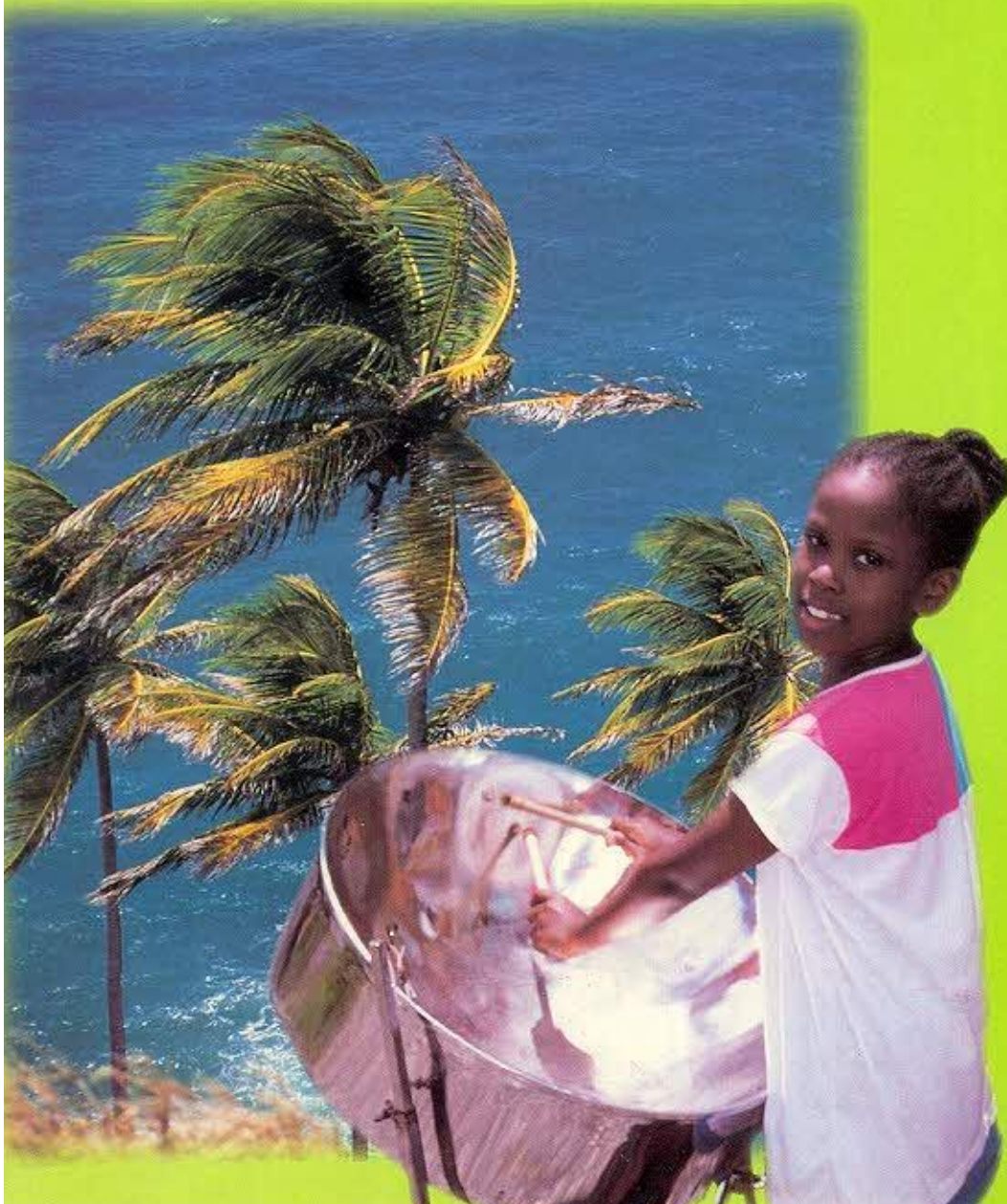


# Energy. Magazine

Year 22, number 1, January-February-March 1998



The energy sector and  
economic adjustment  
programs in Latin  
America and the  
Caribbean

Environmental law and  
energy development in  
Latin America and the  
Caribbean

Energy and sustainable  
development:  
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## Editorial

**D**espite the economic growth and recovery of the nineties in the countries of Latin America and the Caribbean, the region still has a deficit in energy production that is negatively affecting demand coverage levels and preventing energy needs from being fully met for a large segment of the population.

Nevertheless, it is necessary to indicate that the biggest transformation of the energy sector in the region's countries has been taking place since the mid-eighties, with the gradual elimination of monopolies as a result of the participation of new players and competitiveness, the business reorientation of public enterprises, the new role of the State in regulatory activities, and the various schemes of private-sector involvement.

Within this framework, it is necessary to commit efforts to assess the region's energy policies in order to integrate actions of this sector and their broader repercussions for sustainable development.

In this context, the present issue of the *Energy Magazine* includes an article on "Energy and Sustainable Development in Latin America and

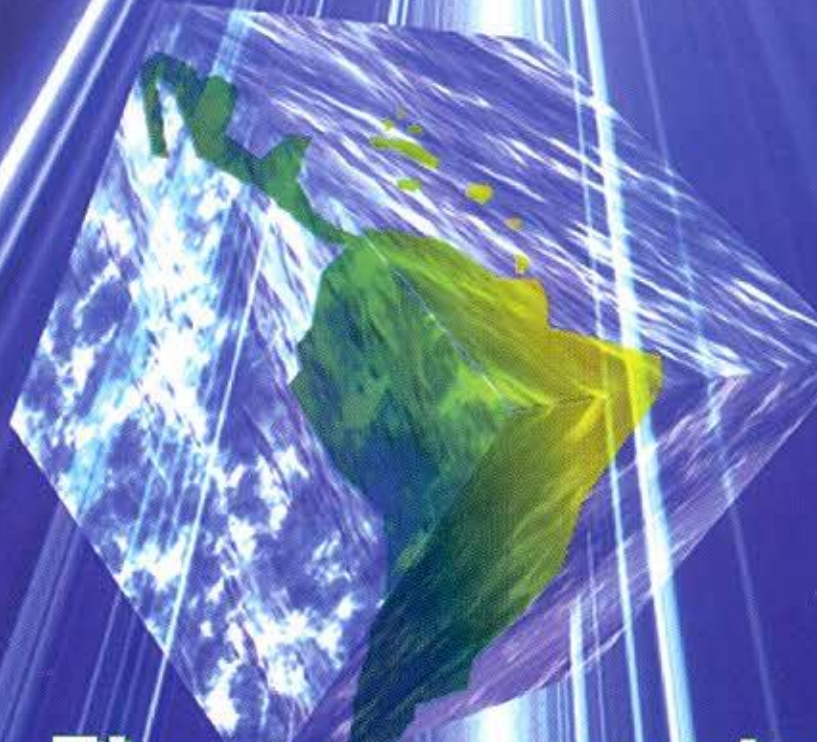
the Caribbean: National Case Studies of Bolivia and Brazil," which summarizes the results of the joint efforts of the representatives of the above-mentioned countries with experts from OLADE, ECLAC, and GTZ (agencies implementing this regional project) in order to systematically review energy policy, from the viewpoint of sustainable development.

The spotlight sector in this issue focuses on Trinidad and Tobago and highlights the impetus of its energy sector over the last few years.

Also part of the present issue is an analysis of the close ties between energy sector and global economic policies of Latin America and the Caribbean and their results, especially since the so-called first energy crisis of 1973, and an article on the importance of environmental law for the region's energy development.

**Luiz A. M. da Fonseca**  
*Executive Secretary*





# **The energy sector and economic adjustment programs in Latin America and the Caribbean**

**Luiz A. M. da Fonseca,  
Executive Secretary of OLADE**

**Rafael Armando Meleán,  
Director of Planning and Energy Projects of OLADE**



**T**here has always been a close and important linkage between the energy sector and global economic policies in Latin America and the Caribbean, especially as of 1973, with the so-called first energy crisis, when oil became a crucial item in the external accounts of both the oil-importing and the oil-exporting countries.

The consequences of the 1973 crisis, which continued throughout the decade, are well known to all. The oil accounts of oil-importing countries rose dramatically, despite the efforts to reduce this dependence on imports by applying substitution and energy efficiency measures, among others.

In addition, the exporting countries considerably increased their foreign currency earnings, although their economies did not have the sufficient capacity to absorb these resources, which ended up in the international financial system, generating a liquidity situation which undoubtedly contributed substantially to the general indebtedness of the countries.

In the eighties, called by some the "lost decade" and by others the decade of "painful learning", the region sustained economic setbacks and social decline. The countries' gross domestic product grew slightly by 1 or 2%; many countries, however, recorded negative growth figures. Of special impact for this decade was the rise in interest rates on the international financial market, which worsened the foreign debt crisis.

Regarding energy matters, it was in this decade that the real deterioration of oil prices started, with prices bottoming out in 1986.

Nevertheless, it can be said that, toward the end of the decade, the

crisis led to a new experience in the political sphere, aimed at ensuring economic stability and modernization, with the start of reforms of the State and the growing participation of the private sector in the economy in general and the energy sector in particular.

## THE IMBALANCES OF THE SEVENTIES AND EIGHTIES

In past decades, the energy sector felt the need to match its development and expansion with the global goals of economic growth under conditions of stability, equilibrium, and social development. This experience now constitutes an important element to be considered in current adjustment policies.

Indeed, the prevalence of an economic policy with a development approach obliged the energy sector, in many countries, to carry out tasks that were highly difficult to resolve, among which that of extending energy supply and coverage nationwide and accepting the decline of real prices to ensure the implementation of social and anti-inflationary policies, without receiving the necessary funds to cover operating costs.

This situation and the widespread presence of state enterprises in the energy sector of Latin America and the Caribbean in the eighties facilitated the linkage of sector policies with global policies.

Instead of ensuring an acceptable rate of self-financing, the sector's companies had to obtain external resources, increase their debt, and even finance the State's budget by transferring earnings and financial resources.

After the debt crisis, these practices triggered major imbalances in the



financial status of the sector's companies and prevented them from making the necessary investments for expansion.

In 1987, the total external debt of Latin America and the Caribbean amounted to US\$424 billion, equivalent to almost five times the export of goods of the region, of which about US\$80 billion, that is 18%, pertained to the energy sector.

A study conducted by OLADE in 1988 indicated that the highest share of energy sector debt in terms of total debt was held by Colombia (41.4%), followed by Argentina (24.4%), Mexico (23.9%), Honduras

(23.4%), Suriname (19.1%), and Brazil (17.8%). The other countries displayed a range of between 1.6% (Peru) and 9.7% (Chile).

