MODERNIZATION

Energy Sector Modernization in Latin American and The Caribbean

Regulatory Framework, Divestiture and FreeTrade

olade
Latin American Energy Organization

ENERGY SECTOR MODERNIZATION IN LATIN AMERICA AND THE CARIBBEAN

Regulatory Framework, Divestiture, and Free Trade

ORGANIZACION LATINOAMERICANA DE ENERGIA
Edificio OLADE, Av. Mariscal Antonio José de Sucre N58-63
y Fernández Salvador, Sector San Carlos
Casilla 17-11-6413, Quito-Ecuador
Teléfonos: 597-995/599-489, Fax: 593-2-539684
E-mail: olade1@olade.org.ec
ISBN :9978-70-083-8

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Foreword

The Permanent Secretariat of OLADE submitted to the XXVIII Meeting of Ministers of the Organization, held in November 1997 in Montevideo, Uruguay, a paper on "Energy Sector Modernization: Regulatory Framework, Divestiture, and Free Trade," aimed at analyzing the reform processes that are modifying the structure and operation of the energy sector of Latin America and the Caribbean.

The general conclusion that can be drawn from this study is that all the countries have made progress in this process so that the future profile of the energy sector in Latin America and the Caribbean and the schemes implemented for its operation are now being defined. Nevertheless, many of the reforms that have been adopted have yet to be implemented, and in those countries where the reforms have already made considerable progress the new schemes must be consolidated.

The results of this study are outlined in the present paper, which covers various aspects of reform in order to identify the lessons learnt or determine what tasks are still pending: the linkage between energy sector reforms and macroeconomic and structural reforms; principal coordination options; status of reforms in the different energy subsectors; the business strategies adopted as a result of reforms; the State's role; and the partial results achieved both inside and outside the sector.

Although energy sector modernization in Latin America and the Caribbean is a already a reality, there is a wide range of approaches, schemes selected, courses adopted, and progress achieved among the different countries and with respect to the subsectors and their links.

The present paper attempts to provide an overview of these processes, thus permitting systematic comparison and exchange of experiences between the countries. The paper embarks on a critical review of modernization not in order to make a value judgment on the course that has been opted by one country or another but rather to identify the challenges of the present and future for the governments of the member countries of OLADE.

For various reasons, this work cannot be viewed as concluded. One reason is that reforms are still in the process of being applied. There are often new events

appearing as part, or as a result, of these reforms. Therefore, the present document should be viewed as the analysis and assessment of a work in progress.

The observations provided by the XXVIII Meeting of Ministers of OLADE led to a series of proposals on the role and future work of the Organization in this area. In addition to the mandate to continue observing reform processes and fine-tuning their study, it will be necessary to incorporate quantitative aspects that will enable results and impacts to be assessed in close collaboration with the member countries.

Luiz A. M. da Fonseca
Executive Secretary

Acknowledgments

The Permanent Secretariat of OLADE is grateful for support from the OLADE-ECLAC-GTZ Project on Energy and Sustainable Development, which conducted the baseline work. In addition, it benefited from the valuable contributions of OLADE consultants and collaborators, as well as the member countries of the Follow-up and Monitoring Committee and those countries that individually made comments.

Rafael Armando Meleán, Director of Planning and Energy Projects of OLADE, was in charge of the work's general coordination. The baseline work carried out by the OLADE-ECLAC-GTZ project team was coordinated by Paul Suding of GTZ and benefited from the collaboration of Francisco Figueroa de la Vega of OLADE (natural gas), Hugo Altomonte of ECLAC (electricity), Fernando Sánchez Albavera of ECLAC and Carlos Jaramillo of OLADE (oil), and Héctor Pistonesi of IDEE/Bariloche Foundation (coal). To set up and process the data base, the project relied on the collaboration of Johnny Hernández of OLADE and Paul Suding and Andreas Kern of GTZ.

The paper was edited by Vicente Solano, Project Coordinator in OLADE, and Héctor Pistonesi. In addition, comments and summaries were provided by Juan Luis Guzmán, Byron Chiliquinga, Héctor Ferro, Carlos Navas, Mentor Poveda, and Arnaldo Vieira de Carvalho of OLADE and Fernando Cuevas of ECLAC.

Chapter I
Modernization: Society, the State, the Economy and the Energy Sector

1. The concept of modernization

1.1 What do we mean by "modernization"?

The term "modernization" is frequently used to refer to the changes that have taken place in the economic and social systems of the Latin American and Caribbean region during the last few years. Its meaning, however, can be rather inaccurate largely due to the value judgments usually attached to its use. Thus, to avoid confusion, the meaning behind the concept of modernization needs to be specified in the present paper.

Modernization is understood here to be *a process of structural and functional transformation of a socioeconomic system or parts of it, presented as a proposal to better fulfill the aspirations of the society and/or to deliberately or conditionally respond to changes in the global economic, technological, and institutional context.* These transformation processes have been recurring throughout the history of societies and appear usually as a consequence of outbursts of innovation leading to the introduction of new technologies and/or in response to the accumulation of stress in the articulation and functioning of different socioeconomic subsystems. These processes are particularly intense when their scope becomes global.

In the present case, as has occurred throughout the last two decades, we mean the deep qualitative changes in the different activities of society: political, institutional, technological, organization of production and circulation of goods and services, financing schemes, environmental impacts, etc.

1.2 Previous modernization

The previous modernization cycle took place immediately after the Second World War and led to the application of an economic model, where the State played a very active role in managing and allocating resources and which prevailed for over thirty years. The role of the State at that time had a crucial impact on the development of productive activities and meeting social needs. In the energy sector, nationalized systems prevailed. It is clear that this modernization process was conceived under clearly different conditions and objectives than those behind the current transformation process.

As a result of the crisis of the eighties and the changing international context, the production process structure and institutional scheme stemming from the previous transformation process turned out to be insufficiently flexible to ensure progressive adaptation to new conditions. Obstacles preventing a progressive adaptation of government organizations and public policies, as well as the adoption of technological changes, led to an accumulation of stress that finally made it impossible to postpone any further intensive efforts to modernize national socioeconomic systems.

1.3 Modernization self-propelled or by adaptation

Modernization processes, which emerge from a complex set of internal and external historical conditions of the countries, recognize that certain regions of the globe's socioeconomic domain act as driving forces. Other regions, however, generally respond by imitating the former regions or by adapting themselves, more or less actively, to prevailing processes of change within the current context, depending on the conditions they are subject to at the moment of promoting the change. Indeed, for the latter type of region, the implementation of a modernization process appears as a condition for economic growth, particularly when the new context implies strong interaction between the world's different subsystems.

Thus, for the national systems of these adaptive regions, the implementation of transformation processes that allow them to link up with the predominant dynamic context exerts a positive impact on the global dynamics of the economy, especially certain sectors of it. These adjustment processes, however, also produce negative impacts on those areas of society that are less capable of

adapting themselves to the new conditions, depending on the scheme being proposed for each case.

As part of the in-depth process of transformation which has become apparent throughout the world for several decades, the Latin American and Caribbean region, *in terms of modernization, belongs to the group of adaptive regions.* This process is taking place as a result of the crisis that has been triggered by the functional failure of the previous development scheme and is profoundly conditioned by the adverse impacts stemming from external shocks and heavy indebtedness that have enhanced economic, social and political tension.

1.4 Diversity of implementation, similar features, external and internal factors

The transformation process has not been completely uniform in the countries of the LAC region. The adaptation strategies applied by national systems have displayed different characteristics, and the specific conditions in which this process has taken place in each country have also been different. There are, however, common features to this adaptation process, particularly due to the strong influence of multilateral credit institutions that have tried to promote a specific model of structural reform, in response to the so-called foreign debt crisis.

There is no doubt that both the modalities and the speed of the reform process are also influenced by a complex series of internal economic, social and political factors that have facilitated or acted as a primer for the above-mentioned adaptive changes.

This has occurred especially with respect to energy sector reforms, where the schemes and pace of reform have varied depending on the country and have even displaying different degrees of correlation to macroeconomic and social transformations. Between the external and internal factors, as well as between the actions of private and state players, extensive interaction and dynamics have become apparent.

With trade liberalization, the region's countries are striving to insert themselves into the world economy. This insertion requires the economic system to be competitive, which in turn is one of the factors that gives impetus to

modernization. The competitiveness of a country is systemic in nature, and therefore an essential sector, such as the energy sector, cannot be discounted.

The relatively low rates of return on international capital markets have helped to making the emerging global markets–-among which the Latin American and Caribbean markets—more attractive for private-sector capital investment flows. This factor has given impetus to modernization processes, which have been favored by current circumstances and high earnings for private-sector players from both inside and outside the region.

Another external factor, which has been basically determined by government policy decisions, is the effort to ensure subregional economic integration. Along with trade liberalization, economic integration has promoted trends that oftentimes are a step ahead of intergovernmental integration actions and which have applied pressure on governments to take new decisions. This situation has also affected the energy sector.

2. Phases in modernization

2.1 Identification of phases in the schematic description of the process

Even though the economic, social, and political evolution of national systems involves permanent imbalances, modernization usually implies disruptions producing substantial changes in the structure and operation of these systems, leading to new patterns and frameworks.

Therefore, in the region's countries, reforms are not identical and their pace of implementation in each country is also different. This diversity is one of the topics that the present paper focuses on. Nevertheless, in view of the similarities that are apparent in the general features of the transformation processes, as well as certain similarities in the conditions that prevailed prior to modernization efforts, it is possible to provide a schematic description of this process and differentiate various phases, thus facilitating later assessments.[1]

Table I.1 Phases of modernization

Phases	Characteristic	Political response	Duration
Pre-Reform	Economic **stagnation** and crisis Economic, political and social **instability**	Conventional adjustments Proposal for reform	1 to several years, failed attempts
Reform	Short-term **stabilization**	Adoption of main elements of the reform	1 year
Transition	**Recovery**, boom and greater efficiency in production **Social tension** **Crisis**	Implementation and addition of complementary reforms Concern over excesses and deficiencies Corrections	1 to 5 years 1 year 1 to 4 years
Post-Reform	Long-term **stabilization**	New approaches (sustainability, regional harmonization, etc.)	

Source: Inter-American Development Bank, adapted by OLADE

Table I.1 provides an outline of the different phases or stages of this transformation process. It is evident that the different countries of the LAC region do not start out from the same point of departure, that is, their respective starting point in terms of reform do not coincide. Some of them have already carried out, at different times, profound macroeconomic changes in the organization and functioning of their markets, in the area of public services, and in the State's role in the economy. In other cases, only partial reforms have been made, varying in depth, which usually imply macroeconomic adjustments. In any case, for the most part, reforms have extended from the mid-eighties to the early nineties.

The sequence of modernization phases described in Table I.1 does not evolve automatically. Rather, it involves a series of events in this order: emergence of problems, impacts, political reactions to these impacts, and new impacts. In addition, political actions and reactions are not the result of homogeneous decisions, but rather the result of struggles between different interest groups or players of society. Likewise, the impacts of political actions also depend on the attitudes and expectations of those players who enjoy the most leverage or maneuverability in the system.

2.2 The pre-reform phase

2.2.1 Stagnation

As previously noted, the phase characterized by stagnation highlights the loss of effectiveness of the previous development model of the region's countries in contrast to new world trends and patterns.

Obviously, the depth of this crisis and stagnation is different in each country. In some of them, the previous model proved to be severely dysfunctional and led to a loss of viability, failure to carry out elementary tasks, and inability to take up new challenges. In others, the persistence of the previous development scheme enabled moderate growth due to the adaptive capacity and degree of flexibility of the general organization of each country, among other reasons.

The first symptoms of a loss of effectiveness of the development model based essentially on import-substitution industrialization began to emerge in the mid-seventies, at which time there were important changes in the global economy, such as the relocation of productive activities and globalization of the financial sector triggered by the growth crisis experienced by the developed economies since the beginning of the decade. The strong international liquidity postponed the crisis of the model's viability in the developing countries, especially in Latin America and the Caribbean. Steady growth, however, led to a rapid rise in external indebtedness, which, as a result of changes in the orientation of U.S. economic policies and their impacts on the liquidity of the international financial market, unleashed the crisis at the beginning of the eighties. Conventional piecemeal attempts to stabilize the situation during the first half of what has been referred to as "the lost decade" were not sufficient to put the region's economies on a sound footing and to enable them to recover growth.

It is noteworthy that, during previous decades, the average rate of economic growth in the LAC region was over 5.3% per year.

2.2.2 Instability

The system entered a phase of instability with the beginning of growing tension between forces that favored change and others that resisted it. It is the solution of this type of tension and not the degree of stagnation in itself that gives way to the change processes. In view of the effort required to bring about changes, without

a clear solution of these tensions in favor of its execution, the system is able to maintain the previous development scheme for a while, in spite of clear signals that indicate that it is no longer functional within the new context. In some countries, the option was to implement the reforms on the basis of the recognition that the new global context offers new opportunities, in spite of the risks and sacrifices that the changes involve.

In the solution of the previously mentioned tensions between opposing groups, the aspirations for improvement and previous experiences have a weight. It is clear that an ideal focus in implanting changes involves softening those opposing positions and looking for a consensus and the participation of the majority of the population and specifically of those groups affected by the conception and introduction of modernization, to weaken the forces of resistance.

2.3 The reform

2.3.1 Stabilization

As a consequence, reform and stabilization are not achieved automatically, only when forces favorable to change are able to overcome the resistance of those wanting to maintain the status quo.

Contrary to the ideal schemes described previously, in concrete situations changes take on very different forms: radical change, gradual change, discontinuous change, or even chaotic change.

- Radical change is possible in conditions where power, whether dictatorial or democratic, is highly concentrated but is always aimed at ensuring change. From the very beginning, its focus is defined. It offers security for the parties involved, as long as the political system perceives that there is a prospect of stability.

- Gradual change requires consensual processes to undermine those forces aimed at keeping the status quo or to convince them to surrender. It begins usually with a relaxation of tensions between differing positions. Gradual change advances step by step, but in an orderly fashion. It may be that, at the start of this process, only the direction may be completely defined not the approach. In this case, “trial and error” schemes are applied and the result is

not clearly foreseeable. This process of change implies a certain degree of risk.

- Discontinuous or chaotic change takes place in environments ridden with conflicts without any stable majorities and with a high degree of risk. It is characterized by unfruitful attempts to carry out reforms. Stabilization is not achieved in a coherent fashion.

2.3.2 Transition: recovery, tension and crisis

The transition phase adopts different forms. Its nature depends in part on how change takes place.

Not even when a strategy for radical change has been adopted is it usual for all reforms needed for its implementation to be introduced simultaneously. It is not possible for new rules to be applied immediately. Adjustments are always needed, particularly if the process of radical change has neglected the interests of important segments of the population and has required large sacrifices over the short term without meeting medium-term aspirations. Regarding this, it is important to stress that tensions involving macroeconomic variables are compounded by social tensions.

A balance can be struck if a radical reform of the system adequately meets the aspirations of the majority of the social players. When the concentration of power that allowed radical change declines, the new system is put to the test. If the majority of the people are not satisfied, the outcome may be a more or less profound imbalance.

In the case of gradual change, the transition phase is naturally longer, and the eventual boom associated with it does not take place as quickly. The options to manage tensions and introduce corrections in the reform process, however, are much broader. The likelihood of achieving a stable dynamic situation (in response to the aspirations of the majority) is much higher.

In the case of discontinuous change, the transition lasts much longer, and in the case of chaotic change, its contents are also unpredictable. The perspective of finding a new balance is highly improbable.

In the region's countries, the transition stage has been characterized by a *recovery* of economic growth and by its positive impact on other economic indicators.[2] It would be erroneous, however, to deduce that the application of reforms is automatically followed by a widespread improvement in economic performance. The positive experience in the early nineties occurred in a context of international liquidity that was substantially higher than that recorded during a large part of the previous decade when external factors also came into play to unleash the crisis at that time. In turn, the implementation of reforms usually was a prerequisite for capital flows to the different countries.

Regardless of the degree of causality between reforms and economic recovery, it should be recalled that reforms have affected variously the social environment, and their impacts seem to more strongly felt when economic growth is insufficient and their gains do not reach those social groups that are most hard hit by the adjustment.

One of the most important results in the countries of the area is that the economic boom as a result of the reform is almost always systematically followed by tension and crisis. All of the countries, whether those that have already implemented reforms or those that are still undergoing periods of instability prior to effective reform, must remain alert to these impacts, as they are decisive for the success of any modernization effort.

The scheme described in Table I.1 attempts to incorporate this experience and points out the possibility of *tensions* and even *crises* during the transition stage. It also highlights concerns about the achievement of new stable dynamics in the post-reform stage.

If a broader series of indicators, such as domestic savings, investment or disinvestment in natural capital, investment in human capital, employment rate, distribution of the benefits of growth, and other socioeconomic and environmental variables, are examined, further evidence about the nature and causes of the tensions and crises observed, particularly in some countries several years after the structural reform, could become available.

2.4 Post-reform

There are still many countries that have not entered the post-reform stage. Therefore, one can only speculate and/or formulate scenarios about this phase of the process. It is assumed that the condition needed to reach dynamic stability is that the majority of the forces that came together to defend the new model refrain from advocating additional structural changes. This means that most of these forces must be satisfied with the new system.

If a new system capable of adapting itself to the new conditions is established, this dynamic stability could be more lasting. History, however, has demonstrated that all social systems based on laws and regulations will inevitably require, sooner or later, further modernization.

3. Nature, levels and elements of modernization in LAC

All structural transformation processes normally affect the different levels (economic, social and political) of a country's social system more or less simultaneously, though always with a strong interrelation. Current modernization of socioeconomic systems has generally taken place alongside political system democratization processes, although in some cases the driving force behind reform was provided by unquestionably authoritarian governments.

3.1 Democratization, legitimization of modernization, unsatisfactory control

When the consolidation of democracy is combined with modernization, the former grants legitimacy to the latter. The idea and way of implementing this process have often been designed in bureaucratic and technocratic institutions directly answerable to the executive power, with a highly variable involvement of the legislature acting as supervisory control institution, depending on the country. The ideal is for the process in society to be based on a consensus. There are no clear-cut models of how to achieve this ideal. Ultimately, there is always a decision that is unfavorable for a minority. The objective would be to have this minority as small as possible. Regarding this, the role of State in this process will be examined in greater detail in Chapter V.

As part of this approach, market mechanisms are granted priority as an instrument for adapting to the new context and finding new solutions. New and mainly private-sector players joining the system due to the wide-ranging market liberalization have contributed decisively to this way of formulating up and implementing the reform process.

On the one hand, there is the conviction that the wider involvement of the protagonists of change, combined with greater economic freedom, leads to more appropriate solutions for both the players themselves and society as a whole. On the other hand, however, there is concern that the resulting decentralization of decision making will imply a loss of control over the development process.

Regarding especially sensitive sectors, among which the energy sector, it would be worthwhile to reflect upon the scope that coordination, development policies, follow-up, and monitoring should have so that decentralized resource allocation decisions are not too far removed from a politically advisable development of the sectors. We can now assert that, in some countries, market operations are not duly regulated and therefore free competition mechanisms are asked to perform duties that are far beyond their capabilities, which means that there is a higher risk of undesirable social results.

3.2 Modernization of the State's role in economic activities

Modernization embraces various domains of State activity, among which, its economic activities as a whole. In particular, it covers activities previously viewed as strategic areas. In view of this, modernization involves all energy subsectors, in addition to the other infrastructure systems, such as telecommunications, transportation, clean water, and sewage, as well as administrative duties, such as customs.

This complex modernization movement has spread to almost all the region's national systems and most of the sectors within them. Some countries have even enacted global modernization laws and created supra-sector institutions pushing for State reform. It is therefore appropriate to speak of macro-processes, to which energy sector reforms belong.

The new approach or model involves a different "division of labor" between the State and the private sector. There have been fundamental changes in public

intervention modalities, and the State's typical attributions, such as central planning or state investment, have been curtailed based on real or assumed interest of the public. At the same time the principle of subsidiarity that provides that the state only make investments that complement those normally made by the private sector has been established. Thus, the State would focus on promoting, regulating, inspecting, and monitoring.

Likewise the general guidelines for reforms aimed at ensuring modernization have been inspired by a fundamental doctrinaire neoliberal orientation which was able to stir up ample consensus in the world during the eighties. New specific theories, supported by new know-how and technology, cast doubts on the theoretical underpinnings of certain imperfect competitive conditions such as natural monopolies, which involved exempting infrastructure sectors from market rules. In addition, a new debate undermined the conviction that certain energy activities should be in the hands of the State. There was also the widespread belief that the State's deficiencies as business manager outweighed the imperfections that needed correcting.

With the changing role of the State in the development of infrastructure sectors, the relationship between the central and local governments has also changed as a result of the phenomenon known as decentralization. The logical upshot of this is if decentralized agencies can perform a more effective role in society, they can also take over certain functions in energy sector activities.

4. The macroprocess of modernization and the functionality of the energy sector

4.1 New macroeconomic operational models and structural reforms

The process of modernizing the economic systems entails introducing new macroeconomic operational modalities in macroeconomic functioning, as well structural reforms. Macroeconomic operations are characterized by new monetary and fiscal policies based on the new institutional order created by the structural reforms that involve authentic changes in the economy and in the rules for state intervention.

The main elements of economic reforms have been:

- Trade liberalization, mainly imports
- Exchange market deregulation
- Divestiture of assets of public companies (privatization)
- Deregulation of commodities market and rationalization of subsidies
- Deregulation of financial markets
- Deregulation of foreign investments
- Flexibilization of labor markets

All of these elements appear in one way or another in most of the countries that have undertaken modernization processes. The form and scope of each one of these elements, as well as the sequence and pace of their application, can be quite different.

What the reforms have in common is the fact that they began with a new macroeconomic policy based on the region's participation in a new foreign debt management strategy, as formulated by the Brady Plan. The first phase is usually associated with foreign trade liberalization and the adoption of a new exchange regime, characterized by the deregulation of the foreign currency market. It is the very functionality of the exchange regime within the new economic system, however, that highlights one of the main differences among the reform processes. In some cases, stabilization and reform were based on anchoring the exchange rate. In other cases, these processes took place within the framework of the monetary policy, where the exchange rate was one more variable to be considered.

As for the interrelationship and incidence of the different elements of economic reforms in the different phases of the macrorestructuring process, the following can be noted:[3]

a) There was always a series of structural adjustments during the modernization process.

b) The different elements of structural adjustment were not applied in a systematic way (not in all cases and not in the same phase of the process), with the exception of two elements:

- Trade liberalization seems to be systematically associated with the reform, as a precursor.

- Likewise, the deregulation of commodity markets takes place at the same time as the main reform.

4.2 The energy sector in the modernization process: a macroeconomic perspective

Energy has traditionally been a sector controlled by the State. Although reforms in the sector itself can be explained by its specific problems, there are many reasons stemming from other areas that have pushed the energy industry toward modernization. Lesser maneuverability by the State in its handling of policy instruments has not only affected the energy sector. The declining validity of the economy's development scheme as a whole spurred the need to modernize the energy sector. Likewise, the new know-how and technologies that have facilitated thinking about other management approaches in all sectors of the infrastructure have rendered some energy practices completely obsolete.

Among the elements of macroeconomic and structural reforms, including those involving the role of the State, that affected or continue to affect the energy sector, the following should be highlighted: a) the profound change taking place in the relationship between the state and the state-owned enterprises, due to the solution of the fiscal problems and the redefinition of the functions of the state itself; b) the privatization of public enterprises; and c) indirectly, trade liberalization, deregulation of the goods and services markets, which involves the reduction and/or change of subsidy schemes, the liberalization of financial markets, and the deregulation of foreign investment.

It can already be seen that, although macroeconomic and structural reforms by themselves entailed partial transformations of the energy sector, specific reforms of the sector in general exerted a broader impact, as demonstrated in the following chapter.

4.2.1 Mitigation of fiscal problems by putting state-owned energy enterprises on a sound footing and giving them a business orientation

In the efforts to eliminate or mitigate the profound fiscal imbalances affecting the region's countries, especially after the foreign debt crisis in the early eighties, a decision was taken to put public-sector enterprises, especially electric power utilities, on a sound footing. The funds channeled to these companies were, to a large extent, responsible for the high foreign debt. In addition to the impact of servicing the debt, there were, in many cases, operating deficits stemming from the real deterioration of prices and rates of these state companies.

Chart I.1

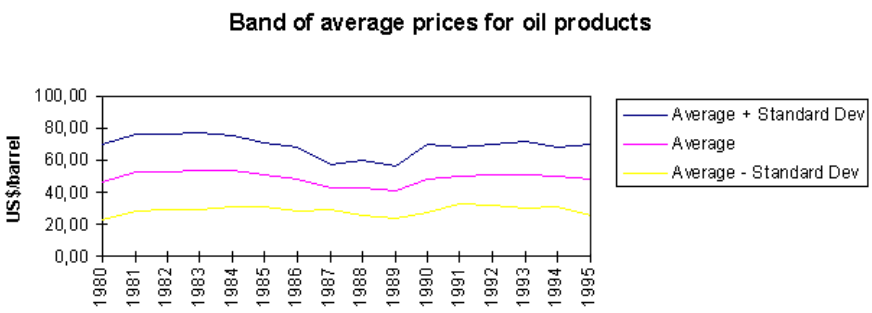
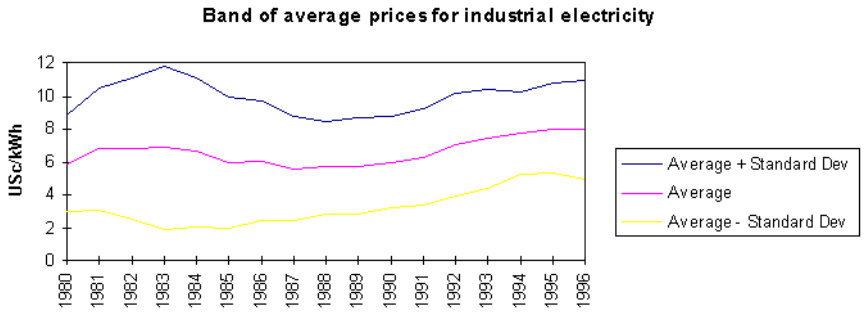


Chart I.2



Therefore, within the framework of fiscal and macroeconomic reforms, the process of putting these companies on a sound financial footing involved transferring the foreign debt to the State's central administration, cutting back on investment plans, and ensuring self-financing by increasing the prices and rates in real terms. In Charts I.1 and I.2, the average price bands of oil products and electricity of the Latin American and Caribbean countries recorded a drop as of the mid-eighties and subsequent recovery at the end of the eighties. Although other costs have not experienced any significant growth in current dollars, it can be asserted that there was a drastic reduction in the level of state subsidies.

In some cases, financial rehabilitation was complemented by an adjustment in the legal and managerial structure as the first step toward redefining the role of the State in public service activities, which shifted from business management to promotion, regulation, inspection, and monitoring, implying a change of legal status of the companies and more business-oriented management schemes. This shift means transforming public enterprises into joint-stock companies, with more autonomy from the state's central administration, which in turn began to carry out functions that were more regulatory in nature. As to the business scheme, a virtual separation of the different business units was launched, and this affected the vertical structure of activities prevailing till then in the majority of State enterprises.

4.2.2 Divestiture of state-owned assets

Although one could say that the breakup of state assets was spurred by microeconomic objectives, such as the improvement of efficiency, or broadening the scope and quality of services provided, the driving forces behind this process were the macroeconomic objectives:[4]

- When fresh funding was no longer needed owing to privatization, short- and long-term public sector debt needs were sharply curtailed, and the public sector no longer incurred operating deficits and did not have to invest in state-owned companies.

- Balance of payments was strengthened when sales entailed net income of foreign capital.

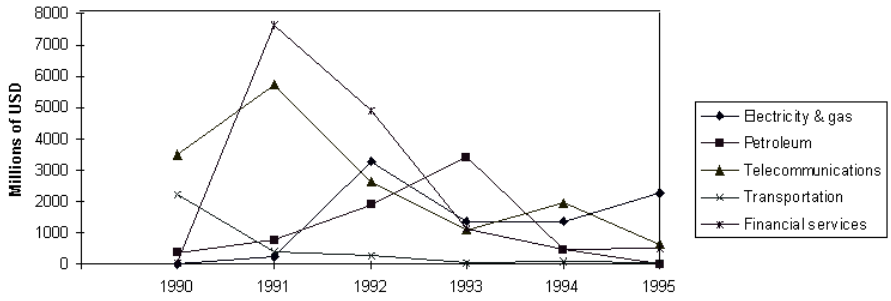
- Macroeconomic stability was the logic outcome of the two previous impacts.

- Higher investment levels were achieved.
- Competition and deregulation were promoted.
- Capital markets were developed.

Especially after trade liberalization, there was widespread privatization of state-owned companies in those activities placing their commodities on competitive markets, particularly those of the industrial sector. Subsequent privatizations, however, involved public service companies and infrastructure development activities, such as transportation and telecommunications.

Diagram I.3[5] confirms this trend in the income stemming from the privatization of state assets in Latin America and the Caribbean. While income from the sale of assets of transportation, telecommunication, financial services, primary sector (including oil) and industrial companies displayed a boom and then a marked collapse, income from the sale of electric and natural gas utilities continue even today at a significant level.

Chart 1.3 Income from divestiture of assets in 1990-1995 in LAC



In effect, the sale of energy companies (over US$15 billion) has accounted for 25% of the total income stemming from privatization in the region's countries during the 1990-1996 period: 14% from the breakup of the assets of electric and gas utilities and 11% from oil companies.[6] In 1995, 64% of the income from privatization came from divesting assets of the electric and gas subsectors, whereas income from privatization of the oil sector fell substantially during that year.

Current observations and forecasts indicate that privatization in the electric sector will continue from 1996 onward, along with the sale of assets of other public services and mining companies, with the exception of the oil companies, for which no major breakups are being predicted in the near future.

In many countries, there has been no divestiture of energy sector assets. In addition, privatization in general and privatization of the energy sector in particular vary in terms of the phases of the modernization macroprocess: they do not take place in all the countries and, in those where they do take place, they occur at different times and phases of the process. Even in those countries where they have taken place, their macroeconomic impact has been diverse.

4.2.3 Break-up of energy assets, liberalization, and macroeconomic stabilization processes

Abrief review of the role performed by the divestiture of energy assets in different countries (see Inset 1) demonstrates, on the one hand, their effective and direct functionality in the case of Argentina[7] and Chile, and on the other hand the indirect character of their functionality with respect to specific macroeconomic objectives.

INSET 1: DIVESTITURE AND ECONOMIC STABILIZATION

- In Argentina's modernization plan, there was widespread divestiture of energy sector assets (electricity, gas, oil), which has been essential to achieve stabilization and economic recovery. It played a leading role in achieving fiscal balance and the balance of payments, in the policy scheme based on a fixed exchange rate to facilitate the entry of capital and foreign investment. That was why it was essential that privatization coincide with general reforms. This is the only country where the inflow of foreign capital for privatization exceeded the amount of conventional foreign investments, precisely during the years of the reform.[7] Its modernizing role was facilitated by the deregulation of financial markets and foreign investments. Another condition to ensure the attractiveness of the companies to be privatized was that the prices of their products on the domestic market had to be sufficiently high to provide satisfactory earnings for the

potential investors. This led to the elimination of subsidies, the liberalization of prices for tradable energy resources, and blanket increases for tariffs of other public services, giving way to new pricing schemes.

- In Chile, the sale of assets did not fulfill that same essential role for stabilization and the exchange rate policy. Of all the energy assets, only those belonging to the electric sector were divested. They were sold to domestic players who agreed to finance the purchases and expansions with private funds stemming from the foreign and national capital markets. The share of local funds, mainly those coming from the new retirement fund, gave impetus to the development of national capital markets.
- In Peru, privatization became important only several years after the main reform. Energy system privatization, as well as privatization of the telecommunications and mining sectors, were the most important. They contributed to the strong flow of direct foreign investments, although their impact on macroeconomic aggregates does not seem to have been definitive. The microeconomic objectives, that is, higher efficiency, seem to have been far more important.
- The divestiture of state assets in Bolivia has involved a kind of capitalization and took place several years after stabilization programs became successful. In macroeconomic terms, divestiture exerted a considerable impact as a result of the injection of new investments into an economy experiencing insufficient growth. Most of the property rights stemming from this capitalization process remained in the hands of private multinational consortiums, even though an important part of the ownership of previously existing state companies remained in the hands of the State and its citizens. Two of the six state companies that were capitalized are energy sector companies (electricity and oil).
- Mexico and Venezuela received substantial amounts of revenue from the divestiture of state assets. Nevertheless, neither of these countries privatized the large state electric power utilities (in Venezuela there are some that have always been private), nor the oil companies, apart from some peripheral business units.
- In Colombia, the privatization program has been relatively small. With regards to the energy sector, multinational companies have already had a traditional share in upstream oil and gas activities and large-scale coal mining. Likewise, medium-sized and small-scale coal production was virtually the exclusive domain of national companies. In the electric power sector, it was decided that, for the sector's expansion and in the development of natural gas transport and distribution (where private companies were already involved), private-sector players would be able participate. Only recently, as a result of momentary fiscal imbalances, were several electric plants whose stock were in the hands of the National Treasury privatized.
- Brazil recently privatized electric power utilities owned by state governments. Before this, Brazil had been content with divesting industrial companies. In view of the size of the economy, however, the latter are not very important in macroeconomic terms.

- Except for Belize, with its relatively important privatization, the only Caribbean country that has privatized state-owned energy sector companies is Trinidad & Tobago, which has proceeded to privatize electric power utilities and petrochemical companies (considered to fall within the energy category). For this country, these actions, along with sector reforms, are extremely important in macroeconomic terms, since the energy sector and petrochemical sector are the base of the economy.
- The privatization taking place in Jamaica and Guyana has not reached the energy sector.
- In Central America, to date, the comparatively most important privatization process is the one carried out in Nicaragua. None of the other countries has as yet sold its energy assets.

Therefore, the linkage between privatization and macroeconomic impact shows a wide diversity. On the other hand, in those countries where the sector's assets were sold, the sale performed an important role, far beyond its normal impact on the economic system. That is why multilateral credit institutions continue to exert much pressure on countries to privatize.

5. Conflict and consistency between sector and macroeconomic objectives

In this first chapter, we have attempted to describe how energy system reforms are part of the larger, overall process of modernization. As a result, this analysis has focused mostly on macroeconomic and political aspects. The macroeconomic overview, however, is only one among other important perspectives, such as the social and environmental impacts of energy sector reforms.

Regarding the energy sector, economic, social, and environmental objectives as formulated by the respective institutions and society as a whole are taken into account, and then an attempt is made to harmonize these objectives with, or incorporate them into, those objectives specifically involving the energy sector.

The various Latin American and Caribbean countries have different concerns with regard to energy sector development objectives. Therefore, their priorities

will also vary. Nevertheless, bearing in mind these differences, it can be said that the specific objectives of the energy sector are generally the following:

- Meet the needs of the population as a whole and of productive activities, achieving a sufficient, safe, diversified, and high-quality supply at competitive prices.

- Achieve more economical supply with greater productive efficiency in the subsectors; structural efficiency in the participation of energy resources and respective subsectors; allocative efficiency in the use of resources, inside and outside the sector; efficiency in energy use by the users, etc.

- Conserve natural energy resources and mitigate impact of energy activities (production, transport, distribution, and consumption) on the environment.

Chapter VI contains a detailed proposal to assess modernization.

The specific approach used by energy authorities, as expressed in these objectives, may differ from the prevailing macroeconomic approach, such as the one adopted by the Ministers of the Economy and Finance, or from the approach of the Ministers of Commerce and Industry, the social viewpoint, or the environmental perspective. Although many of the aspects linked to these approaches have been included in the sector's objectives, there may be noteworthy differences in terms of priorities and the type of measures to be adopted within the sector's domain.

In the past, the antagonism between specific sector policies and macroeconomic policies became particularly evident in Latin America and the Caribbean during the seventies and eighties. In fact, the predominance of a development-oriented macroeconomic policy during the seventies forced the energy sector of many countries of the region to resolve many difficulties. The State found itself obliged to expand energy supply and coverage, while accepting a decline in prices in teal terms, as part of the social and anti-inflationary policies, without even receiving the earnings needed to cover operating costs. Instead of ensuring an acceptable self-financing rate, the sector had to take outside resources, resort to indebtedness, and even transfer revenues and financial resources from abroad to replenish the State's coffers. During the eighties, after the debt crisis, the continuation of some of these practices (particularly the real deterioration of prices), changes in international financial market conditions, and the need for

debt servicing led to severe imbalances in the economic and financial situation of the sector's utilities and prevented investments needed for expansion from being made. Within this framework of macroeconomic instability and the State's diminishing power to implement policies, many countries witnessed a steep fall in the business management capabilities of the sector's utilities.

It seems that in this current modernization phase it might be possible to strike a balance between the various objectives, at least for some of the levels and areas. To do this, there is a series of consensual mechanisms, measures or instruments that could contribute to achieving, simultaneously, macroeconomic, sector and even environmental objectives, as indicated below:

- In macroeconomic terms, the idea is to reduce fiscal deficits, which is consistent with the need to apply business approaches to managing utilities and companies, in order to achieve more productive and allocative efficiency, whereby the prices of energy products and services cover operating costs, thus ensuring a higher degree of self-financing, reducing indebtedness, and mitigating the impact on public finances. It is thus expected that energy service will become more reliable, that the quality of products will improve, and that a wider range of services will become available, so as to enhance the systemic competitiveness of the country.

