improving energy efficiency and renewable energy policies in Latin America and the Caribbean**

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### **A. Separating efficient energy use policies from renewable energy policies**

It is important to consider the possibility of separating renewables promotion activities and programmes from those concerned with efficient use, since the technological characteristics and economic and social effects of the two are very different and, most importantly, because they require different kinds of public policy-making and intervention.

The issues connected with renewable sources have to do with the generation of energy and the replacement of conventional sources. They involve very specific actors and interests: generating companies that are already operating, for instance, often see renewables as a threat to their business. In addition, transmission companies often have to make additional investments to ensure that network input of electricity from renewable sources is viable and stable.

The field of efficient usage policies seems to be quite different. These policies typically require specific promotional measures directed at the country's industrial actors, which may see conservation measures as a worthwhile opportunity to save money, but may also



find it necessary to invest in more efficient equipment, and indeed may be obliged to do so. There are also normal citizens, who require particular social treatment if they are to incorporate energy efficiency into their daily lives over the long term.

Consequently, it seems advisable to differentiate renewables policies from energy efficiency policies by preparing instruments and initiatives that are convergent but at the same time are autonomous and independent, inasmuch as the strategic objectives and actors on which such policies are intended to have a timely and positive impact are completely different. In addition, the measures which central and/or regional governments can implement are different as well, depending on whether their policy objectives concern renewable sources or energy efficiency, particularly in the case of some instruments such as pricing policies, fiscal incentives, regulations and market structuring.

## **B. Integrating normative instruments with national energy policy**

Laws can be categorized as good or bad depending on their effect and the results they achieve. An ill-conceived law that does not have a sound basis in the country's energy policy and is not supported by the necessary institutions and by a range of appropriate instruments, programmes and funds runs the risk of failure.

It is therefore important to understand that enacting a law is not merely a formal measure. It also requires comprehensive implementation planning and a system of supplementary instruments and programmes to deliver a product such as efficient energy use to the different target groups. As the examples from Europe show, each target group of consumers needs a specific "delivery strategy". Instruments and programmes are the vehicles that take the product to the customer, in this case the economic and social target groups.

If the system is to work properly, in other words, there needs to be a transport infrastructure (institutions), traffic rules (the regulatory framework), fuel (human, financial and budgetary resources) and guides to drive the vehicles (key actors such as energy agencies, energy firms, energy services companies, etc.). Examples from Europe show that it is indispensable to think in terms of whole systems (Lutz and others, 2001).

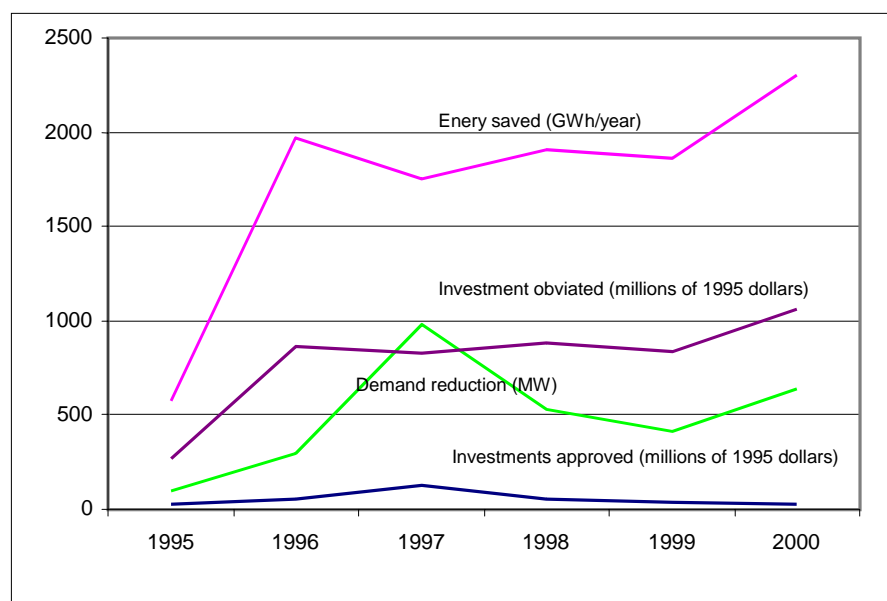
To sum up, the advisability or otherwise of legislating on the issue of energy efficiency is not such a critical matter, nor is it isolated from broader considerations. The subject of discussion should not be the advisability of legislating but what specific issues warrant legislation, and what the best way of designing and applying this legislation would be.

Consequently, the fundamental basis of all State intervention in this area should be an efficient usage and renewables promotion policy that is consistent with and fully integrated into government energy policy. It is no exaggeration to say that this approach is simply non-existent in the great majority of Latin American countries. The need for a comprehensive outlook, though, is confirmed by the experience of the industrialized countries.