When the process of negotiating and rescheduling the external debt started, the debt of state enterprises began to be transferred to central governments. Thereafter, the financial stability of companies and the need to guarantee resources for expanding and preserving the financial balance in operating activities became a priority.

Among the principal actions that were taken, or are being taken, to achieve this objective, the following should be mentioned:

- reversal of the process of real deterioration of energy prices in the domestic market, by substantially increasing these prices, with exchange rate policies harmonizing currency parities;
- market liberalization and breakup of monopolies to promote strategic partnerships between state enterprises and the private sector so as to reduce State investment requirements; and
- the sale of assets (privatization in its many forms) in order to reduce the need for public sector indebtedness and strengthen the balance of payments over the short term and tackle operating deficits

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and meet investment needs over the long term.

Privatization also had an effect on the efforts to promote competition and deregulation, as well as on the development of capital markets, with the resulting positive effect of stimulating

and channeling domestic savings, a prerequisite to maintain sustainable development.

Privatization has been a core element, albeit not the only one, for modernization. Indeed, the earnings from the sale of the region's energy

companies between 1970 and 1990 amounted to US\$15 billion, which accounts for 25% of total income from privatization, of which 14% corresponds to electricity and gas and 11% to oil.

### **GREATER BALANCE IN THE CURRENT PHASE OF MODERNIZATION**

At present, there are mechanisms, measures, and instruments that contribute to achieving simultaneously macroeconomic and sector objectives, namely:

- The objective of reducing fiscal deficits coincides with the need for a more business-like and efficient management of companies, so as to allow operating costs to be covered by the prices of the energy products and services that are sold, reducing the burden on public finance.
- Liberalization policies that strive to enhance the competitiveness of the economy generally base their approach on the expansion of energy supply with more investment and improvements in the quality of supply, elements that appear as priority sector objectives in the context of current reforms.
- The abandonment of the practice of widespread and indiscriminate subsidies enables reduction of the fiscal burden and raises incentives for the rational use of energy, which is consistent with the efforts to improve fiscal accounts and competitiveness.

### **CHALLENGES OF THE ENERGY SECTOR**

Since the energy sector is such a determining factor in the global adjustment process, it is evident that the challenges being taken up for this sector cannot ignore this reality.

Forecasting studies conducted by OLADE indicate that the final demand for electricity

will grow from 586,000 GWh in 1994 to 1.4 million GWh in 2020. To meet this demand, the capacity of the electric power system in 2020 should be 338,000 MW, that is, almost three times the current capacity of 135,000 MW, with a significant reduction in the share of hydraulic capacity, which would decline from 64.5% in 1994 to 42.1% in this period.

In the oil and gas subsector, consumption is expected grow from 1.7 billion barrels of oil equivalent (BOE) in 1994 to 4.3 billion BOE in 2020. This figure assumes a rise in the share of natural gas, from 23% to 29%, in primary energy supply during the period, a value which could increase to 40% if the large gas interconnection projects to integrate the markets of Argentina, Bolivia, Peru, and Brazil are concluded.

In the area of refining, the region's capacity could grow from the current figure of 6.5 million barrels per day to 8.5 million barrels per day by the year 2010. The investment requirements are estimated at between US\$3.7 billion and US\$6.1 billion per year, on the basis of the maximum and minimum parameters of the explanatory variables.

These refining sector demands could fluctuate if, as expected, there is a greater integration between the region's countries that would permit tapping installed capacity and complementary schemes. This integrative process would facilitate the effort to standardize product quality and improvement.

In the face of such challenges, the question is: how can this expansion be financed?



The first considerations on this topic point to the absolute need for a significant participation of the private sector and investors from outside the region and an important effort for regional and hemispheric integration and cooperation. To achieve these objectives, it is necessary to generate political stability, establish clear legal rules, make major efforts to lift trade barriers and liberalize trade and pricing policies, and apply real tariffs to facilitate the generation of surpluses and grant incentives to new direct investments.

In the early eighties, financing came principally from multilateral agencies, commercial banks, and direct investments that focused essentially on certain sectors, mainly those aimed at the export market. Today, the spectrum of options is much wider and includes international financial markets with a wide variety of guarantee mechanisms, new schemes such as ESCOs, BOOTs, and BLTs, strategic partnerships between state enterprises and the private sector, futures markets, among others.

### THE ROLE OF OLADE


The Latin American Energy Organization, in view of the changes taking place over the last few years in the energy sector of Latin America and the Caribbean, has been carrying out various activities and studies that could serve as a reference for analyzing the linkage of the energy sector with the region's global economic policies.

Within this framework, the XXVIII Meeting of Ministers of OLADE, held in Montevideo, Uruguay, in November 1997, analyzed the Central Topic: "Energy Sector Modernization in Latin America and the Caribbean: Regulatory Framework, Sale of Assets, and Free Trade," and approved the contents of the paper prepared on this subject by the Permanent Secretariat.

This Meeting, on the basis of the analysis that was conducted and considering that the modernization process is of the utmost interest for the region, adopted the subject "Results of Modernization Processes and Energy Integration

Prospects in Latin America and the Caribbean" to be the Central Topic for the XXIX Meeting of Ministers, which is scheduled to place in October 1998.

Moreover, the wide-ranging training program being implemented by the Permanent Secretariat of the Organization, which includes a Master's Degree Program in Energy and the Environment, in addition to various courses, seminars, and events involving energy sector development, is essentially aimed at training and providing specialization for professionals who will promote sector modernization processes in the region.

OLADE is also making an important effort to incorporate into its activities the new players of the region's energy sector, especially the private sector and countries from outside Latin America and the Caribbean, in view of their important contribution to both the exchange of experiences and the consolidation of trade ties, privatization, and strategic partnerships. 





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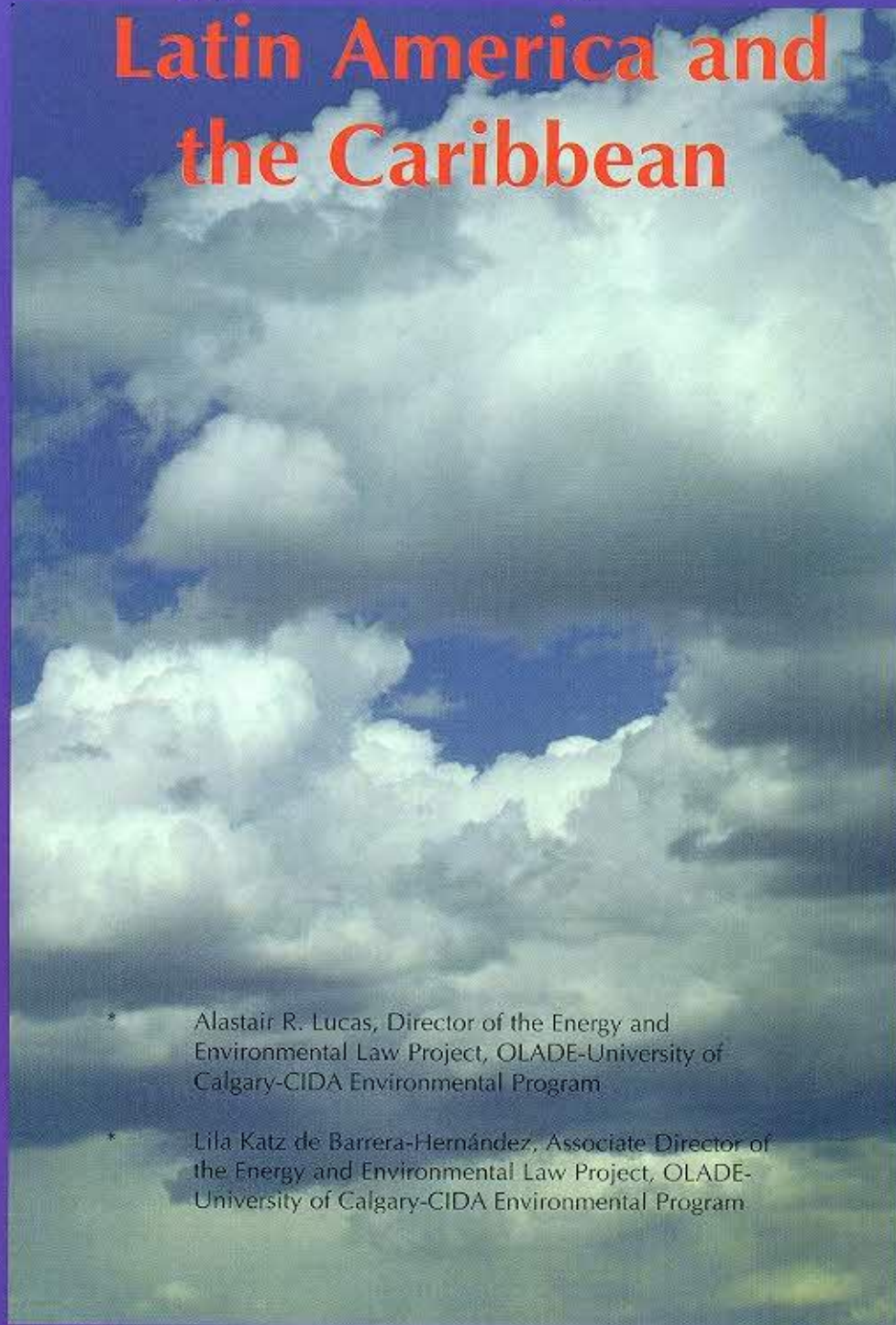
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# Environmental Law and Energy Development in Latin America and the Caribbean



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## 1. Introduction

Environmental law is becoming increasingly important in the debate about sustainable energy development in the Latin America and Caribbean (LAC) region. Much has been said and written about the concept of sustainability and about public and corporate policies and practices to achieve sustainability. In the 1996 Declaration of Santa Cruz de la Sierra, LAC region countries recognized and made an explicit commitment to sustainability, including sustainable energy.

The importance of effective national environmental legal frameworks has also been recognized as concern has shifted from policy to implementation and enforcement of environmental requirements for the energy sector. The Declaration of Santa Cruz de la Sierra emphasizes the need to strengthen environmental legal frameworks. Sustainable energy development frameworks are to be grounded in the rules and principles of international law, and the countries pledge to:

"promote the reform and modernization of national laws, as appropriate to reflect sustainable development concepts."<sup>1</sup>

This commitment by LAC countries includes development of national mechanisms for effective enforcement of applicable international and national laws. Countries will also seek to obtain ratification or accession to relevant international treaties and will fulfill commitments under these instruments.

For the energy sector these laws represent the environmental rules of the game. The clarity, relative stringency, and consistency and harmony both within and among LAC countries may be critical for future energy development and operations in the region.