- A greater capacity for self-financing will facilitate expanding supply, with more investment and supply quality improvements, factors that are of equal importance for competitiveness and for satisfactorily meeting the population's requirements.

- Dropping the practice of widespread and indiscriminate subsidies not only reduces the burden on public spending, but also enhances incentives for the rational use of energy, within a framework of better resource allocation in general. Negative social effects could be minimized by targeting specific subsidies.

- Sector development opportunities, in addition to facilitating the expansion of the energy supply, will attract foreign investors and facilitate the return of national capital, which would contribute, at least over the short term, to improving the balance of payments. In addition, the possibility for savers and investment funds to place funds with more or less guaranteed profits in some

of the lower-risk energy activities, promotes the development of local capital markets.

Along with these symmetries, however, there still are clashes between the sector's outlook and the macroeconomic perspective, especially when the current energy requirements are viewed from a narrow point of view. As previously noted, energy activities are sometimes perceived to be part of the infrastructure sectors where reforms are viewed mainly in terms of unburdening the State, privatization, and attracting investment rather than in terms of reaching any broader objectives.

Faced with such a narrow view, it is necessary to deploy a wide variety of options to restructure and operate the different subsectors of the energy system and to design procedures aimed at carrying out these tasks. Each of the options has its repercussion on the achievement of the different objectives.

NOTES

1. In the document "Progreso Económico y Social en América Latina", the Inter-American Development Bank uses a scheme that appears to be similar to analyze the macroeconomic dynamics of the adjustment and reform process (see IDB, op. cit., Washington, November 1995, chapter 1).

2. In this IDB study, the evolution of GDP and the other macroeconomic variables are conceptually linked to the phases of reform. The existence of a large fiscal deficit, a high inflation rate, and low investment and consumption seems to be significant in the pre-reform stage. The presence of a cyclical boom in the stage after reform, followed by a crisis after some years of structural reform, also seems to be important.

3. The placement of structural reforms inside the phases of the larger restructuring process was made on the basis of information from IDB and ECLAC.

4. IDB, op. cit., Chapter V.

5. IDB, op. cit., page 183.

6. IDB, op. cit., ibid.

7. ECLAC, "15 años de desempeño económico," United Nations, Santiago de Chile, April 1997.

Chapter II
Energy Sector Modernization: Theoretical and Preferred Options for Sector Coordination and Ownership Scheme

In Chapter I, modernization was explained as a deep transformation, also involving the energy sector. In all countries of the region, important decisions that can be described as measures aimed at modernizing the energy sector have been taken. Each country, however, has adopted these measures variously in both form and intensity.

As a rule, the following elements are considered to favor energy sector modernization:

- organizational and administrative changes inside the energy companies;
- reformulation of the mission and objectives of the companies;
- expansion of the company's sphere of action;
- payment of company debts;
- changes in the nature of the service provided by the company (public or commercial);
- expansion of the degree of autonomy in terms of management, investment, and financing;
- change in pricing policy guidelines;
- incorporation of new players;
- sector restructuring;
- sale of assets (divestiture);
- reform of the regulatory framework; and
- others.

This list has been organized by degree of scope and impact. The first items are measures focusing on the structural organization and management of the companies, which before modernization were structured as typical state enterprises directly controlled by the government. Afterwards, the measures that alter the relationship between the State, the company, and the customers, also involving putting state corporations on a sound financial footing. Finally, there are the measures that involve a change in intra-sector coordination, leading to profound reforms that include restructuring, privatization, and change of the regulatory framework, which are interrelated elements, although not in any determinant way, as it will become apparent in this and the following chapters.

The order in which this list is presented is not necessarily sequential nor does it represent a trend. It can at least be asserted that all countries have embarked on some kind of energy sector modernization process, in the broadest sense of the term, although the details and scope of this process are different. After an analysis of the different subsectors in Chapter III, it is apparent that all the countries have redefined the way in which the energy subsectors will operate over the medium term, including those that are governed by traditional coordination schemes.

To ensure maximum clarity regarding the meaning and scope of energy sector modernization, the energy sector's principal coordination schemes are discussed. This distinction will provide a clearer understanding of what has occurred.

1. Energy sector operation schemes

Among the many criteria used to classify with greater or lesser detail the forms of organization and operation of energy industries, for the purposes of the present analysis, it has been deemed advisable to differentiate the following three schemes:

1. The *centralized control* (CC) scheme.
2. The *integrated regulated structure* (IR) scheme.
3. The *open market* (OM) scheme with accessible, decentralized structures.

The basic differences between these three schemes can be determined by answering the following three questions:

- Who decides? (on the use of resources, investments, etc.)
- With what rationale? (objectives or goals pursued)
- How is it coordinated? (explicitly by means of coordination entities or implicitly by means of the market's "invisible hand")

The CC scheme is characterized by almost exclusive decision making by the State, based on technical planning and priority policymaking by state companies.

The integrated regulated structure (IR) scheme enables companies to be more autonomous. The State performs a regulatory role, in which priority can be given to technical and economic considerations, but always with a certain amount of political intrusion. The institutional structure within each subsector may include one or several integrated companies and even, in the case of electric power,

generators that sell their energy to vertically integrated companies. What is decisive is the *lack of disputability* within the markets. The State is involved in investment decision making and in effectively setting prices. The way in which decisions are coordinated responds to regulatory mechanisms, but there are also be elements of negotiation between the different economic interests of the companies and the political objectives of the State and society. A certain degree of disputability can be introduced by means of bidding processes, in a competition for the market, although competition within the market would not seem to be either feasible or desirable.

The open market coordination (OM) scheme is characterized by a *high degree of disputability* (i.e., effective or potential competition) within the energy markets. For sources that are distributed through fixed networks (electricity, natural gas), this disputability can be introduced through the vertical and horizontal segmentation of supply chains and by establishing the principle of free access to the transport and distribution networks. This scheme, however, does not exclude the possibility of having subsector chains organized as monopolies. If these monopolies are unavoidable, it would be admissible for them to be regulated. There are different viewpoints and opinions as to whether they should be excluded from participating in the transactions of other links where market operation is considered possible. In any case, the role of the State diminishes, once the regulatory framework has been established for the free operation of market mechanisms. Investment decisions are made in a completely decentralized fashion, by the many participating parties, and are coordinated only through the markets. With respect to parties excluded from competition, the State has a much stronger regulatory role to play, but strictly based on technical criteria.

The reforms of the energy systems that have been established or are taking place in Latin America and the Caribbean involve shifting from one coordination scheme to another. In most cases, the original scheme was the CC scheme. As a result of the reform processes, many of these situations have been reconverted to the OM scheme, such as domestic markets for oil and products. In several countries, this same type of transformation occurred in the electric power systems and in the natural gas chain (see Chapter III).

From the sector's point of view, this change of scheme is one of the most important features of the reform processes. This transformation feature is

probably more important than the changes in the ownership scheme which, from the macroeconomic standpoint, appears to be the most fundamental aspect.

Table II.1 highlights the most relevant combinations between the coordination schemes and the ownership scheme.

Table II.1 Combinations between coordination and ownership schemes

Organization scheme → / Ownership scheme ↓	Centralized control CC	Integrated regulated structure IR	Open and broken up market OM
Private		x	xxx
Mixed or partial	xxx*	x	xxx
State	xxxx	xx	x

The "x" in Table II.1 indicates the frequency of the combination in the past and present. The original situation (close to 1980) involved the CC scheme and, to a lesser extent, the IR scheme, with state ownership prevailing (including decentralized entities at any level of government, whether federal, provincial, or municipal). As will be seen further on, modernization means an upward movement (more private-sector participation) and/or towards the right (introduction of market forces).

In the CC scheme with private participation, the asterisk (*) indicates the participation of private players as third parties, a variation of the CC scheme that was resorted to frequently during the modernization process.

Whereas the CC scheme is almost exclusively linked to state ownership, the other schemes are possible with any ownership participation by private-sector players and the State. The possibility of private-sector participation is also possible in the CC scheme, although in a very limited way, such as the supply of stand-alone systems or as third parties (generators with specific contracts to sell to the state utility in the case of electricity or services in the production stages) and a minority participation in refinery activities (in the case of petroleum).

1.1 Centralized control scheme (CC)

1.1.1 The model and its purposes

The prevailing organization of energy systems in the Latin American and Caribbean countries, before the current process of reform, was vertically integrated, state-controlled, and state-run monopolies, based on sector (integrated) or subsector planning, with a high degree of centralization when defining objectives and making decisions.

The favorable assumptions leading to the preference for this scheme were the following:

- It ensured domestic energy supply and, at the same time, formulated a wide spectrum of socioeconomic objectives, where energy supply was conceived as a strategic public service guaranteed by the State.

- It ensured the appropriation of revenues by the State in countries with abundant natural energy resources.

- It maintained strategic control over the energy resources, using a national defense approach.

- It optimized the use of resources (capital, energy, human), based on an eventually integral planning of the sector's development, allowing particularly the use of economies of scale and scope.

All of these factors led to the assumption that the widespread presence of integrated state monopolies was the most adequate solution. Thus, a monopolistic structure was set up in the electric power and oil subsectors, with internal rules that were divorced from the realities of the global market. In the oil-producing countries, revenues stemming from earnings were channeled for the expansion of the electric power sector and the development of other infrastructure sectors.

1.1.2 Effective experience and the introduction of changes

The objectives on which these arguments were based continue to be valid. The scheme adopted, however, has turned out to be severely flawed in terms of

achieving its purposes. At the same time, certain mechanisms arose enabling some objectives to be reached without the need to sacrifice others. For example, it is felt that system expansion required for domestic supply can be ensured by private-sector players, within a more competitive framework and to the extent that energy sector activities are perceived as an attractive business. Where these conditions of profitability do not exist, state subsidies or supplementary actions, such as direct investments, has to ensure supply.

The argument behind optimizing the use of resources, which is closely linked to sector efficiency, had lost its validity by the mid-seventies, owing to contrary evidence of concrete experience in many of the region's countries. This is not the place to examine in depth the factors that led to this situation. There is no doubt, however, that widespread political intrusiveness in management, to a lesser or greater degree in almost all the countries, has been an important factor in fostering severe productive, allocative, and structural deficiencies which, in some cases, jeopardized the very viability of an entire subsector.

One by one countries have introduced changes. Some countries have done so without doing away with the centralized control scheme and by introducing additional elements to improve performance.

The need to recover financial viability on the part of the public utilities led to several adjustments, as has already been noted (particularly in the electric power sector), during the eighties, without any alterations in the sector's basic organizational scheme. As already mentioned in Chapter I, *to put the companies on a sound financial footing,* the foreign debt was transferred to the State's central treasury and prices and rates were subject to real increases, measures that were widespread throughout the region's countries over the last 10 to 12 years. Other types of measures applied in some countries involved managerial reorganization and led to downsizing, the establishment of business units, the sale of peripheral units, etc.

1.1.3 Commercial orientation

An important qualitative leap takes place when the company becomes subject to a more *business-like approach*, with a gradual increase in its autonomy. This step, which is elsewhere known as "commercialization", is associated with the legal and/or managerial breakup of the company (see separate paragraph on "Changes in ownership scheme", in this same chapter), which always involves

breaking up the government's immediate environment. The incorporation of companies so that they can become public corporations or joint stock companies, even though they continue to be state-owned, involves a clear definition of responsibilities, as well as higher accountability of company managers with respect to their acts, decisions, and their impacts. Managers, in turn, are granted more responsibilities and greater independence.

In several of the countries of the region, the business orientation of state utilities is not something new within the current stage of modernization. Even though they are still part of the State, several petroleum companies were "incorporated" long ago. Albeit less frequently, state electric power utilities in several countries also enjoyed a certain amount of independence and were governed more by a business approach than a purely political one. In some cases, the utilities had so much autonomy that sector authorities were unable to control them. Political supremacy was maintained in the form of direct subordination to the executive power.

1.1.4 Inclusion of third parties or limited openness

Another step adopted more frequently in this transformation consists of including "*third parties*" into the system, that is private-sector players whose contribution consists of providing a service that is part of the subsector. Their connection with the subsector's system is limited to a contract with the public enterprise, which continues to be under state control.

Obviously the participation of third parties through service contracts already existed before the so-called "modernization process". In the current energy system transformation process, however, this inclusion of new private-sector parties has increased considerably. In the upstream segment of the oil industry, even where the companies are vertically integrated and there is a monopoly within the domestic market, there has been a significant increase in the number of third-party contracts. In electric power systems where in principle the monopolistic structure has been maintained, BOOT (build-own-operate-transfer) or BLT (build-lease-transfer) schemes have been used extensively for power generation contracts. All subsectors are using one variant or another for transmission lines, oil pipelines, gas lines, etc.

The inclusion of third parties allows the following:

- Reduction of state investments, taking advantage of the inflow of private capital.
- Use of private-sector management in operations.
- Taking advantage of outside know-how.
- Introduction of competitive elements through bidding processes.

This form of restricted private-sector participation may involve service contracts, partnerships, participation, or "strategic alliances", etc. As indicated earlier, the most widely used scheme by the current modernization process is BOOT, where the builder (company or consortium) is the owner and operator of the assets and of the entire business for a given period of time, after which ownership and management are transferred to the State or the state-owned company. Based on the BOOT principle, there is a series of variations that, on the one hand, are similar to a turnkey construction contract (BOT, without the operating phase) and, on the other, to a service or leasing contract (BLT, with leasing instead of ownership). The BOOT has a series of contract consequences for both the company (for example, a long term power purchase agreement—PPP) and the State (guarantees, etc.).

The three forms within the Centralized Control (CC) scheme dealt with in this section:

- traditional closed centralized control,
- the corporate company with a commercial orientation, and
- the inclusion of third parties with limited or partial openness,

come under the concept of *single buyer* proposed in some European countries in the European electric power sector reform process.

1.2 Integrated regulated market scheme (IR)

This coordination scheme involves a different distribution of roles between the State and the company or companies operating inside a subsector. The latter are responsible for their own initiatives, planning and implementation, following their own rationale. The State must approve relevant decisions involving investments, rates, etc., so that by itself or through an entity that represents society (public commission), it performs regulatory functions, because the subsector is viewed as a public service. The need for regulation, in addition, stems from the lack of disputability, since in the event that several companies

exist, each one has its own supply area or region reserved. This scheme, therefore, does not involve vertical or horizontal breakup.

The IR type of organization has been the prevailing scheme in the electric subsector of industrialized countries like the United States and Germany. In these subsectors, there are many companies, whether private-sector, state-owned or mixed. There is, however, no effective competition between them, since there is often exclusiveness based on a concession contract for one area of supply, or the companies have divided themselves into areas or by type of customer.

In Latin America and the Caribbean, this form of coordination existed in the electric power and natural gas subsectors, but rarely in an orderly fashion. As will be seen in Chapter III, this option was not well accepted either in the modernization process. For that reason, it will only be dealt with briefly here.

The scheme of the integrated regulated (IR) structure should not be confused with the very different concept of limited or partial openness, which is characterized by the participation of third parties within a centralized structure, that is, with a single buyer.

It is more difficult to delimit this IR scheme in situations where a state monopoly has a high degree of autonomy within the CC scheme, and where, in addition, there is a specific state authority dealing with this company exactly like, or similar to, a regulatory one. A system here is considered to be integrated and regulated when the company, the regulatory agency, and the sector government authorities have functions that are clearly different, which is more probable if there are several companies with different owners.

Contrary to the CC scheme, where the State plans and decides and the company implements, under the IR scheme the company takes the initiative, proposes an investment, and requests the regulatory agency to agree with it. In its assessment, the latter applies criteria involving safety, sufficiency and non-duplication of supplies, the economy, environmental protection, etc. As for the approval of tariffs, in response to redistribution criteria, the regulatory body tries to ensure that the costs and surpluses obtained from the State (taxes), the companies, their shareholders (profitability) and customers (fair price) are fairly distributed. To provide incentives to the companies, it has to make sure they benefit from higher efficiency, but must also prevent them from shirking their responsibility for the costs of a mistaken decision and from transferring these costs to society.

The regulation of integrated monopolies in the energy sector can be reduced to technical-economic criteria that attempt to stimulate productive and structural efficiency and to emulate the effective results of the market. In reality, however, regulation often includes express objectives. Likewise, this regulation can also include political objectives outside of the technical-economic sphere, such as the rational use of energy, the reduction of environmental impacts, and even the promotion of certain energy resources (coal) or new technologies. This regulatory mechanism also enables concepts such as demand-side management, least-cost planning, etc., to be included. In practice, decisions made are ultimately the result of negotiations between the regulator and the regulated company.

The economic justification in continuing with this type of structure comes mainly from the concept of natural monopoly.[1] At the political level, the arguments are based on the concepts of public service and are similar to the arguments in favor of CC.

1.3 Open market scheme (OM)

The third coordination scheme is a new development, particularly for the electric and gas subsectors where traditionally it had been felt that competition, in addition to being inconvenient, could not be practiced. As for the oil and coal subsectors, experience in the use of market mechanisms dates back to earlier phases and even though in the past integrated state monopolies were opted for, the free play of market forces was accepted, although with reservations.

1.3.1 The disputability in parts of the electric and natural gas markets

The theoretical argument for this new development arises from questioning the concept of the natural monopoly as an obligatory scheme for all stages of the electric power and natural gas chains. The thrust of this argument, which also includes the petroleum and coal subsectors, involves questioning the quality of public service as well as strategic activities involved in energy supply. It is also based on the analysis of the real or potential disputability of markets traditionally supplied by integrated monopolies, whether state-owned or partially private, that are governed or regulated by the State. The main conclusions of this analysis can be expressed briefly as follows: in those markets where disputability is possible, it is preferable that they be deregulated, thus facilitating the free play of market forces. In markets that, because of their very nature, cannot be directly

disputable, as is the case for electricity and natural gas chains, it is possible to introduce real or potential disputability and competition through some basic norms and regulatory guidelines, at least in some stages.

For the latter to become feasible, it is essential to eliminate the influence of certain sunk costs that prevent potential competition from working. In the case of the electric and natural gas chains, these sunk costs are linked essentially to the transmission or distribution networks, in one case, and to the gas lines in the other. This has several consequences:

- It is not deemed feasible to achieve a sufficient level of disputability within the transport and distribution links, and therefore, a regulated monopoly is acceptable.

- The separation of these links, their regulation, and the principle of unrestricted third-party access to these networks are fundamental to facilitate the introduction of disputability, that is, competition in generation or production and eventually in marketing, which is a function that can be separated from the transport and distribution functions

- In view of the fear that an integrated company—even when effectively regulated—could enjoy certain false advantages, it seems preferable to insist on obligatory vertical breakup and the total separation of the transport and distribution functions (unbundling).

In short, within the framework of these and other basic regulatory standards in generation, production, and marketing, one can opt for the free play of market forces, based on decentralized decision making by the players involved. According to this approach, it is expected that this coordination scheme will lead to more efficiency in production and in the allocation of resources, as well as a higher volume of investments.

The difference between the two concepts, that of “disputability and sunk costs”, and that of the “natural monopoly” lies in the fact that the former focuses more on market dynamics, whereas the second relies on a static situation. The subadditivity of costs,[2] based mainly on the presence of economies of scale, economies of scope, and/or economies of coordination (transaction costs), is the basic reason for the establishment of a natural monopoly and involves cost

characteristics stemming from the size of the system, whereas disputability involves the behavior of the players based on their cost structure.

1.3.2 Limits and new options for the open market scheme (OM)

Traditionally, the entire electric chain was viewed as a natural monopoly and only one entity was able to own and operate the electric service of an area, regardless of whether ownership was held by the State or the subsector was characterized by the simultaneous presence of both public and private companies.

As a result of the critical approach of the "theory of disputable markets" to this traditional view, in the reform models promoted by multilateral credit institutions and implemented by several countries of the region, natural monopolies have been kept only for transport activities and in electric power and natural gas distribution segments where it is deemed that there is a lack of disputability. In systems that are large enough to allow and guarantee competitive performance, it has been proven that several players can compete in generation and marketing.

In the case of electricity, transmission in an interconnected system, which could cover an area smaller than that of the country's territory, but could also include several countries, is usually monopolistic. There is the possibility, however, of providing third parties with the option of building and operating a transmission line outside the area served by the existing structure. In this situation, there would be potential competition that would limit the existing monopoly's scope of freedom.

In electric power and natural gas distribution, exclusive rights to an area are usually assigned to a company or consortium by means of a concession. This concession defines the regional scope of the monopoly and the type of captive clients supplied by this company. In the market scheme, however, large users are excluded from these captive customers since the former can purchase energy from other suppliers, by applying the principle of third-party access to the distribution networks in the corresponding concession area. Regarding this, in some cases marketing can also be separate from distribution.

Both the integrated transport system and the distribution concession enables limits to be set in terms of duration and providing concessions to various

applicants. Thus, a competitive element can be introduced by a market, although not inside the market itself.

The introduction of competition into small electric power systems involves a problem. On the cost side, in the presence of economies of scale, in terms of both sequence (vertical integration) and scope (horizontal integration), it might be advisable to continue with an integrated monopoly, with mechanisms promoting efficiency. As for disputability, a reduced system would not allow more than three competitors in those segments that are apt for competition (generation and marketing) although there is a danger that they will forge a coalition in order to manipulate market results for their benefit.

It is difficult to determine beforehand and in a general way what the minimum levels should be for the effective organization of competition in generation, since this depends not only on the size but also on the structure of generation and on available energy resources. Another approach to achieving a situation of disputability would be the integration of these small systems between themselves or with larger systems, which would permit economies of scale to be taken advantage of.

Thus, energy integration could lead to new options. If several markets form a larger one by means of integration, the relative position of companies active in the different markets changes decisively. Therefore, if restructuring of the subsector organization were deemed advisable in the more limited domain of the domestic market, for example, by means of horizontal or vertical breakup and eventually the sale of assets, the situation of a large, integrated regional market could suggest other solutions, leaving the structure of nationally integrated companies untouched, since competition would take place within the region's economic domain.

An additional argument is that, to make an important contribution to the development of energy supplies using natural gas imports, it would be more convenient to have an entity exclusively empowered as single buyer abroad, in charge of wholesale marketing inside the country, transportation, and other functions such as load dispatching, contracting insurance for high volumes, long-term supplies, amortization of long gas lines, etc.

1.3.3 Regulation in the open market scheme

The organization of parts of the chain into a monopoly brings entails the need for technical-economic regulation (of prices, investments, etc.) to ensure production efficiency and protect consumers and, in some cases, even investors, in situations where the monopoly cannot be sustained.

Lately, particularly in small systems, transaction and regulation costs have been taken into account more explicitly, as they can be relatively substantial, such as the hiring of qualified staff for the regulatory body and inside the company, legal proceedings, etc. In view of these regulation costs, it has even been suggested that a type of laissez-faire approach be adopted within the framework of a simple regulation of the price ceiling and the control of abuses, with the argument that regulation costs could be higher than earnings achieved through greater efficiency induced by regulation. As a rule, the consideration of transaction and regulation costs has led to a search for more economical ways of institutional and operational organization of regulations, as will be seen later in Chapters III and IV.

As can be seen from the above considerations, the introduction of the coordination scheme through market schemes (OM) may require different types of restructuring, depending on the subsector and the previously existing situations of the national system and considering market size and integration process prospects.

1.3.4 Variants: self-regulated markets or organized markets

Within each market coordination scheme, situations where the markets can function in a self-regulated manner can be differentiated from those where market forces are subject to regulatory standards.

a) Self-regulated markets and free price formation

Self-regulated markets involve free price formation and full freedom for decentralized investment decisions. In this way, resource allocation is governed by the action of market forces, which will become apparent in the freely set prices, which in turn will depend on the expectations of the different parties involved. In these cases, the market's scope of action is complete.

As already indicated, energy markets that come closest to this characterization are those involved in tradable energy resources, like oil and products, as well as coal, under certain circumstances. The free play of market forces, however, should not necessarily be viewed as a model of atomized and perfect competition. In these cases, energy policies should act through the use of indirect mechanisms, generally through the pricing system (taxes, subsidies), to minimize interference in competitive mechanisms.

Regarding this, however, one should bear in mind that, in the relatively small dimensions like those observed in most of the region's countries, oil markets tend to be highly oligopolistic, which explains the limited room for competition. In the market for oil products, only large consumers with high storage capacity are able to bypass local marketing channels and resort to direct imports. These marketing channels—usually linked to wholesale supply—involve sunk costs that restrict market disputability, even in the face of potential competition from imports.

As a result, the adoption of the market coordination scheme, even in the case of tradable energy resources, may require standards aimed at preventing anti-monopolistic practices. Truly effective self-regulation of markets might be nothing but an illusion.

In the petroleum and coal chains, there is no reason to proceed with vertical breakup, since integrated companies compete in all stages of the chain and this is the classical way of organizing these industries, particularly the former. What does indeed interfere with the free play of market forces is the presence of artificial monopolies. An example of this would be when a company is granted exclusivity of crude oil transactions in the wholesale market for oil products. In these cases, the introduction of market mechanisms seems to be comparatively more simple than in the electric and natural gas chains. In principle, it is not necessary to introduce any modification in the managerial organization. It is enough to eliminate the legal barriers hindering other players from entering.

b) Competition and organized price setting

According to what has been stated, the decision to adopt one of the market schemes in the case of nontradable energy resources like electricity and natural gas implies the establishment of a framework of regulatory standards that define and organize the operation of the mechanisms. On the one hand, real or potential

disputability has to be induced and ensured and, on the other hand, price formation has to be organized, not only in the regulated parts of transportation and distribution, but also in those areas subject to competition. The specifics of these energy resources, linked to set networks, do not lead automatically to efficient pricing. Rather, price formation needs to be organized.

As to the task of inducing and organizing the disputability, certain needs have already been mentioned (free access to networks, regulation), as well as options (mandatory vertical breakup, referred to as unbundling) and restrictions.

In addition, the organization of competitive markets in the electricity and natural gas subsectors to ensure efficient performance, at least over the short term, requires a certain amount of centralized coordination of operation, through dispatch centers and an organized wholesale market.

Finally, in order to set efficient prices, the economy has to make room available, with business opportunities, on the one hand, and a series of rules to ensure the flow of transactions in a transparent market, on the other.

All of these aspects are discussed in further detail in the paragraphs on electricity and natural gas, in Chapter III.

2. Changes in the ownership system

Energy sector modernization processes have brought about significant changes in the ownership structure of the companies that were carrying out their activities in this sector. Contrary to the government takeovers, which in many cases involved an implicit nationalization and characterized the postwar modernization process, the current modernization shows a marked tendency toward breakup of state control, enabling denationalization that involves the breakup and sale of state-owned assets. This divestiture is taking place with the widespread involvement of foreign investments.

Increased private-sector participation in the energy sector occurs in two main ways, with several variants:

- Divestiture of state ownership rights in sector companies and utilities.

- Acceptance of participation by private-sector companies, as follows:
  a) as competitors without restrictions by state companies;
  b) as contractors (service provider, energy supplier, etc.) of the state company; or
  c) as a limited business partner (for example, only in new projects or business).

The divestiture of ownership rights ranges from legal forms of divestiture and managerial breakup to the sale of state assets in the sector's companies. Table II.2 provides a wide spectrum of divestiture schemes.

In the following section, in the discussion on possible paths and their requirements, reference is once again made to the forms of breakup presented in the table.

Table II.2 Forms of divestiture of state ownership rights in energy companies

TYPE OF DIVESTITURE	VARIETY
Legal divestiture	Change in company's organizational structure Change of responsibilities and attributions Change of legal standing (incorporation)
Managerial divestiture	Management contracts Leasing
Sale of assets	
Partial	Sale of part of the shares through public bidding processes Sale of parts through bids from private-sector parties Capitalization Transfer to employees under favorable conditions Sale of selected assets Decommissioning installations
Total	Sale of all shares through public bidding processes Total sale through bids from private-sector parties Management buy-out Sale of parts combined with transfer to employees under favorable conditions Voucher-privatization

3. The process of change, courses, and sequences by stage

In the reform process, the coordination scheme that is ultimately selected is an extremely important strategic decision. It can be observed that the decision for change comes chronologically after partial adjustments involving financial and

economic rehabilitation and business overhauls stemming from changes in legal status and in the organizational and operational structure of the companies

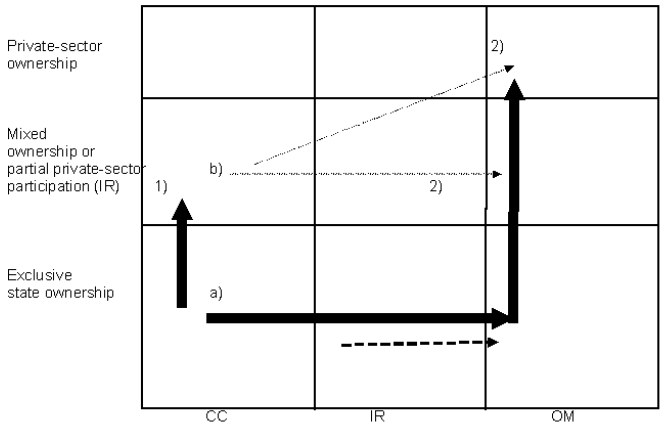
3.1 Courses

The course involved in the shift from one combination of ownership scheme and structure to another can be indicated, along with its frequency. Table II.3 plots the most frequent changes, as depicted by the thick arrows. In the most frequent initial centralized control (CC) situation, with exclusive state ownership or decentralized breakup, the following courses have been the ones most frequently adopted:

1. Private-sector participation in the form of third parties but maintaining the CC scheme, which involves moving from situation a) to situation b). This shift, which is frequent in the electric power and upstream oil subsector, has been called *limited opening up (liberalization)*.

2. The shift from the closed CC scheme (or the IR regulated scheme) to the OM competition scheme (first step), with private-sector participation (second step), is known as *complete opening up (liberalization)*. This has been more frequent in the electric power, downstream oil, and natural gas subsectors.

Table II.3 Course of reform processes



The IR scheme was not widely accepted. It was partially abandoned and, in the case of a change in scheme, the OM scheme was preferred. Other types of options are even less frequent. As observed in the sequences, several countries have opted for sequential changes, either prudently and evaluating the experiences of each stages, or pushed by the insufficient results of previous steps.

The broken lines in Table II.3 indicate trends, which lead to the conclusion that the reform processes move from left (centralized control) to right (market mechanisms), and from the bottom (state ownership) to the top (private-sector participation).

3.2 Sequences

Figure II.1 indicates the sequences for the three courses observed, including steps that have been common to most of the countries (financial rehabilitation and managerial adjustments).

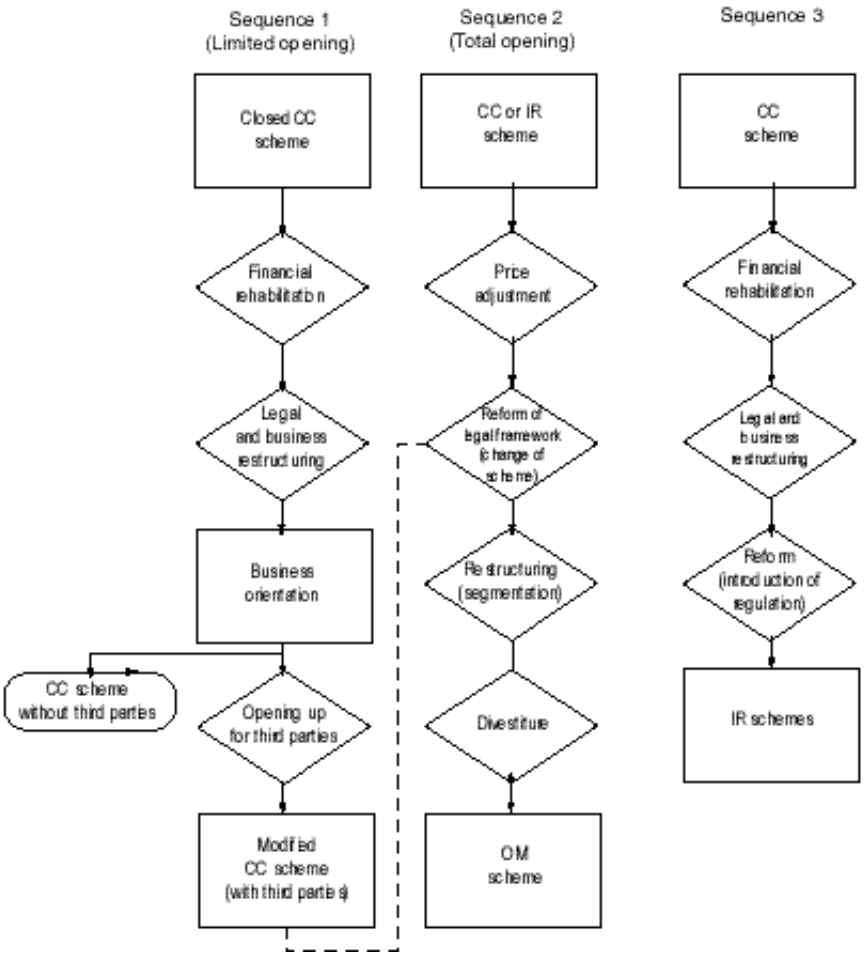
Sequence 1 shows the partial adjustments mentioned previously and both options of opening up, with or without third parties. As previously asserted, the option of opening up to third parties (inclusion of private-sector parties), the so-called *limited opening up* without any change of scheme, has been very frequent.

Sequence 2 is more typical for a change of scheme, taking place instead of or along with partial change, and consists systematically of:

i) structural reform in the organization of the respective subsector's activities;
ii) reform of procedures;
iii) partial or total divestiture of assets.

Few countries have been content with merely taking some steps toward modernization (sequence 1, option without third parties). Many countries have liberalized their electric power and upstream oil sectors, enabling private-sector players to participate, but only as third parties (sequence 1, option with third parties), without really changing the scheme. As for the downstream oil subsector, many countries have introduced market coordination, which only a few countries have ventured to do in the electric power and natural gas subsectors (sequence 2). There are also cases where, after sequence 1, a change in scheme is prepared, linking up with sequence 2.

Figure II.1 Sequences in energy sector reforms



Sequence 3, that is, the change to the IR scheme, has not been too frequent despite its real potential, especially for smaller markets.

3.3 Requirements for the most frequent changes

3.3.1 Limited opening up: private-sector participation without change of scheme

As we have seen, limited opening up means the possibility of private-sector participation without any major changes of the subsector's structure and without transferring the responsibility for fundamental decisions (expansion plans, investment decision-making, pricing). This scheme has been used, with some differences in form, in a considerable number of countries. Typical steps are:

- The scope of changes needed in the legislative framework to enable this limited opening up depends on the extent of previously existing norms. In some cases, only a few adjustments in the laws or regulations are needed. In other cases, only a few profound changes are needed (in the constitution or other basic laws).

- At the company level, there are several options associated with this limited change, several of which have already been mentioned:

  * Give the state-owned companies some managerial autonomy and business orientation. In terms of incorporation, the least that should be done is to separate the company's accounting, and the most is to create a joint stock company, where the state (its coordinating entities) is the main shareholder. In practice, this leads to internally restructuring the company and, more frequently, a breakup of the company itself into business units, including the coordination of specialized companies into one state holding company.

  * Enhance company autonomy and upgrade its administration on the basis of management contracts with private-sector parties and with state participation on the company's board of directors. This form of management breakup (not sale of assets) has not been put into practice in Latin America and the Caribbean, but it has in other regions. A similar option consists of separating managerial duties linked to ownership (which remains in the hands of the State) from the operating duties (under private-

sector management). The latter can be implemented by transferring assets by means of a leasing arrangement over a given period of time.

* Foster the entry of associated private investments to the sector, possibly with technological and/or capital contributions, by means of service, partnership, or participation contracts, which are frequent in the oil sector. One form of limited opening up that is being widely used is the BOT. This third-party participation requires state guarantees, which is a very complex and wide-ranging issue in procedures for limited opening up.

* Forge strategic alliances between the state company and foreign companies, whether state or private, as a more intense form of collaboration, where both companies commit themselves to jointly carry out programs in a more or less wide range of activities involving the inflow of considerable amounts of resources.

* Sell the company by parts (eventually in the form of capitalization) or in bulk to create a mixed or regulated private monopolistic company, without any significant changes in the structure of the subsector.

* Sell off peripheral units that do not belong to the energy sector, which obviously will not affect the sector's structure. The company can benefit from the financial resources obtained and from reducing its complexity, for its internal restructuring in order to increase its productive efficiency in energy activities.

It is evident that all of these changes at the company level do not significantly change the structure of the respective subsector. The structure of an integrated monopoly remains virtually untouched. Nevertheless, a certain kind of competition is introduced at the margin of the monopoly, that is, a market competition to the extent that service, partnership, or participation contracts and BOOT-type contracts are awarded, as a result of a bidding process.

3.3.2 Complete opening up: restructuring to achieve competition within markets and unbundling

The introduction of the open market scheme (OM) involves a series of profound repercussions, especially for the subsector's structure, although not necessarily in the ownership of the state company.

The establishment of competitive conditions in the markets requires profound legal and regulatory changes. The switch from a monopolistic scheme to a system where market forces prevail makes it generally advisable and even mandatory for the state to sell at least part of the assets of its companies.