## **C. Adopting a medium-term results horizon**

There has often been found to be a time lag between investments in energy efficiency programmes and actual results. A very interesting example of this is PROCEL in Brazil. Looking at the significant results of this programme in 2000, in terms of energy savings and lower demand, it seems plausible to state that there was indeed a time lag between the peak financial effort of PROCEL in 1997, which was when the largest project investments were made, and the concrete results, which began to come through in 2000 (figure 22).

Figure 22  
PROCEL: PERFORMANCE, 1995-2000



Source: Prepared by the authors on the basis of data from the PROCEL web site.

This would seem to confirm that energy efficiency and renewables programmes need time to take effect and that their results can only be appreciated in the medium to long term.

## D. Understanding global, sectoral and country-level energy behaviour

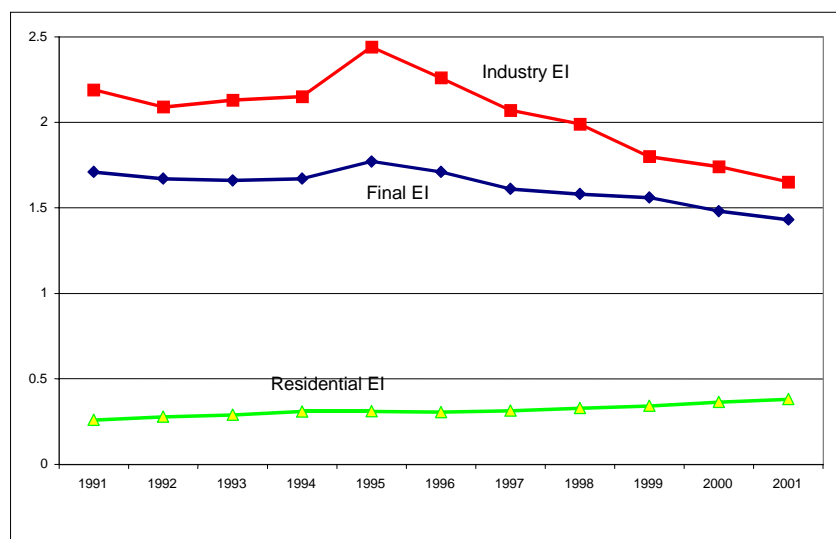
Before designing programmes and initiatives to promote efficient usage and renewable energy sources, it is always important to understand the long-term energy behaviour of the country concerned and the different production sectors within it. At the same time, there is a need to understand more about the way its citizens use energy, taking account of factors associated with national culture or peculiarities. One example of this could be Mexico, where there seems to be a contradiction between the trend towards increasing efficiency in manufacturing and the “inefficient” energy behaviour of citizens (figure 23).

Certainly, between 1991 and 2001 both final and industrial EI followed a downward path, particularly from 1995 onward, while despite the major advertising campaign run by CONAE from 1996 to 1999 to promote electricity economy in the home the residential EI indicator rose steadily, probably showing that:

- Mexicans’ daily lives have not been greatly influenced by government public information activities.
- The downward trend in final EI seen in Mexico from 1995 onward is mainly due to far-reaching structural changes in Mexican industry.
- Lastly, Mexican society is meeting more needs, and per capita consumption is rising as a result.

Figure 23

## MEXICO: PATH OF ENERGY INTENSITY



Source: Prepared by the authors on the basis of SIEE/OLADE data (2003).

## E. Capitalizing on international agreements relating to climate change and renewable sources

As was pointed out earlier, the Latin American and Caribbean Initiative for Sustainable Development was presented and approved at the First Special Meeting of the Forum of Ministers of Environment of Latin America and the Caribbean. The objective of the Initiative is to pave the way for an increase in the share of renewable sources in national and regional energy systems, so that by 2010 renewable sources account for at least 10% of the total primary energy supply.

Forums could be organized<sup>21</sup> to discuss the measures needed to achieve the 2010 target of the Initiative. Such forums could provide an opportunity to expand the agenda for discussion to include issues that encompass the design of a joint regional proposal aimed at identifying a strategic position for Latin America with regard to the different future scenarios for the global carbon market, with or without ratification of the Kyoto protocol.

The Initiative (and its possible related activities) can open up an important opportunity for the countries of the region, since it is the first concrete effort to coordinate and harmonize the different approaches and interests of the countries of Latin America in terms of sustainable energy sources. It thus offers the prospect of a synergetic and mutually beneficial exploration of the possible opportunities that would arise within those various future scenarios.

With this in view, there is potential for joint measures (on top of those taken by the countries individually) to pursue these objectives through initiatives such as: (i) technology sharing; (ii) cooperation to assist isolated communities; (iii) training; (iv) grouping of energy systems to achieve the minimum targets, and (v) the development of accounting methods and of mechanisms for exchanging renewable energy certificates.

<sup>21</sup> In October 2003 a joint meeting of Latin American energy and environment ministers will be held in Brasilia, and this could be a suitable opportunity to debate a Latin American platform.

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