## 2. The OLADE/University of Calgary Energy and Environmental Law Project

Within the framework of the OLADE-University of Calgary-CIDA Energy and Environment Program, the Energy and

Environmental Law Project is designed to address this need for appropriate and effective environmental legal frameworks for the energy sector. Support for the project is provided by OLADE and the Canadian International Development Agency (CIDA).

### a. Objectives

The purpose of the study is to identify, assess and compare environmental legislation in the LAC region countries as it applies to the energy sector (oil and natural gas; hydro and thermal electricity). Strengths and weaknesses of environmental laws are assessed in terms of: promotion of sustainable energy activities, including ecosystem integrity and human health protection in the context of the Brundtland Commission's concept of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Other criteria include procedural fairness and efficiency, and strength and stability of the LAC energy sector.

*"...no previous event has enabled us to simultaneously focus on the need to promote sustainable development of basins that produce water and are capable of generating hydropower. As a result of the workshop, our perception on how to face the challenges of covering sustainable development costs in river basins is much clearer."*

Drawn from the address delivered by the former Vice-Minister of Natural Resources and the Environment of Honduras, Mr. Percy Buck, during the closing of the First Regional Workshop on Environmental Law and Regulation in the Energy Sector of Central America and the Caribbean, Copán, Honduras, October 29, 1997





## Declaration of Santa Cruz de la Sierra

**"Strengthening of the legal framework: Relations between countries of the Hemisphere, within the framework of this partnership for sustainable development, will be grounded on the rules and principles of international law. We will consider the progress in international environmental law and promote the reform and modernization of national laws, as appropriate, to reflect sustainable development concepts. We will also develop national mechanisms for effective enforcement of applicable international and national laws and provisions."**

Ultimately, the study aims at identifying appropriate legal principles, instruments and institutional arrangements for harmonized sustainable energy and environmental laws. Potential application of legal approaches that incorporate economic instruments will be investigated. Legal and institutional models to achieve these objectives will be designed. These approaches, instruments and models could then be used as tools by LAC countries in the review, development or reform of their energy/environment legal frameworks.

### b. Study Structure

The first phase of the study, an inventory of LAC region environment and energy legislation was completed in May 1998. Both general environmental laws affecting energy, and energy or related laws that include environmental provisions were identified. Also included is an identification of the relevant international law instruments, policies of international funding agencies and comparative data on energy and environmental law instruments and approaches in North America and the European Union.

Inventory data for each country is presented in functional tabular form. Preliminary assessment of the laws in terms of the sustainability criteria has also been completed and is presented in a preliminary project report, now in print.

In the second phase of the study, data and conclusions are tested and refined through a series of regional workshops. The first of these workshops, for the Central American and Caribbean Region, was held in Copán, Honduras, in October, 1997. Workshops for the Andean and Southern Cone Regions are planned for July and September of 1998.<sup>2</sup>

The third phase will see final design of the environmental law tool kit of approaches, instruments and models.

Workshops to review and refine these outputs will be held. Results will be presented in a final project report. Finally, in the fourth phase, consultations will be held with national energy and environment officials, industry and public organizations with a view to using the energy and environmental law tool kit in reviewing and potentially reforming energy and environmental law that affects the energy sector. The final report and tool kit will provide a guide and reference for policy makers and will be a useful educational tool.

### 3. Preliminary Findings

The following points highlight the preliminary findings resulting from the legislative inventory and sustainability analysis of environment and energy laws.

The effective monitoring and enforcement of laws, an adequate environmental management framework, and the existence of a country-wide energy development plan are essential for the success of the energy sector's sustainable development.

Although the region is increasingly concerned with incorporating sustainable energy development concepts and mechanisms into the law and policy, very little may be seen in terms of defining and adopting written country-wide sustainable energy development plans and strategies. The lack of general, comprehensive guidelines amounts to frequent contradiction in the law and regulations.

On the other hand, the laws and regulations that make up the environmental management framework are currently traversing an active transition period. However, some common features may be noted. Thus, the way environmental management has been organized and implemented tends to differ between those countries that follow the common law tradition, typically organizing environmental management under a single central administrative body with quasi-judi-



cial decision-making powers, and the civil law countries. Civil law countries follow what may be called a “prescriptive” model whereby a number of administrative agencies and the courts administer a broad set of rules distributed throughout the legislative spectrum. Notwithstanding the differences in approaches, environmental regulation is generally scattered and presents frequent gaps despite the increasing incorporation of modern management instruments such as the law of Environmental Impact Assessment (EIA).

In assessing the region’s regulatory and institutional arrangements for the environmental management of the energy sector, three basic questions may be asked in order to obtain a preliminary and broad diagnosis of the current situation. These are:

1. Is there a framework conducive to fairness and transparency?
2. Are present and future needs taken into account?
3. Do those needs include a sustainable energy future?

The region’s answer to question #1 seems to translate into an ever-increasing tendency to reorganize energy-sector management from a government/producer model to the separation of roles between regulator and producer. Further steps should see improvements in the coordination and cohesiveness of law and regulations within and between energy and environmental laws. In addition there is a need for recognition and implementation of the right to access information and to participate fully and timely.

Moving on to question #2, present and future needs are currently taken into account through the widespread adoption of Environmental Impact Assessment (EIA) as the main environmental planning tool. Although it is yet to be perfected, EIA requirements in LAC seem to incorporate

those features that have led to its success in other jurisdictions. Other planning tools, particularly protected areas legislation, require further regulation to become effective. Overall, the resource by resource approach to planning continues to prevail over the integrated ecosystem approach.

The main obstacle to a sustainable energy future (question #3) may be found in the energy-specific legislation where provisions that are in conflict with sustainability and environmental management principles are frequent. Examples of provisions that may run counter to those concerning the sector’s environmental management are the frequent public interest override provisions, the subsistence of uncurtailed surface rights, subsidies, etc.. Also, as mentioned previously, very little evidence of integrated long-term plans and guidelines may be found. As evidenced in policy statements throughout the region, so far, it would appear that concern for the future is being addressed mainly through the adoption of demand-side management and efficiency as common criteria for planning.

Finally, although the efficiency of monitoring and enforcement efforts cannot be ascertained through a review of this nature, it should be mentioned that while, for the most part, provisions mandating self monitoring are scarce, on the other hand, enforcement tools generally mirror the ones currently in use in other jurisdictions. The recognition of environmental rights in various constitutions throughout the region is also a powerful source of environmental protection and a clear indication on the direction of future development.

#### 4. The Copán Workshop

The First Regional Workshop on Environmental Law and Regulation of the Energy Sector in Central America and the Caribbean, was held in Ruinas de Copán, Honduras, on October 27-29,

## Plan of Action for the Sustainable Development of the Americas

**“The Governments will carry out the following initiatives:  
#59: Recognize and support the work undertaken to implement the Summit of the Americas energy agenda, (...), which promotes sustainable energy development and use by: increasing investment in the energy sector; (...) advancing regulatory cooperation and training; increasing the economic and environmental sustainability of the petroleum sector; (...) and sharing information on policies, programs and projects to address climate change.”**



Regarding the development of local hydropower development, among other things, the need for clarity and harmonization of the laws and a legal framework that is adapted to the State restructuring process is evident. In regional terms, there is the need to create international mechanisms to value water resources for the comprehensive management of river basins in order to obtain standardized management criteria and share the social cost of hydropower development projects.

### Group #1, Report of the First Regional Workshop, Central America and the Caribbean, October 1997



1997. Workshop participants included private and public sector representatives from 9 region countries as well as OLADE and Canadian participants. Among other things, it provided an opportunity for energy and environment agency officials, who in many countries have little contact, to discuss energy and environment legal issues.

Presentations included preliminary project findings, national, regional and subsectoral perspectives. These were supported by a series of background papers. Working groups discussed energy and environmental law questions related to three major issues in the region:

- Basin management and hydro-electricity development.
- Coastal and marine protection in relation to hydrocarbon activities.
- Environment and energy legal framework and institutional issues.

Conclusions and recommendations of the working groups include:

- Though framework environmental laws exist in most countries, the process of implementation is often incomplete and there is a need for resources to develop and implement regulations.
- There is a need to incorporate international standards, such as the MARPOL Convention on Ship-Based Pollution, in domestic law,

and to fully address the problems involved.

- In relation to hydroelectric development, in some countries, there is a need for a clear definition of the legal status of the land in the river basin. Existing property laws may reduce the flexibility needed for sustainable basin management.
- Notwithstanding the SIEPAC transmission and interconnection project, there is a lack of framework and institutions for basin management in the region.
- Mechanisms for interagency and interjurisdictional coordination for hydro-electric development are needed.
- In the case of coastal and marine protection, legislation in some countries fails to clearly define the jurisdiction of national institutions.

Substantial feedback was received on the legislative inventory and analysis, including comments on the legislation tables, from a number of countries.

### 5. Conclusion

The Energy and Environmental Law Project will continue to identify legal issues in the promotion of sustainable energy development. Regional and national workshops and meetings will be an important means of testing findings and informing interested parties. Study results should provide ideas and guidance for LAC Region countries in the necessary process of improving their environmental legal frameworks for sustainable energy development.