To ensure a higher degree of competitiveness, there has to be a large enough number of participants on both the supply and the demand sides. Where there has been complete opening up, the public sector has had to resort to both the participation of new private-sector players in expanding investments and the divestiture of state company assets in the respective subsector. In most cases, however, this divestiture affected only part of the assets. This confirms the fact that complete opening up does not necessarily require the divestiture of assets, at least not a total one.

The state company can continue unchanged if it does not control the market and is not a monopoly in any of the links of the respective energy chain. It is quite likely, however, that at the moment of transforming a monopolistic system into a more competitive one, the public company might have to transfer some of its assets in order to strike a more equitable balance, in terms of conditions, with the new private players.

In the case of the oil industry, where competition was usually introduced in the downstream, immediate impacts have been achieved when equality of conditions has prevailed for access to oil products. To introduce competition in electric power generation, it has been necessary to promote the evolution toward a more balanced structure. Imperative unbundling concerns every company actively involved in both regulated and unregulated stages at the same time, with a monopoly over the transmission networks or over the entire distribution market (whether it be state or privately owned). This type of situation can in fact lead to the divestiture of state assets, not because the state owns them but to avoid vertical (and/or horizontal) integration of these characteristics.

In oil-producing countries, a divided strategy can be observed: limited opening up in the upstream segment and complete opening up in the downstream segment.

The following chapter discusses management schemes and changes in the different subsectors.

NOTES

1. Regarding the concept of natural monopoly, see OLADE, *The State's Role in the Energy Sector,* Quito, Ecuador, November 1992.

2. See OLADE, *The State's Role in the Energy Sector,* Quito, Ecuador, November 1992, page 32, etc.

Chapter III
Subsector Reforms in the Energy Systems of Latin America and the Caribbean

Beyond the general orientation guiding this new transformation process in the energy sectors of the region's countries, characterized by the search for a more outstanding role for market forces and a greater participation of private-sector parties, there is a wide diversity of specific schemes in the reforms being implemented, both between the subsectors of a given country and between countries for one same subsector. This diversity will be evident in this chapter, where modernization is examined by subsector: electricity, oil, natural gas, and coal.

Chapters IV and V study the issue from two different angles: from the standpoint of the utility and from that of the State as a player in the process.

A. Reforms in the electric power subsector

As part of the region's energy system transformation processes, electric power reforms are the ones with the widest range of diversity, due both to the initial context in which they took place and to the sequence, intensity of the changes, subsector coverage, scope of asset divestiture, and mechanisms utilized.[1]

It is important to stress that the reform does not end with, or necessarily involve, the breakup or transfer of assets or greater private-sector participation in electric power systems, although this may appear to be one of its most evident manifestations.

In reality, electric power reforms have involved restructuring the different markets along the electric power chain (generation, transmission and distribution), the emergence of new players, a new institutional structure, a shift in supply objectives away from an activity viewed exclusively as a public service, and, above all, a change in the economic coordination modalities with respect to its three main components: unified decision making, resource-

allocation mechanisms, and the prevailing objectives in the subsector's new institutional organization.[2] Obviously, the changing role of the State is included here.

1. New forms of organization after the reforms

The different countries of the region, in an attempt to achieve greater supply security, with sufficiently high quality and low costs, leading to greater production efficiency and the efficient allocation of resources inside the subsector, have implemented transformation processes aimed at implementing new forms of industrial organization for their electric power systems.

The situation of years prior to the reform was characterized, in general , by organizational structures that integrated the three basic activities (generation, transmission and distribution) along vertical and horizontal lines, with the active participation of the State. In almost all the countries, this was a form of organization based on state predominance, with centralized hierarchical structures, as the dominant mechanism for coordinating activities. In a smaller number of cases, there were agreements with other parties, such as decentralized public bodies, provinces and/or municipalities, or even private parties. In other words, the State administered resource allocation mechanisms, was the principal decision-making entity for economic and supply policy design and implementation, controlled the entry of new players and the ownership structure, and applied a public service approach to all energy supply activities.

Until the end of the eighties, there was no open market (OM) option for the industrial organization of the electric power subsector in Latin America and the Caribbean. At that time, monopolistic structures were widespread, either through centralized control (CC) and/or integrated regulated companies (IR). There were also different criteria as to the degree of legal, financial, and managerial autonomy of the integrated utilities and less versatility in their investment decisions and price setting, which had to be approved by the respective executive state structures.

With the exception of Haiti, Barbados, Grenada, and Guyana, since the eighties, in the region one can see a trend towards liberalization[3] or deregulation,[4] or partial or total re-regulation of the chain, depending on the degree of regulation that existed in the original situation, both due to changes in the prevailing

coordination system and due to changes in some of its characteristics, which brings about significantly different organizational models than the previous ones.

A series of studies reveal that the reforms that have taken place in the Latin American and Caribbean countries have taught the lesson that there is not one single blanket recipe to improve the structural, financial, administrative and operational bases of the sector or to achieve the self-sufficiency of the utilities by orienting them towards more business-like schemes, operating them efficiently and with the possibility of attracting private-sector investment. [5, 6, 7]

Even while recognizing that one blanket recipe has not been applied, we should indicate that the first reforms were aimed more at privatizing existing assets (Chile, Argentina, then Peru, and recently Bolivia) and granting priority to the breakup or segmentation of the electric power industry and *free access to the networks*, thus introducing the open market (OM) scheme. In other cases, the participation of private-sector capital was promoted, by means a process of *partial opening up*, without breaking up the electric power chain and maintaining more or less dominant state control, depending on the case.

These two forms of liberalization profoundly modified the outlook for coordination schemes of the region's electric power subsectors. In Table III.2 they are grouped together according to the size of the electric power system of each country:

1. Countries that carried out structural reforms of the sector in order to organize the operation of market mechanisms, through segmentation of the chain and free access to the transmission and distribution networks.

2. Countries that introduced limited opening up or partial opening up in generation, usually for private-sector players acting as third parties.

3. Countries where no change has been introduced and which continue with situations of vertically integrated monopolies, whether they are regulated or controlled more directly.

Table III.1 Size of the electric power systems and degree of opening up introduced by the reforms (1997)

SIZE OF THE SYSTEM	FREE ACCESS (OM)	PARTIAL OPENING UP (CC or IR)	MONOPOLY (CC or IR)
0 - 500		NICARAGUA SURINAM	GRRENADA, HAITI, BARBADOS, GUAYANA
501 - 1000	BOLIVIA EL SALVADOR	HONDURAS JAMAICA	
1001 - 2000	PANAMA GUATEMALA	COSTA RICA T. & TOBAGO	
2001 - 5000	PERU, ECUADOR (*) URUGUAY(*)	CUBA (***) DOMINICAN REP.	
5001 - 10000	CHILE		PARAGUAY(****)
10001 - 20000	ARGENTINA COLOMBIA		
> 20000	VENEZUELA(**) BRAZIL(*****)	MEXICO	

(*) If the laws passed in 1996 (Ecuador) and in 1997 (Uruguay) are enacted; (**) if the Law Governing the Organization of the Electric Power Sector, which was sent by the Executive to Congress in May 1997, is approved; (***) if the possibility offered by the law materializes in the form of projects; (****) legal framework being revised, with a tendency toward limited opening; (*****) legal framework being revised, with a tendency toward free access.

Source: ECLAC, based on information from the member countries; ECLAC, based on Fernando Cuevas, "La Déreglementation de l'Industrie Electrique," Révue de l'Energie, No. 480, September 1996, pages 431-438.

Ecuador, Venezuela, and Brazil currently show a tendency to free access. In Ecuador, until the new law is enacted, the CC scheme with limited opening continues to be in force. Meanwhile, according to the bill for the Law Governing the Organization of the sector in Venezuela, sent by the Ministry of Mining and Energy to Congress, the electric subsector of this country could be switching rapidly to a system of organized competition. In the case of Brazil, reform and the sale of assets are out of step. Even before the current reform defines the regulatory framework, a series of assets in the distribution area are already being transferred by local governments.

Colombia is a unique case since, while essentially maintaining a state-owned company system, it segmented the transmission stage[8] and virtually broke up large regional public companies into business units, thus granting a leading role to market forces. At the same time, it provided opportunities for private-sector investors to become involved in expanding the system.[9]

A brief presentation of the operational particularities of both opening up processes is provided below:

1.1 Partial opening up in generation

This scheme can be currently found in Nicaragua, Suriname, Honduras, Jamaica, Costa Rica, Trinidad & Tobago, Uruguay, the Dominican Republic, and Mexico. It is characterized by monopolistic structures, with one single utility company integrated vertically and horizontally that operates all or most of the generation, transmission and generation systems. In some cases, local utilities, either provincial or municipal, are in charge of distribution.

The participation of private-sector capital is allowed only for power generation, by means of independent cogenerators or producers,[10] who have to sell energy to the vertically integrated public utility at long-term contract prices. Meanwhile, local distributors can buy energy only from the monopolistic utility. In some countries—Mexico, Honduras and the Dominican Republic—self-producers are also allowed.

Energy transactions in the interconnected system remain in the hands of the state utility. Private generators, whether cogenerators or independent power producers, can use the transmission network only for their transactions with the state utility, but may not sell energy to end-users. Therefore, the type and number of market transactions are quite limited.

This system is centrally planned and operated, and operations are optimized by means of unified load dispatching in real time.

In the case of Costa Rica, regulation is independent from the ownership system, and the utility's management is assessed on the basis of quantitative goals to be reached over a given period of time for certain variables that determine its economic efficiency.

1.2 Competition in power generation and free access to the networks

The guiding principle behind this model (Chile, Argentina, Peru, Bolivia, Panama, Guatemala, Colombia, El Salvador, Uruguay and probably Ecuador,

Venezuela and Brazil) is total opening up of the system. For this, distributors cannot be made to depend on supplies from one utility alone—public or private, integrated or only generator—but rather should be able to buy electricity from any generator.

The same occurs with large consumers or "free clients" that draw up agreements regarding power capacity and energy with any generator. Because of this, the establishment of a free wholesale market between generators, distributors, and large users necessarily requires free access to the transmission and distribution systems.

Operation of the transmission system without any kind of limitations in access and with a centralized dispatch are essential functions to make sure all parties receive equal treatment in bulk energy transactions.[11]

1.2.1 Fragmentation of the generation-transmission segment

Two schemes have been applied to fragment the power generation-transmission segment:

- Permission for vertical integration in Chile and Uruguay.
- Mandatory breakup in other countries, which have attempted to avoid that the same companies participate simultaneously in all phases of the electric power chain.

a. Permission for vertical integration

* In Chile, in the central interconnected system, the most important generator (ENDESA) is also in charge of transmission (TRANSELEC), although there is no transparent mechanism for determining transmission charges. This asymmetry in the transport networks' conditions of access undoubtedly constitutes a limitation for the action of competition in the bulk market. In addition, this managerial control also extends to the retail market in the country's main distribution area (via the ENERSIS holding, which controls metropolitan distribution through CHILECTRA).[12]

* In Uruguay, the recent law passed in June 1997 allows the main state utility company (UTE) to stay vertically integrated, entitling it to generate,

transform, transmit, distribute, export, import and market energy. Neither does it specify anything against letting potential new private players into the system; therefore it can be deduced that private or public players can be vertically–either totally or partially–integrated.

b. Mandatory separation in other countries

* In Argentina, the high-voltage interconnected transmission system is operated by TRANSENER, by means of a concession, which acts as an independent corporation that only performs that function.[13]

* In Peru, the new norm also establishes these restrictions, although it is difficult to avoid intra-firm relations.

* Bolivia provides that the electric power companies of the National Interconnected System must be broken up into generation, transmission and distribution, and they can participate in only one of these activities.

* In Guatemala, the public utilities INDE and EEGSA have a one-year period starting on the date of enactment of the Law to separate management from generation assets, public transport and distribution service, and to enforce the law regarding those activities being carried out by different legal entities.

* In Colombia, the state utility Interconexión Eléctrica S.A. (ISA) maintains its ownership of the interconnected network but its function has been limited to managing this network and to coordinating load dispatching. In turn, the regional (public) utilities are allowed to maintain their integrated structure, but must proceed to virtually separate their generation and distribution businesses. In distribution, they are obligated to take bids for their energy purchases.

* In Venezuela, the bill for the organizational law envisages having the national executive branch establish a joint stock company, aimed at providing transmission services for the National Interconnected System. The company's assets will consist of those transmission facilities owned by the state electric power utilities at the time the law is enacted and which, in the opinion of the Superintendence of Electric Power Services, should belong to the transmission's main network. It also contemplates division of generation and distribution activities. If one company carries out transmission activities

or is related to transmission companies, it must proceed to separate accounting and management (article 5) and will have a term of three years after the law is issued to proceed with the legal separation (article 154).

1.2.2 Participation of private-sector capital

Among the countries that have established or promoted free access to the networks and that have removed other obstacles to market disputability, the following cases are noteworthy:

- Chile is developing private-sector participation throughout the entire system, but one hydropower plant (COLBUN S.A.),[14] which is in the process of being divested, is still in the hands of the State and is currently providing about 15% of the energy supply.

- In Argentina and Peru, the trend is toward total privatization of power generation. In Argentina, included in this trend are the large hydropower plants shared with other countries (Yacyretá, Salto Grande) and the nuclear plants.

- Bolivia is a unique case, in that its "Capitalization Law" is aimed at ensuring private participation through a capital expansion plan. There are three stages in this process:[15]

  * Capitalization: The State transforms the state-owned utility into a mixed, or semipublic, joint stock company, with the participation of the utility's workers, who voluntarily decide to participate in the company, contributing an amount no higher than their social benefits. Once the mixed stock company is created, the state selects a strategic partner who makes an offer corresponding to 100% of the mixed company's capital, which grants it 50% of ownership and management rights over the capitalized company.

  * Distribution of ownership: The State commits itself to distribute all its assets in the capitalized company to the population having reached legal age by December 31, 1995. This distribution will take place by making a deposit in an individual nontaxable capitalization account that will be

managed by the retirement fund administrators which will have to be determined as a result of the reform of pension and retirement plans, based on individual capitalization.

* Reform of the social security system: The idea is to modify the system adopting a plan similar to the Chilean one. Retirement fund administrators would be created, and their duty would be to maximize the profitability of Bolivians' taxable and nontaxable accounts, which would provide for withdrawals at the time of retirement.

- In Venezuela, the national executive branch will adopt whatever actions it deems necessary so that the State's participation as manager becomes subordinate, over a prudent period of time. Venezuela's Investment Fund will determine the moment when whatever privatization processes are deemed necessary will be carried out, in keeping with whatever restructuring and privatization plans are established, in compliance with the Privatization Law. The state will maintain its control over the company CVG Electrificación del Caroní (EDELCA), at least until conditions for the development of the wholesale electric market and the subsector itself allow free competition between generators.

- Brazil has begun privatizing part of the regional utilities, and until July 1997 the cases of ESCELSA, Light, and ultimately, the Companhia Energetica de Minas Gerais (CEMIG), the latter being an utility that integrates power generation with distribution, were the most noteworthy.[16] In addition, generation is being promoted through independent producers. AES Co. was awarded a contract by the Electric Power State Company (CEEE) of the state of Rio Grande do Sul, to build, control and operate a 600-MW combined cycle plant, located near Uruguayana. This will be the first project of an independent producer and the first to integrate both sectors–gas and electricity–of both countries.[17]

- In Guatemala, breaking up of assets began with the sale of two plants. The buyer, a Canadian firm, however, signed a long-term power purchase agreement (PPA) with the state electric company of Guatemala, which in turn will lose its monopoly, along with INDE, with the establishment of a wholesale market.

Table III.2 Private-sector participation in the ownership of generation assets, in free access systems

PERCENTAGE	COUNTRIES
OVER 80%	**BOLIVIA, CHILE, PERU**
BETWEEN 50 AND 65%	**ARGENTINA**
BETWEEN 20 AND 35%	**COLOMBIA, GUATEMALA**
BETWEEN 10 AND 20%	**VENEZUELA, EL SALVADOR**
0%	**PANAMA, URUGUAY**

Table III.2 shows the private-sector component of installed capacity in free access generation systems, taking into account the sale of assets of public utilities at August 1997, as well as other private intervention schemes, such as independent producers, cogenerators, etc. High percentages can be noted in the cases of Bolivia, Peru, and Chile, and lower albeit still considerable ones in Argentina. In Guatemala, private systems accounted for 32.5% by that date, a figure that will probably increase with the privatization of the plants belonging to EEGSA.

2. Regulatory frameworks[18]

2.1 General principles

As a rule, the objectives specified for the new organization of the electric power systems, within the corresponding regulatory frameworks, involve achieving greater competition on the markets, looking for supply security, ensuring higher-quality service, and safeguarding the interests of users.

In this sense, what is noteworthy about regulatory standards is the application of principles like the following:

a. Economic efficiency: productive and allocative; rates must reflect the marginal costs of supply opportunity.

b. Transparency: access to information for all parties involved (utilities, authorities and users)

c. Quality: optimum provision of services

d. Continuity: no interruptions in supply

e. Obligation: Attention for whoever requests the service

f. Neutrality: no kind of discrimination against suppliers and users

g. Adaptability: inclusion of the most appropriate technologies, according to their availability

h. Reliability: security in the operation of the systems

i. Environmental harmony: operations that are compatible with the natural environment

2.2 Public service

As for the definition of the public service offered by the electricity industry, within the reform processes implemented so far, there are three major approaches:

- One of them could be called "integral" (for example, Colombia), which considers that all phases of the industry must meet essential collective needs, and because of this they should be viewed as public service activities.

- The other situation could be termed intermediate, as in Mexico and Uruguay.[19]

    * Mexico partially fits the previous definition but does not include all the players in the electric power chain. According to the Law, the nation must generate, transport, transform, distribute, and supply electric power for the delivery of this public service. There, no concessions will be granted to private-sector players. Electricity imports by the private sector are not considered to be a public service if they are aimed exclusively at meeting its needs, and the same holds true for power generation for self-supply, cogeneration, or the total sale of energy by independent power producers to the CFE. Under any of these modalities, exports are not considered a public service either.

    * In Uruguay, the new law has still not clarified this matter, since in its second article it mentions that transformation, transmission and distribution activities are viewed as a public service when they are regularly and permanently directed to third parties, except for power generation activities. On the other hand, Article 19 states that public electric power service consists of the regular and permanent supply of electricity for

purposes of collective use, carried out through distribution networks, without mentioning transformation and transmission.

- The last one, which could therefore be called "partial" (in force, for example, in Argentina, Chile and Peru), considers that only some phases of the industry should be considered to be a public service. In this sense, the following aspects are specified:

  * Transport and distribution are public services, whereas generation aimed at supplying a public service is of general interest (Argentina).

  * The supply provided by a distribution concession holder to end-users located in the concession zone or to those end-users who, being located outside that area, are connected to the concession holder through their own or third-party lines, is a public service. This is not the case for supplies coming from power generation and transport facilities, nor distribution without concession or that provided by non-concession-holding cooperatives (Chile).

  * The provision of energy for collective use is a public service, considering power capacity limits (Peru).

2.3 System planning and expansion

This aspect is generally considered as part of institutional norms. Although pressure should be exerted within the corresponding regulatory frameworks, few countries mention this aspect.

In general, the energy authority (Ministry, Secretariat, Commission, etc.) is in charge of medium and long-term planning. In some cases, as in Costa Rica, planning is the responsibility of the vertically integrated company and must be approved by the Ministry of the Environment and Energy (MINAE).

The attributions and influence of the public entities are clear with respect to system planning and expansion, since they are responsible for approving concessions and operation authorizations.

Nonetheless, the concept of state subsidiarity prevails in the new "rules of the game." Plans are viewed as referential and attempt to guide private-sector investors and rationalize the State's eventual participation. The opposite case to the general trend is that of Mexico, where the Federal Electricity Commission plays a leading role in planning and expanding the system, submitting the corresponding investment and financial plan to the Secretariat of Energy for its approval.

2.4 Institutional framework

The regulatory frameworks have tended to divide the functions of the different bodies according to their political, regulatory, inspection, control and managerial nature.

2.4.1 Functions involved in policymaking

General policy planning and formulation is a responsibility of the energy ministries, secretariats and commissions. In the region, there are still two major schemes still in place: an intersector coordination, which is rather formal, at the Council of Ministers level, which is a scheme that still prevails in Argentina, Bolivia, Colombia, Mexico, Peru and Venezuela, or at the level of the Ministries of Energy (Costa Rica, Guatemala, Honduras); and a specialized coordination, at the level of the energy commissions, where ministers or high-ranking technical experts are involved (Brazil and Chile).

As part of this last trend, it is interesting to note the case of Honduras, which has formed an Energy Cabinet for the standard-setting activities and a National Electric Power Commission for the regulatory activities, comprised of technical experts.

Venezuela also set up the Foundation for the Development of Electric Power Service (FUNDELEC), as an advisory body answerable to the Electric Power Regulatory Commission.

2.4.2 Regulatory functions

The regulatory frameworks have tended to separate regulatory functions from managerial ones, in those cases where the State still has a clear leadership in the

development of the industry. This, for example, is the case of Mexico, where an integrated public monopoly is maintained and where there is an Energy Regulatory Commission, comprised of five commissioners designated by the country's President, who have technical and operational autonomy and the authority to apply regulations and resolve controversies.

As a rule, an attempt has been made to create bodies that are technically and administratively independent. In some countries, these bodies have been conceived to depend on the energy ministries or secretariats. In other cases, they are entities answerable to the President of the Republic (Superintendence of Electricity, in Bolivia). In even others, they function as interministerial commissions (National Energy Commission in Chile, Electricity and Gas Regulatory Commission in Colombia, National Public Services Commission in Honduras and Electric Power Regulatory Commission, on the basis of the decree currently in force, or Superintendence of Electricity, on the basis of a bill to be submitted to Congress, in Venezuela). In the case of Uruguay, the Electric Power Regulatory Unit is answerable directly to the executive branch, without specifying any Ministry or other executive office.

In the case of Peru, regulatory activities focus on tariff-setting (Electric Rate Commission), leaving other regulatory aspects to the General Bureau of Electricity of the Ministry of Energy and Mines. At present, the creation of a Superintendence of Energy, which would centralize all regulatory aspects, is being studied.

2.4.3 Inspection and control functions

These functions are carried out by the ministries or secretariats themselves, through certain divisions or bodies assigned to them. In Chile, there is a Superintendence of Electricity and Fuels, whereas in Colombia the Superintendence of Residential Public Services was created, as part of the Office of the President of the Republic.

2.4.4 Functions linked to market organization and operation

The reforms have tended to grant more autonomy to public enterprises, exonerating them from carrying out the regulatory tasks that, in some cases, they had taken over in the past.

To ensure the efficient operation of the electric power systems and to administer wholesale market transactions, several bodies have been created and although they have been given different names, they perform similar functions, geared to coordinating the system's operation (Dispatch Station) and the transactions between generation, transmission and distribution utility companies (Bulk Market).

There is no one model that determines the configuration of these bodies. Generally speaking, it is one single institution that performs the two functions.[20]

The common characteristic is that they involve one or more players of the system vis-à-vis the nature of their operations. Thus, in some cases only generators with a minimum capacity of 62 MW (Chile) are included. In others, generation, transmission and distribution companies are included (Bolivia, Colombia and Honduras), whereas in Peru generation and transmission system leaders whose facilities are interconnected form part of the Committee. Uruguay is a unique case, in that the National Load Dispatch will be operated by the Electric Power Market Administration (created as a non-state public entity), comprised of five members: one appointed by the Executive Branch, one by the public utility UTE, one by the binational Salto Grande utility, and the other two representing the remaining agents of the market.

In general, these provisions establish special conditions of ethical and technical suitability that must be met to become part of the sector's entities.

In some cases, state regulatory bodies are also included, although this is not common.[21] In addition, the legal configuration varies. In the case of Argentina, it is a joint stock company comprised of associations of players from the bulk electric power market (including large users), whereas in most other cases it is like a committee.

To date, the figure of the broker who buys and sells electricity and acts on the electricity futures market has still not been developed. Some countries are opening up more space for this and creating the proper conditions for this type of activity.

2.5 Price-setting mechanisms: the introduction of new principles

As part of the centralized control scheme there was a broad scope of mechanisms to set electricity prices. On the one hand, it was a matter of maintaining an economic rationale by basing prices on economic costs, whether historical costs or long-run marginal costs. On the other hand, a discretionary approach to pricing was adopted, one based on political criteria linked to social arguments and restricted by fiscal needs.

In a business-oriented utility, as well as in the scheme involving the regulation of mixed integrated structures, negotiations between utilities and the State, or between regulated and regulator, economic soundness carries more weight when prices are to be set. In calculating prices, financial arguments prevail, based on the priority given to historical costs, instead of the principle of long-run marginal costs.

The introduction of the market coordination mechanism in the electric subsector entails new pricing concepts: free contracting through term contracts between a generator and large client (consumer, distributor, or broker) and the spot market.

In most countries, transport and distribution systems are subject to regulation, with the exception of Chile in the case of transmission.

In Argentina, the prices of transport services and the rates of distributors are regulated, in which case initial specific values are established in the concession contracts.

In Bolivia, prices are regulated between generators and between contractors and distributors because, when there is no supply contract, the marginal cost determined by the National Load Dispatch Committee is used as a reference. Prices at the points of delivery are also regulated for distribution companies, as well as the price for normal customers and the prices of autonomous systems that continue to be integrated.

In Chile, supplies to end-users with a capacity of under or equal to 2 MW and located in a concession zone, as well as supplies from generation or transmission facilities to end users with a connected capacity of under or equal to 2 MW, are regulated.

The load dispatch centers, as in the rest of the countries of the region, determine the price among generators in Peru, a country in which compensations for the use of transmission systems, energy sales from generators to public electric power service distribution concession holders, and sales to users of this service are subject to regulation.

As a general orientation, the idea is for regulated prices to cover operational costs, promote efficiency and reflect an attractive rate of profitability, with a tendency to ensure a discount rate varying between 10% and 12% for private investors.

2.5.1 Consumer prices

In setting prices for consumers, they are combined with price-setting mechanisms for the regulated links. The price paid by the end-user is made up of payments for generation (which in turn can have several components), transmission, and distribution.

In open market systems, large consumers have the option of being supplied by means of term contracts or through the spot market, organized like a spot price market (as in Argentina) or in some other way (as in Chile, for example, related to short-term marginal costs). In addition, the transport service must be paid for on the basis of a regulated tariff or, in exceptional cases, a toll is agreed upon with the carrier.

Small consumers usually continue to be the captive customers of a distributor. The distributor can supply itself just like, or similar to, a large consumer, but cannot charge consumers for higher costs that might eventually result from the way it made its purchases on the bulk market.

2.5.2 Generator prices

The generator has the option of selling electricity in both markets, on the basis of a medium-term or long-term contract (in compliance with a minimum duration) or on the basis of a short-term market, that is, the spot market. In the latter case, the price received by the generator normally consists of a remuneration for energy, power capacity, and availability.

On a spot market, the price for energy is equal to the spot price per hour or each half-hour set by the institution having jurisdiction on the basis of the supplies dispatched (in Argentina, it is the price of the last dispatch supply), corrected by eventual transport losses due to changes in the load flow at the reference knot. The price for power capacity is paid for each MW of power capacity at peak hours that is made available and the availability price is paid on the basis of available reserve. If the reserve is sufficient, there is no premium.

The novelty of the spot market is that both the tariffs (variables over time) of the buyers on the market and the remuneration for the generator are governed by the system's marginal costs and not by average costs. Thus, the generator wins (loses) when its variable costs are below (above) these marginal costs. With these differentials, it must cover its nonvariable costs.

In the case of Chile, the power generation companies are free to contract electricity sales up to the amount of their power capacity and firm energy. For larger sales they must buy the difference at unregulated prices, which are determined on the basis of the spot marginal costs calculated by the Economical Load Dispatch Center.

In some countries, there is a certain correlation agreed upon for the supplies to the nonregulated or free customers and the system's long-run marginal costs. Thus, for example, in the cases of Chile and Peru, these prices cannot be either lower or higher than the 10% of the amount stemming from the transactions between the generators and the nonregulated customers.

2.5.3 Regulation of transmission prices

The main transmission systems should allow generators to market power capacity and energy in any of the system's busbars or knots, whereas the secondary systems should facilitate connection to the main system and also trade energy on any one of its bars. The criterion applied throughout the region is that transmission rates should be regulated, as this is an activity carried out in a "natural monopoly".

These rates are set by the regulatory agencies and should correspond to the annualized investment, operation and maintenance cost of a transmission system of such a size that it strikes a balance between the supply and demand of electricity (known, for example, as the "Adapted Economic System" in Bolivia's

regulatory framework). In addition to the connection charges, tariffs with one fixed and one variable component are also considered.

Chile is an exception because these values were left free to negotiate between the parties. Any generator can use the transmission systems, by paying the corresponding toll, as compensation, to the owner of the network, which is in force for a period of not less than five years. The regulatory authority is excluded from this negotiation and does not intervene in any way. In the event of a controversy that cannot be resolved, an arbitration court is resorted to. This has been a highly conflict-ridden issue in Chile, especially in the case of the central interconnected system, because in reality there is a vertical integration scheme.

2.5.4 Regulation of distribution prices

All of the countries of the region regulate the rates paid by captive users of the public services, including base rates and indexation formulas previously agreed upon with the regulatory authority.

The general norm is that distribution prices include bar or knot prices established at the point of connection with the distribution facilities, and the distribution margin stemming from service delivery to the end user. Thus, the regulated distribution price includes generation, transmission and generation costs.

In some countries, this distribution margin is calculated on the basis of the cost stemming from a model company (Colombia, Chile, Peru). This calculation includes fixed costs in serving the user (apart from whatever consumption is registered), average distribution losses of power capacity and energy, and standard investment costs (new replacement value, 25 years of useful life, and a discount rate that varies between 10% and 12%), as well as operation and maintenance costs (for a series of typical distribution areas defined by the regulatory authority).

In this aspect, regulatory standards attempt to prevent operational or administrative inefficiencies of the electric utilities from being transferred to end-users, which could occur as a result of a regulation system based on historical costs accounted for by the utilities.

The approval of rates is often full of conflicts and can end in arbitration. In the case of Chile, when there are controversies, weighted averages are applied to rates set by the distribution company (one third) and those set by the regulatory entity (two thirds).

In Colombia and Venezuela, what is most noteworthy is the differentiation between marketing activities and distribution as such, which opens up the possibility of increasing the number and variety of participants in the electric power business, thus rendering system coordination and control even more complex.

2.5.5 Consideration of redistribution effects

Finally, in some consumer price-setting mechanisms, tariff management based on income redistribution criteria has been included:

* In Colombia, the regulatory framework establishes that the tariff structures must include guidelines to ensure that low-income sectors can gain access to coverage to meet their basic energy requirements. For this purpose, the establishment of funds is being envisaged in order to grant subsidies to those population groups, and the Electricity and Gas Regulatory Commission is empowered to set the corresponding contributions. As a general rule, high-income residential and non-residential users must contribute resources to establish these funds in an amount equivalent to up to 20% of their supply cost.[22] The outstanding balance is funded by resources from the national budget.

* In Honduras, the regulatory framework establishes that the rates must be structured so as to promote equitable use of electricity. With this in mind, all non-residential consumers must be charged between 100% and 120% of their total supply cost. In the residential case, consumption of over 500 kWh-month should be charged 110%; between 301 and 500 kWh-month no less than 100%; between 300 kWh-month 80%; and between 0 and 100 kWh-month at no less than 45% of total supply cost.

* In Brazil, Law 8987 provides that supplies should be made to the residential market without excluding the low-income population groups. In addition, it indicates that bills with a consumption equivalent to 30 kWh must not be

affected by any financial compensation disbursed for the use of water resources.

* Although the tariff system is not specified, since it will be provided for by the regulations of the new electric power system bill, Venezuela apparently intends to consider the possibility of granting subsidies. Indeed, Article 158 of this bill states that "until mechanisms are established for the payment of direct subsidies to low-income residential customers, the Electric Power Service Superintendence will determine the minimum consumption range that is essential for each region of the country and the rates that will be applied to each range."

3. Some conclusions about the modernization process in the electric subsector

When observing the landscape of reforms in the electric power subsector, where two forms of modernization are apparent, namely, limited and complete opening up, the question arises as to why only these two forms were chosen, and if there are reasons for some countries to have chosen one form and other countries another. Is it purely by chance or do both groups (and the third one, that is, the countries that implemented no change whatsoever and kept the centralized coordination scheme) have something in common? Additionally, in view of the differences in the process followed by each group, it would be interesting to know why some proceeded gradually, whereas others more compulsively, and yet others have been unable to achieve any organized process.

In addition to the above-mentioned reasons, there could be different conditions inside and outside the sector, involving the endowment of energy or human resources, different sector traditions, general cultural aspects, specific policymaking approaches and the political system's capacity to resolve problems that are ultimately related to the opportunity of becoming part of the play of interest groups or individuals.

What is unusual is that complete opening up at first was concentrated in the south of the region and then gradually extended to the north. Another interesting aspect is that the first reforms toward complete opening up relied heavily on the authoritarian wielding of political power, either democratic or not, but at least

based on elections and a broad parliamentary majority. Reforms of this type in other countries took place more gradually.

Chapters V and VI will come back to some of these observations, in order to study them more in depth and find answers to some of these questions.

B. Oil subsector reforms

Reforms in the petroleum industry took place within a complex context of changes in the structure of the global market, in technology, and in transactions, as indicated below:

- A new prevailing order, starting in the eighties, where one can see dominance on the part of large consumer countries over producing countries, and a substantial reduction of OPEC's power, especially with respect to international oil pricing.

- The appearance of new independent producers and the geographical diversification of supply.

- An environment of important technical innovations enhancing productivity and efficiency of operations along the industry's entire chain.

- The consolidation of new contracting schemes for international oil purchases/sales, the boom of spot prices and futures markets.

- The shift in approach, from a view of oil as a "strategic asset" to that of oil as a "tradable commodity".

The restructuring processes of the petroleum subsector in the Latin American and Caribbean countries are taking place in two major contexts. The first involves a new order governing the world petroleum industry since the eighties, where the breakup of OPEC predominance led to a more preeminent role for large oil-consuming countries on the market.

In this new situation, supplies are coming from far more diversified origins and the different regions with petroleum resources compete amongst themselves to lure investments.

In addition, the incorporation of important technological innovations has enabled production costs to be cut substantially and has facilitated the inclusion of new areas for exploitation. In the upstream activities, by contrast, results are declining steadily as the companies begin to operate in fields that are less accessible or involve smaller-scale production, with unit costs thus increasing. In downstream activities, one can observe forces that are pushing prices up, such as

the need to produce cleaner fuels that are more compatible with the environment, the need to adjust supplies to the changing conditions of demand, and the need to process heavier crude oil with a higher content of impurities.

The development of spot, futures, and options markets in the petroleum sector could lead one to think that, within this new order, the operation of the market and the setting of prices fully reflect the economic conditions upon which supply and demand act, therefore granting petroleum the characteristics of a commodity. Some authors disagree with this characterization, indicating that this energy resource has kept its characteristics as a strategic asset and that the markets are far from being free of determinant influences.[23] In any case, this was the conception that prevailed during the petroleum reform processes in the region's countries.

The second situation observed in the restructuring of the petroleum subsector in Latin America and the Caribbean involves economic modernization processes, whose characteristics were already outlined in Chapter I. As in the case of the other energy subsectors, the first reform actions in the petroleum case consisted of financial corrections and adjustments in the legal schemes and/or in the management of the utilities. The following stages involved much deeper changes, linked to the operation of the markets, the opening of certain activities to private investment and, in some cases, the partial or total divestiture of public assets.

1. Main characteristics of the petroleum reforms[24]

The modernization of the petroleum subsector needs to be visualized as an adaptive, sequential and continuous process, subject to a technical, economic and political rationale that attempts to accomplish long-term objectives within an environment determined by the following:

a. international relations as a whole, and

b. the capacity to maneuver as a consequence of the availability of technological, financial, natural, and other resources.

On the basis of this it can be concluded that "modernization" is not necessarily synonymous to "privatization". In fact, the strategies adopted by the countries do not respond exclusively to strictly ideological or political factors, but rather to a series of different types of conditions.

Among the measures initially adopted by the countries in the modernization of the petroleum subsector, the following can be noted:

- Rationalization of subsidies.
- Reduction of transfers to state utilities.
- Fuel price adjustments to cover costs, or in order to put them on par with their opportunity costs: thus, mechanisms like import parity prices and export parity prices are adopted.
- Organizational reforms consisting of rationalization of expenses, identification of business units, downsizing, outsourcing, core business concentration, creation of holdings and others.

Later on, much deeper structural changes begin to take place, such as:

- Changes in the contracting systems for oil and gas exploration and exploitation (upstream).
- Liberalization of barriers to the entry of transport, refining and marketing (downstream).
- Modernization of state utilities.
- Privatization of state utilities.

The source of the differences in selecting “desirable strategies” can be found in their “feasibility”, as options to be achieved by the governments while bearing in mind the following:

- The balance of power that is typical of contemporary democracies.
- Viable macroeconomic options.
- The amount of reserves and, therefore, oil production capacity.
- The size of domestic markets.
- The level of development achieved by state utilities, their experience in the industry, and their technological level.

During the nineties, petroleum laws were substantially reformed in most Latin American countries. Regarding this, the cases of seven countries of the region are noteworthy: Argentina, Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela. Chile launched its reform processes in the mid-seventies, liberalizing the market but without considering privatizing the ENAP, which controls the upstream and all the refineries.

The only country that has not touched the scheme governing the petroleum sector is Mexico, where what was established by the Constitution of 1917 has remained in force, that is, the state’s exclusive right to produce hydrocarbons.

Nevertheless, the regulatory laws have been modified, providing opportunities for private-sector participation in some downstream activities.

The driving force behind the reforms are more or less similar, although there are some differences arising from each country's endowment of reserves, reserves-production ratio, production/consumption, size of the domestic market, public business development, technological level and experience in the petroleum industry, among others.

Common aspects include the free market model and, as stated earlier, the conditioning factors of macroeconomic adjustments, like the reduction of fiscal pressures, financial rehabilitation of public companies, price adjustments, and the elimination of subsidies.

At first the price adjustments were motivated by almost exclusively fiscal interests, and depending on each case there was more or less gradualism. In any case, the companies progressively increased their participation in final fuel prices. Subsequently, a policy aimed at bringing domestic prices on par with international prices was applied, using the latter as reference parameters. Although this pattern has not been followed by all the countries, these prices are considered to be the basic indicators of opportunity costs.

In addition to price adjustments, other instruments were used, albeit not everywhere, such as the reduction of transfers of utility resources to the treasury, restructuring of liabilities, and external debt rescheduling. Adjustments were also made to managerial organization, aimed at improving productive efficiency (especially at the operational level), by separating business units and rationalizing expenses. In some cases, certain low-performance units were closed down, or decentralization schemes were used to ensure the transparency of the operation of the different business units.

1.1 Elimination of barriers to the entry of petroleum activities and investment incentives

As a rule, petroleum reforms for most of the countries involved eliminating artificial (normative) barriers to the entry of new players into the industry's activities. In addition to responding to the prevailing model of market liberalization and deregulation, this aspect of reforms responded to the need for

non-state resources for the expansion investments needed in the different stages of the chain, as well as the incorporation of new technologies into these activities.

1.1.1 Upstream changes

As for the upstream, the main objective was to attract risk capital to increase reserves, raise national production, and increase the net balance of foreign currency. The environment in which this objective is to be reached is one of close competition with other regions of the world that have a substantial petroleum component, such as Russia and the Middle Eastern countries, which are currently interested in foreign investments.

a. Countries that expanded already existing incentives

The countries of the region that have increased already existing incentives for foreign investments are Argentina, Bolivia, Colombia, Chile, Ecuador and Peru. These countries have, to a greater or lesser extent, adopted part or all of the following measures:

- Extension of oil exploration periods.
- Elimination of the obligation to drill exploratory wells.
- Increased participation of contractors in net mining revenues.
- Permission for free disposal of petroleum produced.
- Reduction of taxes.
- Establishment of a freely convertible exchange system from national to hard currencies, as well as free availability and free repatriation of earnings.
- Political flexibility with regards to domestic supplies and links between internal and international prices.
- Permission to operate under more flexible operating conditions.
- Freedom to transfer or cede contracts to third parties.
- Permission for international arbitration in resolving conflicts.

INSET III.2.1
OBLIGATIONS OF OIL CONTRACTORS, OWNERSHIP, TRANSFER, AND AVAILABILITY

I. Obligations of the contractor

1) In exploration, a work program is required including the obligation of drilling exploratory wells or the "seismic option" and guarantees of compliance are demanded (i.e. finances).
   a) Obligation to drill (Ecuador and Guatemala)
   b) Seismic option (Bolivia and Peru)
   c) Seismic option or drilling (Colombia
   d) Seismic option or drilling (Argentina)

   In Colombia, contractors are reimbursed 50% of costs of unsuccessful exploratory wells if petroleum is found.
2) In exploration, development programs are required, as well as investment commitments with the corresponding guarantees.

II. Availability of petroleum

* State ownership (Guatemala)
* Contractor ownership (Argentina, Bolivia, Peru)
* Free availability through participation or association (Colombia and Ecuador)
* Free availability through remuneration (Bolivia, Guatemala, Peru)
* Retention of petroleum by cost recovery (Guatemala)

III. Supplies for domestic market

1) There is an obligation to supply the internal market at international prices
   * In production participation contracts (Bolivia, Ecuador and Guatemala)
   * In association contracts (Colombia)
   * In the case of a national emergency (Peru)
2) There is no obligation
   * In concession (Argentina) and licensing contracts (Peru)

IV. Possibilities for cession or transfer

In all countries of the region there is the possibility to cede or transfer the contracts to third parties with the authorization of the corresponding authority.

Source: Humberto Campodónico, Cambios en el régimen de contratación petrolera en América Latina en la década de los noventa, ECLAC, Natural Resources and Energy Unit, Environment and Development Division, document LC/R 1626, March 1996.

In general terms, these incentives focus on the greater participation in petroleum production (Bolivia, Colombia, Chile, Ecuador), on the free availability of petroleum (Argentina, Peru), on a reduction of income tax quotas and taxes on earnings remittances in all of the countries, and on contracts with more flexible operational conditions leading to contract extensions for exploratory periods, the elimination of the obligation to drill exploratory wells within the framework of the seismic option, among others. Insets III.2.1 and III.2.2 specify some of these aspects with regards to the countries.

INSET III.2.2
REPAYMENT TO CONTRACTORS AND AVAILABILITY OF FOREIGN CURRENCY

In most of the region's countries, changes have taken place in setting earning levels, granting contractors wider participation in oil production and reducing the tax burden to promote private investments.

I. Concession and licensing contracts
The contractor owns the petroleum and therefore his earnings depend on international prices, after royalty payments (Argentina and Peru).

II. Participation contracts
1) Case by case, in kind or cash (Bolivia and Chile).
2) Contractors win bids on the basis of the proportion of distribution being offered. An "R factor" is established, which means that the more petroleum there is, the less is the participation of the contractor, taking into account the quality of the crude extracted (Ecuador).
3) In Guatemala, the earnings correspond to a production volume set for each contract.

Once the royalty is deducted, state participation is at least equal to 30% of the shared hydrocarbon production. Therefore, maximum earnings for the contractor is equivalent to 70% of these.

III. Association contracts
Depending on the proportion agreed upon and considering an "R factor" based on the earnings of the associate, the investment made, and accumulated costs (Colombia).

IV. Operations and service delivery contracts
Earnings are agreed on case by case, in kind or in cash (Peru and Chile).
In most of the countries there is free availability of foreign currency (Argentina, Bolivia, Chile, Ecuador and Peru). In Colombia, free availability of foreign currency exists, but not a formal guarantee for the "associate".
Contractors can take out of the country the capital they have invested, cover external operating expenses, amortize credits and interests agreed on abroad, and transfer profits

Source: Humberto Campodónico, Cambios en el régimen de contratación petrolera en América Latina en la década de los noventa, ECLAC, Natural Resources and Energy Unit, Environment and Development Division, document LC/R 1626, March 1996.

b. Countries that have just begun opening up

The countries that began opening up to private investment where it did not exist before in this area are Brazil and Venezuela.

In Brazil, the 1995 constitutional amendments that modified the 1988 Constitution allowed private investments in petroleum exploration and production, through the subscription of contracts, although regulations from Congress for this amendment are still pending.

The model Brazil will adopt during its modernization process is aimed at:

- Preserving constitutional monopoly over hydrocarbons.
- Ensuring state control over PETROBRAS.
- Allowing nondiscriminatory access by private companies in different activities of the industry.
- Ensuring that activities take place in a more competitive environment. The new Brazilian policy will facilitate (in the upstream) the participation of private investors in oil and gas exploration and production activities, by means of concession contracts.

Therefore, once the transition established by law has concluded, PETROBRAS will eventually carry out its activities under conditions of free competition with other companies along the different links of the chain.

In Venezuela, in 1992 Congress interpreted the legislation then in force to allow the subscription of operation contracts for marginal fields, along with the establishment of "strategic alliances" between PDVSA and private-sector operators for heavy crude exploitation along the Orinoco Belt. In 1995, Congress authorized "shared earnings" agreements for the exploration and production of new reserves. None of these new modalities imply privatizing the fields in which PDVSA currently operates.

In Cuba, CUPET has launched business incentives with foreign companies for shared production in risk exploration. By July 1997, this type of exploration activity had been contracted for most of the national territory, both inland and offshore, thus enabling wells with a declining production to be reactivated.

c. Countries with exclusive public-sector participation in upstream activities

Only Mexico has abstained from any type of opening up with respect to exploration, development and production activities and thus has maintained the State's exclusive rights over upstream activities.

Nevertheless, PEMEX is entitled to enter into "service contracts" in upstream activities with specialized private-sector companies.

1.1.2 Changes in the downstream

In the downstream, the following basic trends can be observed:

- Market deregulation
- Elimination of subsidies
- Reduction of price controls
- Free imports of crude oil and products

Most of the region's countries have dismantled the barriers that prevented entry into downstream operations, a sector previously reserved for state companies: transport of oil, gas, and products, refining, and commercialization. Below are the main modifications with respect to transport and refining activities, whereas marketing aspects will be covered in the following section.

a. Transport activities

With the exception of Mexico and Venezuela, the oil pipelines can be built and operated by both state and private enterprises. In some countries, however, private companies first have to sign contracts with the state company.

In Argentina, Bolivia, Colombia, Chile, Ecuador, and Peru, no major changes have taken place, since private companies prior to the reforms could get involved in transport. In Bolivia, transport was recently capitalized. Shell and Enron own the recently created TRANSREDES S.A., which will manage 2,663 kilometers of natural gas pipelines and 2,314 kilometers of pipelines for crude oil and liquids, in addition to the Bolivia-Brazil interconnection project which involves an investment of US$263 million.

In Brazil, the 1995 constitutional reform authorized private investments for the transport of crude oil and products, something that had been forbidden under the 1988 Constitution. Brazilian policies will allow the participation of private-sector capital and technology in petroleum, natural gas and oil product transport activities to supply the domestic market or to export or import these energy resources by means of proposals for the construction and operation of oil pipelines, polypipelines, gas lines, and storage facilities.

In Mexico and Venezuela, the transportation of oil, gas, and products can only be carried out by state companies. Mexico allows private-sector participation in the downstream segment of natural gas production (see next section), as well as in secondary petrochemicals. Venezuela is in the process of passing a law that will liberalize the domestic market of oil products.

b. Refining activities

There are four types of situations:

- State-owned refineries, where the state exercises a monopoly (Mexico, Venezuela, Brazil,[25] Bolivia, Colombia, Ecuador, Costa Rica, Cuba, Chile, Jamaica, Paraguay, Trinidad & Tobago, and Uruguay).
- Refineries that belonged to the private sector even before the liberalization process (Argentina, Barbados, Panama, El Salvador, and Nicaragua).
- Mixed refinery companies (Dominican Republic).
- Refineries that have been privatized (Argentina and Peru).

Most countries allow private-sector involvement in refining activities. This is intended to stimulate free enterprise, which in turn will depend on the entry conditions and on the size of the markets.

Venezuela allows private-enterprise participation in specialized industrialization activities, which require state-of-the-art technology.

In Argentina, Colombia and Chile, no major changes have taken place with respect to legislation prior to the reform, but only in Argentina were there private-sector refineries. In Colombia and Chile, all refineries are owned by ECOPETROL and ENAP.

Reforms in Bolivia, Brazil, Ecuador, and Peru now allow private-sector investments. This activity had been previously reserved for state enterprises. In 1996, the Pampilla refinery in Peru, which handles over 70% of the domestic market, was privatized. In Ecuador, even though plans were established to allow private-sector involvement in the La Libertad refinery, this has not yet materialized. In Bolivia, the YPFB capitalization plan envisaged the sale of refineries, but apparently this option has been detained for now.

In Brazil, Colombia, and Chile, all existing refineries are owned by the state. No privatization has been envisaged, although it was recently announced that ENAP, in Chile, would be looking for a strategic partner to buy about 30% of its equity capital.

Brazil, with its new energy policy, will allow the participation of private-sector investors in refining activities, with the proposal to build, expand and operate natural gas refineries and processing and storage units.

In the case of PEMEX, other types of scheme, such as agreements for crude oil supply in exchange for oil products, are being allowed. To ensure placement of the Maya heavy crude oil on the international market and to ensure provisions of unleaded gasoline, PEMEX has a contract with the Deer Park refinery, located in the United States and owned by Shell. Thus, Mexico exports petroleum and imports gasoline.

Cuba has paved the way for mixed companies to treat petroleum-associated gas, the rapid development and marketing of LPG, and the production and marketing of hi-tech lubricants.

1.2 Free trade and liberalization of the prices of crude oil and products

As for the operation of fuel markets, the general trend observed in the reform processes has been increasing deregulation of the domestic markets with the elimination of subsidies and price controls and free imports of oil and products.

1.2.1 Free import of crude oil and products

In most of the region's countries, the unrestricted import of oil and products for domestic consumption is allowed. This means that prices in that market are in

line with international prices. For the plan to work, there have to be port facilities available and storage tanks, which in many countries are in the hands of state companies. This undoubtedly means that there may be limitations on market disputability. In Argentina, this type of infrastructure has been privatized, and in Peru storage is in the process of being privatized.

In Chile, free trade dates back to the seventies. It was not until the nineties that Argentina, Ecuador and Peru adopted this free trade. By contrast, in Bolivia and Colombia, unrestricted imports are allowed, but domestic prices are set by the state.

In Brazil, recent reforms to the constitution are permitting the free import of oil. A law recently passed allows the import or export of petroleum, oil products, natural gas, and condensates to any company or consortium that has obtained authorization from the National Petroleum Agency.

In Mexico and Venezuela no provision has been made for free import of oil. Although the topic of energy is not part of the package, it is important to note that, in the case of Mexico, the free trade agreement with the United States and Canada (NAFTA) envisages gradual liberalization of government purchases.

Although the Central American countries have liberalized the import of oil products and have adopted import price parity systems to ensure competitiveness, transparency, and lower supply costs, they have not been able to benefit completely from this policy, as a result of the anti-competitive practice of some large multinationals that use Caribbean posting prices as international benchmark prices. This, however, is not the only reason. High transport costs due to the small volume of purchases is another important factor, which will only be surmounted with the adoption of a larger and more coordinated import system. In addition, in Central America the private ownership of the assets needed to import oil products is a barrier for competition, as there is no general policy permitting third-party access.

1.2.2 Liberalization of fuel prices

As previously stated, there is growing acceptance of the principle whereby domestic prices are set on the basis of international prices. The implementation of this kind of policy has helped to significantly improve the revenues of state enterprises and has contributed to their financial rehabilitation.

In Chile, the application of this approach dates back to the mid-seventies. At present there is a Petroleum Stabilization Fund, which is supposed to operate only if there is a steep rise in international prices. This plan works well, since large consumers can freely import and, if they do not do so, it is because ENAP is not abusing its monopolistic prerogatives.

This policy was also adopted in the nineties in Argentina, Brazil, Ecuador, Peru and Mexico. It should be noted that, in Brazil, Ecuador and Mexico, the wholesale price of oil products is set by government agencies, taking into account international prices. In Bolivia, the alignment of domestic prices with international ones will take place when the capitalization of YPFB is complete. Meanwhile, prices continue to be set by the government.

In Brazil, the law provides for a maximum three-year transitional period, during which basic oil and natural gas prices are readjusted and revised by the refineries and processing units, in keeping with guidelines and parameters that were established jointly by the Ministries of the Treasury and of Mining and Energy. The National Petroleum Agency, however, is the agency in charge of establishing, during this transitional period, price deregulation criteria.

Colombia and Venezuela have adopted a process in which domestic prices are aligned with international ones, and this process is even more advanced in Colombia.

2. Trends in managerial reforms and market structures: preeminence of the State versus privatization

Throughout the entire oil industry modernization process, the following trends can be observed:

- Liberalization
- Division of functions
- New organization structures
- Contractual flexibility
- Adoption of different schemes and models

2.1 Opening up (liberalization)

On the basis of the description made in the previous section, it is evident that the reform processes in the petroleum subsector involve a general trend toward liberalization of downstream and/or upstream activities, with the elimination of normative barriers as well as greater liberalization of markets.

2.2 Division of functions

As in the electric power subsector, there is a trend toward the separation of functions:

- Those related to energy planning.
- Those for granting concessions, licenses, and contracts to carry out activities in any one link in the industrial chain.
- Those related to the regulation and setting of standards, norms and procedures.
- Specific monitoring and auditing functions.
- Those involving management and operations.

Thus, for example, in Peru the functions and attributions PETROPERU, which continues to be in charge of managerial and operational functions, are clearly differentiated, in contrast to PERUPETRO, which was in charge of granting concessions and other public functions.

In Brazil, according to the new energy policies, the following distinctions should be made:

- The National Energy Policy Council
- The National Petroleum Agency
- PETROBRAS, with exclusively business functions

2.3 New organizational structures

These reforms have also involved changes in the organization and formulation of management strategies, covering all of the activities involving hydrocarbons (see Chapter IV).

As for the degree of state control over the sector's activities, the options adopted by the countries in the region range from continuation of public monopolies with strategic partnerships in Brazil, Mexico, Venezuela, and Chile, the continuation of preeminent control by State but with a more intense promotion of private-sector investments in Ecuador and Colombia, to privatization of the industry, as in Argentina, Bolivia and Peru.

In addition, new financial models are being tested to incorporate the capital of the companies. Thus, to maintain state control over PETROBRAS, a new energy policy, a variation of the golden share, is being proposed:

- The company's capital is divided into ordinary shares, with a right to vote, and preference shares, without a right to vote.

- The state maintains a majority interest in the company, with ownership and holding of not less than 50% of the stock, plus an ordinary capital share with a right to vote.

As can be noted, this scheme ensures in a practical manner state control over strategic decision making, without the need for a hegemonic hold over asset ownership.

As for organizational schemes, holding schemes with a breakup into business units are prevailing. This is the case of state companies such as PETROBRAS, ECOPETROL, ENAP, PETROECUADOR, PEMEX, and PDVSA, whereas YPF maintains this scheme within the privatized companies. In Bolivia and Peru, privatized business units are included in the corporate structures of the

Table III.3 Business structures in the oil subsector

OPERATIONS ON THE DOMESTIC MARKET	
CENTRALIZED COMPANY	RECOPE, PETROJAM, PETRONIC, TRINTOC, ANCAP
HOLDING (MAIN OFFICE AND SUBSIDIARIES)	PDVSA, PEMEX, PETROBRAS, PETROECUADOR, ENAP, YPF
DECENTRALIZATION AND IDENTIFICATION OF BUSINESS UNITS THAT COULD BE PRIVATIZED	BOLIVIA, PERU
PARTNERSHIPS WITH PRIVATE-SECTOR COMPANIES TO OPERATE ON THE DOMESTIC MARKET	OPTION HAS STILL NOT BEEN USED

OPERATIONS ON INTERNATIONAL MARKETS	
STRATEGIC PARTNERSHIPS TO TAKE ADVANTAGE OF INTERNATIONAL MARKET	PDVSA (REFINERY AND DISTRIBUTION OF OIL PRODUCTS) BRASPETRO (CRUDE OIL EXPLORATION AND PRODUCTION)

companies that bought them. Large international petroleum operators also act as a holding. This scheme is considered to be the best form of organization for vertically integrated companies in the petroleum industry.

PEMEX's gigantic structure was an obstacle for its administration and managerial decision-making. In 1991, *Fortune* magazine classified this company as the third largest one in the world. Its annual sales were over US$20 billion, its assets amounted to US$45 billion, and it employed 120,000 workers. PEMEX's modernization took place by means of a restructuring process aimed at establishing efficiency and competitiveness. Financial rehabilitation has been a priority for the company since the 1982 economic crisis. Toward the end of the eighties, the managerial strategy focused on reducing and servicing the debt, on the one hand, and cutting back its investment budget, on the other hand. Between 1983 and 1991, the shortage of resources for the petroleum industry made it necessary to continue producing and exporting the same volumes but to virtually suspend tasks involving the search for and production of new fields. Cost control was based on the creation of cost centers and the use of *transfer prices* between these centers.

The last plans for sector development, in 1990, emphasized the need to:

- decentralize functions;
- delimit responsibilities; and
- restructure organizational schemes along business lines.

On July 17, 1992, the new Organizational Law for PEMEX was enacted, and as a result the state company was transformed into a consortium. The following guidelines continue to be of the utmost importance for Mexican petroleum policies:

- Maintain state ownership and control over hydrocarbons.
- Maintain PEMEX's central leadership.
- Maintain the vertical integration of the industry, as an essential condition to enhance its domestic and international competitiveness.

Thus, with the exception of the retail marketing of oil products, where extensive competition is permitted, the petroleum markets, including crude oil and the wholesale marketing of oil products, continue to have predominantly monopolistic or oligopolistic structures, due precisely to their economies of scale and the sequence characterizing the oil chain.

2.4 Contractual flexibility

As observed in Table III.4, in those countries where some kind of liberalization has been implemented, access of new parties to upstream activities is conditioned by different types of contract modalities:

- Contracts involving the freedom to dispose of extracted oil and operating as a normal concession are in effect in Argentina, Bolivia, Peru, and Colombia. Nevertheless, in Colombia old concession schemes have been considerably reduced, whereas in Argentina these contracting schemes have regained ground in the current transformation processes. Thus, with the exception of Colombia, there is total private-sector control over all upstream hydrocarbon markets in Argentina whereas this control is clearly dominant in Peru and Bolivia.

- Operation contracts, without the free disposal of petroleum, exist in countries where there is strong state control, as in Colombia, Ecuador, and Venezuela. Venezuela, however, continues to hold a virtually monopolistic control over crude oil marketing, whereas in Colombia and Ecuador private-sector multinational corporations are deeply involved in disposing of crude oil. As can be seen in Section III.3, this situation in Colombia will also be applicable to natural gas, starting in the year 2005, with the complete deregulation of the wholesale market.

- Contracts involving obligatory partnership with the state company only exist in Colombia.

- Contracts involving a shared earnings scheme only exist in Venezuela.

- Only in Mexico is access to upstream closed.

In Brazil, “concession contracts” will have the following basic characteristics:

- Except in the case of PETROBRAS, during the first year the law is in force, the contracts will be awarded on the basis of the bidding processes, as long as they involve fields already in production, exploration investments have been made, or hydrocarbons have been discovered.

- The concession holder will be obliged to explore, at its own risk and expense, and, if successful, to produce petroleum or natural gas in a given

block. Ownership over these goods will be granted once they have been extracted and brought to the surface.

- The transfer of concession contracts will be allowed, with authorization from the National Petroleum Agency.
- International conciliation or arbitration will be used to resolve disputes.

Table III.4 Organizational systems and degree of liberalization in upstream and downstream activities

Degree of opening	Predominant control	Predominantly state systems	State predominance with important private participation	Private or mixed systems with private predominance	Predominantly competitive market systems
UPSTREAM					
Contracts, concessions, licenses		Brazil[4]		Argentina[4] Peru[3,4]	
Participation contracts			Ecuador[1] Guatemala[2,3]	Bolivia[3,4]	
Obligatory partnership Contracts		Chile Cuba	Colombia[1]		
Shared earnings contracts		Venezuela			
Closed upstream		Mexico			
DOWNSTREAM					
Transport activities		Mexico Venezuela Brazil Chile	Colombia	Argentina Peru Bolivia	
Refinery		Mexico Venezuela Brazil Chile Colombia Costa Rica Bolivia	Argentina Peru rest of America Central America Dominican Republic		
Wholesale marketing		Mexico Venezuela Brazil		Argentina Ecuador Peru	
Retail marketing of oil products					Most of the countries

1 Free disposal of crude through participation (Ecuador) or association (Colombia)
2 Free disposal of crude through cost recovery
3 Free disposal of crude through remuneration
4 Crude owned by contractor, license holder, or concession holder

In the downstream area, except for activities involving the retail marketing of oil products, activities are highly concentrated:

- Transport: This is a natural monopoly in all the countries. There is free access to transport networks, depending on the needs of the owner or concession holder and depending on available capacity. It is assumed that rates will be regulated when dealing with third parties.

- Refining: A monopolistic structure is apparent in most of the region's countries and an oligopolistic structure in Argentina. Except for the breakup of assets in some countries, especially in Argentina, and despite the elimination of normative barriers for the entry in other countries, the reforms have not led to substantial changes in the structures of the wholesale market of oil products. Domestic prices at the producer level have been linked more closely to international prices.
  In Central America, the refineries were already being managed by private monopolies, except for Costa Rica, where RECOPE is exclusively in charge of this activity.

- Retail marketing of oil products: In this sphere, the general tendency has been deregulation, with more effective space given to the free play of market mechanisms.

2.5 Adoption of different schemes and models

Thus, as indicated in Table III.5, the main options chosen in the petroleum reform processes are:

- The state model
- Restricted liberalization and strategic partnerships
- State dominance and the promotion of private-sector investment
- Privatization

2.5.1 State monopoly option

The policy of keeping a state monopoly in all phases of the industry, that is, exploration, production, refining, transport, and marketing, is only in force in Mexico, as provided for by the Constitution and regulatory laws.

2.5.2 Restricted opening and option of strategic partnerships

This option involves a broad spectrum of alternatives, ranging from the penetration of state companies abroad in order to obtain crude oil to ensure domestic supply, as in Brazil and Chile, or to broaden market participation in the downstream to the use of operation or participation contracts and ultimately the coordination of different types of strategic partnerships aimed at expanding and technologically consolidating oil exploration and production activities.

Venezuela used this option to open up the industry to private investments, but only in the upstream segment. In the downstream segment, strategic partnerships have been established with the U.S. market.

As indicated below, this scheme of strategic alliances was also adopted by ENAP in Chile, PETROBRAS, and PEMEX, for their external operations. The announcement has been made that ENAP is looking for a strategic partner to take over 30% of its shares, but this option is still being studied.

In these countries, the intention to consolidate the preeminence of state companies is quite clear. In Brazil, although it is possible for private operators to participate in all phases of the industry, the notion of privatizing the company has been completely discarded, in view of its major impact on the national economy.[26]

Colombian mandatory partnership contracts could be included in this option. As part of this contractual scheme, however, most of the exploratory activities and reservoir management are in the hands of private multinational firms.

2.5.3 State control and promotion of private investment

In Colombia and Ecuador, the governments have repeatedly asserted that they will not privatize their companies, but will try to expand private-sector participation under different types of contracts, with mandatory partnership prevailing in the former country and participation contracts in the latter. In both cases, the R factor is used as a production allocation mechanism or to repay contractors.

In Chile, where over 90% of the petroleum consumed is imported, the sale of the ENAP-owned refineries has not been proposed. It should be noted that SIPETROL, a branch of ENAP, was created to carry out oil exploration and production in third countries.

2.5.4 The privatization option

Only Argentina, Bolivia, and Peru deemed that the statist development model implemented by the petroleum industry was no longer valid:

- In Argentina, YPF's privatization plan, carried out in 1993, determined that the State would still control about 20% of the company's shares, functioning like a "golden share", since it could veto certain decisions that might put the industry at risk.[27] This is the only country where there was still substantial development of local private-sector oil companies, even before the current transformation process. These companies significantly expanded their involvement in all activities of the national oil and gas industries. Some of them even took over strategic positions in the different stages of the electricity industry, forming part of the purchasing and/or bid-winning consortiums (see Section III.2). These companies, just like YPF, have now adopted a transnationalization strategy, as indicated below.

- On the contrary, in Bolivia the requirements for petroleum companies that are candidates for YPFB privatization (minimum amount of oil reserves and production) are so high that no national company can ever qualify to buy the shares. Different stages of production and transport have been capitalized and soon the same procedure will be followed for the marketing infrastructure. It seems that, for now, the refineries will not be subject to capitalization.

- In Peru, PETROPERU's different business units are being sold through international bidding processes. The main production lots (PLUSPETROL, from Argentina, has bought the largest one, Lot 8) have already been privatized and licensing contracts have been signed to grant freedom to dispose of extracted petroleum. Around 60% of the largest refinery in the country, La Pampilla, has been privatized and was bought by a consortium comprised of Mobil Oil, REPSOL, and YPF. The lubricant plant was

acquired by Mobil Oil, giving it approximately 60% control over the domestic market.[28]

3. Some conclusions about petroleum reform processes in the region

In short, the following conclusions can be reached:

- The changes that have taken place in world petroleum industry have conditioned those that have taken place in the region.

- As part of the oil industry modernization design and processes, the neoliberal model has been one among several factors. Only in a few cases has it been a determinant factor.

- Those countries with lower reserves or limited production volumes have been quicker to come up with flexible laws, make their contracting systems more attractive, reduce their tax levels, and accelerate their reform processes through opening up and liberalization schemes for the industry.

- Those countries with larger reserves and/or without any major macroeconomic problems have kept their structures and policies and made less radical and more gradual changes.

- Only oil-producing and exporting countries with large reserves and solid state companies are capable of expanding their activities to other countries, consolidating their position, and taking advantage of their vertical integration strategy.

It is probable that transformation processes of the petroleum subsectors in the region have been more influenced by changes in the world petroleum order than by the economic modernization of the region's countries. Undoubtedly, the neoliberal paradigm of deregulating the petroleum markets and activities has had a significant influence. Those countries with the largest reserves, however, have serious doubts about the validity of this currently fashionable conception and are reasserting the importance of petroleum for their economies and international relations.

As a result of a decline in leverage experienced by producer countries because of the new world petroleum order, only those countries with extensive and proven petroleum resources and facilities can expect to obtain better negotiating conditions, maintaining a scheme involving a powerful state enterprise and international expansion of their activities to further consolidate their vertical integration.

On the contrary, those countries that experienced a reduction in their reserves but where state control over the sector has been maintained and/or there are high exploratory risks, the tendency has been to more openness to private-sector involvement, with contracting schemes that are more flexible and attractive for multinational investors. The massive breakup of assets, however, only occurred in Argentina and Peru, with notably different circumstances and objectives and more in response to local conditions than to international ones.

Nonetheless, what is important is that the countries of the region should be able to reconcile these objectives: self-supply or expansion of their participation on the world market, depending on the case; attract more investment flows and retain a growing share of production value (domestic purchases, salaries, taxes, royalties, etc.). In this sense, it should be pointed out that the petroleum issue should not be examined only in terms of revenues taken by the State, but also taking into account the integral impact of its activities on the domestic economies.

The subject of revenue is undoubtedly an extremely important aspect. In the case of exporting countries, what matters is to set up regulatory and tributary mechanisms to allow that the prices set by operators effectively turn out to be, in effect, the best options for placement on the international market, avoiding possible strategies involving the establishment of “reference prices” that undermine the value of eventual exports and, therefore, tax revenues.

In turn, importing countries require controls facilitating their access to better pricing conditions, preventing dominant market positions from undermining domestic supply.

In countries that have opened up their downstream activities to private-sector involvement, they should take into account that the wholesale market of oil products is not easily disputable, due to the presence of sunk costs in the form of port and storage facilities, as well as to the existence of established distribution

channels. In view of the predominantly oligopolistic or monopolistic structure of these markets, certain regulatory mechanisms need to be institutionalized to prevent possible abuse against consumers.

C. Reforms in the natural gas subsector

The present decade has been witnessing the start of a transition to a new energy situation, where gas is increasingly important and involving a series of factors affecting the region's countries in different ways. These factors have triggered a process of change aimed at achieving sometimes explicit, and at other times implicit, objectives.

The most noteworthy of these factors and objectives are: investment lags in hydropower generation, due to financing constraints; technological breakthroughs that ensure more economical power generation, compared to conventional thermal systems; and the apparent competitive potential between gas lines and electricity transmission. There is also a need to ensure long-term domestic energy supply by means of a diversification strategy. All of these factors, along with growing environmental concerns, are exerting an impact on the expansion of the gas markets in the region.

Either due to the requirements inherent to global economic modernization and/or due to the need to adjust the role of the natural gas industry to the conditions brought about by the reforms in other subsectors (petroleum and electricity), important changes also took place in the gas industry in terms of internal organization and market operation or the opening up to new private-sector players.

1. Main characteristics of the reforms in the natural gas subsector

Like the other subsectors, the first steps to change the region's gas industry involved financial rehabilitation of the companies belonging to this subsector. The characteristics of this stage have already been described in the analysis of the electric and petroleum reforms. On the other hand, it is important to focus

attention in this case to changes in the managerial reorganization of the subsector, since they involve structural transformations.

These transformations include the following: openness, to a greater or lesser extent, to private players; in some cases, the massive divestiture of assets; vertical and horizontal breakup of gas chain stages as part of a reorganizing process or to facilitate opening up to new players; market segmentation, with the identification of suppliers and users and in some cases the introduction of free trade mechanisms; and, finally, establishment of regulatory frameworks, as a result of both the attempt to separate state administrative activities from managerial ones and the inclusion of new players in activities with natural monopoly characteristics or due to the existence of emerging markets where it is necessary to limit dominant positions.

2. Liberalization, structural reorganization, and operation of the natural gas subsector as part of modernization

2.1 Liberalizing activities in the gas chain

A first attempt to classify the countries, using as a reference the stages in the natural gas chain and policy trends with respect to the degree of opening up to private players, highlights certain preferences of the countries with respect to the role their companies should play in retaining and controlling gas earnings.

While some countries grant special importance to the role of state-owned enterprises in retaining earnings, others have opted for a minority shareholding State and the free play of market forces to improve the industry's performance. In the latter countries, it is usually felt that the taking of revenues must rely on taxation on profits and a more efficient monitoring system to avoid tax evasion. These approaches to natural gas and state asset ownership are different, ranging from countries with mainly state-controlled systems to countries that have mostly private systems.

The different approaches to ownership and the circumstances of each country have led to a liberalization process that has triggered changes in the subsector's

structure. The liberalization modalities that have been observed in each system can be summarized as follows:

- Predominantly state systems

    * with limited openness to private-sector investments, granting them a complementary role in nonpriority areas or exclusively involving the expansion of activities;

    * with total openness to the use of state facilities and the unrestricted import of gas.

- Mixed systems: due to capitalization, through private-sector shareholding participation in state companies or through private and state participation in the sector.

- Predominantly private-sector systems: due to the sale of state assets, with or without mandatory investment.

In addition, the crossover of categories mentioned for each stage of the gas chain illustrates the way in which some countries have chosen to fit into one of these categories or where they are in a transition between systems or between modalities within one single system.

2.1.1 Liberalization of upstream activities

In natural gas exploration and production, a preference for predominantly state systems with limited liberalization has been observed:

a. Countries with predominantly state systems, without liberalization

- By means of its 1992 Organizational Law for Petróleos Mexicanos (PEMEX, the Mexican state oil company), Mexico transformed PEMEX into a consortium. Since then, the company has moved to the current structure of four subsidiaries comprised of PEMEX Exploration and Production, PEMEX Refining, PEMEX Gas and Basic Petrochemical, and PEMEX Petrochemical. Gas supply and the ownership of exploration and production assets are in the hands of the first subsidiary.

b. Predominantly state systems, with limited liberalization

- In 1989, Venezuela launched an important structural adjustment program to promote the participation of private-sector players. The program involves deregulation and provides incentives for an increased participation of the private sector in all activities previously reserved for the state. This program made considerable progress but then was hard hit by two crises: first a political one at the end of 1993 and then a financial one at the beginning of 1994, which disrupted the process.

  In 1995, the sector entered into a strategic alliance with Mitsubishi and Shell to exploit natural gas in the eastern part of the country. This partnership was a milestone in the interpretation of the oil nationalization law, since it permitted foreign majority shareholding. This option of strategic alliances is similar to what has already been said about petroleum activities (see section 2 of the present chapter, and Chapter IV). The intention of the government is to extend this process of liberalization and to develop a regulatory framework to make foreign investments safe and attractive.

- In Colombia, most of the natural gas production is obtained from free gas reservoirs. The most important reservoirs are located in Guajira and were discovered by Texas Company in 1973. They have been developed by means of a partnership contract with Ecopetrol. Among the other reservoirs that could be highly productive and would help to consolidate supplies over the longer term, some of them are dry gas reservoirs (Opon) whereas others are condensate reservoirs (Cusiana, Cupiagua, Volcanera). These reservoirs are under some type of partnership contract. Only the older and smaller reservoirs are being exploited directly by Ecopetrol.

- In Brazil, the November 1995 constitutional amendment and ratification of the Hydrocarbon Law, already approved by the executive branch in August 1997, will enable the Brazilian state oil company Petróleos de Brasil (PETROBRAS) to operate on par with the private companies that have been awarded concession contracts.

- In Chile, the National Petroleum Company (ENAP) is in control of this activity. Nevertheless, the legislation acknowledges exploration and development contracts with the private sector.

- In Trinidad & Tobago, large-scale private-sector investments are taking place for the export of liquefied natural gas (LNG).

c. Mixed systems with total liberalization

- In 1995, Bolivia initiated a process to include private-sector activity. In December 1996, Bolivia transferred 50% of its oil and gas exploration and production shares to international groups, through a capitalization process that we already mentioned in the section on petroleum. In addition, YPFB divided activities into two exploration and production business units (Andina and Chaco). Each business unit is a mixed company with shareholding equally divided between the Bolivian State and private consortiums, which were put in charge of the operation. Through these actions in oil and gas upstream activities, the path has been paved to a system of mixed ownership, especially involving natural gas.

d. Predominantly private systems with total opening

- In Argentina, YPF SA[29] and other area concession companies are operating under equal legal conditions. The YPF SA privatization process, which controlled almost all upstream natural gas activities, began by a change over to a joint stock company, and later its low-earning shares were sold off until they became reasonable and profitable. Finally, part of the share package was placed on the stock market.