### Notes

1. *Declaration of Santa Cruz de la Sierra*, Santa Cruz de la Sierra, Bolivia, Dec. 7, 1996.
2. Dates to be confirmed



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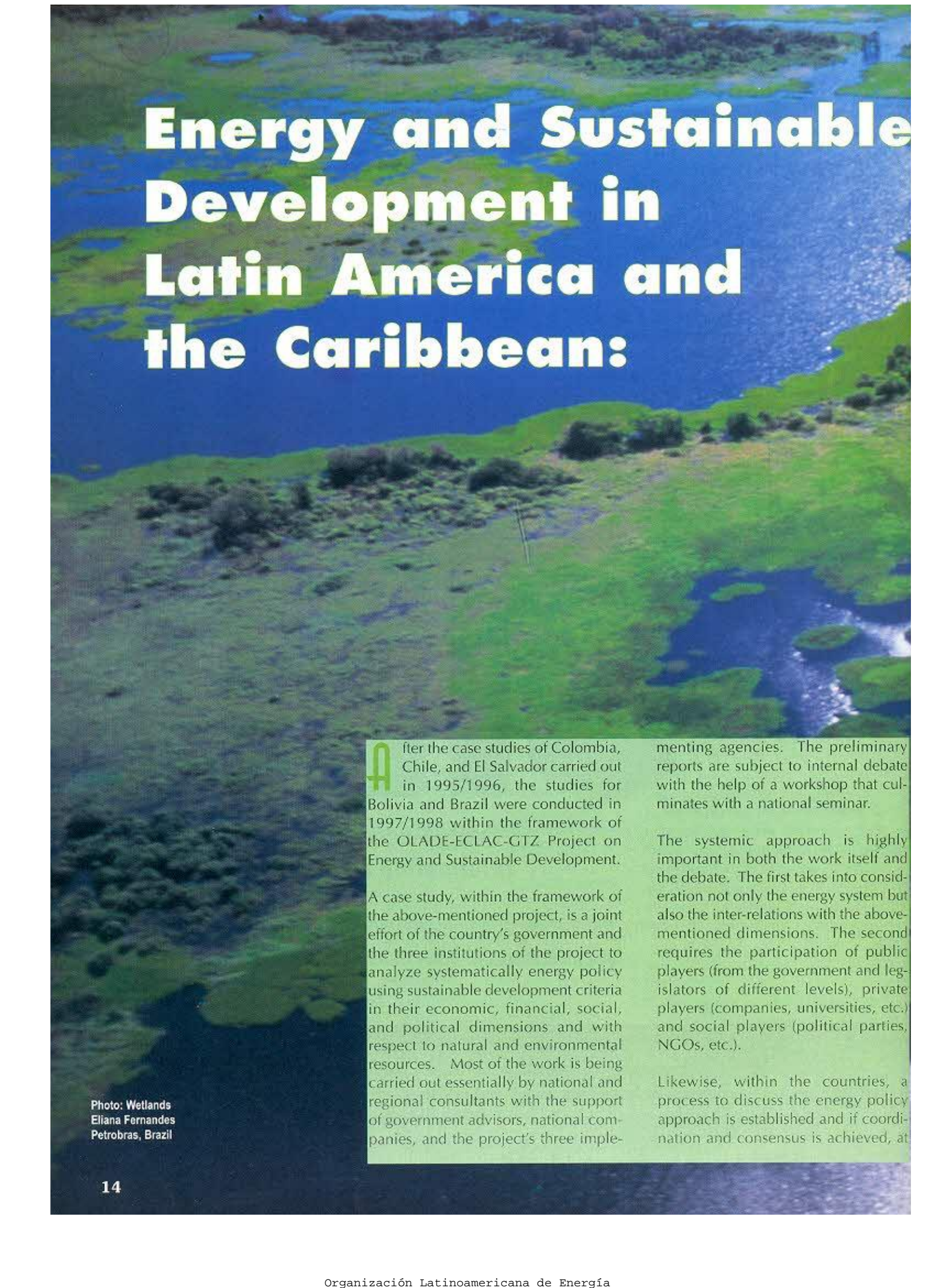


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# Energy and Sustainable Development in Latin America and the Caribbean:

Photo: Wetlands  
Elana Fernandes  
Petrobras, Brazil

**A**fter the case studies of Colombia, Chile, and El Salvador carried out in 1995/1996, the studies for Bolivia and Brazil were conducted in 1997/1998 within the framework of the OLADE-ECLAC-GTZ Project on Energy and Sustainable Development.

A case study, within the framework of the above-mentioned project, is a joint effort of the country's government and the three institutions of the project to analyze systematically energy policy using sustainable development criteria in their economic, financial, social, and political dimensions and with respect to natural and environmental resources. Most of the work is being carried out essentially by national and regional consultants with the support of government advisors, national companies, and the project's three imple-

menting agencies. The preliminary reports are subject to internal debate with the help of a workshop that culminates with a national seminar.

The systemic approach is highly important in both the work itself and the debate. The first takes into consideration not only the energy system but also the inter-relations with the above-mentioned dimensions. The second requires the participation of public players (from the government and legislators of different levels), private players (companies, universities, etc.) and social players (political parties, NGOs, etc.).

Likewise, within the countries, a process to discuss the energy policy approach is established and if coordination and consensus is achieved, at



# National Case Studies of Bolivia and Brazil

least regarding the major guidelines, it is possible to build a sound foundation for a national energy policy that is aimed at taking up the challenges of the future.

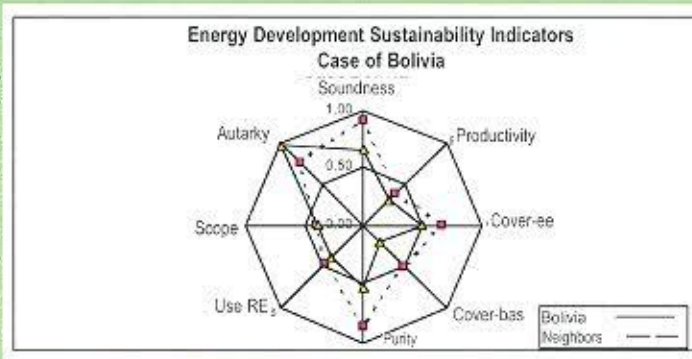
With the completion of five studies in highly different countries of the region and, in addition, with the experience of energy sector modernization and energy integration using a sustainable development approach from other project studies and other organizations, the project has accumulated specific regional experience on the possibility of incorporating the concept of sustainable development in energy policy. The five countries represent the different realities of Latin America and cover many aspects embracing the region's wide variety, thus making

available an important sampling of energy development patterns.

The following charts focus on the energy situation in terms of sustainable development of the two countries compared with their neighboring countries (Southern Cone plus Bolivia and Peru), on the basis of the indicators that have been developed by the OLADE-ECLAC-GTZ Project.

Bolivia is characterized as an exporting country, and therefore its autarky is quite high whereas its soundness with respect to changes in the world energy market is low. In addition, it displays

a certain weakness in terms of the scope (durability) of its energy reserves. Its energy productivity is very low, even lower than that of its neighbors. Electricity coverage, as well as the coverage of basic energy needs, has improved but is still unsatisfactory. Because of the high use of hydrocarbons in the energy system, relative emissions are more significant than those of neighboring countries.







Brazil's situation is better balanced and quite representative of the entire subregion. Weakness is apparent in energy productivity; in other words, energy intensity of gross domestic product is too high in the coverage of basic energy needs and in the scope (durability) of reserves. Its strong points are soundness because it does not depend on energy export trade and maintains sufficient autarky. The widespread use of renewables enables emissions to be reduced to a lower level, which leads to an exemplary air purity index figure.

1. For a synthesis of the concept of energy and sustainable development, see the publication of the OLADE-ECLAC-GTZ Project, *Energy and Sustainable Development in Latin America and the Caribbean: Approaches to Energy Policy*, OLADE, May 1997, Quito, and the article "Sustainability as a Development Objective," *Energy Magazine*, OLADE, Year 21, No. 1, 1997.
2. For example, OLADE: Central Topic for the XXVIII Meeting of Ministers (November 1997), "Energy Sector Modernization in Latin America and the Caribbean: Regulatory Framework, Sale of Assets and Free Trade."

## Energy and Sustainable Development in Bolivia

The report on the Bolivia case study\*, prepared by the group of consultants headed by Carlos Ríos and Miguel Fernández, includes the following conclusions:

"Reforms in Bolivia can be differentiated into two groups: the first is a set of structural reforms of an economic nature that announce Bolivia's shift to a globalized and highly competitive market economy; the second group of reforms reflect the intention of introducing social, redistributive (in economic terms), participatory, and decentralizing (in democratic terms) improvements.

Since the study's general objective was to survey the current energy policy and its implementation, as well as to conduct an economic, social, and environmental assessment, it is not possible to categorically assert that the model is globally compatible with sustainable development objectives.

When evaluating development of the **social plan**, broadly speaking it can be

said that there are gaps between the social policy and the current economic policy. In this aspect, the development model adopted by the country hampers payment of the social debt, which means that medium- and long-term sustainability is at risk. Poverty is persistent. In the energy sector, to ensure coverage, timeliness, and fairness of energy access, noteworthy efforts will be required (in terms of policy and investment) for their effective implementation.

In strictly **macroeconomic** terms, the export model that was selected (principally natural gas) and is being implemented poses the challenge of how to use the resources that come from export earnings. The surpluses should facilitate the development of economic activities of higher added value and the diversification of the country's economy. Indeed, with appropriate policies, it is possible to control the risk of an unsound application of financial surpluses, which would help to consolidate the State's role

as setter of standards and the creator of sustainable policies.

In terms of **natural resources and the environment**, there is a legal framework that is highly promising for the energy sector. As long as the standards that have been established, at least in the sector, are complied with, there will be no major problem undermining sustainability.

Redirecting Bolivia's energy matrix is far more than just a challenge, it is imperative. To do this, short- and medium-term actions must be implemented on a permanent basis, orienting consumption in terms of production and the larger energy reserves that the country has available, introducing a long-term energy efficiency and sustainable energy supply approach.

\* OLADE-ECLAC-GTZ Project Energy and Sustainable Development in Bolivia, preliminary report, La Paz, December 1997.



## Energy and Sustainable Development in Brazil

Brazil's postwar energy policy was mainly aimed at obtaining cheap energy for the country's economic players. Therefore, two state enterprises were set up, one for the electric power sector (ELETROBRAS) and the other for the oil sector (PETROBRAS), with a dual objective: enhance the use of domestic energy resources and coordinate the development of the country's energy infrastructure.

The outcome of this policy was highly significant. In the hydrocarbons area, refining facilities, with a capacity to process 248 million cubic meters per year of crude oil, were installed. Oil production amounted to 45.6 million cubic meters, whereas natural gas production attained 9.2 billion cubic meters. Moreover, sufficient reserves were discovered to ensure self-supply. In the electric power area, generation capacity amounted to 60.7 GW and two large interconnected systems were set up to cover the majority of Brazil's territory, with virtually all the urban regions connected to the power grid.

More recently, the perception that energy plays a major role in the economic development process has become quite noteworthy. Concern for the depletion of the natural resource base, as well as environmental impacts of the exploitation and use of energy resources, has led to the reformulation of energy policy so as to avoid compromising the welfare of

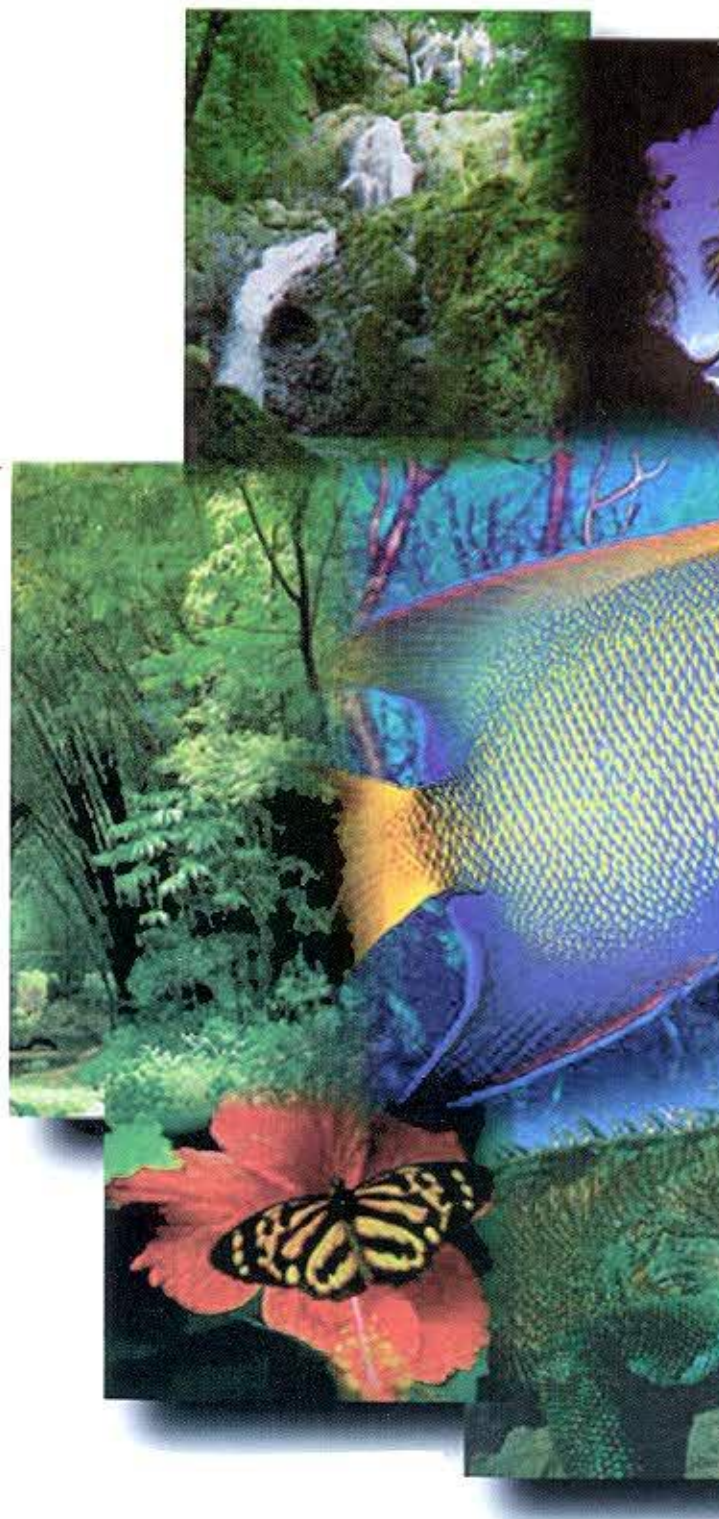
future generations. According to the United Nations Development Programme (UNDP), development should strive to *enlarge the range of options of persons, providing them with greater opportunities for education, medical care, income, and employment, and covering the full spectrum of human options, from good physical environmental conditions to economic and political freedom*. On the basis of this approach, it is not enough to expand energy supply to achieve development. More than that is needed. Access to the energy infrastructure should be guaranteed to all citizens, and the environmental impacts stemming from the use of this infrastructure should be mitigated.

In addition, because of the financial crisis of the State, institutional reform of the energy sector has become a priority for the current administration of Brazil. Privatization of energy companies and the introduction of competition, in both the fuel market and the electric power market, will be core elements for the new industrial organization being proposed for the Brazilian energy sector.

The group of consultants headed by Professors Adilson de Olivera and Antonio Dias Leite has presented an analysis of the energy situation of Brazil and political proposals in the paper entitled "Energy and Sustainable Development in Brazil." 



# TRINIDAD AND TOBAGO ENERGY INVESTMENT AND DEVELOPMENT





Christopher Columbus discovered the islands of Trinidad and Tobago in 1498, but Spain's first attempt to colonize the island of Trinidad was 1592. It remained under Spanish control until 1797 when it was taken by the English. In 1802 it

was formally ceded by Spain to Great Britain.

The island of Tobago was held by the Dutch, the French, and the English at different times of its history, until 1814 when it remained in the hands of England.

In 1888, the two islands were merged to form one single colony.

During the eighteenth century, many slaves were brought from Africa to work on the plantations of Trinidad and Tobago, but with the abolition of slavery in 1834 the plantation owners had to resort to indentured workers from India. As a result the present demographic composition of the country, which has 1.4 million inhabitants, is 39.6% African, 40.3% East Indi-





an, and 18.4% from various other backgrounds.

From 1958 to 1962, the country was a member of the Autonomous Federation of the Caribbean. It won its independence in 1962. In August 1976, it adopted a new Constitution whereby the country became a Republic, member of the British Commonwealth. In 1980, Congress was granted powers over finance, economic development, and social services.

### Growing economy

With a growing gross domestic product (GDP) of 3.1% in 1996, Trinidad and Tobago has been recording positive economic indicators since 1994. It is estimated that the GDP growth rate for 1998 will be 4.9%.

The Government has promoted actions to ensure steady sustainable growth within a framework of social equity, with a set of programs and policies aimed at enhancing investments, especially in those sectors that have a greater potential to generate job opportunities: agriculture,

tourism (over the last five years, an average of 350,000 tourists per year have arrived in the country), construction, and manufacturing.

In addition, the continued development of the hydrocarbons, petrochemical, and metallurgical sectors has promised long-term growth for the country.

The expansion of foreign direct investment, mainly from the United States, has been a key factor in the surpluses recorded by Trinidad and Tobago over the last four years. U.S. investors committed US\$646 million in 1996, and it is forecast that they will have invested more than US\$1 billion in 1997 and US\$745 million in 1998. Other countries interested in bringing capital into the country are Canada, Germany, India, Norway, the United Kingdom, and Spain.

In order to apply its economic diversification strategies, the Government, while undertaking legal reforms to promote investments, is making efforts to mod-





ernize its economic sector. Within this context, the necessary steps have been taken to develop a competitive economy in international terms and to enlarge even further its market access. The State is facilitating economic activities and ensuring that the private sector will become the driving force behind this national transformation process.

Trinidad and Tobago is also participating in regional integration efforts such as the Latin American Energy Organization (OLADE), and has close ties with the Caribbean Community and the Association of Caribbean States (ACS).

### Energy development

Trinidad and Tobago's energy sector activities are currently in the midst of an unprecedented upward swing, involving an increased focus on the monetization of the country's significant natural gas reserves. The ongoing initiatives in the sector have their origin in the evolution and adoption of sectoral and macroeconomic policies that are now yielding major earnings for the benefit of the country's economy and people.

In the past two years, 13 production sharing contracts have been signed for offshore hydrocarbons exploration. AMOCO, Agip, ARCO, British Gas, BHP, Conoco, Deminex, ELF, ENRON, Exxon, PETROBRAS, Repsol, Shell, Texaco, Talisman, and Union Texas are the companies currently involved in these exploration projects. Of special note is the deepwater exploration bidding round that was completed in mid-1997, culminating in the selection of four companies/consortiums to work in the blocks located in water depths of up to 1,750 meters. This means that geographical coverage of major offshore exploration leads will be complete once drilling begins in all of these blocks.

The gas-based downstream and heavy industry sector has recorded especially high levels of investment in the past two years. The Atlantic LNG plant, which is currently being built and is scheduled to


start up in mid-1999, deserves special mention as it is a landmark for industry. The estimated cost of this facility is US\$950 million. There are also two



**Honorable Senator Finbar K. Gangar, Minister of Energy and Energy Industries of Trinidad and Tobago, promoter of his country's energy sector modernization**

It is estimated that,  
for the period  
1997-2001,  
investments in  
Trinidad and  
Tobago's petroleum  
and downstream  
gas-based sectors  
will exceed US\$5  
billion





methanol plants and two ammonia plants under construction. By the year 2000, Trinidad and Tobago will have six plants producing 3 million tons of ammonia per year and five plants producing over 3 million tons of methanol per year, thus making the country the world leader in the export of these products.

In terms of heavy industry, construction began on a direct reduced iron plant, which will be utilizing the as yet commercially unproven Circored process. The principals, Cleveland Cliffs, hope to emulate the success of Nucor, which has proven the commercial viability of its iron carbide process. At the end of 1997, the Government signed Memorandums of Understanding with Norsk Hydro and the Southwire Consortium for the construction of two aluminum smelter plants. In addition to the commissioning of these two new projects, there are plans for the significant expansion in capacity of Phoenix Park Gas Processors, a natural gas liquids removal concern.

It is estimated that, for the period 1997-2001, investments in

Trinidad and Tobago's petroleum and downstream gas-based sectors will exceed US\$5 billion.

In Trinidad and Tobago, dynamics similar to the changing global energy scene are also at work in Trinidad and Tobago, and the country has had to shift its policies to adapt to the new international environment. These rapid changes in the international markets will also promote an evolution in the Government's role as the millennium approaches. This new outward-looking approach has resulted in high levels of investment, a success that is, in part, attributable to the government's focus on the private sector for its development process.

By the year 2000, Trinidad and Tobago will be the location for a wide array of projects in the oil and gas sector. There is now an air of optimism that envisages highly intensive upstream and downstream activities in Trinidad and Tobago's energy industry, which bodes well for the continued success of the country's industrialization thrust.





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### ARGENTINA-URUGUAY: Building a gas pipeline

The Minister of Industry, Energy and Mining of Uruguay, Dr. Julio Herrera, informed that a British-U.S.-Argentine consortium, British Gas and Panamerican Energy, was awarded the bid for building the southern gas pipeline between Argentina and Uruguay.

The pipeline, which will extend over 215 kilometers, will require 12 months of work and an investment of US\$120 million.

"I believe that the possibility of extending this transport network to the south of Brazil influenced the final calculations. It is MERCOSUR that is making it possible for Uruguay to have this natural gas coming from Argentina at a price that would have been hard to obtain if there were no possibility of gaining access to the Brazilian market," stated the Minister, Dr. Herrera.



### BOLIVIA-PERU: Promotion of the project to build the La Paz-Puerto Ilo polypipeline

The Vice-Minister of Energy and Hydrocarbons of Bolivia, Carlos Alberto López Quiroga, informed that his country is studying a project to export natural gas to Peru, through a polypipeline that would be built between La Paz and the Peruvian port of Ilo.

The matter was dealt with by President Alberto Fujimori of Peru and General Hugo Bánzer, President of Bolivia, during the meeting held in Puno, Peru, on March 27.

It is estimated that the project will cost about US\$175,000; it will consist of a pipeline with an 8-inch diameter, three pumping stations, two pressure reduction stations, cold storage rooms, and systems providing shipping facilities.