- In Peru, the privatization process is developing at a steady pace. The privatization strategy has taken into account the following actions: maximize the number of participants to enhance the sector's competitiveness; restructure PETROPERU into operationally and economically independent business units; promote the participation of operator-investors in those units; facilitate vertical integration of bidders; restrict certain horizontal integration combinations; use adequate privatization schemes, depending on the type of petroleum operation. In 1996, various PETROPERU blocks were selected as business units to be privatized; PETROPERU transferred 100% of the licensing contracts and operation assets. Investors in operations had to take over the investment commitments. Regarding the main natural gas reservoirs, the following actions were carried out: In March 1994, PERUPETRO S.A. signed a contract with Maple Gas Corporation to develop the Aguaytia reservoir. In May 1996, PERUPETRO S.A. and Shell

Prospecting and Development B.V., along with its minority shareholding partner, Mobil Exploration and Producing Peru Inc., signed a concession contract to carry out exploratory drilling in Camisea and to analyze the alternatives for the development of reserves. If this assessment of the reservoir turns out to be satisfactory, reinjection, treatment, and cracking facilities will be built.

2.1.2 Liberalization of transport activities

In the natural gas downstream activities, different types of behavior can be observed, depending on whether transport or distribution is involved:

In transport activities, there is no limited liberalization, rather there is a direct shift to total liberalization:

a. Predominantly state systems without liberalization

- In Venezuela, transport activities have been transferred to Maraven, Lagoven, and Corpoven, which will operate in the upstream with a new subsidiary of PDVSA, Deltaven. This company will receive the assets and fulfill the duties that the above-mentioned companies were performing previously.

b. Predominantly state systems with total liberalization

- In Mexico, owing to legislation stemming from the amendment to the Regulatory Law of Article 27 of the National Constitution, PEMEX Gas and Petroquímica Básica coexist with private investors and, along with other concession holders, are subject to regulatory norms. The private sector can invest in the building of new gas pipelines, as long as they comply with technical standards. PEMEX's main line will not be privatized, but PEMEX will be able to invest in new pipelines after obtaining the respective permit from CRE, which is the relevant regulatory agency. There will also be free access to existing or future pipelines.

- In Brazil, any company or consortium that complies with the requirements can receive authorization to build facilities and carry out any kind of natural gas transport for domestic supply, export, or import. The new Law also allows free access to the pipelines through adequate remuneration. In turn,

PETROBRAS will have to set up a subsidiary to operate and build its natural gas lines, and can partner up with other companies as a minority or majority shareholder.

c. Mixed systems with total liberalization

- In December 1996, Bolivia transferred 50% of its shares in oil and gas transport to international groups, through a capitalization process that was already commented on before. Transport involves a business unit set up as a mixed company with equal shareholding between the Bolivian State and the private consortium that was left in charge of the operation. These oil and gas transport actions have paved the way for a mixed ownership system.

- In Colombia, except for the gas lines along the northern coast, the main transport system has only recently been developed. ECOPETROL has transferred its participation in the coastal transport system. Although it coordinated the development of the gas line system for the central part of the country, it did so through BOT schemes or concession contracts with the private sector. To manage this system in a coordinated fashion, however, a public managerial unit, independent from ECOPETROL, will be created, and these contracts, as well as some of the assets of the latter company and some oil pipelines retrofitted for natural gas transport, will be transferred to it.

d. Predominantly private-sector systems with total liberalization

- In Argentina, two gas transport companies are operating, as a result of the privatization of the transport facilities of Gas del Estado (GdE). This company was broken up vertically into two business units, which were then transferred through public bids in which several consortiums comprised of national private players and multinational companies participated.[30]

- In Peru, as part of the above-mentioned privatization strategy, the oil and gas law entitles the investors to build, operate, and provide maintenance for pipelines, storage facilities, and gas processing plants. It is expected that these activities will begin once the Aguaytia and Camisea reservoirs have been assessed and final plans for the generation plants have materialized.

- In Chile, the development of interconnection gas lines with Argentina is being carried out by private consortiums. Operation, construction, and projects are being implemented in different parts of the country.

- In Uruguay, the government has resorted to a public works concession scheme to build the Buenos Aires-Montevideo gas line, aimed at supplying the residential, industrial, and thermoelectric plant sectors. It is expected that this project, as well as other interconnections that will meet demand in coastal cities, will begin operating in 1998.

2.1.3 Liberalization in distribution

In distribution activities there is no record of any limited liberalization scheme, but rather a direct shift, without any transition, to predominantly private systems, using a scheme of total liberalization.

a. Predominantly state systems, without liberalization

- In Venezuela, distribution is carried out by Cevegas, a subsidiary of Corpoven.

b. Mixed systems with total liberalization

- In Brazil, on the basis of the 1988 Constitution, distribution became a monopoly of the states of the Federation. These regulations, however, have become flexible, and municipalities and private-sector players have been allowed more participation, and some of them are already operating state companies using the concession scheme.[31] In July 1997, the first privatization took place (Riogas and CEG).

c. Countries with predominantly private systems with total liberalization

- In Colombia, distribution is virtually decentralized, although ECOPETROL holds shares in some of the distribution companies. This company recently began to divest some of those assets by selling its share packages, such as Gas Natural SA. Therefore, both the coastal distribution markets as well as the development of central markets will be mainly in the hands of private-sector players or regional public utilities, the most noteworthy being that of Medellín.

- In Argentina, in June 1992, the Natural Gas Law ordered the privatization of GdE, awarding 35-year licenses. Since then, eight distributor companies have been operating, after a process similar to the privatization of transport.

- In Mexico, the distribution system is mainly private. In 1997, 12 companies were registered, of which three are public and the others are private. Although the distribution system is still very small and concentrated,[32] the Government, through its Energy Regulation Commission (CRE), continues to stimulate private-sector investment through distribution permit bidding processes for an exclusive 12-year period, in most of the country's cities. The reclassification of PEMEX lines will mean that those used for distribution might be transferred to the public sector.

- In Chile, distribution is in the process of being developed by the private sector. An important distribution network will begin to operate from Santiago to other cities in the country and to new thermal plants.

2.1.4 Intermediate summary

In short, whereas State ownership of subsector assets prevailed in almost all of the countries at the beginning of the nineties, by 1997 the situation had changed, with the schemes described previously and summarized in Table III.5. This table aims to reflect the situation achieved after the divestiture of assets.

This table, however, is a static representation of the situation observed to date. Therefore, it does not reflect the dynamics of the transition process that almost all the countries are involved in, either because they are changing their approach or transferring assets and providing opportunities for the private sector in different activities or because, even when applying the same approach, changes are being made to the activity's structure, financial rehabilitation is being ensured, business units identified, and managerial functions being incorporated and separated from those corresponding to the State in its new role as regulator, supervisor, and auditor.

Table III.5 Degree of liberalization as a result of divestiture of assets in the natural gas subsector (July 1997)

	Predominantly state systems	Mixed systems	Predominantly private systems
Exploration Production	Brazil, Colombia, Chile, Mexico, Venezuela	Bolivia	Argentina, Peru
Transport	Brazil , Mexico, Venezuela	Bolivia , Colombia	Argentina, Chile, Peru, Uruguay
Distribution	Venezuela	Brazil	Argentina, Bolivia, Colombia, Chile, Peru, Mexico, Uruguay
Regulatory Authority	Ministry of Energy	Ministry of Energy (upstream) Regulatory bodies (downstream)	Ministry of Energy (upstream) Regulatory bodies (downstream)

In this table one can note that, since the beginning of the nineties, in only a few countries of the region have natural gas activity assets been privatized (Argentina, Peru, Bolivia). By contrast, in the downstream, a growing trend toward privatization can be observed.

Some countries, like Brazil, are in a transition period with respect to all or part of the subsector. In others, like Colombia, BOT contracts have been awarded to private companies, which have built large gas pipelines and where the participation of private-sector players has been very important. Finally, a third group decided to maintain existing assets under state control, but with a better operational structure based on the creation of subsidiaries to which the assets are transferred, or opening up the possibility of private investments to include assets that complement state activity, under conditions of equality (Mexico, Trinidad & Tobago, Venezuela). The rest of the countries, which are potential natural gas importers, like Chile and probably Paraguay and Uruguay, will be receptive to the possibility of including private-sector parties in storage, transport, and distribution.

2.2 Structural reorganization of the gas chain

In the upstream, natural gas exploration and development activities, as well as those involving oil, are characterized by high risks for investors. This activity depletes the fields and replacement and expansion costs of new discoveries usually grow. Cost and risk reduction relies, among others, on the incorporation of technology, which allows a better investment allocation and a better distribution of risks among the basins.

In view of these characteristics, the natural gas supply can be organized more competitively by:

- adequately distributing the reservoirs, to reduce the possibility of dominant positions;

- liberalizing product availability;

- eliminating discriminatory barriers to transferring the amounts sold out of the reservoirs.

In the downstream, activities related to natural gas transport and distribution normally have low investment risks. The activities generate economies of scale (declining marginal costs) and sequence and scope (vertical and horizontal coordination in the activity), which are the characteristics of natural monopolies.

These characteristics favor capital concentration. As a result, possible market domination practices on the part of the companies is will be curtailed by means of the following:

- Mandatory vertical breakup: breakup of the company along the production, transport, distribution and eventually marketing chain, where linkages between the players of each stage are prohibited.

- Horizontal breakup: breakup of one stage among different players, on the basis of licenses allocated by zones of influence.

- Free and nondiscriminatory access to the lines, when capacity is available.

- Bypass for natural gas delivery in the transport and distribution system, when the distributor does not comply with the commitments made to a wholesale consumer or to organized groups of retail consumers.

As explained in the analysis of the electric power reforms, the option of organizing market mechanisms in terms of functions, with some degree of competition and in the presence of important hidden costs in the transport and distribution infrastructure, will necessarily require horizontal and vertical breakup of gas chain stages and free third-party access to the networks.

Nevertheless, given a certain installed capacity, the size of the market determines the minimum volume to be transported or distributed under conditions that allow for a reasonable return. Consequently, this activity cannot be divided below or over the capacity of a minimum business unit. For this type of activity, it is recommended that it operate as a regulated monopoly, with monitoring that systematically assesses the activity of the companies.

Relations between or within each phase of the gas activity in the region's countries and the ownership system have led to the configuration of systems with varying degrees of vertical and horizontal integration, with open or closed access. This situation is not uniform among the countries, although they do have in common the fact that there is no privately owned vertically or horizontally integrated systems.

In exploration and production, the following can be observed:

- Systems where the product is not freely available to independent producers.

- Systems where the product is freely available to independent producers.

In the downstream (transportation and distribution), the following can be observed:

- Systems that are broken up vertically and horizontally, with closed access.

- Systems that are broken up vertically and horizontally, with open access.

Gas subsector reforms of the countries found within the systems described below are in many cases undergoing transition. Because of this, this is not a final classification.

2.2.1 Reorganization of upstream activities in the gas chain

In the upstream, the unrestricted availability of the product favors the formation of supply-side markets, which depend, for competitive conditions to take place, on the other conditions that were mentioned, that is, atomization of suppliers, transparency, and unrestricted market access, for competitive conditions to emerge. If a state monopoly turns out to be a legal way of controlling earnings, ensuring efficient production without any supply constraint or price discrimination, the supply could display similar results. In the region we have:

a. Systems where the product is not freely available to independent producers

- In Mexico, there are no independent producers. Therefore, gas produced locally is marketed exclusively by PEMEX Gas and Petroquímica Básica, whereas in Colombia and Venezuela independent producers, who are area operators under contract, deliver the product to ECOPETROL or to the PDVSA subsidiaries, which also hold exclusive rights over the product. This is one of the characteristics of limited opening mentioned before.

b. Systems where the product is freely available to independent producers:

- This is the case of Argentina, Bolivia, Brazil and Peru. It is a characteristic of total liberalization stemming from the introduction of free trade. The case of Brazil is the most recent one, where producers have the possibility of operating under conditions that are identical to those of PETROBRAS.

2.2.2 Reorganization of the gas chain in the downstream

In the downstream, the degree of integration also seems to be associated with the ownership system adopted by the countries, but with a more flexible concept, since these are activities linked to services (transport and distribution). In this case, their characteristics as natural monopolies, in any case, require legal monopolies, regulated when they are private or audited when they are public. The

purpose in controlling these monopolies is to make sure the product reaches its destiny without any type of obstacle and with an assurance of quality, safety and quantity as required by the people supplying and demanding the product. The reform processes, however, have focused particular attention on this part of the activity, often relegating the objective of supplying the subsector. In the region, the following can be observed:

a. Systems that are broken up vertically and horizontally with closed access

- In Colombia, the new norm (Law of Residential Public Services and the regulatory provisions issued by the Regulatory Electricity and Gas Commission—CREG) envisages total separation of production, transport, and distribution functions, as well as free access to the transport and distribution networks. This system, however, is still not working completely, since the Massive Gas Plan is still in the first steps of its development.

  Gas production, due to the partnership contracts signed prior to 1995, is still managed almost exclusively by ECOPETROL. Nevertheless, a progressive liberalization of wholesale natural gas supply is expected to take place by the year 2005. From that year on, there will be total deregulation.

  In transport stage there are two subsystems: the North Coast and the Center. Within a certain amount of time, the coastal system will be supplied almost exclusively by the La Guajira field. Therefore, competition will be very restricted there, although transportation and distribution are completely private. By contrast, the central system envisages a public utility (ECOGAS) in charge only of transport and coordinating operations. For this, ECOPETROL will transfer to it the management of BOT contracts and concessions signed with private-sector players for the construction of the gas pipelines, as well as certain assets like oil pipelines that have been reconverted to carry gas. Transport fees are regulated by CREG.

  In distribution, companies are municipal or at the most regional, and therefore are public as well as private (all of them private law companies), although the latter are the prevailing ones. ECOPETROL is withdrawing its participation from this part of the gas chain. Distribution areas are been handed over by means of concessions or bids for “exclusive areas”. The components of gas prices at captive user level are subject to CREG regulation and the inspection

and control of the distribution services is carried out by the Superintendence of Public Services.

- In Venezuela, the gas supply is controlled by state utilities all along the gas chain. Production is carried out by PDVSAsubsidiaries (Maraven, Lagoven, Corpoven). Transport is controlled by Deltaven and distribution by Cevegas, which are in turn subsidiaries of the first ones. Access to the gas pipelines is closed to other possible producers. The intention of the government is to introduce a regulatory framework to separate the managerial function from the state regulatory function for this energy activity.

b. Systems that are broken up vertically and horizontally with open access

- In Chile, in the southern part of the country, production, transport, and distribution are carried out by the National Petroleum Company (ENAP). The geographical difficulties in transporting to the north of the country have hindered the expansion of the domestic market, which has been confined to this region. The first interconnection with Argentina took place in this region toward the end of 1996, to supply the methanol plant located close to the city of Punta Arenas. In the next interconnection, which will start up in mid-1997 to supply Santiago and extending to other cities, transport will be carried out by GasAndes, a company belonging to a private consortium, and distribution to Santiago will be done by Metrogas, which is also a private company. As a result, with these projects and others under way, Chile is setting up an atomized system with open access at the international level (binational protocol). The National Energy Commission (CNE) is the regulatory agency.

- In Mexico, first with the 1992 Organizational Law of PEMEX, production and transport have been broken up vertically, with distribution already operating as a separate activity. In 1995, unrestricted gas imports and private investments in the transport and distribution stages were permitted. As a result, PEMEX Gas and Petroquímica Básica were able to compete under equal conditions with the private companies, thus favoring horizontal breakup. Although commercial and physical interconnection are allowed, the vertical integration of concession holders with interconnected systems is not allowed. Concession holders have to provide open access that is not unduly discriminatory. Activities carried out during the transport and

distribution stages are regulated by the Regulatory Energy Commission (CRE).

- In Brazil, the New Statute for the Petroleum Sector states that PETROBRAS must form a subsidiary to operate and build its natural gas lines and enables it to be a minority or majority shareholding partner with other companies. With this provision, the vertical breakup of the chain is complete, since distribution had already been transferred to the federal states in 1988. The law also provides for free access to the lines through adequate payment, and created the National Petroleum Agency (ANP), linked to the Ministry of Mines and Energy and whose mission will be to act as the regulatory body for the petroleum and natural gas industry.

- In Argentina, with the 1992 Natural Gas Law, this activity was broken up vertically and horizontally, free access was introduced, and the National Gas Regulatory Organization (ENARGAS) was created. Natural gas production is comprised of a relatively large number of private producers. These players are for the most part former contractors with YPF SE, which was the company that held the state monopoly until the end of the last decade and which, at present, as a private company controls an important part of the supply. Transport and distribution are carried out by private companies, two for transport and eight for distribution (see Chart III.3.1).

Chart III.3.1 Argentina: Gas flow system for 1995 (in Mmc of 9300 kcal)

Note: - - - - - - - - - Being studied or project
1) electric power stations, gas treatment plant,
2) residential, commercial and public, industry, transportation

2.3 Natural gas market organization and operation

As indicated, to create conditions of disputability in the natural gas markets, in addition to the vertical breakup of the corresponding production chain and the horizontal segmentation of production (wholesale gas supply) and distribution activities, the principle of unrestricted third-party access to transport and distribution networks needs to be applied.

Even in those case where these conditions actually do exist, disputability can only be in force with respect to the wholesale market (producers) and the liberalized segment of the retail market (large users). Transport and distribution service markets are not indisputable natural monopolies, due to the presence of important sunk costs. In these cases, all that can be done is for competitive mechanisms to be introduced between suppliers, by means of bidding processes, at the moment of granting the corresponding concessions.

In addition, the scope of competition that can be established in the bulk gas markets relies heavily on the level of supply concentration and the greater or lesser interconnection of transport networks. Thus, only in vary wide markets, with a large number of producers and with a high degree of transport network interconnection, is it possible to establish an atomized competition that has properties that are similar to the ones observed in mature markets. The U.S. market comes reasonably close to this model of competitive gas markets.

The gas markets of the Latin American and Caribbean countries are still very small or, at the most, medium-sized, and are still in the process of being developed. The number of producers is usually very limited and the transport systems are scarcely interconnected. As a result, the gas markets of the region's countries will be initially characterized as oligopolistic structures, which in any case will not have much opportunity to hold dominant positions, since natural gas will have to compete in final markets with other energy resources that can substitute it for different uses. In addition, the gas-versus-gas competition will probably begin once interconnections between neighboring countries are established, where the case of Mexico may be the first demonstration that it is possible for a competitive gas market to exist in the region.

2.3.1 The wholesale markets

Following is a description of the main typical situations of bulk natural gas markets in the region's countries, along with their trends, using as a reference the type of coordination. In the first case, the characteristics of these markets are explained for countries with centralized coordination schemes where natural gas prices are set on the basis of some type of economic rationalization approach, in an attempt to emulate freely agreed upon prices or set prices that ensure financial self-sufficiency, expansion of capacity. and gas penetration in the different uses (long-run marginal cost, opportunity value). In the second case, characteristics are pointed out for countries that have adopted the market coordination scheme, where prices are set by the unrestricted contracting between suppliers and end-users (market prices, border prices).

a. Centralized coordination systems (CC)

These would be the characteristics of markets like that of Venezuela and, for still a few more years, that of Colombia.

- In Venezuela, a transitional price plan has been designed for the current stage, which enables prices to be increased from the current level to prices that will allow covering operating and maintenance costs for the current gas system. With this first adjustment, gas operating companies will have the time needed to carry out actions aimed at reducing the impact of new gas prices, and thus place them at their opportunity level. For new consumers, as well as for the expansion of the capacity of current companies and for activities not regulated by the state, gas will be sold at its opportunity value.

- In Colombia, as a result of the regulatory reform introduced by the Law of Residential Public Services, important modifications will be carried out in the price-setting mechanisms of the gas chain. As for the wholesale market, the goal is to obtain a price stemming from free contracting between producers and marketers, while having to cover any charges resulting from transport and the use of the distribution networks. Until the new system is implemented, prices will be between the amount of the long-run marginal cost and the opportunity value.

b. Market coordination systems (OM)

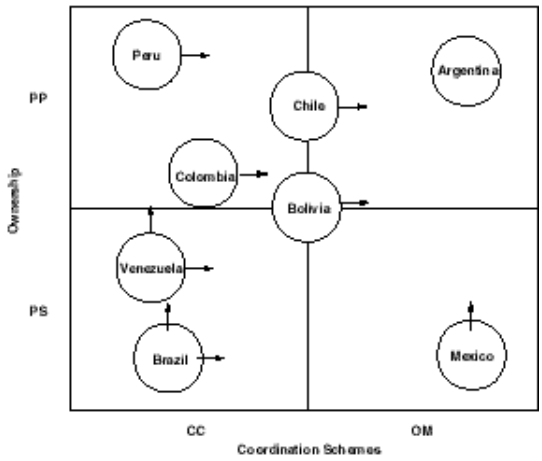
- In Mexico, dry gas prices are equal to those of the southern Texas market, given the possible access to the latter. To this are added transport and service costs and the value-added tax. Natural gas imports and exports can be conducted without a license and concession holders have to ensure free access that is not unduly discriminatory.

- In Argentina, the wellhead gas price is determined on the basis of unrestricted negotiations between producers, distributors and other players, subject to the law. Import prices are free. There is the so-called free or "open" access to the transport and distribution networks, whereby concession holders cannot refuse to carry the gas in the event if their pipelines have the capacity. The transport fee is regulated by ENARGAS. After price deregulation, the price was subject to unrestricted contracting between parties, and the average wellhead price recorded an increase that attempted to strike a balance.

c. Trends

When linking market characteristics (centralized CC and market OM) to the ownership system (predominantly state PS or predominantly private PP), three types of strategies can be seen with relation to the operation of the wholesale markets (see Chart III.3.2).

Chart III.3.2 Natural Gas Wholesale Markets: Trends



- Centralized coordination system, with predominantly private ownership system: The most typical case is that of Peru, which has opted for breaking up its assets, although without market development.

- Market coordination system, with predominantly state ownership system: The most typical case is that of Mexico which, without breaking up its assets, has opened up the market to potential competition with foreign companies.

- Market coordination system, with predominantly private ownership system: The most typical case is that of Argentina, which has opted for breaking up its assets, with a very developed market with almost competitive characteristics.

The rest of the countries have intermediate modalities, with more or less emphasis placed on different dimensions, but with a tendency to balance the alternatives. In these cases, displacements tend to be gradual in keeping with objectives favoring economic rationalization through prices that allow financial self-sufficiency, expansion and gas penetration in different uses, all at the same time. The case of Bolivia seems to have reached its final destiny with respect to liberalization, where the potential for a competitive wholesale market is being developed.

The above-mentioned characteristics suggest the need to differentiate between interests based on the separation of managerial functions and those related to state administration (regulation, monitoring, and auditing). The separation of functions favors general efficiency and ensures that the objectives of equity are attain, when users find that their interests are duly represented. This last function should be governed, as is occurring with more or less emphasis in Colombia (CREG), Mexico (CRE), Argentina (ENARGAS), Chile (CNE), and Bolivia (SIRESE), by fixed objectives and the State's energy policies, coordinating, directing, and correcting aspects that do not hinder this function, since the market in itself responds to the interests of the parties and does not ensure convergence in the direction of the above-mentioned objectives.

It seems that, at first, regulatory frameworks adapted to each situation are needed to balance market forces, and secondly as an energy policy instrument to facilitate convergence toward objectives. When the markets mature and operate as expected, it will be necessary to curtail whatever norms might hinder their

operation. The regulation area (see Chart III.4.3), under the conditions already indicated, involves all dimensions, whereas the operation of an anti-monopolistic law could be particularly relevant as privatization extends.

2.3.2 Retail markets

In the case of retail markets of captive users, the variety between countries basically involves the existence of regulatory bodies that establish pricing criteria and conditions that these users must face.

a. Unregulated markets

In Venezuela, Brazil and Peru there are no regulatory bodies that represent the general interests of consumers vis-à-vis the monopoly of suppliers. In the case of Venezuela and Brazil, suppliers are public utilities, which in part ameliorates that lack. However, in both countries the governments expect to form regulatory bodies.

b. Regulated markets

In Mexico, Colombia, Argentina, Bolivia, and Chile, prices that captive users have to pay are set according to criteria established by regulatory bodies, which tend to protect their interests vis-à-vis the monopolistic power of the companies.

- In Mexico, the law empowers the CRE to define the methodology to be used in calculating prices and rates. First-hand natural gas sales prices are determined in conformity with the methodology issued by the CRE. Storage rates not related to production, transport fees and distribution rates are approved on the basis of proposals made by the concession holders and the methodology issued by the CRE. In the future, natural gas prices will be established through the maximum first-hand sale price, the transport and distribution rates, comprised of the fees for use and capacity, distribution, comprised of the fees for use, capacity, and service. Other charges can be added to this final price, such as connection. CRE's objective is to establish flexible prices that will allow an appropriate return on gas assets, to favor market development.

- In Colombia, the regulation of prices and the quality of electricity, natural gas and LPG is under the responsibility of the Electricity and Gas Regulatory Commission (CREG). For users within the regulated segment, CREG prepared a resolution that attempts to regulate the principles established in this law.[33] The tariff formulas applied to users in the regulated segment will be contained in the bids presented by the companies within the corresponding concession process. CREG resolutions establish procedures for their review every five years, starting from the initial date of the concession contract. Among other objectives, the purpose of these reviews is to provide incentives for productive efficiency in the company, by gradually reducing the maximum charge that corresponds to the marketing service.

  In the case of residential users, there is a basic 20 m^3 block that will be subject to subsidy for socioeconomic strata 1, 2 and 3 (50, 40 and 15% respectively). These subsidies will be covered with taxes applied to the consumption of strata 5 and 6, of the residential sector and of commercial and industrial users.

- In Argentina, ENARGAS, which is part of the Ministry of Economy, is aimed at protecting consumers, promoting competition, encouraging long-term investments to improve service standards and expand the system, and ensuring fair and non-discriminatory rates for customers.[34]

  Rate components fluctuate according to distance and consumption patterns (firm and interruptible) and have a ceiling depending on the long-run marginal cost (bypass risk included). In addition, there are explicit subsidies envisaged in the national budget. Rates are revised every five years. Distribution and transport service rates are automatically adjusted every six months, according to the Industrial Producers Index (PI) of the United States.

2.3.3 Final consumer prices

Charts III.3.3 and III.3.4 indicated the relative position and evolution of natural gas prices for final consumers (residential, industrial), with taxes in some countries of the region.

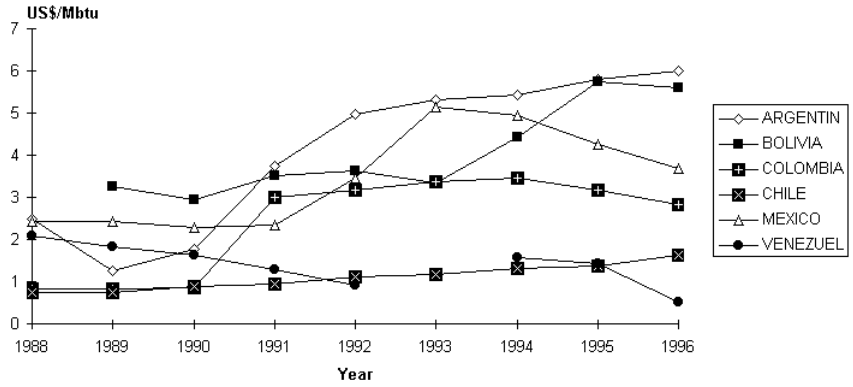
Residential consumer prices (Chart III.3.3) reflect significant changes in the position since 1991. From that year on, Argentina, Bolivia, Mexico, and Colombia

broke away from the trend by increasing band prices from US$1 to US$3 per MBTU in 1990, to a band that grew from US$3.0 to US$6.0 per MBTU in 1996, whereas Venezuela and Chile kept their prices at around US$1 MBTU.

These changes are related to the introduction of a new economic rationale oriented to financial self-sufficiency and/or profitability of the subsector. The most radical changes in 1996 were seen in Argentina and Bolivia, followed by Mexico and Colombia.

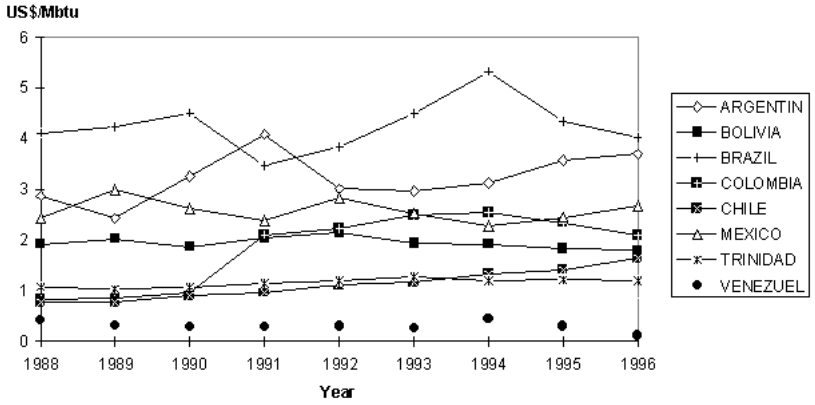
Industrial consumer prices (Chart III.3.4), in turn, did not undergo any significant changes, even though transitory adjustments were apparent, except in the case of Brazil, where starting in 1992 there is a change in policy with a growing and more accelerated trend compared to the other countries.

Chart III.3.3: Residential consumer prices



Likewise, it has been observed that the adjustment policy has been absorbed, in those countries with more radical changes, by the residential sector. Nevertheless, it should be indicated that in these cases the prices of substitutes (in calorie equivalent) has remained above the price of natural gas. The circumstance shows that the rationale behind the pricing process is aimed at meeting the above-mentioned objectives, financial self-financing, or profitability, which are needed not only to rehabilitate the companies but also to facilitate the liberalization process by means of privatization.

Chart III.3.4: Industrial consumer prices



Likewise, it has been observed that the adjustment policy has been absorbed, in those countries with more radical changes, by the residential sector. Nevertheless, it should be indicated that in these cases the prices of substitutes (in calorie equivalent) has remained above the price of natural gas. The circumstance shows that the rationale behind the pricing process is aimed at meeting the above-mentioned objectives, financial self-financing, or profitability, which are needed not only to rehabilitate the companies but also to facilitate the liberalization process by means of privatization.

Nevertheless, for residential users, these adjustments have led to higher costs in the family budget although, in those cases where operating efficiency has improved, this has not provided them with any savings. In any case, improved service supply and lower cost of substitutes favor a broader penetration of gas in domestic uses, as actually observed in Argentina and as will probably occur in the rest of the countries. In Colombia, for lower-income sectors, price increments are mitigated by means of cross subsidies between different social strata, whereas in Argentina subsidies have been completely separated from the rate and form part of a fund in the national budget.

2.3.4 Natural gas service markets

In Argentina, transport companies may not purchase or sell gas. According to the law, no subject may have a controlling participation in the companies or bodies that carry out activities for other subjects, not even in the producer companies. For the service, a rate is charged to the distribution firms. Those who can build their own gas pipelines compete with producers and distributors. Expansion is at one's own risk. In turn, the distribution companies exercise a monopoly over their area of influence, charging for the service a rate that is regulated by ENARGAS. They do not have exclusive control over service supply, since subdistributors may also provide it. There is free or "open" access to transport and distribution networks, and concession holders cannot refuse to transport gas when the pipelines have the capacity to do so. Commercial and physical distribution bypassing is allowed.

In Mexico, market differentiation undertaken by CRE has restricted its participation in regulating monopolies and eliminating entry barriers to the competitive markets. The Commission's administrative decisions include the following: transport permits are granted to all technically viable projects, without any exclusiveness; commercial and physical interconnection is allowed; the vertical integration of concession holders with interconnected systems is not allowed; concession holders must provide open non-discriminatory access; they must separate their services and may not apply cross subsidies between them; transport system users may allocated their capacity rights directly or via the transport provider (secondary capacity market).

In Colombia, as a rule, policies are aimed at ensuring free access to the transport networks, in order to create a competitive wholesale market between producers, merchandisers, distributors and large consumers. Companies that transport fuel gas are not allowed to be involved in production, marketing, or distribution activities, nor are they allowed to have financial ties with companies involved in these activities as part of their business. The regulation of fuel gas distribution via the network is similar to the regulation of transport with respect to structure: free access, fees for use, planning in charge of the distributors, prohibition of restrictive practices with regards to competitors. There is, however, an important difference in determining fees for use of the distribution system, since distributors have the faculty to adopt them, after approval of the CREG, according to its methodology.

3. International natural gas markets

The modernization of the natural gas subsector has exerted a dynamic impact on the exchange of natural gas inside the region, which will multiply rapidly over the next few years.

At this moment, the gas interconnections in operation or under construction in the region are joining Argentina and Bolivia, Argentina and Chile, Bolivia and Brazil, Mexico and the United States, and soon Argentina and Uruguay. The first is over twenty years old, whereas Mexico and the United States have been operating for several years. The rest are new interconnections. More gas pipelines have been planned to operate between Argentina and Chile and between Argentina and Brazil, with a good chance of being putting into practice.

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CHARACTERISTICS OF CONTRACTS IN THE SOUTHERN CONE

- The contract between Bolivia and Argentina envisages supplies of 6.1 Mmcd during a 20-month period, renewable for one year or multiples thereof for up to 4 years. The price for residual gas during the first 20 months is of US$1.00 per Mbtu. The price of liquefied gas included is US$96.34 per ton. For the gasoline included, a variable price has been calculated, estimated at an average US$0.30 per U.S. gallon. As a result, the value of injected natural gas is estimated to be US$1.24 per thousand cubic feet. Starting in 1994, the price is determined by what is set by the Argentine market.
- The contract between Argentina and Chile (Methanex), which began operations in December 1996, foresees initial supplies of 2 Mmcd and over a 20-year term.
- The contract between Argentina and Chile (Santiago) envisages an initial supply of 3.0 Mmcd by the end of 1997, although operations will begin in August 1997, until a volume of 19 Mmcd is reached by the year 2013.
- The contract between Brazil and Bolivia envisages supplies of about 14 Mmcd at the beginning of operations in 1998, a volume that will increase after the year 2005 to 22 Mmcd. The term of the contract is 20 years. The initial price will be US$0.98 Mbtu and will increase progressively to US$1.06.
- The supply contract between Argentina and Brazil for the Uruguaiana thermoelectric plant involves a price of US$2.20 per Mbtu.

In view of the geographical difficulties of the jungle, a new gas integration link between the G3 and Mercosur countries could take place through Venezuela and Brazil. This aspect will be facilitated as a result of the letter of intent recently signed between PDVSA and Petrobras. Between these two countries there are electric interconnection projects, and natural gas will eventually be supplied over the same route (Guri-Manaos), since there is a considerable gas potential in the latter region, with projects that could join Manaos with Sao Paolo.

There are large natural gas markets concentrated in the G3 and Mercosur, involving highly important projects. Demand in these markets has been estimated in a very preliminary manner and with wide differences in various publications, but they all highlight the natural gas boom natural gas that will eventually take place. In addition, they hint at an enormous market with potential benefits for the public and private sectors.

3.1 Mercosur and neighboring countries

The gas interconnection in the River Plate Basin and between Argentina and Chile will help to develop a subregional market that will integrate Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay (and eventually Peru), through an important network of gas pipelines.

It is estimated, however, particularly for potential supplier countries of Mercosur, that large investments will be required for exploration, development and gas lines, to ensure long-term supplies. Gas from Camisea in Peru and from Venezuela can be included among these potential supplies.

3.2 Group of Three and neighboring countries

Central America could benefit from the wealth of natural gas reserves in the countries of the Group of the Three (Mexico, Colombia and Venezuela). Meanwhile, existing projects have a scope limited to the neighboring countries. Mention should be made here of the study being carried out by OLADE, ECLAC, and GTZ about a potential interconnection between Mexico and Central America.

4. Some conclusions about natural gas industry changes

Since the beginning of the nineties, and particularly with the transformation processes being implemented in the energy systems of the region, natural gas has been gaining more and more importance in terms of energy market development prospects.

The factors that have contributed to this new image of natural gas are varied in nature. As indicated, however, one of the most important factors involves electric power generation. Regarding this, the availability of new thermoelectric power generation technologies has facilitated new forms for the institutional organization of the electric systems. The financial difficulties faced by the states in the region in terms of the investments needed for expansion, within the framework of global economic changes, and the ensuing opening up to private participation in the energy industries constituted additional conditions for this renewed role of natural gas in electricity generation.

The comparatively lower capital intensity and the shorter investment recovery periods achieved by these technologies become particularly compatible with the profitability and risks private players are willing to take. It is because of these economic rationality characteristics that it can be asserted that private-sector players and the heightened competitiveness in electricity generation are very much linked to the availability of natural gas.

In addition, one must take into account that the development of residential natural gas markets, and even production use markets, in countries where this energy resource still has a relatively low penetration, as a rule depends crucially on the existence of an abundant demand for gas for electric power generation.

It is clear that the divestiture of assets in a gas industry that has already achieved high levels of maturity is a viable project. The reform experience of this industry in Argentina is undeniable proof of this.

As in the case of electricity, the organization of competition along the natural gas productive chain requires vertical and horizontal segmentation of production (or wholesale supply), transport, and distribution activities, as well as the principle of free access to the networks. There are two aspects, however, that distinguish the situations of both subsectors regarding this. The first is that, in the countries

of the region, the degree of interconnection of the gas pipeline networks is much lower than that of the electric transmission networks. In addition, in terms of gas production, it is impossible to opt for partitions such as those that are feasible in thermoelectric generation, because of the new technologies available.

Thus, even in the countries with the most mature gas industry, there will probably be a strong concentration of the wholesale supply in the different substrata, possibly encouraging an oligopolistic type of behavior.

Thus, the total deregulation of wholesale natural gas markets in countries that have opted for the market-based coordination modality (OM), could exert negative impacts on the development of these markets. It should be recalled that, in those cases where this option was chosen, final rate regulations take the wholesale gas price as a market indicator.

The last important subject to point out has to do with the use of gas. Mention has been made of important projects under way to facilitate gas exports to sub-regional areas. The need to coordinate such efforts for adequate resource allocation and sustainability has also been stressed. It is therefore indispensable that there be national and regional public policies aimed at facilitating this coordination.

D. Coal in the energy transformations of Latin America and the Caribbean[35]

Until 1996, coal was the world's main source of energy. It continues to be so in China and is very important in Germany and in the Eastern European countries. In Latin America and the Caribbean, on the other hand, it accounts for barely 5% of final energy consumption, with a maximum participation of almost 15% in Chile.

The abundant hydropower and liquid and gas hydrocarbon resources explains the low incidence of coal in the region's energy supplies as a whole. This particularity during this century led the different sectors of the economy to shift directly from woody fuels to hydrocarbons, especially petroleum, without passing through coal, as occurred in Europe and part of the United States.

Although the manifestations of different quality coal are well known in most Latin American and Caribbean countries, commercial production (in order of declining importance) only exists in Colombia, Mexico, Venezuela, Brazil, Chile, Argentina and Peru.

1. Coal markets

In general, electric power generation and the steel industry are the two markets, especially the former, where coal has been most used in the region, in addition to the cement industry where this energy source is also quite important.

1.1 Problems in electric generation

In the region's coal-producing countries, the participation of this energy resource in electricity generation is very low. For the region as a whole, it accounts for hardly 4%, with a maximum of 19% in Chile and virtually null values in Peru and Venezuela.

Among the non-producing countries, the Dominican Republic is the most noteworthy, because of a 250-MW plant operating with this fuel. The coal producing countries have mostly used their water resources, oil, and/or natural for generating electricity, in view of the abundance of these energy resources in their countries.

In this market, and for thermal generation, coal must therefore compete with fuel oil and/or natural gas. In countries with important proven natural gas reserves or reserves that are being assessed (as Venezuela, Mexico, Colombia, Ecuador, Peru, Bolivia and Argentina) or in those where the decision has been made to import natural gas from neighboring countries (as in the case of Brazil, Chile and Uruguay), the probabilities of coal are even lower.

There are different and diverse reasons for this situation, besides the availability of the competing energy resource. On the one hand, the institutional changes in the electric sector, under way in almost all the countries of the region, have transformed the risk-profitability ratio of private-sector investments into a crucial decision-making factor when selecting alternatives to supply this service (see the

section on conclusions from the natural gas section). Additionally, the new regulatory schemes tend to favor the dispatch to the electric systems of lower cost equipment.

This being the case, the technologies used to generate electricity that have the most advantages with respect to fuel cost and/or lower initial investments and/or shorter periods of project implementation time will have more chance of being implemented in a market open to different suppliers. The high initial investments required for coal plants place this energy resource at disadvantage in this market.

In addition, there are increasingly more stringent environmental provisions, which is another element favoring other fuels that require less environmental impact mitigation and monitoring costs to comply with current standards.

This series of reasons makes it very difficult for coal to penetrate the electric power market of most Latin American and Caribbean countries.

All of this is not to disregard the breakthroughs achieved in coal use technology. It is undeniable, however, that private-sector electric power utilities confronted with the option of generating with natural gas or with coal will probably be more inclined towards the former, unless the conditions for using coal as feedstock as an alternative are extremely favorable, and the latter would depend on explicit government policies to develop the use of coal[36] and/or specific managerial strategies, such as linking mining companies with electric utilities.

Now that these general aspects have been mentioned, we now need to highlight some of the particularities in the countries.

- In the case of Chile, a country with a market open to private-sector participation but where ENDESA is preeminent and with a considerable contingent of self-producers (who generate 24% of the electricity), coal-operated plants produce 19% of the country's electricity. In the public service, hydropower prevails, whereas in self-production coal-fired generation accounts for almost 60%. Among self-producers the National Copper Corporation (CODELCO) is noteworthy; it is state-owned but with a privatized division for electric power generation. That is, mining activity, which is an important consumer of electricity, also consumes coal to generate this electricity.

Although between 1994 and 1996, coal was considered for new thermoelectric generating plants, the construction of the gas pipelines coming from Argentina, and particularly those being planned for the north of Chile, transformed natural gas as a major competitor of coal. In addition, a large number of new plants would use coal imported from Colombia, the United States, Canada, and Australia.

Likewise, environmental legislation caused the shutdown of coal-operated plants near Santiago, due to the high sulfur content of domestic coal.

In any case, among the coal-producing countries, Chile has the best prospects for using coal for thermal generation, despite competition with natural gas from Argentina.

- In the case of Colombia, which is the largest coal producer in Latin America, this energy resource is ensuring part of the future expansion of electric power generation. Although the share of coal decreased during the eighties, the low water flows of Colombia's rivers in 1992 and the preeminence of hydropower generation fostered the idea of setting up a more balanced supply system where coal and natural gas together would account for a share of 50 to 60%.

  Thus, there are firm contracts and studies that will facilitate increasing the capacity of coal-operated thermal plants from 850 MW to 2000 MW during the next ten to fifteen years.

  Large coal reserves, a well-developed mining infrastructure, promotion of coal use by Ecocarbon, state coal enterprises and institutions, the need to balance the electric power supply mix which depends heavily on the water flows of rivers, current tax breaks, electric power generation privatization, and Carbocol's proposals to secure private-sector financing for the construction and operation of coal-operated plants are all elements that could contribute to expanding coal-operated thermal generation in Colombia.

  On the other hand, stricter environmental standards (by the year 2006, the sulfur content in combustion gases must be reduced to less than 1%, compared to the current 1.5%), the plans to disseminate the use of natural gas, which is also abundant and cheap, and the reforms introduced in the

electricity subsector, will surely moderate the prospects for coal penetration in electric generation.

- In the case of Brazil, almost 96% of electric generation comes from water, due to the important resources this country has developed to mitigate, among other things, the heavy impact of petroleum imports.

  In future, the deregulation of the electric industry, especially in the generation stage, may give impetus to the installation of thermal plants. There is domestic coal in the southern states of Brazil, relatively close to the area of highest economic development and, therefore, with the greatest electric power demand. Although the installed capacity of coal plants is relatively reduced (less than 1.5% of the country's total) in absolute terms (1,200 MW), it is not negligible. Due to the magnitude of Brazil's electric market, any small increase could involve important requirements for additional capacities. That is why almost 2300 MW of additional installed capacity will be needed over the next fifteen years.

  These optimistic figures, however, must be tempered by the prospects of equipment or supply alternatives that might be more competitive, rather than complementary, namely, natural gas supplies also in the south of Brazil, coming from Bolivia and Argentina, which would be largely used for electric power generation. Likewise, demand for coal may be affected by part of the hydropower energy from Yacyretá, new hydropower developments like Garabí, and the quality problems of Brazilian coal, which has a great deal of ash and therefore requires costly processing techniques (like fluidized beds, for example) and environmental impact controls.

- In the case of Mexico, there is very high dependence on thermal generation using oil products, as a consequence of the abundance of that resource in the country. Coal-operated thermal capacity, which comes close to 2600 MW, represents 8% of Mexico's electric generation.

  The future of coal in this market is strongly conditioned by the state's electric power policy, which ensures the preeminence of the Federal Electricity Commission as service provider and liberalization permitting private-sector involvement in the natural gas industry, which would be absorbing a substantial amount of the future demand for generation capacity.

- In the case of Peru, the future participation of coal in electric generation seems to depend on the results of the resource assessment study being conducted in the Alto Chicana deposits and on government incentives, as well as competition from natural gas. Thus, the future does not look encouraging.

- Among other Latin American and Caribbean countries, we should first mention the Dominican Republic, then Jamaica, and finally Costa Rica.

  The resistance to break up and privatize the Dominican Electricity Corporation and the application of the San José Accord, which encourages oil imports from Mexico and Venezuela under acceptable financing conditions, seem to be elements hampering the penetration of coal in electric power generation activities in the Dominican Republic.

  In Jamaica, with support from private investors through the financial systems set up for the building of plants and their further operation, plans are being made to include coal-operated thermal generation.

  In Costa Rica, state control over electric power transmission and distribution continues, and plans are being made to open up future generation to private investors, among other things, to build plants using imported coal.

1.2 Iron and steel market problems

The demand for coal in the Latin American iron and steel sector involves various aspects, such as:

- The development of the Latin American commodities industry as a result of the local iron and steel industry or manufactured goods made with imported steel parts. This in turn is linked to the integrated industrial development of the countries.

- The installation of factories with foreign capital aimed at producing raw materials for the iron and steel industry and semifinished goods.

- The technology used to produce cast iron and/or steel.

- In general, except for Brazil, in the other Latin American countries the iron and steel industry is not that important and has suffered its ups and downs, namely, the setbacks during the eighties and some recovery in the nineties.

- Likewise, in general, Latin American coal, except for some in Colombia, is not the most suitable for the preparation of iron and steel and, therefore, the coal used in the iron and steel industry is mostly imported.

- Some countries, mainly Mexico and Argentina, have developed the direct iron mineral reduction technology, which permits the use of natural gas as a reducer. This has affected the consumption of coal, which in most cases is imported.

- Changes in processes adopted by the iron and steel industry, with the more widespread use of electric arc furnaces instead of traditional oxygen furnaces, has reduced the use of coal.

- The injection of granular coal to substitute the injection of pulverized coal for coke and steel production has reduced capital costs and loading coal processing costs, thus improving efficiency.

The iron and steel industry, however, is not the same in every country, and therefore it is worthwhile to specifically examine some of special characteristics of the countries.

- In Brazil, the use of coal for the iron and steel industry accounts for nearly 80% of that country's total coal consumption. Additionally, almost all that coal is imported. This makes of Brazil the region's main coal consumer, with almost 50% of the share. Imported coal comes mainly from the United States.

  Another characteristic of the iron and steel industry in Brazil is its concentration, since the five largest companies produce 70% of the steel, while the remaining 30% is produced by 21 smaller companies. In addition, these large companies are importing coke directly, instead of producing it from imported coal. In Brazil, the iron and steel industry has traditionally worked with charcoal which, although it has reduced coal and/or coke imports, has generated severe deforestation problems. Environmental measures that require reforestation commitments before authorization to use

the forest to manufacture charcoal have increased the costs of this industry, which has favored those that depend on coal or coke.

In addition, pulverized coal injections have reduced the demand for coal that can be made into coke, allowing the use of lower-quality coal.

Since Brazil is the world's largest steel exporter and the iron and steel demand of its domestic market continues to grow, estimates are that future coal consumption will also increase and consolidate Brazil's position as the main user of this energy resource in Latin America. This circumstance merits special attention when energy integration policies are established.

- In Mexico, the iron and steel industry consumes less coal than electric power generation activities. Even so, the former consumption is far from negligible. Although the introduction of crude steel has been increasing over time, coal consumption by this industry has been falling due to changes in the type of processes used and because of the importance of the direct coal reduction techniques using natural gas. For these reasons, in spite of the expected expansion of the iron and steel industry over the next few years, coal consumption will not be increasing at the same pace.

- In Colombia, the steel industry is not highly developed and only consumes 11% of the coal aimed at the domestic market.

- In Chile, the steel industry has not expanded much during the last decade, and the demand for coal is relatively small.

- In Argentina, somewhat like Brazil, most of the coal consumption (which is imported) is used by the iron and steel industry to manufacture coke. The availability of the country's own natural gas will probably lead to an increase in the use of direct reduction processes and for supplying electricity to arc furnaces.

1.3 Other coal markets in the region

Among the remaining markets for steam coal we have the cement industry. In some countries like Peru, Colombia and Venezuela, this industry is more relevant

than the iron and steel industry in terms of coal use. But since coal competes here with other fuels, the price per calorie is fundamental in deciding its use.

In Colombia particularly, coal is used as a fuel in virtually all consumption sectors. Consumption other than for electric power generation and the iron and steel industry accounts for 70% of the sales on the domestic market.

The massive dissemination of natural gas which is expected in the immediate future will most probably substitute coal consumption in these other markets.

1.4 External markets

Coal-importing countries in the region essentially buy coal to be converted into coke (with the exception of Chile and the Dominican Republic, who also buy coal to generate electricity),and the most important importer is Brazil.

In this sense, the production and transport difficulties arising from the use of Colombian coking coal do not encourage transactions inside the region, and therefore regional coal imports will continue to come from outside the region.

On the other hand, steam coal imports for electric power generation or the cement industry, particularly for Chile, the Central American countries and the Caribbean, could come from Colombia and/or Venezuela.

But for this to happen, specific regional agreements need to be reached, with rates that favor producer-exporting countries of the region. In any case, the size of this intra-regional market certainly does not seems to be as important as transactions from petroleum, natural gas, and electricity.

2. Coal supply

In most of the coal-producing countries and in several importing ones, there are coal supply problems:

- With the exception of Colombia, and not in all its mines, since exports are not substantial and investments have not been made retrofit and upgrade coal

use technology, coal export costs are not competitive compared to alternative fuels or coal from outside the region.

- In several countries, such as Argentina, Brazil and Chile, production and even sales are subsidized by the state to keep jobs and avoid additional social problems in mining areas.

- But there also are problems involving the transport infrastructure and port facilities that make large scale loading and/or unloading difficult.

- Under the previous conditions, and due to the relatively low quality of the region's coal, with the exception of Colombia and Venezuela, it is difficult to attract private capital flows to reactivate exports, except through subsidies and the construction of facilities, whose costs must also be borne by the State.

3. Some conclusions about coal market transformations

Circumstances have conspired to have undermine the importance of the coal subsector in current energy reform processes. The changes in this subsector have therefore been comparatively marginal.

Attention is being focused, rather, on the future of this energy resource as such within the region. In spite of the abundant mineral coal reserves of several countries in the region, the outlook for developing markets for this energy source seem quite meager, because of both demand and supply factors. To improve options for the use of this energy resource available within the region, efforts must be made to apply clean technologies and create competitive conditions.

Electric power generation is the principal internal market for coal in several countries of Latin America. In this and other internal markets that are geared to steam coal sales, coal must compete with natural gas, which in fact is a much more attractive fuel due to its ease of use and the lower investment costs it entails in equipment. Reforms implemented in the region's electric power systems have highlighted even further the importance of these factors. The rational approach governing private-sector players tends to favor technologies with low investment costs when there are situations of risk. A reduction of the political and

commercial risks in the electric sector and a revision of the regulatory schemes would help to improve the opportunities for coal on this market.

To the above-mentioned problems, one must add the costs stemming from environmental impact mitigation activities, which have acquired increasing importance. Coal-producing countries and those that produce coal-use technology, have made specific efforts to develop clean technologies. Some countries in the region are participating with more interest than others in these efforts.[37]

In some countries, the iron and steel market is important. The market for the iron and steel industry continues to be focus more specifically on coal with coking characteristics. The new steel technologies, however, have enhanced efficiency in the use of this fuel and have somewhat mitigated the impact of the growing demand for coal.

NOTES

1. ECLAC, Economic Development Division, “Reformas económicas en América Latina: una síntesis de la experiencia en once países”, LC/R 1606, Santiago, December 1995.

2. See, for example, Maarten J. Arentsen and Rolf W. Kunneke, “Economic organization and liberalization of the electricity industry: in search of conceptualization,” *Energy Policy,* Vol. 24, No. 6, 1996, pp. 542-556.

3. By liberalization we understand the process of shifting from a state coordination system to a system where market forces prevail. In view of the specific characteristics of the electric power systems (presence of fixed networks in transport and distribution, no storage capacity and complementary technologies in generation), the market should be organized by changing how activities are organized and establishing regulatory principles (see Chapter II).

4. In follow-up to what was indicated in the previous footnote, in the electric power sector the concept of deregulation in reality means the dismantling of artificial barriers to certain activities (essentially generation) and re-regulation tending to organize competition wherever it is possible and to effectively control those activities that should continue as natural monopolies (essentially transmission and part of the distribution markets). Of course, “deregulation” could have a different scope, depending on the case.

5. World Bank, “Reforms and private participation in the power sector of selected Latin American and Caribbean and industrialized countries,” Report No. 33, Washington, March 1994.

6. OLADE, *The State’s Role in the Energy Sector,* Quito, November 1992.

7. See OLADE/ECLAC/GTZ, *Energy and Sustainable Development in Latin America and the Caribbean: Approaches to Energy Policy*, Chapter 2, Quito, May 1997.

8. This was done by dividing ISAinto two utilities: ISAGEN, which kept the generation activities, and ISA Transmisión, in charge of interconnection networks and dispatch coordination.

9. Only recently were some generation assets transferred, as a consequence of momentary fiscal imbalances. The sale of shares of the main regional public utility (Empresa Eléctrica de Bogotá), however, is currently being studied.

10. By independent producer we mean here any generator able to supply energy and/or power to the national transmission network. It cannot establish contracts with end-users.

11. Usually the entity in charge of dispatch is responsible for ensuring the integrity of the interconnected system and supervising the economic dispatch of contracted energy. This entity determines the term price of the power generated in blocks (usually for 30 to 60 minute periods) and makes this information available for future energy buyers.

12. ECLAC, ,Tohá, Jaime, "Estudio sobre la Reforma del Sector Energético en Chile," document LC/R 1493, Santiago, January 1994, and Lorenzini, Sergio, "Análisis de la Competitividad en la Generación Eléctrica en el Caso de Chile," document LC/R 1498, Santiago, February 1995.

13. Some of the business partners, however, that participate in the consortium comprising TRANSENER also participate in generation and distribution activities, through other consortiums. In fact, in some cases this participation extends also to all activities of the productive petroleum and natural gas chains. (See G. Diaz de Hasson, "Análisis de las privatizaciones eléctricas," *Desarrollo y Energía*, Vol. 3 No. 6, IDEE, March 1994.)

14. COLBUN recently signed a strategic agreement with the Inversora Andina consortium, which is comprised of Powerfin (62.5%) (which is a branch of Tactabel of Belgium), Iberdrola of Spain (25%) and the Chilean group Enagas (12.5%). Inversora Andina bought 37.5% of COLBUN's shares and may obtain another 12.5% over the next three years, and thus secure a majority on the board.

15. See Rosella Cominett, "La Privatización y el Marco Regulatorio en Bolivia y Nicaragua: Un Análisis Comparativo," ECLAC, Public Policy Reform Series, No. 43. LC/L 973, August 1996; and Fernando Cuevas, "Análisis de las reformas de la industria eléctrica en Bolivia y Nicaragua," ECLAC, Public Policy Reform Series, No. 49, LC/L961, August 1996.

16. 33% was sold to an international consortium formed by AES Co. and Southern Co., both U.S. companies, and the Brazilian bank Opportunity S.A. The state of Minas

Gerais will continue with operational control over CEMIG, which is considered to be one of the best administered public service utilities of the country. The new consortium paid US$1.08 billion and will have the right to designate three of the eight directors on the company's board of directors.

17. The plant will sell electricity to CEEE according to a 20-year contract, and YPF will supply Argentine gas through a new gas line (Mesopotamia), which will start up commercial operations in 1999. See *Tecnoil*, April 1997, Year 18, No. 185, page 68.

18. The present document uses the term "regulatory framework" in a broad sense, that is, not only related to the regulation function itself or to the activity of the regulatory body, but also covering the legal framework, the regulations and all their implications. Regarding this, also see F. Sánchez Albavera and H. Altomonte, "Las Reformas en el Sector Energético de América Latina y el Caribe," ECLAC, Environment and Development Series, May 1997, pages 39-45.

19. See ECLAC, "Reforma de las industrias de energía eléctrica y gas natural," Mexico, July 1997. Version being published.

20. This organization has the following names: National Load Dispatch (Argentina), National Load Dispatch Committee (Bolivia), Economic Load Dispatch Center (Chile) and Committee for the Economic Operation of the System (Peru). In Colombia, a National Operations Council has been formed, which includes the different players in the system. In addition, there is a National Dispatch Center that depends internally on the company in charge of the national interconnection service.

21. The National Load Dispatch Committee of Colombia includes a representative from the Superintendence of Electricity, whereas in Argentina, at first, the Energy Secretariat was in charge.

22. For reasons of transparency, both subsidies for poorer residential consumers, as well as charges applied to higher-income groups and non residential users, have to be registered separately on the respective invoices.

23. See, for example, J.W. Baddur, "The international petroleum industry: Competition, structural change and allocation of oil surplus," *Energy Policy,* Vol. 25, No. 2, 1997.

24. This paragraph is based on pages 51-69 of the publication: F. Sánchez, Albavera and H. Altomonte, "Las Reformas en el Sector Energético de América Latina y el Caribe," ECLAC, Environment and Development Series, May 1997.

25. With the exception of the Manguinhos refinery, of 10,000 bls/d, and Ipiranga, with 9,000 bls/d.

26. PETROBRAS operations generate close to 2% of GDP. If we add to this its holding operations and the activities it induces through its purchases of goods and services, this share could amount to 25%. The holding generates about 50,000 jobs, and it is estimated that, as a result of its operations, about 1.5 million jobs are created. The net worth of PETROBRAS is calculated to be over US$50 billion.

27. For a detailed analysis of the transformation process of the Argentine petroleum subsector, see R. Kozulj, V. Bravo and N. Disbroiavaca, "La política de desregulación petrolera en Argentina y sus impactos", *Revista Brasileira de Energía,* Vol. 3, No. 1, 1993.

28. For further details, see F. Sánchez Albavera and H. Altomonte, "Las reformas energéticas en América Latina", ECLAC, Environment and Development Series, Santiago de Chile, 1997.

29. YPF SA continues in any case to be a vertically integrated company, controlling about 50% of market for crude oil and products. The state holds 39% of its direct shares (20% for the national state, 10% for the provinces and 9% for the national retirement fund).

30. Gas del Estado was divided into transport and distributor companies and was later privatized. The state holds a 25% share in the transport companies and 5% in the Shared Ownership Program. As for the distributors, the situation varies in terms of state participation, ranging from 0 to 30% participation, whereas in the Shared Ownership Program it has 10% in all of the cases.

31. In 1995, 16 distributor companies were registered, of which three were operating as concessions and five were not operating at all. By mid-1997, non-operating companies had been reduced to two.

32. Based on data from ECLAC.

33. In these resolutions, what is proposed is that for any year the average rate per unit of gas supplied be equal to the maximum average charge resulting from the following formula:

$$M_{st} = G_t + T_t + D_t + S_t + K_{st}$$

where G_t is the average maximum cost for gas in the reservoir (weighted average of the mean purchase price from the distributor and of the average cost paid by the other distributors; the weight in this last cost increases progressively until it reaches the maximum value of 25% by the year 2000). T_t represents a mean maximum transportation cost (total net transportation cost paid by the distributor, divided by the amounts effectively transported. D_t is the mean maximum cost for distribution in local networks. S_t is the maximum charge for the commercialization service and K_{st} is a correction factor that allows one to adjust the differences between the mean rate and the total maximum charge allowed in the previous year.

34. At this moment, under ENARGAS regulations, user rates (tu) are set according to the following composition: price of gas (pg), plus the transport tariff (tt), plus the distribution tariff (td). That is to say: tu = pg+tt+td

35. Paul S. Baruya and Lee B. Clarke, *Coal Prospects in Latin America to 2010: Perspectives: IEACoal Research,* March 1996; and OLADE, SIEE, *Energy Statistics*, Version No. 8, July 1996.

36. We can mention, for example, the concession of the coal field of Río Turbio in Argentina to a private company, Yacimientos Carboníferos de Río Turbio S.A. (YCRT SA), under the following conditions:

    * The Argentine state grants an annual subsidy of US$23.106 and US$37 per ton for coal sold to an electric generator of the YCRTSA company.

    * The province of Santa Cruz discounts 70% of the amount to be paid by this company as an employer in social benefits.

37. As for OLADE, it is conducting a study with support from the European Union, in order to find out if there is any technical-economic feasibility in installing thermoelectric generation plants using clean coal technology.

Chapter IV
Business Strategies

This chapter deals with the new business strategies adopted as a result of energy sector modernization. Previous chapters have shown that modernization involves, among other things, a new coordination scheme for decision making, arising from different degrees of participation ranging from limited opening up to full market coordination. This new situation and the players' newly found decision-making capabilities explain why business strategies in the energy sector have become the focus of those charge of designing energy policies in the region. This chapter is a preliminary step toward dealing specifically with this new topic.

The next chapter (Chapter V) centers its attention on the role of the state, which is the driving force behind this modernization process and the counterpart for the new players in implementing transformation processes and post-reform stages.

1. Outstanding features of the new situation

1.1 Opening up and expanding opportunities

The modernization processes in the energy systems of the region's countries discussed in previous chapters have provided opportunities, not only in terms of incorporating new players, but also in terms of broadening the margin of action of entities traditionally operating in the sector.

The expansion of these opportunities and spheres of action, for both new and traditionally productive players, has been mainly the result of:

- Sector reforms and the limited or total liberalization of activities previously characterized by strong entry barriers.

- The breakup of state assets in favor of private-sector capital, usually allowing the participation of foreign capital (breakup of state control and denationalization).

- Structural reforms that have affected the economy as a whole: trade and financial liberalization and subregional integration.

Opportunities for business in the sector have also increased, both internally and externally.

1.2 Characteristics of new players

Although reform processes implied the massive incorporation of new productive players in most of the energy systems in the region, in only a very few cases were these economic groups or companies entirely new in those systems. The newly incorporated companies had in fact been operating outside the country or were players from outside the sector, many times functioning as subsidiaries or consortiums created for each new business. New companies also appeared as the result of transformations of previously existing ones. Preference was given to the creation of consortiums or partnerships between local companies that had acquired experience operating in the country and foreign companies that could contribute technology and/or capital.

For the most part, therefore, the new players already have experience in the sector itself or in sector-related activities. In some cases, companies with a speculative approach also managed to enter the system, taking advantage of emergency situations and/or decision making processes that were not too transparent or rational.

In addition to the widespread presence of the multinationals normally found in the oil subsector, other North American and European companies came onto the Latin American stage as external players. These groups had been operating as public or private companies in the electric power or natural gas subsectors in their respective countries.

The private-sector companies in the region that had been developing activities in more restricted areas such as the production of marginal fields or oil services, or that were just involved in construction and equipment manufacturing, penetrated the very heart of the energy business. Other “new” national players, which have succeeded state companies that were partially or totally broken up, have also appeared.

These new players behave quite differently from the traditional companies of the sector. This new approach is also typical of other players. The state companies themselves have also modified their behavior after having undergone important transformations (rehabilitation, internal reorganization, changes in business management schemes, partial breakup of assets, etc.). After such changes, these companies now have a different set of objectives, opportunities, structural conditions, and available tools.

1.3 Relationships between the state, companies and other players

Transformations have introduced changes in relationships between the state and energy sector companies. These relationships changed drastically in those countries and subsectors where market coordination schemes were adopted. Although previously the companies had collaborated closely with the government, in the new scheme the sector's productive players enjoy a greater margin of autonomy and focus their attention primarily on looking for business. The state, instead of acting as sector leader, is now creating the framework within which the utilities can carry out its activities and fosters its evolution by applying other instruments. Although before the State and its public enterprises attempted to define and implemented what it deemed to be most advisable for the country; now the state's mission in the new strategy is to ensure that the utilities'activities are in the best interests of the country.

The government's relationships with other players have also changed, as in the case of consumers. Instead of being the direct provider of a public service and therefore responsible for service delivery problems, the State is now performing the role of supervising the companies'compliance with their obligations in terms of service quality and coverage and, at the same time, attempting to striking a balance between the companies' interests and those of their shareholders and customers. It is clear that it is also responsible for ensuring that the energy system will evolve in keeping with the sustainable economic, social, and environmental development.

In addition to creating new regulatory frameworks, the governments have also had to keep an eye on their implementation. Both tasks have entailed, and will continue to entail, major challenges for the future, especially because of the lack of tradition within the region and the lack of experience throughout the world. Proof of this are the repeated changes and adjustments that had to be introduced

in the new regulatory framework in the years following the reforms in order to avoid negative impacts. On several occasions, governments were surprised by unexpected private initiatives which forced them to define immediately new regulatory instruments.

In countries where the reforms have had a slighter impact or are just being beginning to be implemented, the relationships between companies and the state have also changed. The legal and managerial breakup of the state utilities has required procedures on both sides to be redefined. In situations of limited opening up, new issues and concerns have emerged, one of the thorniest being the government's underwriting of the state company's contracts with third parties.

2. Business strategies

2.1 Some general aspects

A business management strategy can be defined as a set of explicit actions which result in the achievement of long-term objectives.

Some examples of long-term objectives set by utilities are:

- Penetration in markets to obtain the most favorable positions and/or the consolidation of their positions.
- Consolidation and maintenance of competitive advantages.
- Reduction of risks to assure long-term sustainability.
- Agreement with and support of national policies.

The objectives of the utilities do not necessarily coincide with those of their shareholders or owners. Nevertheless, they must bear in mind the interests of the different groups, especially those of the shareholders, the board of directors, the employees and the State.

The companies define their strategies depending on the resources they control, the market options that are available, and the eventual reactions of their competitors, always keeping in mind their objectives, specific mission and the interests of the different groups.

The elements which make up the strategies are related to:

- Structure and organizational-administrative functioning (outsourcing, rightsizing, profit centers, holding).
- The market (positioning, focus on the core business).
- The territorial nature of its activities (expansion in the national territory, internationalization with a regional or supra-regional approach, and multi-nationalization).
- Relationships with other players (cooperation, strategic alliances, consortiums, mergers, vertical integration, horizontal integration, inter-sector integration, diversification outside the sector).

2.2 A look at world trends

Energy utilities are employing a wide variety of new strategies throughout the world. In addition to the multinational oil companies that have always carried out their activities in many different countries and in different links of the energy chains, the utilities which were traditionally bound to one subsector or to certain links of the energy chains within a country have adopted strategies for diversification and multi-nationalization during the last few years.

The first step in the framework of these new strategies is multi-nationalization within the same sectoral environment. This is the direction the initiatives of electric power companies in the United States have taken. These companies have taken advantage of the restructuring processes of electric power sectors in different countries in Europe, Asia and Latin America to extend their field of action by purchasing companies and investing in independent power generation, etc. At the same time, some European public utilities have responded to this offensive by increasing their participation in the electric power utilities of Asia and Latin America. The next step would seem to be diversification toward other energy activities.

Another type of strategy involves vertical integration toward other activities of the energy sector chains. For example:

- Forward integration of companies that build power stations or manufacture equipment and become project developers or project financiers and then envisage becoming the operators of the facilities they have built. These initiatives usually take place within the framework of BOOT projects, extending even to energy supply based on the granting of concessions. At present even the most traditional manufacturers of machinery, such as GE, ABB, and Siemens have adopted this type of strategy.

- Forward integration of technological and natural gas transportation companies, gradually working up to the generation of electricity.

- Forward integration of companies that supply energy, extending their activities to service delivery (service companies) or to marketing.

- Inter-sector integration and diversification outside the sector. For example, oil and natural gas companies that incorporate electric power generation, transport, and distribution activities and electric power and natural gas distribution companies that become involved in other services through networks (water supply and telecommunications) or apart from networks (such as municipal solid waste collection).

2.3 The most common strategies of the Latin American and Caribbean energy companies

It has already been stated that the region's energy companies adjusted their strategies to the new situation by using the new business approach as either a state or private enterprise, taking advantage of the liberalization of energy markets and foreign trade and financing.

The financial rehabilitation of the companies and their institutional-administrative restructuring were identified in Chapter II as the most frequent steps taken to ensure modernization, quite apart from the thoroughness of this modernization. In the case of public service utilities, their reorganization has been associated mainly with a business reorientation.

The present chapter describes the business strategies shaping these processes. The specific strategies involving institutional-administrative organization are part of a first group, frequently applied in the LAC since the new owners of divested companies have used elements of this type, such as the concentration in core business, outsourcing, profit centers, rightsizing, and holdings.

The creation of consortiums, preferably between local and foreign companies, has been the almost customary form of entering new projects and participating in the purchase of companies that have been broken up in the electric power and natural gas subsectors. In the oil subsector, cooperation and alliances seem to be the most frequent forms, particularly in producer countries. These actions constitute a second group of strategies. Some of them, especially coordination aimed at activity integration, merit greater attention on the part of governments. Some cases of this type will be analyzed in greater detail in the next section.

The third group of strategies characterizing the new performance of the region's energy companies is the expansion of activities outside the countries of origin. Some of the largest oil companies in the region have been carrying out important operations outside the region for some time. What is new is that companies traditionally confined to their national territories have expanded their activities to other countries and that electric power utilities have also adopted these strategies.

3. Some strategies of the electric power utilities and potential conflicts

In the case of electric power utilities, the second group of strategies is the most interesting. As a matter of fact, the establishment of alliances and consortiums as well as the different forms of integration and the placement of those companies in different energy markets is a priority matter owing to their potential interference with the guidelines established by those in charge of energy policy.

Since this issue is being dealt with for the first time, the present chapter examines some of the strategies that seem to be the most important and that merit further attention from the people in charge of energy policy. Regarding this, the examples referred to most frequently are from the Southern Cone since it was the first in the region to apply the new market coordination scheme.

3.1 Vertical integration

As indicated in Chapter III, changes in vertical and horizontal integration schemes are the core elements of electric power sector restructuring. In the open market scheme (OM), vertical breakup is indispensable to promote market disputability. Control of a generator's transport links and/or distribution can help to consolidate a dominant position on the market, hampering potential competitors and thus enhancing the taking of monopoly quasi-earnings. By contrast, regulated integration (IR) and centralized control (CC) schemes permit and even assume vertical integration.

Inset IV.2.1: The problem of vertical integration of electric power utilities in Chile

- There is now a tremendous debate in Chile about the problem that has occurred as a result of the ENERSIS holding. Because of the linkage between its utilities, the holding company controls inside the Central Interconnected System 60% of power generation (ENDESA), 100% of the transmission (TRANSELEC), and power distribution for the greater metropolitan region (CHILECTRA).

- A petition submitted by the National Economic Prosecutor to the Antimonopoly Commission against this group of companies, aimed at ensuring its vertical breakup, has caused a number of political and economic debates. It is thought that, as currently configured, the holding could hinder the competitive efforts of the entire system.

- Because of this, the business strategy of maintaining vertical integration has become an extremely touchy issue with the State. The ENERSIS holding defends its strategy on the basis of economic arguments: the system has grown rapidly without the need for price hikes; vertical integration enhances supply security without eliminating competition; the present situation, which is the target of debate, has not prevented other companies outside the group from extending their participation to power generation and to the market of large users; because of sequence checking and scope, breakup will lead to a substantial increase in supply costs.

These assertions raise doubts about the advantages of mandatory vertical breakup, which is supposed to play an essential role in creating and promoting competition within the electric power sector. As a result, these arguments seem to question the very advisability of extreme competition in electric power systems, especially from a long-term perspective.

The presence of economies of scale and sequence is the principal argument against breakup and therefore against the adoption of the open market scheme in small electric power systems.

It is not easy to transform an entire or partially integrated system into a totally segmented system, especially when there are several vertically integrated companies owned by the states, the federal government, and/or the provinces. Actually, the cases of total breakup are very few. Even in situations where there is the will to breakup, it has not always been possible to do so. A good example of this is what is happening in Chile (see Inset IV.2.1).

Because of the reasons explained herein, the debate over the Chilean case may exert considerable impact on the configuration and appraisal of the open market model in the electric power sector within and outside the region.

3.2 Inter-sector integration of the utilities

For the electric power utilities, inter-sector integration appears to be an interesting option. As in other parts of the world, after consolidating their standing in the subsector of their own countries, some regional utilities have begun to diversify their activities toward the natural gas subsector and at the same time extended their interests internationally. Intersector integration obligates governments to adopt a stance when it can interfere with its own strategies and create competitive markets. Examples of this are found in Insets IV.2.2 and IV.2.3 (the examples of Chile and Argentina).

The phenomena observed here inspire expectations of a still wider reintegration after breakup. The debate continues among those who defend the advisability and/or need for new integration and those who prefer the advantages of short-term competition. This debate is no doubt relevant for planning the reorganization of the electric power systems. Nevertheless, it is clear that the reform processes should not lead to a new integration of the energy business with advantages for a limited group of private interests.

Inset IV.2.2: Inter-sector integration of utilities in Chile

Among Chile's economic integration agreements in Mercosur, the great progress made by the last two governments in achieving one of the most important objectives of Chile's energy policy, namely, bilateral energy integration with neighboring countries, is noteworthy. Several gas pipeline projects in order supply the central zone and other projects involving the supply of gas to the northern zone are being carried out. Regarding the central zone, in August 1997, the GasAndes pipeline that, in its initial stage, will be supplying the greater metropolitan region, receiving gas from the central western pipeline in La Mora (Mendoza, Argentina), entering through the Cajón de Maipo, and finally reaching Santiago, was commissioned. It is 465 km long and has a total capacity of 10^6 m^3/dRa. Its business configuration consists of the Argentine Compañía General de Combustibles (13.5%), the Canadian company Novacorp (56.5%) and the Chilean companies Metrogas (15%) and Chilgener (15%). Chilgener is one of the main generators in the Central Interconnected System.