### CENTRAL AMERICA: IDB supports electric power interconnection project

The electric power interconnection project of the Central American countries received a new impetus as a result of a US\$16 million loan package granted



by the Inter-American Development Bank (IDB), aimed at implementing technical studies, which will be coordinated by the Electric Power Interconnection System for Central America (SIEPAC).

It should be underscored that OLADE has been supporting SIEPAC and this interconnection project by compiling information on the legal and institutional aspects of the electric power system of the Central American countries, preparing preliminary regulations for the operation of an electric power market for the Isthmus, and identifying barriers that might hamper further exchanges of electricity.

It is estimated that the project has a cost of US\$320 million, of which 51% will be covered by the countries to be interconnected.



### **GUATEMALA: Substantial increase in oil production**

The Ministry of Energy and Mines of Guatemala informed that, in 1997, oil production in its country reached a daily average volume of 32,000 barrels, four times what was obtained in 1996.

By mid-1998, it is expected that average extraction will have increased to 40,000 barrels per day, a volume that will enable the country to meet domestic demand for oil. Guatemala's proven reserves have been estimated at 526 million barrels.



### **MEXICO: Greater production of natural gas over the short term**

In order to meet the increase in domestic demand, Mexico's state oil company Petróleos Mexicanos (PEMEX) will increase its natural gas production by about 46% over the next three years, according to PEMEX sources.

With an investment of US\$90 million in infrastructure projects, it is expected that 5.4 billion cubic feet of gas will be extracted per day. Use of this energy product has been gathering momentum as a result of its low production costs and slight environmental impact.





### **VENEZUELA: Oil reserves for 100 years**

According to information from Venezuela's state oil company Petróleos de Venezuela S.A. (PDVSA), the country has guaranteed oil reserves for more than 100 years of continuous production. The investment plan for this sector over the next 10 years involves US\$73 billion. According to studies that were conducted by PDVSA, it is expected that new discoveries will amount to over 50 billion barrels of crude oil, mostly middle and light.



### **ECUADOR: Bidding process to operate marginal reservoirs**

Ecuador's energy authorities will be announcing an international bidding process for the operation of 10 marginal oil reservoirs in the country. According to reports disseminated by Ecuador's state oil company PETROE-CUADOR, 57 have already indicated their interest in this project, which would require US\$171 million for its development.



### **BRAZIL: Rio de Janeiro is a candidate to host the World Petroleum Congress in 2003**

An intensive promotional campaign is being conducted by the Brazilian Petroleum Institute (IBP) to ensure that Rio de Janeiro will host the 17th World Petroleum Congress, scheduled for the year 2003.

This campaign is supported by the wide-ranging development, over the last few years, of the Brazilian oil sector and, naturally, the attractions and facilities that Rio de Janeiro offers for organizing this event.

It is noteworthy that Rio de Janeiro is the only Latin American city that has submitted its candidacy to host this Congress, which is an international technical and scientific event of the utmost importance for the oil sector.





### **CUBA: Support from the People's Republic of China for the development of small hydropower**

The Minister of Foreign Trade of Cuba and the Vice-Minister of Foreign Trade and Economic Cooperation of China signed a framework cooperation agreement, which includes a US\$1 million grant to conclude two small hydropower projects that would provide major benefits to the campesino communities of the island.

Chinese cooperation in this area is the result of actions undertaken within the framework of the Project for the Development of Small Hydropower Stations being implemented by OLADE.



### **OLADE: Standardization of criteria for the exchange of energy information**

The growing interest of agencies, international organizations, and the private sector in the evolution of LAC's energy sector has intensified their need for information from the countries and OLADE.

In order to standardize criteria and provide the countries with tools to optimize their responses, OLADE has invited the principal international agencies and organizations involved in the energy sector to participate in a program for the standardization of energy information exchange methodologies and mechanisms, which will at the same time enable these institutions to avoid duplicating efforts. This process has started with OLADE's sending to these institutions a detailed questionnaire aimed at identifying their respective energy information requirements.

In a subsequent phase of this project, a meeting will be held in Quito, at the end of the first semester of 1998, to which the following institutions will be invited: Inter-American Development Bank (IDB), Economic Commission for Latin America and the Caribbean (ECLAC), World Bank, Organization of American States (OAS), Food and Agriculture Organization (FAO), International Energy Agency (IEA), U.S. Department of Energy (DOE), Reciprocal Assistance for Latin American Oil Companies (ARPEL), Regional Electric Power Interconnection Commission (CIER), and the Asia Pacific Energy Research Centre (APEREC). The meeting's objective is to achieve standardization of questionnaires, methodology, definitions, and mechanisms for the exchange of information, which will be incorporated into the Project Support for the Development of National Energy Information Systems (SIENs), which is being implemented by the Organization.



# THE OLADE-UNIVERSITY OF CALGARY-CIDA ENVIRONMENTAL PROGRAM SUPPORTS THE REGION'S ENERGY DEVELOPMENT



The sponsorship of the Canadian International Development Agency (CIDA) has given new impetus to the Environmental Program being conducted jointly by OLADE and the University of Calgary.

The Program is comprised of three basic activities, whose objectives and guidelines are described below:

## Master's Degree in Energy and the Environment

It is aimed at providing training in energy-environmental management, within the framework of a master's degree program, to a broad spectrum of professionals in charge of decision making in the energy sector of Latin America and the Caribbean.

The courses are delivered over a 14-month period at OLADE headquarters in Quito, Ecuador; upon termination of the Program the students earn a Master of Science in Energy and the Environment conferred to them by the University of Calgary. The first academic year concluded in November 1997; at present the second program is being conducted; and the third program is scheduled to begin in March 1999.

The screening process to select the participants for the third course is currently being implemented. The deadline for sending the documents for the applicants to this course has been extended to November 1998.

## Environmental Legislation Project

This project is aimed at reviewing current environmental legislation in the energy sector and proposing a model legislation that could become an effective tool for the member countries of OLADE.

On the basis of the compilation of energy-environmental laws from the countries, regional workshops and meetings of experts are being organized to analyze and propose referential legislative frameworks.

The first workshop, for the subregion of Central America and the Caribbean, took place in Copán, Honduras, in October 1997. New workshops are being scheduled in Peru and Chile in July and September 1998, respectively.

## Certification Program

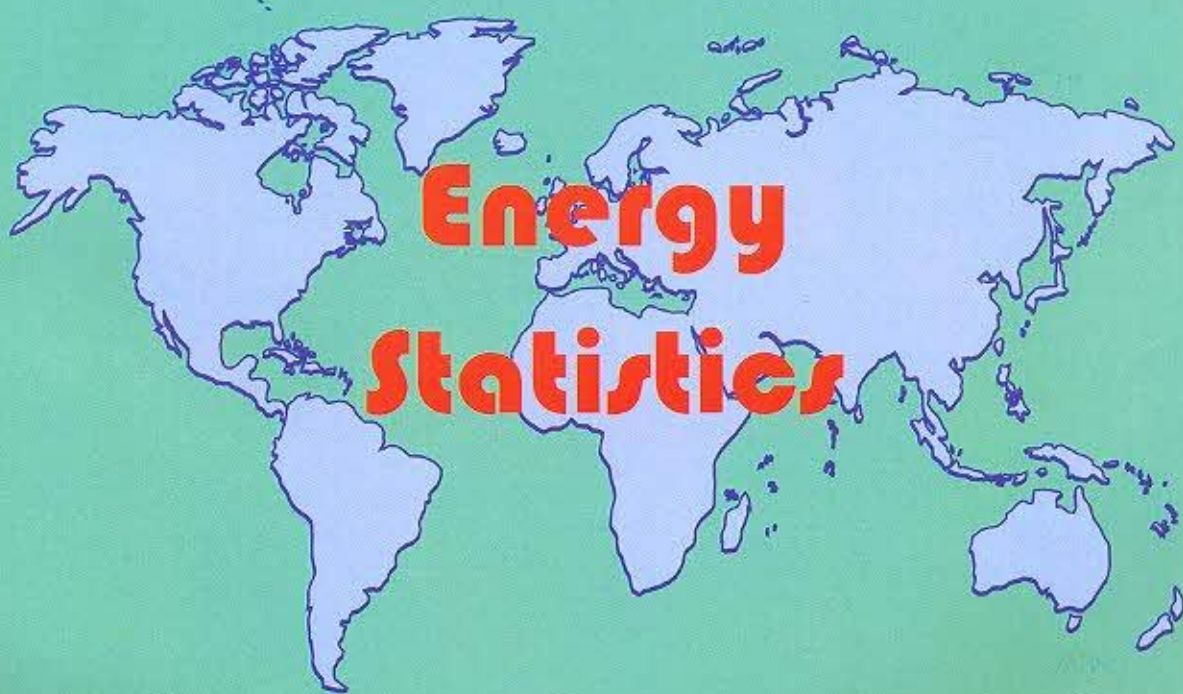
Its objective is to decentralize training activities and combine the efforts of universities and training centers of the different subregions of Latin America and the Caribbean in order to foster programs their meeting training needs and increase the number of beneficiary professionals, who will receive training certificates.

The program is to start in early 1999.

**For further  
information on  
the Third Academic Year  
of the Master's Degree  
Program in Energy and the  
Environment, the Environmental  
Legislation Project, and the  
Certification Program, please  
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## ENERGY PRODUCTION 1996

[thousand BOE]

### PRIMARY ENERGY

COUNTRY	OIL	NATURAL GAS	COAL	ELECTRIC.*	BIOMASS	TOTAL
ARGENTINA	290465	207192	1318	27855	19391	546221
BARBADOS	364	335	0	0	511	1209
BOLIVIA	12531	35064	0	2960	5578	56134
BRAZIL	283886	55569	12434	164673	343786	860347
COLOMBIA	243257	34625	140812	25539	48981	493214
COSTA RICA	0	0	0	3050	2695	5745
CUBA	10651	257	0	69	41058	52035
CHILE	3533	15161	5644	13024	26459	63821
ECUADOR	144746	5306	0	4912	8762	163727
EL SALVADOR	0	0	0	5335	10098	15432
GRENADA	0	0	0	0	34	34
GUATEMALA	5292	66	0	1449	21923	28730
GUYANA	0	0	0	0	2914	2914
HAITI	0	0	0	627	11350	11977
HONDURAS	0	0	0	1631	10971	12602
JAMAICA	0	0	0	79	3841	3920
MEXICO	1155205	260025	49647	47803	98444	1611123
NICARAGUA	0	0	0	2353	8789	11142
PANAMA	0	0	0	1884	3952	5836
PARAGUAY	0	0	0	37329	18426	55755
PERU	43659	1495	248	12803	31456	89660
DOMINICAN REP.	0	0	0	1306	9387	10693
SURINAME	1848	0	0	932	345	3125
TRINIDAD & TOB.	47215	58084	0	0	666	105964
URUGUAY	0	0	0	4467	3867	8334
VENEZUELA	1121504	283250	18336	41705	2361	1467156
TOTAL	3364155	956427	228440	401785	736046	5686852