Two projects are being studied to meet the considerable needs of thermoelectric stations which were built to meet the growing demand for electric power energy of the mining industry:

- Atacama Gas Pipeline. This will be 640 km long starting from Ramos (Salta, Argentina) and stretching to Antofagasta, Mejillones and Tocopilla, Chile. The consortium includes ENDESA (Chile) 50% and CMS (United States) 50%, and envisages the possibility of incorporating an Argentinian producer (YPF or another) with as much as 20%.

- NORGAS Pipeline. Its principal shareholders are ELECTROANDINA (Chile 33%), Techint (Argentina 33%), Edelnor (Chile 33%) and the possibility of incorporating Norgener.

One of the main positive effects that the Chilean government expected from the incorporation of natural gas coming from neighboring countries was the possibility of introducing new generators in the electric power systems, especially in the Central Interconnected System. Achievement of this objective, however, is being hindered by the strategy adopted by the main electric power companies of participating in gas projects, in a sort of integration. Endesa and Chilgener took advantage of the opportunity of assuring their participation in supplying this new energy source in order to improve their competitive positions. As a result, they have blocked the road for new players, and the Chilean government's strategy of increasing the number of competitors in electric power generation has, for the time being, been thwarted.

Inset IV.2.3: Inter-sector integration of utilities in Argentina

The strategy proposed for reforming the electric power system in Argentina entailed extensive segmentation of business units, especially in the area of generation and to a lesser extent in the area of distribution (in the greater metropolitan area of Buenos Aires) where the number of participating players was already quite high. The same thing happened with distribution in the natural gas chain, which was also the target of a vertical breakup.

The scheme used to implement the privatization process helped certain local economic groups or transnational investors to reach and consolidate strategic positions, not only in the different stages of the electric power chain, but also in energy activities as a whole, through shareholding in purchasing or concession-holding consortiums.

Thus, some of these groups have managed to achieve simultaneous and extensive participation in oil upstream and downstream activities, in natural gas production, transport, and distribution, and in the three stages of the electric power chain. Although this participation in the corresponding consortiums has not yet dominant, it is clear that it tends to facilitate business coordination. This coordination is especially important because of its relation to electricity and natural gas. The importance of being able to count on the supply of low-cost gas in order to improve the competitive position in electric power generation has already been emphasized.

Since the beginning of the reform and uninterruptedly, these players have been improving their strategic positions within the framework of energy activities by purchasing shares in consortiums that for different reasons are leaving some of the segments of the energy business.

3.3 Trend toward oligopolistic restructuring

In addition to the concern for the intrasector and intersector, vertical and horizontal integration of companies, there is concern regarding a possible the emergence of oligopolistic schemes for supply, especially in power generation. In previous sections mention was made of the Chilean government's efforts to increase the number of suppliers of electric power generation in order to counteract the ENERSIS holding. In addition to the vertical integration described earlier, this holding is characterized by its strong participation in the generation market in the Centralized Integrated System. In this system, Endesa and Chilgener account for more than 80% of installed capacity and generated energy.

On the basis of trends observed throughout the world, reintegration processes and restructuring after breakup can be expected in LAC, as decreed and implemented by the governments. So there exists a certain danger of a progressive emergence of private oligopolies.

Besides Chile, where there are two dominant national groups, this trend is becoming apparent in other countries having small systems. This is the case of Bolivia where, as part of the capitalization of power generation, only foreign companies have entered. As in Chile, the Bolivian government expects that this situation will be resolved with the admission of other private generators.

3.4 Internationalization of electric power companies

Specifically, the Chilean electric power companies have embarked on an internationalization strategy within the region. Alone or by creating consortiums with neighboring electric power companies or with others outside the region, they are broadening their field of action. This strategy does not interfere with Chile's interests or with those of the country of destination.

Likewise, to a certain extent, regional companies are replicating North American and European business offensives, and this had exerted a highly positive impact on technological and entrepreneurial development in the region. When they merge with important European companies, they are able to compete better with the North American companies in the region and even in the world market.

Perhaps this strategy offsets a disconcerting world trend. According to some analysts, the structures of the world's electric power subsectors are in the process of broken up-built up. Processes of concentration that could lead to oligopolistic schemes on the market are apparent in the United States. If similar processes take place in Europe with the participation of the same North American companies and if the offensive strategies also appear in Europe, Asia, and Latin America, the scenario will open to a group of transnational energy companies worldwide and in all the electricity markets.

Nevertheless, the vertical intersector reintegration seen in the energy markets in the region combined with internationalization may create economic conglomerates of such a magnitude and power that governments will have little chance to achieve their objectives when these objectives enter in conflict with

those of the companies, such as in the issue of the redistribution of increases in productivity, environmental impacts, etc.

4. Some oil company strategies

As was expressed in Chapter III, reforms in the oil subsector largely involve granting new investors access to different activities, and in only a few cases such as Argentina, Bolivia, and Peru has the sale of assets been involved. Even with the continuing preeminence of the state companies, however, important changes have taken place in the strategic schemes applied for managing these companies.

The main elements of these strategies involve the search for greater vertical integration of activities, in order to ensure crude oil supply or wider marketing of oil products, through the internationalization of operations and the establishment of strategic alliances.

The presence of private national companies is considered relevant only in Argentina where these players existed before the reform processes. The strategic options adopted by those companies and the privatized YPF are, generally speaking, similar to those mentioned above, with a noteworthy trend toward internationalization.

Following is a brief description and examination of the main characteristics of those company strategies.

4.1 Strategies of the state oil companies

As part of the upstream and downstream reforms, the region's countries have redefined the strategies of their public companies, aimed at reaching different objectives, depending on such factors such as: the existence of proven reserves, production capacity, company size, degree of technological progress, as well as variables involving the country's economic situation.

- In Mexico and Venezuela, PEMEX and PDVSA, which have the largest proven oil reserves in the region, are intensifying both exploration and exploitation of their reserves in their respective national territories and internationalization of their downstream operations. It should be stated that

the internationalization of PEMEX and PDVSA does not include upstream activities outside the country, mostly because they have given priority to their untapped reserves.

- In Brazil, PETROBRAS conducts substantial oil production development activities in its national territory. It is also the world leader in the deep-water offshore oil production. In contrast to PEMEX and PDVSA, PETROBRAS has become involved in the exploration of reserves outside Brazil, mindful of the need to increase proven level of reserves and meet the domestic need for oil products. At the same time, it has also been internationalizing its operations through the sale of services and the marketing of oil products, although this does not hold true for oil refining.

- In Colombia and Ecuador, the strategies of the state companies, ECOPETROL and PETROECUADOR, are aimed at developing the national oil industry. This demands a significant investment effort, leading to the promotion of private investment and eliminating the possibility of internationalization in either the upstream or the downstream.

  * An important objective of ECOPETROL is the development of the Cusiana and Cupiagua fields which it is exploiting together with British Petroleum, Total and Triton, enabling production to be raised to one million barrels a day over the next few years. The search for financing for ECOPETROL's upstream activities and the Coveñas pipeline for the development of national production are at the core of the strategy.[1]

  * The main objective of PETROECUADOR is to increase proven reserves and tap the already discovered deposits of heavy and medium crude oil. For this, it is necessary to extend the transcontinental pipeline that carries crude oil from the Amazon region of El Oriente to the Pacific coast. It is believed that the present capacity of this pipeline is constraining production hikes in the Oriente; there its expansion is a major priority.[2]

- Chile is a special case. Because of the country's limited oil resources (it only produces 10 MBD), in 1990 the Chilean government decided to create SIPETROL, a subsidiary of ENAPthat undertakes oil exploration in countries of the region[3] and also plans to work outside the region.[4] Finding a strategic partner would serve to consolidated its operations outside the country, making

it possible to have its own crude oil and also modernize and expand its existing refineries.

Among the countries opting for the privatization strategy, such as Argentina, Peru, and Bolivia, evidently there are different approaches to the industry's development. In Argentina, the strategies of private enterprise determine the course. The most important of these companies show a clear tendency toward internationalization, as indicated below.

In Bolivia, because of the unique method of privatization adopted, the strategy consists of strengthening the YPFB business units by increasing private cooperation and not by selling assets.

In Peru, there does not seem to be a clear national strategy. As in Argentina, industry development has been left in the hands of private investors. It is not yet clear if the 40% of the shares reserved for the state in the refineries will be sold. Apparently, the option will be to sell them. The scheme adopted is based on total privatization and agreeing on contracts and PERUPETRO is in charge of this. PETROPERU will tend to disappear and the shareholder package will go to some state entity.[5]

4.2 Internationalization of state companies

Since the early nineties, state oil companies of different countries in the region have been internationalizing and becoming involved in the region, although they also have interests in Europe, Africa and Asia.

This process envisages mechanisms ranging from conventional joint ventures to coordinating strategic alliances between companies in the region and large operators outside the region.

Internationalization is a strategy accepted by state companies in the region's countries that hold large reserves, such as Mexico and Venezuela, and by countries, such as Chile and Brazil, that need to import in order to supply their domestic market.

4.2.1 Internationalization with vertical integration

- PDVSA of Venezuela is the most important example of internationalization for the placement of oil products on the international market. Since the early eighties, PDVSAhas drawn up the following objectives: securing markets for its exportable oil surpluses and at the same time generating more value-added by exporting oil products and/or purchasing refineries outside the country. At present, most of the crude oil produced by PDVSA is sold as a refined product. In order to do this, this state company implemented the following types of actions:

  * It forged strategic alliances with foreign companies.[6]

  * It expanded its refining capacity, both at home and abroad.[7]

  * It has begun to work in several Latin American countries in the areas of refining and marketing oil and oil products. PDVSA's objective is essentially to develop markets where it can safely sell its production of crude oil and oil products.

  * It has designated its associate, MARAVEN, to participate in regional markets. At present, its interest is concentrated in Colombia, Ecuador and Peru.

- PEMEX of Mexico has a national refining capacity[8] greater than that of PDVSAin its own territory, but it is involved mostly in supplying its domestic market. Most of PEMEX's exports are crude oil for the United States.

  * A preference for making strategic alliances is noticed in the following: the acquisition of 3.5% by REPSOL of Spain; the creation of a company for conversion projects and oil supply contracts that have provided it with new prospects in the European Union; the creation of MEXPETROL in association with private capital to export services and goods in oil operation projects.

  * PEMEX made a strategic alliance in order to expand its refining capacity by purchasing 50% of the Deer Park, Texas refinery owned by Shell that has a capacity of 220 MBD.

4.2.2 Internationalization to ensure crude oil availability

- PETROBRAS of Brazil, through its subsidiary BRASPETRO, carries out exploration and production activities outside the country. BRASPETRO operates in Angola, Argentina, Colombia, Ecuador, the United States, and the United Kingdom.

- Chile imports about US$800 million of crude oil per year for the ENAP refineries. The creation of SIPETROL as a subsidiary of ENAP is aimed at finding oil outside the country.[9] For this work it has established joint ventures with Bridas and YPF (Argentina), Repsol (Spain), and BRASPETRO (Brazil).

4.2.3 Internationalization for marketing oil products

- BRASPETRO, a subsidiary of PETROBRAS, markets products of its own production in Colombia, the United States, and the United Kingdom. In the same way, it has become involved in the distribution of LUBRAX lubricants through PETROBRAS in Argentina.

4.3 Internationalization of regional private companies: the case of Argentina

In Argentina, private companies, among which YPF, Pérez Companc and Pluspetrol, promote their action in the national upstream, but they are working aggressively outside the country in Peru, Venezuela, and Bolivia. YPF is internationalizing its operations both in the upstream and in the downstream (fuel refining and marketing).

4.3.1 Extending the availability of oil

Internationalization is an important aspect in YPF's entrepreneurial development. The plan is that exploration investments in third countries account for 15% of total exploration expenses in 1995-1999.

This company has exploration projects in Bolivia, Chile and Peru. In association with PETROBRAS, it explores a portion of the Gulf of Mexico, and it has offshore operations off the coast of southern Argentina.

In January 1996, it created a consortium with British Petroleum (37.5%), Amoco (37.5%) and Maxus (25%, a subsidiary of YPF SA) to explore in Guarapiche as part of Venezuela's oil liberalization efforts. It is estimated that this area could contain reserves of about 5 billion barrels of oil.

YPF and British Gas signed an agreement to carry out joint studies on the hydrocarbon potential around the Falkland Islands (Islas Malvinas). In March 1996, YPF and British Gas set up a commission to carry out this project.

4.3.2 Purchase of assets outside the country

In 1995 YPF purchased the Maxus oil company for US$750 million. Since Maxus is a company operating in the United States, YPF has become an international gas and oil company. This purchase enables YPF to operate not only in the United States, but also in Indonesia, Bolivia, Ecuador, and Venezuela. And it also can obtain technological advantages from offshore operations.

In May 1995, the consortium Refinadores del Perú, established by YPF, along with Repsol, Mobil, and three Peruvian companies, purchased 60% of the shares of the La Pampilla refinery as a result of the privatization of PETROPERU.

4.3.3 Placement of exportable surpluses through oil pipelines

In 1994, construction of the Trans-Andean pipeline belonging to YPF of Argentina and ENAP of Chile concluded. Its maximum carrying capacity is 113 MBD. Of the crude oil volume carried from Neuquén to Concepción, YPF will get 56 MBD, whereas ENAP promises to buy 41 MBD and has the option of purchasing an additional 20,000 BD depending on its needs.[10] This agreement assures ENAP a stable source of oil for Chile's domestic market.

4.3.4 Expansion of retail marketing in third countries

YPF of Argentina purchased the Gazpesa company in Chile for US$15 million. This company has a network of 20 service stations. YPF's objective is to participate in the Chilean fuel and lubricant market. YPF also plans to enter the retail market in Brazil. It has already entered Peru where it recently inaugurated a network of service stations.

4.4 Strategic alliances between regional companies

Regarding the above-mentioned trend toward internationalization, it is important to underscore the strategic alliances established between regional companies, since they may exert a substantial impact on the process of energy and economic integration, at least at the subregional level.

4.4.1 The YPF-PETROBRAS alliance

This is a strategic alliance to carry out joint operations in both exploration and exploitation as well as in refining and marketing, taking advantage of the technological benefits of each partner. The joint exploration activities of PETROBRAS and YPF take place in the Gulf of Mexico and also in the offshore reservoirs off the southern coast of Argentina.

PETROBRAS is recognized worldwide as a leading company in offshore deep-water exploration. YPF can take advantage of this technology if its offshore operations around the Falkland Islands materialize.

YPF has major gas reserves as well as wide-ranging experience in gas exploration, production, transport, and marketing. For PETROBRAS, this is of the utmost importance because gas consumption is expected to increase fivefold over the next eight years.

These companies have recently signed a letter of intent to jointly start refining and marketing oil products and natural gas on the regional market.

4.4.2 The PETROBRAS-PDVSA partnership

In November 1995, PETROBRAS and PDVSA signed a letter of intent to create the PETROAMERICA partnership. The projects that the company could carry out include the construction of a 100-MBD refinery in Brazil that would process oil from Venezuela. The plan, however, is to participate in all upstream and downstream phases.

PDVSA is also interested in the deep-water offshore oil production technology that PETROBRAS is using.

4.4.3 The YPF-ENAP alliance

This strategic alliance proposes to sell YPF's crude oil to ENAP. This was explained previously.

5. A new entrepreneurial approach for natural gas

The renewed role of natural gas in energy systems, stemming from the technological breakthroughs in electric power generation equipment, has given rise to a very intense interest in business strategies in this subsector, specifically stemming from the reforms implemented in the region's energy industries.

5.1 New approaches in the upstream

The business strategies in this stage of the chain are similar to those previously mentioned for oil activities. The gas that for different reasons in the past was viewed as rather marginal treatment has recently been reappraised. Public and private companies have begun to create and give as much importance to gas management as to oil. Free gas reservoirs have begun to acquire strategic importance, and associated gas is reinjected or marketed.

Because of the liberalization processes stemming from reforms, many local and foreign companies have seen new business opportunities in the region. The oil companies inside and outside the region also use gas fields as their hub for developing new activities in the region.[11]

This change of attitude of the oil companies regarding both natural gas and business possibilities in the region may be leading some of them to doing something new, using gas as their main source of earnings as gas prices come increasingly closer to those of oil products, if the transport and distribution infrastructure is created in order to supply the potential market. Another important consideration is the environmental advantage between the two sources, which could lead to important substitution processes in liquid fuel markets in the region.

5.2 New situations in the downstream

In natural gas transport, there is heavy competition between consortiums to obtain licenses for 20 to 30 years. The process that began in 1992 with the concessions to North Gas Transport and South Gas Transport in Argentina in 1992 is continuing steadily.

In Colombia, Enron, which built the gas pipeline between Ballena and Barrancabermeja using a BOT scheme, has now bought Promigas SA, which entails control over 560 km of gas pipeline.

In Bolivia, Enron was awarded the section up to the border (557 km) of the gas pipeline to Brazil, while on the Brazilian side, Petrobrás (51%) will control the consortium and the Tennessee Gas and Gulf Oil companies will be in charge of the project's technical and financial installation. Also in Bolivia, the consortium comprised of Shell and Enron was awarded the Transredes SA business unit that will be operating 2,663 km of gas pipeline and 2,314 km of oil pipelines.

Establishing potential competition for Bolivian gas in Brazil, the consortium comprised of AEC Pipelines of Canada, Mobil of the United States, Marubeni of Japan, and Petrolera San Jorge of Argentina recently submitted the Mercosur gas pipeline project, which starts in Argentina, passes through Asuncion. and proceeds to the southeast of Brazil.

Regarding the other emerging market in the Southern Cone, namely, Chile, several consortiums have been competing to supply the central and north zones for a number of years. There are also other transport projects that have secured private financing or are in the process of obtaining it between Argentina and Chile, Bolivia and Chile, and Argentina and Brazil.

In Mexico, which after reforms in its transport sector is considered to be one of the largest natural gas markets by U.S. and Canadian companies, important investments are expected; they will help to expand the market to all of North America. Regarding this, five consortiums (Enron, Nova Corporation, the Williams Companies, Gutsa-Transcanada Pipelines and Shell-Mitsui) have

offered to build a 500-km gas pipeline between Ciudad Pemex and Mérida to supply electric power generation capacity in the Yucatán Peninsula.

Another important phenomenon is the offensive launched in several LAC countries by foreign companies. In addition to the U.S. company Enron, which has activities extending from Mexico to Argentina, the expansion of Nova Gas of Canada is also quite noteworthy in the MERCOSUR subregion where it is operating gas pipelines and proposing a number of new projects.

Likewise, parallel to these activities, Bridas of Argentina also has interests outside its region and was recently awarded a concession to administer the state gas transport system in Kazakhstan for 15 years.

Distribution has also undergone a process similar to that of transport. Several national and foreign companies are participating as shareholders in the concessions, along with banks and international investment funds.

Among these investment funds, there are several that specialize in energy that want to intervene in the direction or supervision of electric power and gas companies in which they are important shareholders.

Retail distribution, which has been poorly developed in the region, except in Argentina, has been growing steadily over recent years and providing new opportunities for companies because of its prospects in a large number of cities in Mexico, Brazil, Colombia, Venezuela and Chile.

5.3 Some business strategies for natural gas

Business strategies are being applied with increasing confidence to expand national and regional natural gas markets, in which many of the region's governments have become involved, and private-sector players have become increasingly responsive. In this process, private-sector players assume the financial risks of their investments on the basis of a business strategy that wagers that natural gas development in the region will be a sound investment for the future. Meanwhile, the governments have taken over the responsibility of ensuring long-term supply.

Business motivation stems from the fact that increasing difficulties for developing hydropower capacity in the region's principal electric power markets (Brazil, Colombia, Mexico and Chile) will, over the short term, lead to the need for important investments in new gas-fired thermoelectric generation. This new capacity, along with the growing availability of gas and transport and distribution facilities, will also facilitate supply expansion for a potential market in the industrial, residential, and transport sectors.

At the national level, the business seems profitable if, in addition, there is a high degree of efficiency in power generation from gas turbines and combined cycles, compared to conventional thermoelectric generation. Natural gas transport must also compete with high-voltage electric power transmission, not only in terms of capacity costs, but also in terms of lower product losses.

Moreover, at present, environmental issues have gathered such momentum that they are adding externalities to the use of natural gas. As a result, industrialized countries interested in the issue of climatic change are stimulating the action of these companies in their investment projects.

The region's governments have common interests regarding private-sector participation in risky investments, including greater manufacturing competitiveness, the disposal of liquid fuel to reduce or financially improve its share in the balance of payments, energy mix diversification, reduction of short- and medium-term supply vulnerability, curtailing the risk of electric power rationing, and improving living standards in the cities by cutting gas emission pollution.

At the regional level, gas integration processes have unleashed a unique type of competition. In Mercosur, which includes Chile and Bolivia, the consortiums of local and foreign companies have mobilized large numbers of projects that compete between each other for concessions and contracts. After becoming partners with Shell in Transredes SA, and being awarded the domestic segment of the gas pipeline to Brazil, Enron in Bolivia has positioned itself strategically at the very heart of transport activities for Bolivian gas to Brazil, reserves in northern Argentina, and possibly Peruvian gas.

In turn, Mercosur's gas pipeline will compete with other Argentine gas pipelines and also with the Bolivia-Brazil pipeline to supply southern Brazil. Between Argentina and Chile, Transgas and Gasandes compete for the market in Chile.

In addition, the gas pipeline network that is being designed is also at the root of the heavy competition between its owner-consortiums and the owners of the projects that are promoting electric power interconnections or electric power generation using schemes not based on natural gas.

NOTES

1. In addition, there is a plan to intensify the use of natural gas with the help of the private sector.

2. Enlarging the pipeline or building an additional one would also facilitate the production of reserves being operated by foreign oil companies.

3. In Ecuador and it is studying projects in Peru, Cuba and Brazil.

4. Albania, Angola, Gabon and Guinea-Bissau.

5. Probably the Development Financing Corporation (Corporación Financiera de Desarrollo).

6. Such as the UNOVEN Company, the Unocal Corporation (which has 50% of the shares) and with Ruhr Oel GmbH of Germany and AB Nynas Petroleum of Sweden, associated with Veba Oel AG and Neste Corporation, respectively.

7. PDVSA, 1,182 MBD, produces more than three times Venezuela's domestic consumption. Outside the country, especially in Europe, PDVSAowns a refining capacity 1,246 MBD. PDVSA's total refining capacity of 2,428 MBD makes PDVSA the largest refining company in Latin America.

8. 1,520 MBD.

9. SIPETROLcurrently operates in Argentina, Ecuador, Colombia and Venezuela. It plans to enter Albania, Gabon, Guinea-Bissau, Cuba, and Brazil.

10. The pipeline belongs to two companies called Trans-Andean Pipeline (Oleoducto Trasandino). Each one is incorporated in its own country. YPF owns 58% of Oleoducto Transandino Argentina and also Oleoducto Transandino Chile. The Chilean state enterprise ENAP contributes 12%, and Banco Río (Pérez Companc) holds the remaining 30%.

11. For example, YPF, Pérez Companc and Pluspetrol (Argentine companies) have a 50% holding in the consortium to which Bolivia awarded the Andean exploration and production business unit. These reservoirs contain half the oil and gas reserves of the country and are predominantly gas. YPF and Petrobras explorations are in the Gulf of Mexico or in area of the Falklands (Malvinas). In Peru, Shell and Mobil have been awarded the gas reservoir of Camisea, and Maple Gas Corporation has been awarded the deposit of Aguaytía. In eastern Venezuela, Mitsubishi and Shell have been awarded gas production activities in the eastern region (Oriente). In Colombia, there are partnership contracts with Texas in Guajira, and Ecopetrol has partnerships with private companies in the Opon, Cusiana, Cupiagua and Volcanera reservoirs

Chapter V
The State's Role in Energy Sector Modernization

1. Status of energy sector modernization

1.2 Future energy sector coordination schemes

Based on the description made in the first four chapters, it can be inferred that energy sector modernization is a fait accompli in most Latin American and Caribbean countries, and that the main decisions regarding this process have already been taken. In these countries, the process has already gone beyond the decision making required for determining future coordination and sector management schemes.

Many countries have begun the transition phase. Some are at the end of this phase or, depending on their stance regarding further adjustments, are in the post-reform phase. There are very few cases where no laws have yet been issued regarding to the reform of the different subsectors. Almost all have made substantial progress in formulating the process and in achieving majority support for their ratification.

As for the characteristics of the changes that have already taken place or are about to be implemented, what was asserted in Chapters II and III can be reiterated:

- Open market systems, but continuing with the regulated monopoly structure for gas and electric power transport and distribution, have been the most prevalent schemes. This scheme also tends to be widespread in the downstream of the petroleum sector.

- Limited liberalization keeping a centralized control scheme, with a vertically integrated and regulated company, is the main alternative to the market scheme. It can be said, however, that in several countries limited liberalization is just one step toward complete opening up.

Even though there is a possibility that the process will be dropped or will come to a standstill, most of the Latin American and Caribbean countries have already chosen the coordination schemes that will be governing their energy sector operations in the near future.

2. The role of the State and its agencies in the modernization process

2.1 Principles, conflicts and state agencies involved

Sector development cannot occur itself. It is a process that is fostered, organized, and implemented by State agencies, in keeping with the objectives and aspirations of a given society.

As a rule, there are several noteworthy guidelines that are sought after when implementing a modernization policy:

- The transformation should involve a systemic process: energy sector reforms are part of the modernization of society, as well as the modernization of the State and the economy.

- Legitimacy of the process should be ensured: by incorporating criteria that render the process selective, efficient, transparent, well-informed, with cost estimates and, to the extent possible, consensual.

- Institutional reforms need to ensure adequate discharge of the duties that are no longer in the hands of the State. The State, in turn, should effectively take over new tasks and challenges, promoting decentralization and democratization of government activities.

- In a global economy and with the adoption of supranational commitments by governments, the need to maintain national autonomy and sovereignty has to be taken into account.

- Finally, care should be taken that transformation processes do not become an obstacle to a regional integration process, which is in itself an essential

instrument for the economic development of the countries that participate in this process.

Obviously, these principles are not easy to apply in view of the presence of others, whether legitimate or not. Observance of these guidelines, however, leads a more stable process. Flagrant infringements of the systemic and consensual approach can lead to a crisis over the medium term, as described in Chapter I. Disorganized processes, in turn, are characterized by stumbling and, in extreme cases, by dropping the process altogether, with higher costs over the long term.

2.1.1 The energy sector as the center for redistribution conflicts in the modernization process

Some of the conflicts that have arisen during the course of modernization are closely tied to the dichotomy between economic accumulation and its distribution. To achieve better allocative efficiency, which in turn fosters the acceleration of economic accumulation, ownership rights have to be transferred and participation in decision-making has to be fostered. This redistribution of ownership and economic power, however, has led to conflicts. The sum total of the aspirations of the different social groups usually exceeds any reasonable possibility of meeting them over the short term. It is doubtful that, even within a broader time frame, economic dynamics would be enough and redistribution mechanisms would function so as to respond to social aspirations, especially of those groups most affected by the changes.

These conflicts are not limited to the energy sector. They can acquire considerable momentum in this sector, however, due to the deep changes stemming from reforms involving ownership rights, decision-making, price levels and functions, and also the implications of the energy sector, which have already been broadly discussed, considered by many to be a key sector providing public or basic services, of strategic importance for the economy, etc. On occasion, these claims have been used to conceal personal interests due to the financing that is available or as a springboard for wielding political power. The present chapter examines, among other things, the options chosen to transform the sector and analyzes its real contribution, and that of other factors, to the solution of these conflicts whose scope also involves the social and political framework of the countries.

2.1.2 Different views of energy sector modernization and the need to harmonize them

In energy sector reform processes, a wide range of views and interests, expectations or aspirations of different social groups come together, adding to the conflict characterizing these processes.

From a macroeconomic perspective, as underscored in Chapter I, privatization that extends to both the energy sector and other infrastructure sectors has prevailed over other schemes. The risk of modernization by means of just privatization, a scheme that neglects more complex needs and broader sector policy options policies, as well as social and environmental dimensions, cannot ignored.

Transformation policies must therefore look for solutions that strike a balance between all the relevant objectives, taking into account sector conditions as well as the different options available in view of the specific situations of each country. The present chapter examines the role of the state and its institutions in the energy system modernization processes, in order to detect typical problems, deficits, lack of definition, vulnerabilities or dangers that have emerged along with modernization. In the following chapter, the focus is less on the process itself than on the results and impacts of modernization, taking into account the broad spectrum of economic, social, and environmental objectives.

The critical spirit permeating these lines in no way constitutes a rejection of modernization or a vain turnabout. On the contrary, by acknowledging the achievements of a profound reform of a secular nature, the present analysis is able to determine which tasks must be carried out to ensure a more efficient state,[1] also with regards to the energy sector.

2.1.3 Phases of the process and state agencies involved

In Chapter I, several phases of the modernization process were identified, with their respective policy responses. Table V.1 explains in greater detail all activities of the State as a whole.

Table V.1 Participation of the different institutions of the State in modernization

Phase	Modernization activities	Main players
Pre-Reform	Conventional adjustments, reform proposals	Government, political parties, social groups
Reform	Decision making regarding reform	Parliament, executive branch
Transition - beginning	Implementation of reforms; creation of the respective regulatory framework	Executive branch and its institutions; Parliament;
	Learning and implementation of new functions	Independent institutions (regulatory bodies); utilities and investors
	Monitoring and follow-up, addition of complementary reforms	Executive branch, Parliament
- final	Corrections and adjustments	
Post-Reform	Monitoring and follow-up; routine implementation of functions	Executive branch, Parliament Executive branch, Parliament; Independent institutions

It is clear that when referring to the State, one does not mean an internally homogeneous player, but rather a group of players that often defend partially contradictory views or interests. Usually, when defining policies, in addition to these differences at the very heart of the State's structure, there is pressure from parties of the opposition and different social groups.

Although these different views within the state's institutions and the above-mentioned pressure exerted their influence along the entire modernization process, in the energy sector they were particularly decisive during the first two stages indicated in the table above. These issues will be discussed again in the following sections.

2.2 The reform adoption stage

2.2.1 Modernization steps during the pre-reform phase

The modernization steps taken prior to the main reform, particularly those involving legal and managerial breakup, did not encounter any major difficulties. It was a matter of clearly separating business management activities from the state's executive activities and from those involving auditing and regulation. In some cases, new administrative entities were established, and in others these activities were redistributed among the Ministries and public companies.

In practice, this breakup of activities was not always clearly achieved. Rarely was government planning different from that normally conducted by the state enterprise. As a rule, regulatory activities were not given the priority they required. Investment and pricing decisions continued to be the result of negotiations between the companies and the government, with the latter often having the last word.

Thus, domestic energy prices, despite a certain official autonomy of the company, continued to be set on the basis of political criteria, in an attempt to strike a balance between the need for fiscal equilibrium and the government's perception of what the population could withstand. As a result, pricing policies based on economic cost criteria were rarely applied by the countries, unless the market scheme option was adopted by the reform process.

Therefore, although official more autonomous, the companies did not have enough funds available to make the necessary investments to guarantee supplies or even to improve production costs.

2.2.2 Main reform adoption stage

a. Leading role of the executive branch

The actual adoption of the reforms is the most difficult stage in the energy system change process. It is considered, however, that this phase has been implemented already in most countries. During implementation, all of the changes described in Chapter I (radical, gradual or discontinuous change) have been observed. The central government played a prominent role during this phase. The executive branch often relied on the work of national institutions, created specifically for

modernization, or on the recommendations of international consultants, with technical and financial support from multilateral agencies.

Moreover, multinational financing institutions have played the role of *spiritus rector*, or guiding leader, in this modernization process by making a series of loans available under very favorable terms for the task of preparing these reforms.

The essential part of modernization is almost always based on legal reforms, and because of this its final implementation would not have been possible without a majority of the legislature. This usually entails securing the support of at least part of the political parties of the opposition, unless the government has already ensured its own majority.

A large number of countries is already in the stage of reform implementation. Inasmuch as the main reform is based on a sufficiently broad consensus, there will be less resistance in carrying out legislative decisions.

b. Overcoming the opposition of affected groups

The promotion of complete opening up along with the breakup of assets usually encountered opposition of varying intensity on the part of the different groups affected. The strength of the opposition depended, among others, on the following factors:

- the extent of the macroeconomic imbalances that society had to withstand;
- the general situation of state enterprises and the quality of the services they provided, deemed to be acceptable in some cases and unbearable in others;
- perception regarding the scope of the changes;
- the degree of freedom with which those affected could manifest their opposition and the resources and means available to them to do so;
- the degree of participation in the debates conducted to define the profile of the reform process.

Solutions attempted to achieve acceptance on the part of the groups affected by the modernization became more elaborate as each country learnt from the experiences of other countries with more advanced processes. Finally, some common solutions were applied to address the concerns of the affected groups.

1. The political "establishment"

In political culture marked by paternalistic schemes and in the light of the rapid breakdown of State structures in the eighties, players on the political stage were able to wield the state companies as an instrument to gain and consolidate power. Even before the reforms, these companies were viewed as political strongholds that were often considered to be the normal booty of winning an election. These political strongholds provided the parties not only with economic resources and the possibility of appearing as the benefactors of society, but also with benefits and privileges.

As the executive and legislative institutions lost direct access to the companies after legal and/or managerial decentralization, and particularly after the sale of assets, the political players felt deprived of these sources of resources and power.

In any case, these processes have helped to achieve a certain amount of transparency since they required the strict application of international bidding mechanisms. Likewise, private international consultants have been usually involved, acting under the joint supervision and auditing of the executive branch and Parliament, in addition to the scrutiny of various international institutions.

2. Company employees

Judging the state enterprises from the viewpoint of productive efficiency and their specific microeconomic mission, it can be asserted that they were in a pre-reform stage, marked by extreme overstaffing. One explanation for this situation is that during the post-war transformation, state-owned companies were given the broader task of acting as an instrument for the region's socioeconomic development. Another possible explanation, tied to the more recent experience of public company management, involves the above-mentioned paternalistic culture.

Since one of the objectives of modernization is to achieve higher productive efficiency, the workers of the public utilities were hard hit by downsizing, a shift

in employment conditions or other types of labor achievements. In most cases, therefore, they were against the reforms, even when offered substantial settlements for voluntary resignations.

Depending on the options available to them to vent their discontent and on the attention their aspirations could attract, the employees protested variously and attempted to influence decision making.

The element that carried the most weight in meeting these aspirations was the participation of the workers as shareholders in the divested and restructured companies.

3. Consumers

In most Latin American and Caribbean countries, the prices of energy resources were below long term economic costs. The situation became worse when prices were not even able to cover cost outlays and the State could not bridge the lack of revenues by resorting to subsidies. It was evident that, to achieve a more business-like management and ensure financial sustainability, the state companies needed a pricing policy that was more closely linked to costs. These cost adjustments and the shift to conditions of productive efficiency necessarily implied that many consumer groups would have to pay higher rates and prices to put the companies on a sound financial footing.

In some countries, the fear of higher energy prices led to increasing opposition against modernization processes. This opposition, further enhanced by that of state enterprise employees, gained such political momentum that divestiture processes often came to a standstill. As a result, dismantling the resistance of trade unions and employees became a key element in also mitigating the opposition of consumers and the politicians themselves.

In technical terms, tariff structures were revised so as to eliminate subsidies that previously were applicable across the board to all consumers or to focus these subsidies exclusively on the neediest social groups. This affected mainly the middle-income and middle low income groups that had to bear the brunt of most of the price increases. In some cases, these adjustments involved switching, at the same time, from average rates or rising tariff structures by consumption blocks to decreasing tariff structures.

During the course of energy reforms, the income of these social groups declined considerably as a result of similar impacts arising from the reforms in the sectors of telecommunications, water, health, education, and pension plans. The prospect of eventually receiving more efficient and higher-quality service, as well as a reduction in prices as a result of a more efficient energy sector, turned out to be insufficient to offset price hikes.

A relatively recent phenomenon in LAC is the emergence of consumer associations and consumer defense organizations. Whereas the first type of association brings together consumers of a specific commodity, the second type of organization are NGOs whose purpose is to protect the rights of small consumers in general. Both types of organizations can help to strike a balance between the different interests inside the energy sector in general and especially between energy suppliers and consumers.

Large energy users began to organize themselves to effectively defend their interests over those of large suppliers, state institutions, independent regulatory bodies or even politically oriented entities. As for the small captive users, however, they are still far from striking this balance. Although there are now consumer protection organizations (albeit admittedly few), as well as public hearings convened by the regulatory bodies to resolve conflicts with this type of customer and supplier companies, the economic and technical resources available to defend one group or another are still highly unbalanced. This could have severe repercussions for recently installed democracies and of a judicial system that is answerable to the executive branch that was the driving force behind the reforms.

4. Certain population groups

Finally, the breakup of state assets involves an exchange of assets for values expressed differently and which is supposed to lead to a certain redistribution. Since the two values do no correspond, this redistribution effect will only favor a limited group of buyers, to the detriment of the state, which presumably represents society as a whole. Clearly, another type of redistribution effect takes place as a result of the final destiny of the revenues from the divestiture of the above-mentioned assets.