(\*) : Hydro+Geo+Nuclear

### SECONDARY ENERGY

COUNTRY	ELECTRICITY	LPG	GASOLINE	KEROSENE	DIESEL	FUEL OIL	OTHERS *	TOTAL
ARGENTINA	43219	15348	50944	10888	70377	13590	219538	423904
BARBADOS	418	11	480	20	229	1122	12	2293
BOLIVIA	2003	2113	3152	1021	2723	160	694	11865
BRAZIL	179569	29679	162719	20662	163316	90589	100235	746769
COLOMBIA	27637	5445	36507	7021	24011	20404	25088	146114
COSTA RICA	3033	14	642	251	1502	2136	135	7713
CUBA	8201	643	7430	4514	5549	15379	2199	43915
CHILE	19380	4148	16670	5188	23308	14914	10953	84560
ECUADOR	5737	2066	11386	2120	12215	22196	836	56557
EL SALVADOR	2141	216	1445	487	787	2304	548	7927
GRENADA	59	0	0	0	0	0	5	64
GUATEMALA	2167	57	991	231	1851	1995	798	8090
GUYANA	203	0	0	0	0	0	10	213
HAITI	375	0	0	0	0	0	1735	2110
HONDURAS	1744	0	0	0	0	0	72	1816
JAMAICA	3741	66	1258	714	1988	3380	405	11551
MEXICO	94110	69002	170242	25611	104471	175655	263131	902222
NICARAGUA	1137	116	803	235	1722	1405	470	5888
PANAMA	2426	146	1662	374	2951	3307	445	11311
PARAGUAY	29865	4	198	45	524	363	1218	32217
PERU	10249	1313	8878	8205	13724	21102	3438	66910
DOMINICAN REP.	4242	303	2757	1758	3243	7121	1735	21160
SURINAME	873	0	0	0	0	0	0	873
TRINIDAD & TOB.	2781	2453	6253	3958	7800	17531	2251	43027
URUGUAY	4133	286	1797	585	4428	4108	430	15768
VENEZUELA	45033	41104	133089	31745	96409	110085	23350	480816
TOTAL	494477	174536	619301	125632	543129	528846	639112	3125032

(\*) : Coke+Charcoal+Gases+Other Secondary+ Nonenergy

SOURCE: (OLADE/EC), Energy-Economic Information System (SIEE)



## IMPORTS AND EXPORTS 1996

[10(3)bbl/day]

### IMPORTS

COUNTRY	OIL	PRODUCTS
ARGENTINA	14,6	32,6
BARBADOS	3,2	4,3
BOLIVIA	0,0	2,7
BRAZIL	560,7	291,3
COLOMBIA	0,9	24,4
COSTA RICA	12,4	16,6
CUBA *	107,3	67,9
CHILE	160,4	39,9
ECUADOR	0,0	18,0
EL SALVADOR	14,9	16,6
GRENADA	0,0	1,2
GUATEMALA	12,7	24,0
GUYANA	0,0	6,6
HAITI	0,0	7,5
HONDURAS	0,0	24,4
JAMAICA	20,6	41,2
MEXICO	0,0	177,9
NICARAGUA	12,3	6,6
PANAMA	34,5	9,8
PARAGUAY	3,2	16,3
PERU	56,3	29,0
DOMINICAN REP.	41,3	34,0
SURINAME	0,0	9,6
TRINIDAD & TOB.	41,4	3,6
URUGUAY	29,8	12,5
VENEZUELA	0,0	0,0
TOTAL	1126,4	918,3

(\*) OLADE Estimate

Oil products: (LPG+Gasoline+Kero./Jet+Fuel Oil+Diesel Oil)

### EXPORTS

COUNTRY	OIL	PRODUCTS
ARGENTINA	325,0	90,9
BARBADOS	0,0	4,3
BOLIVIA	0,0	0,0
BRAZIL	2,1	74,8
COLOMBIA	317,4	65,0
COSTA RICA	0,0	3,9
CUBA *	0,0	1,4
CHILE	0,0	1,2
ECUADOR	231,2	33,2
EL SALVADOR	0,0	2,3
GRENADA	0,0	0,0
GUATEMALA	12,9	0,0
GUYANA	0,0	0,0
HAITI	0,0	0,0
HONDURAS	0,0	0,0
JAMAICA	0,0	1,1
MEXICO	1548,1	77,4
NICARAGUA	0,0	0,0
PANAMA	0,0	4,2
PARAGUAY	0,0	0,3
PERU	37,3	18,3
DOMINICAN REP.	0,0	0,0
SURINAME	0,9	0,0
TRINIDAD & TOB.	58,9	97,8
URUGUAY	0,0	2,7
VENEZUELA	1866,2	656,3
TOTAL	4400,0	1135,2

(\*) OLADE Estimate

Oil products: (LPG+Gasoline+Kero./Jet+Fuel Oil+Diesel Oil)

SOURCE: (OLADE/EC), Energy-Economic Information System (SIEE).



## ENERGY CONSUMPTION 1996

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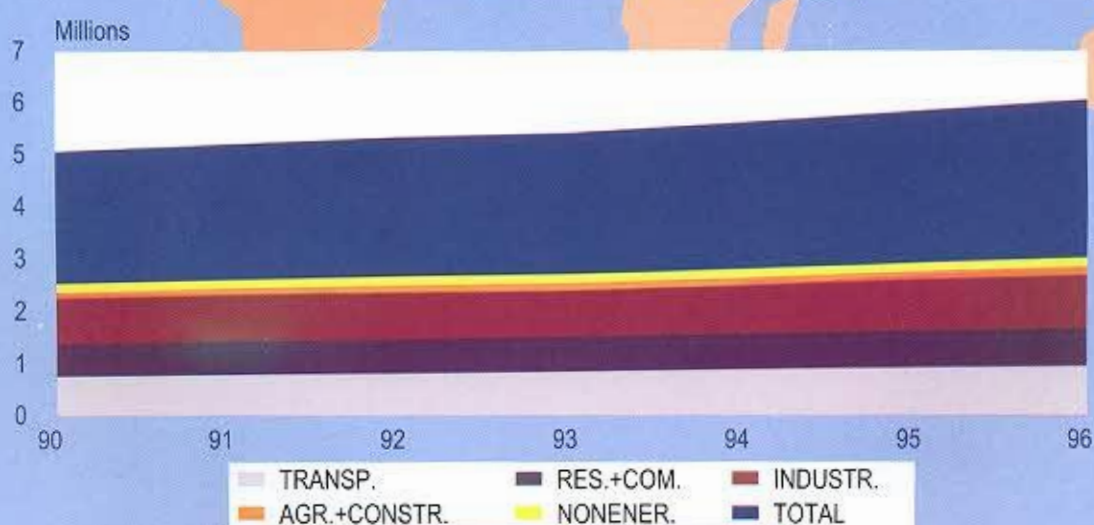
### BY SECTOR

COUNTRY	TRANSPORT	RESIDENTIAL + COMMERCIAL	INDUSTRIAL	AGR. FISH. MIN. + CONSTRUCTION	NONENERG.	TOTAL
ARGENTINA	96425	75068	80855	19852	20975	293175
BARBADOS	653	433	542	58	111	1797
BOLIVIA	6449	7109	4051	899	167	18675
BRAZIL	302542	176725	317934	63250	75773	936224
CHILE	42158	36806	41966	0	835	121765
COLOMBIA	56015	50738	51011	18412	11536	187712
COSTA RICA	6955	3961	3380	537	170	15003
CUBA	17023	9044	51935	5738	3959	87699
DOMINICAN REP.	7648	12153	5363	262	622	26048
ECUADOR	19749	16260	8398	4041	836	49284
GRENADA	190	122	13	19	0	344
GUATEMALA	7640	21906	4979	463	911	35899
GUYANA	815	1788	1428	504	0	4535
HONDURAS	3769	10592	5936	179	0	20476
HAITI	1465	9020	995	343	14	11837
JAMAICA	5569	2844	3747	1742	297	14199
MEXICO	255812	163914	267566	18254	59000	764546
NICARAGUA	2387	8238	1771	164	42	12602
PANAMA	4570	5246	3258	961	97	14132
PERU	21937	35910	12331	11025	2287	83490
PARAGUAY	6590	10897	10235	1	72	27795
SURINAME	812	714	3622	338	55	5741
EL SALVADOR	5376	12468	4519	0	237	22596
TRINIDAD & TOB.	3722	1328	16851	54	16903	38858
URUGUAY	5289	6116	4409	1973	406	18193
VENEZUELA	82649	37117	114373	8	6989	241136
TOTAL	964209	716515	1021668	149077	202294	3053763

SOURCE: (OLADE/EC), Energy-Economic Information System (SIEE).

## ENERGY CONSUMPTION

### LATIN AMERICA AND THE CARIBBEAN





## ENERGY CONSUMPTION IN LATIN AMERICA AND THE CARIBBEAN 1996

COUNTRY	POPULATION 10(3) inhab	GROSS DOMESTIC PRODUCT 10(6) 1980 US\$	FINAL ENERGY CONSUMPTION 10(3)/boe	GDP PER CAPITA 1980 US\$/inhab	PER CAPITA FINAL CONSUMPTION boe/inhab	ENERGY INTENSITY boe/10(3) US\$GDP	CONSUMPTION				CO2 EMISSIONS*	
							ELECTRICITY		OIL DERIVATIVES		ELECTRICITY GENERATION 10(3)tons	ALL ACTIVITIES 10(3)tons
							FINAL	PER CAPITA	TOTAL (1)	PER CAPITA		
							(D)	(D/A)	(E)	(E/A)		
	(A)	(B)	(C)	(B/A)	(C/A)	(C/B)					(F)	(G)
ARGENTINA	35220	143409	293175	4071,8	8,3	2,0	58717	1667,1	170762	4,8	4401	69389
BARBADOS	265	945	1797	3566,0	6,8	1,9	592	2234,0	1708	6,4	467	1045
BOLIVIA	7592	5517	18675	726,7	2,5	3,4	2813	370,5	15185	2,0	1249	14509
BRAZIL	157830	335764	936224	2127,4	5,9	2,8	268078	1698,5	538265	3,4	11371	293330
COLOMBIA	36442	59597	187712	1835,4	5,2	3,1	36206	993,5	99080	2,7	10893	82591
COSTA RICA	3443	5536	15003	1607,9	4,4	2,7	4454	1293,6	8917	2,6	580	5196
CUBA *	11019	16066	87699	1458,0	8,0	5,5	10648	966,3	67524	6,1	5944	40884
CHILE	14419	51054	121765	3540,7	8,4	2,4	26305	1824,3	79743	5,5	6973	51333
ECUADOR	11698	16696	49284	1427,3	4,2	3,0	7027	600,7	48333	4,1	2596	23322
EL SALVADOR	5790	4479	22598	773,6	3,9	5,0	3014	520,6	10180	1,8	1240	9750
GRENADA	92	129	344	1402,2	3,7	2,7	81	880,4	416	4,5	68	183
GUATEMALA	10928	10685	35899	977,8	3,3	3,4	2911	266,4	14450	1,3	742	15667
GUYANA	844	601	4535	712,1	5,4	7,5	224	265,4	2335	2,8	203	2255
HAITI	7329	988	11837	134,8	1,6	12,0	255	34,8	2654	0,4	125	4034
HONDURAS	5816	3848	20476	661,6	3,5	5,3	2039	350,6	8344	1,4	13	8979
JAMAICA	2465	3962	14199	1607,3	5,8	3,6	5370	2178,5	23098	9,4	5020	9456
MEXICO	92712	223652	764546	2412,3	8,2	3,4	121573	1311,3	647217	7,0	72111	295790
NICARAGUA	4236	2042	12602	482,1	3,0	6,2	1205	284,5	6509	1,5	857	6431
PANAMA	2677	5079	14132	1897,3	5,3	2,8	3049	1139,0	14603	5,5	1134	6272
PARAGUAY	4958	6595	27795	1330,2	5,6	4,2	4529	913,5	7609	1,5	103	8939
PERU	23947	24046	83490	1004,1	3,5	3,5	13555	566,0	48727	2,0	2183	34470
DOMINICAN REP.	7961	10613	26048	1333,1	3,3	2,5	4844	608,5	26254	3,3	4570	13114
SURINAME	428	814	5741	1901,9	13,4	7,1	1269	2965,0	3455	8,1	111	2111
TRINIDAD & TOBAGO	1269	5006	38858	3944,8	30,6	7,8	3944	3108,0	7678	6,1	5444	11448
URUGUAY	3204	8652	18193	2700,4	5,7	2,1	5124	1599,3	12723	4,0	307	6263
VENEZUELA	22311	72522	241136	3250,5	10,8	3,3	56535	2534,0	208630	9,4	26843	128597
T O T A L	474895	1018297	3053763				644361		2074399		165550	1145358
REGIONAL AVERAGE				2144,3	6,4	3,0		1356,8		4,4		

(\*) OLADE Estimate

(1) Final Consumption + Transformation Center Consumption



## DOMESTIC CONSUMER PRICES [JAN/98]

COUNTRY	NATIONAL CURRENCY (N.C)	EXCH. RATE N.C./US\$	DOMESTIC FUELS (US\$/Gallon)						L.P.G US\$/kg	ELECTRICITY		
			REGULAR GASOLINE	PREMIUM GASOLINE	DIESEL OIL	HOUSEHOLD KEROSENE	JET FUEL	FUEL OIL		US cent/kWh RESIDENTIAL	US cent/kWh COMMERCIAL	INDUSTRIAL US cent/kWh
ARGENTINA *	Pesos	1,00	2,86	3,58	1,62	1,77	0,87	0,55	1,00	13,90	13,88	7,86
BARBADOS *	Barbadian Dollar	2,01	n/a	2,90	2,43	1,04	0,40	0,74	1,03	16,64	17,42	17,30
BOLIVIA *	Boliviano	5,39	1,40	2,11	1,40	0,77	0,74	0,91	0,25	6,73	13,48	7,53
BRAZIL *	Real	1,12	2,50	2,84	1,34	1,29	0,94	0,65	0,54	12,73	10,89	5,17
COLOMBIA	Peso Colombiano	1341,85	0,70	0,75	0,70	0,70	0,59	0,31	0,19	3,38	8,14	6,80
COSTA RICA *	Colón	244,29	1,63	1,71	1,16	1,06	1,02	0,52	0,55	5,94	10,15	8,62
CUBA	Peso Cubano	1,00	1,51	1,89	0,72	0,32	0,69	0,58	0,24	13,03	7,57	6,94
CHILE *	Peso Chileno	439,81	2,02	2,08	1,24	1,00	0,78	0,55	0,73	11,33	10,17	6,66
ECUADOR	Sucre	4527,00	1,06	1,29	0,74	n/d	0,70	0,32	0,07	5,31	6,19	5,74
EL SALVADOR *	Colón Salvadoreño	8,76	1,76	2,03	1,13	0,89	0,95	0,58	0,34	8,19	10,70	11,10
GRENADA *	Grenadian Dollar	2,70	n/a	2,03	1,54	1,14	n/d	n/d	0,98	19,26	20,37	16,30
GUATEMALA *	Quetzal	6,24	1,60	1,66	1,31	0,94	0,94	0,69	0,27	6,94	7,94	9,39
GUYANA *	Guyanese Dollar	144,25	n/a	1,52	1,33	0,98	1,05	0,72	0,96	7,66	11,85	10,24
HAITI *	Gourde	17,31	2,14	1,94	1,30	1,04	1,04	0,71	0,67	9,30	11,50	9,94
HONDURAS	Lempira	13,09	1,91	1,96	1,22	1,07	0,98	0,79	0,54	7,12	10,86	8,34
JAMAICA *	Jamaican Dollar	36,16	1,38	1,43	1,28	1,09	1,01	0,47	0,58	13,18	9,73	10,29
MEXICO	Peso Mexicano	8,36	1,51	1,54	1,22	1,11	0,58	0,31	0,38	3,95	11,36	4,78
NICARAGUA	Córdoba de Oro	10,00	1,86	1,98	1,39	1,16	0,50	0,50	0,48	13,69	15,84	12,12
PANAMA *	Balboa	1,00	1,70	1,78	1,25	1,18	0,95	0,74	0,53	12,05	11,86	9,96
PARAGUAY	Guarani	2540,00	1,79	2,01	1,01	1,19	1,27	0,78	0,51	7,09	7,55	4,11
PERU *	Nuevo Sol	2,77	1,87	2,65	1,63	1,26	n/d	0,61	0,88	13,29	10,81	5,03
DOMINICAN REP. *	Peso Dominicano	14,39	1,39	1,67	0,96	1,29	1,41	0,56	0,11	8,06	10,71	9,65
SURINAME	Florin	1,79	n/a	2,11	1,55	1,36	1,36	0,25	0,72	17,08	17,30	13,13
TRINIDAD AND TOBAGO	Trinidad Dollar	6,28	1,41	1,48	0,77	0,69	1,26	0,51	0,35	2,75	3,02	2,32
URUGUAY	Peso Uruguayo	10,06	3,20	3,65	1,71	1,67	1,31	0,59	0,73	15,49	15,99	7,56
VENEZUELA	Bolívar	510,75	0,44	0,59	0,36	0,50	0,52	0,09	0,23	1,19	3,66	3,10

SOURCE: OLADE/EC, Energy-Economic Information System (SIEE)  
 1 barrel=42 US gallons=158.98 liters  
 (\*) Preliminary data

Notas: n/d no disponible  
 n/a no aplicable

Notes: n/d not available  
 n/a not applicable

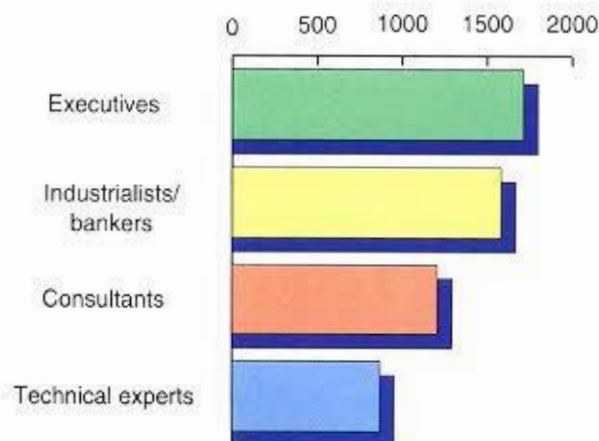


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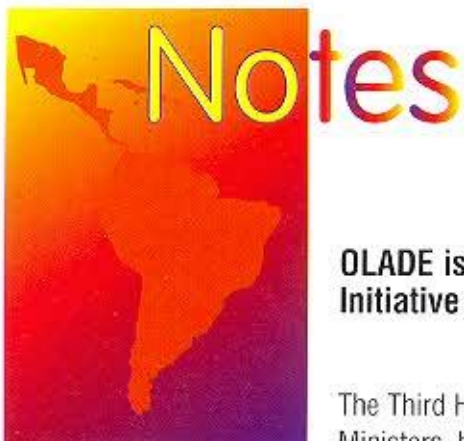
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## **OLADE is part of the Coordination Secretariat of the Hemispheric Energy Initiative**

The Third Hemispheric Meeting of Energy Ministers, held in Caracas, Venezuela on January 15-16, 1998, in view of the need to ensure the continuity of activities by the countries participating in the cooperation effort referred to as the Hemispheric Energy Initiative, decided to establish a Coordination Secretariat comprised of the following:

- Ministry of Energy and Mines of Venezuela, with headquarters in Caracas, Venezuela.
- U.S. Department of Energy, with headquarters in Washington, D.C.
- Latin American Energy Organization (OLADE), with headquarters in Quito, Ecuador.

The establishment of this tripartite Coordination Secretariat is a positive step for OLADE and its member countries, most of which also are participating in this hemispheric initiative. It can be asserted that it is an achievement from various viewpoints, among which the most noteworthy are:

- Through the direct ongoing participation in the activities of the Hemispheric Energy Initiative, the potential for transferring technology and training to the member countries of OLADE in U.S. and Canadian institutions has been enhanced.
- OLADE's participation in this Secretariat avoids the duplication of efforts in areas where the Organization already has regional programs.

It should be underscored that OLADE has been participating in this hemispheric initiative since the start of its activities as the coordinator of Outcome #2 "Promoting Clean Energy Technologies in Electric Power Markets." It has also participated in the Steering Committee meetings. The Organization, in addition, has previously worked, and has a thorough knowledge of, each one of the seven outcomes that the initiative has been analyzing and discussing in order to contribute to the hemisphere's energy development. They are:

1. Increase investments in the energy sector.
2. Promote clean energy technologies in electric power markets.
3. Promote cooperation in regulatory aspects.
4. Promote hemispheric collaboration to enhance the economic and environmental sustainability of the oil sector.
5. Promote new natural gas opportunities.
6. Promote energy efficiency.
7. Develop rural electrification strategies.