The risk of triggering a substantially adverse redistribution effect, contrary to the interests of society, can be avoided by making use of certain divestiture schemes, especially the one known as capitalization. As part of this scheme, the population is actively involved in the ownership of the assets of the divested company, where the new players become strategic partners, contributing capital and technology and benefiting from specific management rights.

The mechanism of setting up a general fund for meeting basic social needs or a facility aimed at financing energy supplies for lower-income social groups with the revenues earned from the sale of state assets can not only help to counteract the regressive redistribution impacts of breaking up assets, but also to correct the market coordination scheme's tendency to neglect to unprofitable markets.

A broad and detailed discussion of the advantages and drawbacks of the solutions examined is beyond the scope of this document. We can assert, however, that there are many courses that can be adopted to meet aspirations that are for the most part quite just but which also sometimes involve exaggerated expectations. Results are not always satisfactory. Ultimately, the redistribution may have turned out to be negative for society's middle and low-income groups, which perhaps had previously enjoyed more favorable conditions in some countries. This is one of the undesirable effects of modernization, for which solutions still need to be found.

2.3 Transition: implementing the new scheme

A large number of countries are still at the beginning of a transition, which involves putting into place a new model. A series of activities for the government and the companies stems from the principal reform: to provide a legal institutional framework for the sector's companies, to formulate and legislate the regulatory framework for the new structure and operational scheme, to create auditing and regulatory bodies, to select and train personnel, and to carry out the bidding processes needed to divest the companies. The legislative power would be in charge of ensuring that all of these activities are in keeping with the spirit of the legal instruments that were enacted, particularly with regard to the breakup of assets.

Some countries have already passed through this stage, following well-defined steps, whereas others have not been able to comply with the dates established in the laws for the creation of the new institutional framework and structures for the energy sector.

Some countries have begun this process within a very specific regulatory framework, whereas others have left areas to be defined along the way. This last strategy usually corresponds to a process of gradual change.

Bringing about change is naturally more demanding in cases where there has been a drastic change of scheme, switching from a centralized command and control scheme to an open market. If the scheme is not changed, that is, when there is only some form of limited liberalization, there are substantially less tasks in formulating the new regulatory framework and creating new institutions. Even most of the matters can be managed within the existing framework. One of the main exceptions involves with the topic of guarantees.

2.3.1 The incorporation of new actors in limited liberalization: the problem of risk for private-sector investment and State guarantees

Although the inclusion of new actors in the scheme of total opening has not involved serious challenges for the State, the projects of third parties within the framework of limited opening placed the countries before the thorny problem of the guarantees that investors normally demand.

Generally speaking, private investors are willing to assume the risks of a business if the earnings they expect to obtain are enough, in their judgement, to offset costs. Clearly, this type of judgment depends on the opportunities offered by the context and the business capacity of the players involved.

There are different types of risks: commercial, political, and of force majeure. Although the latter ones, mainly catastrophes or natural disasters, can be mitigated by means of adequate insurance contracts, governments can have a decisive influence on the other types of risks.

Within the energy sector, the *commercial* risks of a project or business in general are mainly related to:

- the possibility of gaining access to the market;
- the prices paid for the product or service;
- the timely availability of the facilities and the possibilities of experiencing technical interruptions during operation;
- the possibility of purchasing raw materials and resources under competitive conditions;
- the possibility of freely transferring capital and earnings, with an appropriate currency exchange.

When market forces are allowed to act freely, in an economy open to external transactions, the commercial risks would be those typical of any business.

Thus, if the prices of a product and of its raw materials are set on the basis of unrestricted market forces, if there are no major access barriers for the different potential suppliers of raw materials and equipment, and if in addition there are no major constraints on the inflow and/or outflow of capital, investors would have no reason to demand guarantees from the government for commercial risks or for a minimum level of profitability for the business. Their decision is limited to staying in or leaving the business.

If the prices of the product or services, however, are regulated, whether or not an investor can recover his investment and earn an acceptable profit margin will depend on the regulation criteria.

Thus, in the electric and natural gas systems that are coordinated under the open market scheme where the principle of free access to the networks and reasonable regulations for transportation and distribution are in force, the State should not give in to demands for guarantees by investor firms. Clear rules and transparency should be enough.

On the contrary, in those cases where investors are incorporated into a limited liberalization scheme, within the framework of a centralized control system, it is evident that the conditions of freedom and access are not a reality. In these situations, investors enter into contracts with the state company on the basis of conditions that are controlled or set by the State. Even if the supply contract

stipulates amounts and sales prices, or if it provides pricing criteria that are satisfactory for investors, the business can still entail certain unacceptable risks, particularly if the price that the integrated company sets for the market turns out to be insufficient to cover the agreed upon purchase price and other costs. This is particularly important if the project in hand represents a high volume of the integrated utility's transactions.

It is understandable that, in these cases, investors request guarantees. The government should analyze its options. Risks can be mitigated in different ways, creating better market conditions, providing investors with guarantees, and using other risk-reduction options. International financial agencies have developed tools and formulas precisely to help mitigate risks.

These tools are also used to reduce *political* risks in a country. It is the government, however, that should be in charge of reducing risks. It is basically the risk stemming from legal security, whether current or expected, that determines whether a business will be viewed as stable or not.

Although the political sustainability of the reforms in the different countries did not seem sure at the beginning of modernization, the experience of the last 10 years points not only to certain stability, but also to the growing force of the democratic institutions and to a sustained improvement of the conditions in which the energy sector operates. Concerns over the political risk should be very small, with the exception of a few countries where commitment to clear rules has still not been achieved.

2.3.2 The new institutional framework and the inclusion of new players in complete liberalization

In those cases where modernization involves significant changes in the coordination modality, three major tasks stand out:

- To create a new institutional structure and establish a regulatory framework for sector activities in keeping with the chosen scheme or at least modify substantially the existing institutional framework. This is a task that almost all the countries need to carry out.

- To organize and regulate or clearly define the access conditions for new players. This is a delicate task not only in the case of limited liberalization, as described, but also in total liberalization.

- To break up the State's assets, that is to say, totally or partially privatize the state companies. In those countries and subsectors where this strategy is chosen, it is usually accompanied by the total liberalization scheme.

a. The new institutional framework and its problems

When there is a change of scheme, especially in the case of the introduction of market coordination in the electric and natural gas subsectors, it is necessary to build a new system of institutions and develop different forms of operation. Among the main tasks to be carried out in this case, the following are noteworthy:

- To immediately create or upgrade sector institutions, as well as set regulatory criteria aimed at facilitating the operability of the model, such as:

    * the agency in charge of centralized dispatch, in the case of the electric power systems;

    * the bulk market, to organize competition in gas and electric power marketing;

    * regulation of prices and other conditions for electric, gas and eventually oil pipeline transport and distribution services;

    * technical regulations related to quality and safety standards, etc.

- To reorganize or create the institutions and the respective legal frameworks to meet certain global objectives of the energy sector. We are referring here to long-term issues that have been the focus of enough attention during energy sector reform, such as:

    * environmental regulations;

    * regulations for tapping natural fossil resources;

* regulations involving the foreign trade of energy resources;

* anti-trust control.

A change in modality also involves the need to review a series of functions and tasks that were previously carried out through certain mechanisms that eventually became inoperative or whose basic conditions changed. This has to do with aspects such as:

- general energy system information and monitoring;
- planning and formulation of active policies by the government (using schemes in keeping with the new situation);
- technological research and development;
- and, in general, the attainment of energy policy objectives, whose implementation was previously in the hands of the state companies, as well as:

    * the energy supply for purposes of social development of rural and marginal urban areas;

    * the supply of traditional energy resources such as firewood and charcoal;

    * rational energy use;

    * short-term supply security;

    * availability of supplies over the medium and long terms.

b. Achievements and problems in creating efficient institutions

According to the experiences examined, it would seem that the creation of institutions needed immediately for the operation of the new modalities, such as the dispatch centers, wholesale markets, regulation of prices and transport and distribution conditions, technical regulations in the different subsectors, depending on the case, has been accomplished quite effectively. Nevertheless,

there is plenty of criticism with regard to the efficiency of these institutions and how they are discharging the duties assigned to them by legal or regulatory instruments.

For the first countries to establish the new institutional framework in keeping with market schemes for the electric power and natural gas subsectors, this task was especially difficult, as they had no precedents and experiences in the region on which to rely. Chile and Argentina set up their new coordination systems virtually on the basis of a laboratory design. As a precedent, they only had the experience of England and contributions from some countries that had started to discuss the application of this scheme, along with the theoretical proposals of several economists.

Quite quickly, almost during their very creation, these entities had to carry out their new business, which was acquired by means of trial and error, with many adjustments on the way. In addition, the utilities had to learn about market operations and the intricate technical aspects of regulatory frameworks and deal with regulatory entities.

The countries in the region have adopted surprisingly different options for the sector's institutional framework. Thus, for example, in some cases they opted for a scheme of independent regulatory entities for each subsector, while in others one joint entity was set up for electricity and gas. In some countries, control and auditing of the energy subsectors have been included in a general public services regulatory body. In other cases, the regulatory function is shared between the government's energy authority and a supervisory entity.

In countries with small energy markets that have chosen the market scheme, the problem of efficiency in regulation is particularly important. The institutional framework for regulation requires a certain critical mass, where operating costs could well be higher than the eventual gains in efficiency that could be achieved by introducing competition, leading to higher, rather than lower, total costs of the system. One solution to this problem could be the installation of extremely simple regulatory procedures, which would therefore be lower in cost.

This problem of regulatory costs is added to possible losses in economies of scale and sequence stemming from the introduction of the market scheme in small

energy systems. These considerations are particularly applicable to the situation of the Central American countries. If in these countries there was a political will with regard to the adoption of the market scheme, at least in relation to certain subsectors like electricity, the integration of a larger market would be a simultaneous solution to these problems.

There is no lack of other "classical" regulation problems in Latin America and the Caribbean, like the *imbalance of information* between the regulatory body and the regulated players, or the *captivity of regulators*. The first type of problem is particularly relevant in transport price regulation and distribution service margins. The second type of difficulties, which are added on to the first, are the result of very different economic possibilities and, in some cases, also of the technical capabilities of the regulatory bodies and regulated companies.

c. Shortcomings of complementary institutions

As has been stated, the adaptation of regulatory frameworks and institutions responsible for complementary functions, especially for anti-trust control and environmental protection, has not been the focus of the same amount of attention.

In countries where there is no general anti-trust law, a specific institutional framework needs to be created for the sector, possibly in combination with other auditing and supervision functions. Some of the problems discussed above with regards to managerial strategies are due in part to the weakness of anti-trust control, which is a new task in the region with no regulatory tradition.

There is also little tradition in the region for environmental protection institutions. The energy sector modernization process is taking place precisely when the first steps are being taken to set up regulatory frameworks and new institutions in the environmental field. A practice of environmental assessment and conditioning of energy projects had started, promoted and backed especially by international funding and technical cooperation organizations.

It is now feared that the new operational modality of energy systems –which involves significant changes in the rationale or mission of the companies, as well as investment decision jurisdiction– and multilateral banks' withdrawal of their

funding from sector projects, could exert negative impacts on environmental control.

The governments now face the task of effectively reestablishing mechanisms that ensure the environmental protection needed within these new conditions. In view of international concern about this matter, the countries of the region can count on cooperation from outside the region.

In another matter, once established the opening up of subsectors to business backed by private enterprise initiatives, these have forced the government and the regulatory bodies to accelerate the regulation of certain aspects like the control over the exploitation of fossil reserves. They have also proposed new possibilities, like natural gas imports and exports, for example, which pushed the governments to quickly define new regulations aimed at protecting natural interests, which were somewhat improvised.

In view of the approach of the new players, involving the prevalence of basically short-term views, and after having moved through the first stages of implementing the reforms, the State now needs to consolidate its new functions, making whatever institutional and regulatory adjustments are needed to complement the formulation of active public policies that are compatible with sustainable development and a long-term outlook.

d. Lack of clarity with respect energy policy support functions: information and planning, research and development

The information function, particularly in terms of recording and processing energy statistics, has become highly complicated due to the atomization of the sources as a result of the incorporation of new players. On the contrary, in the case of certain variables like the prices of the bulk electric power market, for example, which are controlled by dispatch or regulatory entities, information has become more quickly available and is more reliable.

Some countries have tried to obtain certain data from the utilities through legal means. In others, the utilities themselves have started to see the importance of statistical information for their own decisions and have started to collaborate, even after a certain chaos in the sector’s statistical systems.

During the course of discussing and then implementing reform processes, there was a debate in the region about the need and nature of energy planning. This debate was marked by strong ideological positions. As it gradually evolves toward a more practical treatment, the debate has focused on issues such as scope, production phases and the normative, indicative, orienting or referential impact that the State should have in planning the energy system.

One possible way of resolving these issues is to include the legal frameworks of the different countries in a set of norms dividing and allocating responsibilities. If, in terms of electric power generation, a given country opted for limited liberalization, where the State defines the expansion program through a competent entity and draws up BOT contracts with private players, substantial planning will obviously be needed.

If, on the contrary, competition is chosen for the electric generation link, this type of organization would be incompatible with normative planning for the subsector. Nevertheless, it would still be useful and necessary for the State to study power generation system expansion, to orient private-sector players as to its expectations.

The State could upgrade information from all the players involved and mitigate the risks of mistaken investments by promoting forecasting studies carried out by third parties, whether scientific institutions or consultants, and encourage the sector's utilities to participate in the debate on the results of their own strategic planning. In addition to the State, there are usually other national institutions, like foundations, political parties, business associations, academic or international institutions, able to carry out or sponsor studies of this kind in the energy sector.

Technological research and development have kept their institutional framework and strength in those cases where large state companies have been kept, but they also need to be reorganized when a change of scheme takes place, when this activity was exclusively in the hands of state companies.

e. Energy policy objectives with respect to sustainable development: postponed until after the reform?

Rethinking the form in which energy policy objectives should be treated with relation to sustainable development –that is to say, energy supplies that include the promotion of social purposes, the rational use of energy, safe supplies, etc.[2] – was even more improvised. With the exception of the social dimension, which in some case received special, although limited, attention to the use of funds resulting from the sale of the companies, these issues have been disregarded in a systematic way within the new regulatory frameworks and institutional schemes. Only recently have a few countries begun to give these objectives more equal treatment. In those countries that have advanced the most in the transition process, one can clearly see insufficiencies in the way in which these objectives have been treated, as well as progressive awareness that has resulted from setting aside extreme dogmatic positions. This encourages hope about these insufficiencies being resolved.

f. Inertia of the new regulatory framework: difficulty to correct and adjust

Once in force, legal provisions are interpreted by the players and a new organizational structure and operational practice are implemented in keeping with these provisions.

Often after a certain amount of time, flaws, malfunctions, or undesirable impacts and breakdowns can be seen, when the results that were expected do not materialize. Thus, there is a recognition that structures and operational forms can be enhanced.

Due to the enormous legislative effort and the different interests stemming from the new modus operandi, it seems difficult to substantially change recent laws. Therefore, the legal framework will have to be improved through regulations, which are not always the most adequate solution.

Meanwhile, those companies that have taken up solid positions within the system, on the basis of norms in force, could strongly resist the introduction of changes that could affect their interests. The Chilean authorities have tried to foster access to new players, even supporting this action through imported

natural gas supplies to resolve the problem of electric power generation being concentrated in the Central Zone Interconnected System, with only slight results.

In contrast to Chile, Argentina's electric power system has introduced a series of changes in the new regulatory framework as operating flaws and shortcomings became apparent. It also became clear, however, that in some cases these changes were only second-best options compared to in-depth changes in the legal framework or in its basic regulations.

When a certain malfunction has been detected, it might be very difficult to consider changes in the basic regulatory framework. The option would then be to formulate promotional policies, using another type of instruments, such as fiscal ones, for example, via taxes or subsidies and via direct control, particularly with respect to environmental protection.

2.3.3 Private-sector participation: inclusion of new players and breakup of assets

There are three main ways of facilitating private-sector participation in energy activities viable within a market scheme:

- Limiting their participation in new business; that is, by expanding the system and also eventually replenishment investments.

- Offering a strategic participation to private players in state companies.

- Privatizing the assets of the existing system and leaving private actors exclusively in charge of expansion investments.

The most important difference is that, in the first case, there is still no significant breakup of assets. In the second case, even if this were to occur, it can acquire a known form, such as capitalization, based on the experience of Bolivia.

Generally speaking, from what we have seen it would seem that the first two forms of private-sector participation are but transitory steps to the third form.

In some countries, the privatization process began even before the new legal framework for the subsector had been defined, as occurred with the privatization of the Light Company of Rio de Janeiro and of other electric distributors in

Brazil. This was possible because it is a country with diversified state company structures that operate within a relatively stable framework. There were, however, stumbling blocks, as can be seen from the way in which some potential buyers withdrew from operation.

The most advisable order in which to start a divestiture process would involve first setting up the respective regulatory frameworks, revising prices of the corresponding energy resources, and adjusting the institutional structure, before shifting to the final privatization phase.

In the divestiture process, the governments resorted to international consulting firms and other entities to conduct the various tasks of determining the value of assets, select suitable privatization schemes, attract the interest of potential investors, assess bids, organize and ensure the transition process, according to the sales scheme that was selected, etc.

Apart from defining the regulatory framework in the shape of a legislative body, the asset divestiture process is the most sensitive of all the reforms, especially since what is being transferred is the State's decision-making authority and its assets, representing society as a whole. In addition, this activity involves transferring rights that entail future income from natural resource revenues that belong to the untransferrable assets of society as a whole. Consequently, this process should take place with the utmost transparency, as well as with as much social participation and auditing as possible. This type of care, in addition to ensuring more equity in this type of transaction, contributes to a sounder legal security for the new players.

3. Energy integration: a process driven by energy sector modernization

Until 1990, Latin American integration was characterized by the constant struggle to surmount obstacles. There were major breakthroughs in energy integration only when the advantages of a given project seemed to be large enough to justify the cost and effort of surmounting all obstacles and signing bilateral or trilateral agreements. Integration evolved progressively in the form of projects, exports and imports based on specific contracts or on contracts between national companies under bilateral agreements, multilateral energy supply

agreements like the San José Accord or globally through the creation of international organizations in the sector, like the Latin American Energy Organization (OLADE), the Reciprocal Assistance between Latin American Petroleum Companies (ARPEL), the Regional Electric Power Integration Commission (CIER), the Central American Electric Power Commission (CEAC) and others in charge of integration actions at a lower level, such as technical assistance or cooperation. The main players were the governments and energy companies, along with multilateral and bilateral funding institutions or commercial banks.[3]

The continued increase of international trade starting at the end of the eighties is mainly due to the successive unilateral liberalization of an ever-growing number of economies in Latin America and the Caribbean and due to international financial flows returning to the region and allowing monetary restrictions to be lifted. An immediate result of free trade was the increase of tradable energy resources in intra-regional trade, such as crude oil and products. Trade between subregions grew with even more intensity.

The restructuring, incorporation of new players, and the breakup of assets also taking place in the electric power and gas subsectors of several countries have multiplied the number of players or companies searching for business opportunities. Obviously, the managerial strategies have replaced political incentives as the driving force behind energy integration. This encouraged those in charge of establishing national policies to make decisions, for example, on the international gas pipelines. Thus, the dynamics of the sub-regional energy integration process has gathered unexpected momentum and this will promote growth. During this year, the first of several intra-regional natural gas trade projects will begin.

This last observation involves especially the southern part of the region, whereas government initiatives continue to prevail in the Central American subregion.

Existing subregional economic integration treaties, such as Mercosur, the Andean Group (GRAN), the Group of the Three (Mexico, Colombia and Venezuela), MCCA and CARICOM have responded to this new integration dynamics both in the energy as well as other sectors. Some have been able to organize energy groups quickly and effectively within their own subregions (Mercosur No. 9 Task Force, the Regional Energy Forum for Central America—FREAC, with its

Hydrocarbon Commission—CCHAC), to assist subregional organizations and governments to further this process in the energy sector.

The Miami Summit on hemispheric integration has created a new institutional forum and a new movement for the integration of North, South and Central America and the Caribbean. We will have to wait to see if this movement materializes even further. It is obvious that the United States is attempting to increase the trade of energy and associated goods especially to guarantee ensure its own supply security, based on the abundant energy resources in Latin America, whereas for the countries of the region the objective, rather, is the sustainable and competitive economic, social, and environmental development of the energy sector.

NOTES

1. As stressed by the World Bank in its latest report on world development, "good government is not a luxury, but an essential good for development." It is necessary to define its role, tasks, and the new circumstances of the energy sector. See World Bank, *1997 Report on World Development*, World Bank, Washington, D.C., 1997.

2. See OLADE/ECLAC/GTZ, *Energy and Sustainable Development in Latin America and the Caribbean: Approaches to energy policy*, Quito, 1997.

3. See the study on energy integration prepared for the Central Topic of OLADE for the 1995 Meeting of Ministers, which was later published by OLADE, *Energy Integration in Latin America and the Caribbean*, Quito, 1996.

Chapter VI
Results and Impacts of Energy Sector Modernization

1. Relevant questions and difficulties in appreciating the effects of modernization

In the previous chapters, it is apparent most of the countries in Latin America and the Caribbean have carried out significant changes in at least one of the energy subsectors. In addition, the conclusion has been drawn that almost all of the countries have agreed to adopt a similar course to ensure the sector's future development, even though accomplishments in implementation are at different points in the path to modernization.

In the previous chapter, we analyzed the role played by the State agencies in this process and identified tasks that are still pending. In this chapter we will try to point out the results of the modernization of this sector and its effects both within and outside it.

Analysis of these reform experiences raises many different questions in the region's countries. The following are among the most noteworthy:

- What have the results been with regards to the performance of this sector's business units?

- What have the results been with regard to structural efficiency? Has the relative share of the subsectors to supply and the energy transformation structure become more appropriate?

- What has the impact been on the efficient use of energy?

- What has been the impact of reform processes on the degree of efficiency in the use of energy resources and other resources of the economy as a whole? What happened to allocative efficiency?

- What has happened with domestic market supplies? Has it been enough, higher quality, more diversified, safer?

- What have reforms contributed to macroeconomic objectives, particularly with regard to growth, fiscal and external balances, employment and price stability?

- What has been the impact of energy production, transport, distribution and consumption activities on the environment?

- What has been the effect on the provision and availability of natural energy resources?

- Has there been any change in the possibilities available to the neediest sectors of the population to gain access to basic energy services, in terms of in quantity and quality?

All of these questions point to immediate or indirect impacts stemming from the form of sector management, that is, coordination schemes, pricing policies, etc. and changes in the latter. One needs, however, to look beyond direct results sought by sector management and energy investment policy decisions and programs, operational performance, state budget cuts, etc. These results are a first step in analyzing the effects.

Clearly, the ideal situation would be to have an empirical analysis that associates results and impacts with the schemes currently in force and the different modernization steps.

Nevertheless, in trying to respond to questions like those pointed out above, for Latin American and Caribbean countries as a whole, and to identify empirically the effects of modernization, there is a series of problems with respect to methodology and information availability:

- Although it is possible to group countries together by coordination scheme as a result of the reforms in each one of the subsectors, their combination for all of the subsectors is considerably multiplied and classification becomes unfeasible. Countries that carried out similar reforms in their electric sector

differed significantly when it came to the introduction of changes in the petroleum sector and belong to different categories in the case of gas and coal.

- Although the operational scheme for the energy sector or subsectors might, at present, appear to be quite similar in several of the countries, the course adopted to implement change was very different. In addition, in several countries the scheme now used already existed even before the reforms, whereas in others the current scheme was the outcome of important alterations. The sequence and time used in implementing reforms have also been different.

- The main reform took place in the subsectors at different points in time. In addition, in some cases it is difficult to identify precisely when the turning point actually did occur, because the process took several years, particularly with regard to implementation. There are even cases where it is impossible to verify when certain reforms took place, although applicable laws had been issued much earlier. In other cases, changes have been recent or are still under way.

- Any attempt to separate modernization from the consequences of other global economic, social or political events is hampered by severe methodological difficulties.

- Last, but not least, specific data needed to assess the impacts of different modernization schemes in the region's energy systems are lacking. Also, in existing data series the impacts of modernization can are apparent the changes in definitions, changes data gathering and compilation, and the weight ascribed to different elements, distorting the results.

Despite all these problems, progress has been achieved in terms of a deeper understanding of modernization. Keeping this objective in mind, criteria have been prepared to identify impacts, with establishing a data base and conducting some analyses.

The empirical work should continue, with revised and complementary data bases for all of the countries in the area. This task is still pending.

2. Pertinent issues and procedures for the analysis

Chart VI.1 provides a diagram aimed at describing a procedure for conducting the analysis.

The point of departure for this outline recognizes that the coordination and ownership schemes adopted exert a decisive influence on the performance of the energy sector it its different levels, with different impacts on the use of natural resource reserves and on economic and social development. As part of this analysis we hope to identify differences, in those dimensions, between the countries that followed different energy development models. We also try to examine the impacts of the changes brought about by modernization within the national systems.

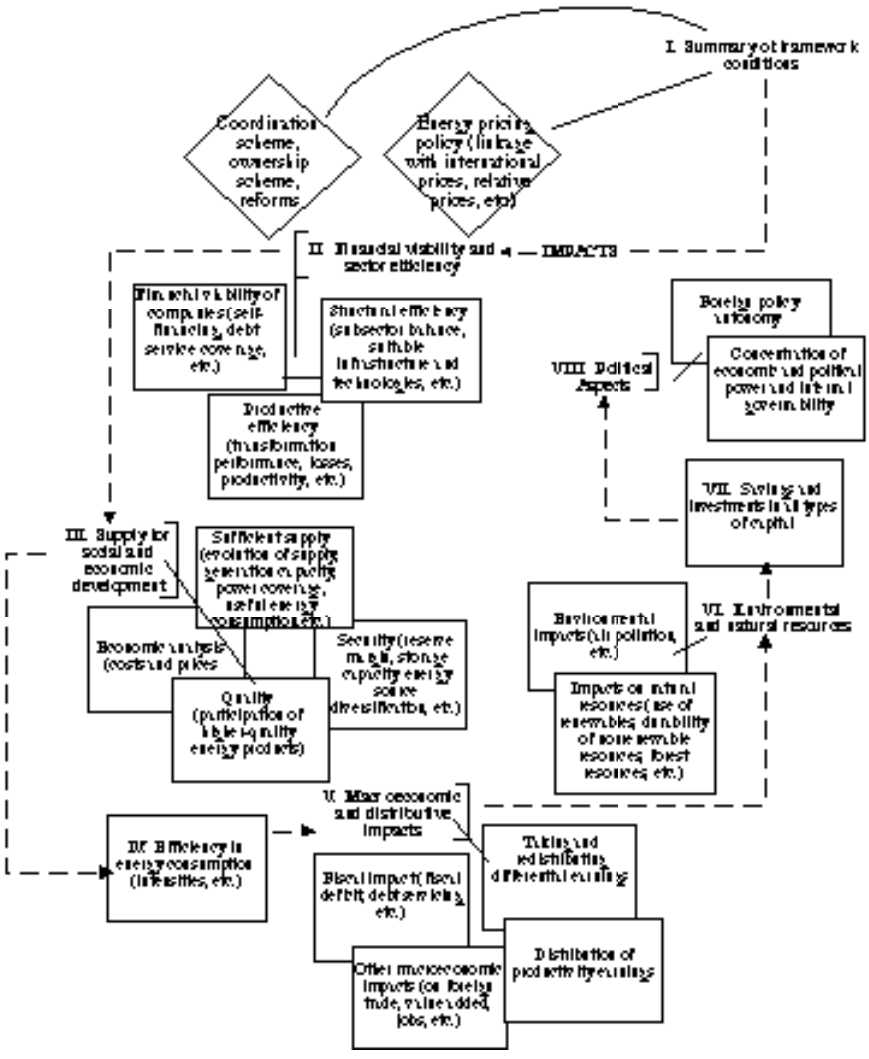
In addition to the coordination and ownership schemes, the pricing policy—which is influenced by the first two—is an important determinant in current energy sector performance, as well as its future evolution. Consequently, the coordination scheme, the ownership system, and the pricing policy are the most important elements of macro conditions.

As for the sequence of the presentation, it is more advisable to begin with an analysis of the impacts in the subsectors themselves. It is in subsector performance, that is, the capacity to perform the duties that have been assigned, especially those involving financing the investments needed and the productive efficiency of these duties, that the analysis of sector reforms focuses.

After this analysis, it is important to examine the new coordination of the different subsectors in the energy system as a whole. On the basis of economic criteria, the subsectors will be evaluated to determine if they and available technologies are fulfilling the role they have been assigned in the system. We will therefore be making reference to structural efficiency.

From here on, we will proceed to analyze a complex series of relevant issues, particularly those involving supply. Among the priorities for energy policy objectives, domestic market supply traditionally ranks first in most countries in Latin America and the Caribbean. It is therefore interesting to investigate which among the different macro-sector conditions (coordination schemes, ownership

Chart VI.1 Methodological and conceptual scheme for analyzing the impacts of modernization in the energy sector



systems, pricing policies) have achieved the best results in terms of supply quantity and quality, as well as supply security and costs.

Supply issues are therefore related to economic and social development, as well as to environmental conservation. On the economic side, energy supply may contribute, to a greater or lesser extent, to the competitiveness of the economy. As for the social viewpoint, its contribution involves coverage of basic needs and to living conditions. And regarding the environmental dimension, the different alternatives for supply can exert very different impacts, and this is closely tied to the coordination schemes.

Closely linked to the issue of supply is the issue of efficiency in energy use. This subject has progressively become one of the main concerns of energy policies. In this sense, it is necessary to examine the evolution of energy intensity or its inverse, energy productivity, in consumption.

The following group of issues is related to the macroeconomic impacts of the different background conditions, as well as of the policies promoted by the energy systems. As part of this group of subjects, the fiscal deficit stands out as one of driving forces behind energy sector reforms. But also of interest are the consequences of sectoral evolution over other variables and the goals of the macroeconomic policies, such as the foreign trade balance, price stability, employment, and the dynamics of growth in general.

As part of the macroeconomic aspects we also have the issue of eventual redistribution impacts. These impacts are in addition to the social issue, as well as the above-mentioned supply dimension, employment, and prices. In this case, the question focuses on the way in which the different coordination schemes, ownership systems, and pricing policies affect the appropriation and redistribution of revenues stemming from energy resources and on the distribution of productivity improvements.

It is therefore important to analyze the impacts of energy system development on resources in general, and on natural ones in particular, especially on the environment. The different background conditions exert direct effects on these dimensions, but also impact them indirectly, as a result of their effects on energy and structural efficiency in the sector and on energy end-use

We intend to summarize the schematic analysis presented so far, by considering the development of natural and productive capital in general. The "genuine savings" indicator proposed by the ESD Vice-Presidency of the World Bank brings together some aspects like net investment in fixed capital, exploitation of natural resources, and environmental degradation, which are affected by energy development. This is why this generic indicator constitutes a first approach to a summary assessment of the impacts of a country's development strategy.

Also of interest is an analysis of the consequences of energy reforms (and of the coordination schemes adopted) in the political sphere, especially with regards to the viability of actions involving public policies. The centralized control scheme involves a much more important potential for political management and to provide the sector with instruments for achieving macroeconomic, social, and other objectives. But there also is the possibility of taking advantage of the enormous political-economic potential of the state companies to benefit particular interest groups or party objectives, with certain consequences on internal governability.

The market coordination scheme, by contrast, might mean a certain breakup of power. To achieve this, a new imbalance would have to be avoided, and this would mean concentrating the sector's activities in the hands of a small group of private players, thus generating an asymmetry of powers in favor of this group compared to public entities, which in turn would undermine the State's capacity for implementing its domestic policies.

A similar reduction in political liberty toward the outside could occur if the State does not handle with care its commitments to multinational firms and multilateral organizations, with regard to the entry and output rules for the country's markets, and if it does not take sufficient advantage of integration and cooperation opportunities with the region's other countries.

3. An initial approach

In spite of the limited resources and time for this analysis, in view both of the scope of the subject and the difficulties spelled out at the beginning of this chapter, we will attempt here to present a preliminary approach to an assessment

of the consequences of the reforms, according to the interpretative outline presented above.

This is not a final and detailed analysis of the effects, but rather an overview of energy developments in the Latin America and Caribbean countries during the modernization stage over the last three decades. From this we can draw certain conclusions about the results and effects of the coordination models and energy policy strategies adopted in the region.

As was previously stated, this analysis is but a first approach; on the basis of this approach, we will provide a preliminary interpretation and assessment at the end of this chapter.

3.1 Evidence in the electric sector

For comparative purposes, four countries have been grouped together under two different criteria: their belonging to a subregional grouping and whether they carried out or not a profound reform before 1995.

- Group 1: South American countries that carried out a profound reform with a change in scheme and ownership system of the electric sector before 1995.

- Group 2: South American countries and Mexico that did not carry out any profound reform in the electric sector prior to 1995. Other steps towards modernization or reform could have taken place after 1995.

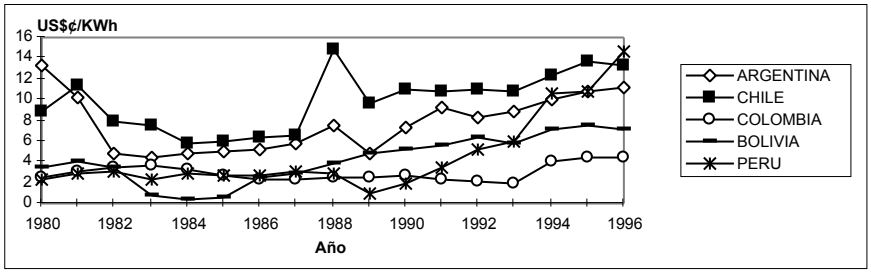
- Group 3: Central American countries.

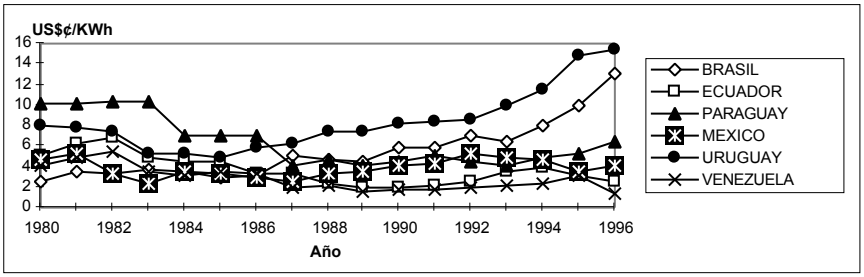
- Group 4: Caribbean countries.

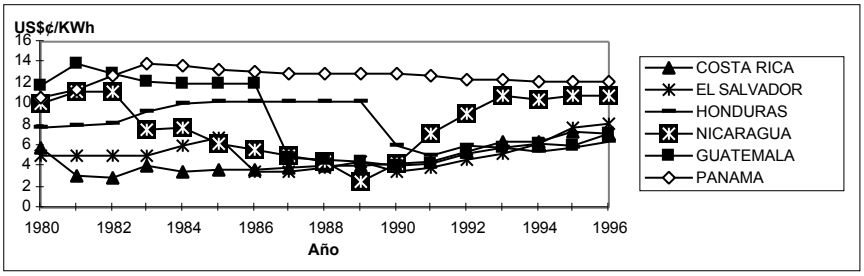
3.1.1 Coordination scheme and prices

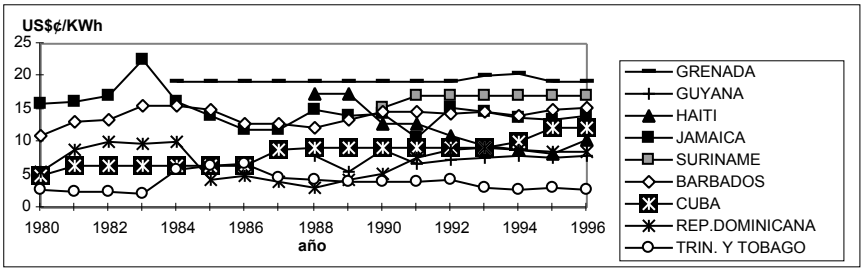
The first subject, involving background conditions, is an interrelationship between the sector's coordination scheme and prices. The series of average prices for residential electricity (Chart VI.2) and industrial electricity (Chart VI.3) in Latin America from 1980 to 1996, converted to U.S. dollars, were compared. In order to compared prices between the different countries, it was

Chart VI.2: Average prices of residential electricity



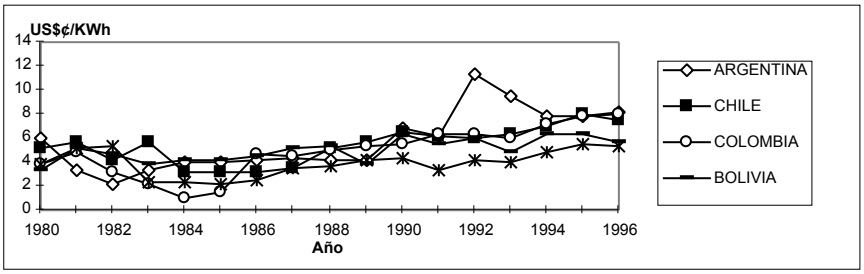


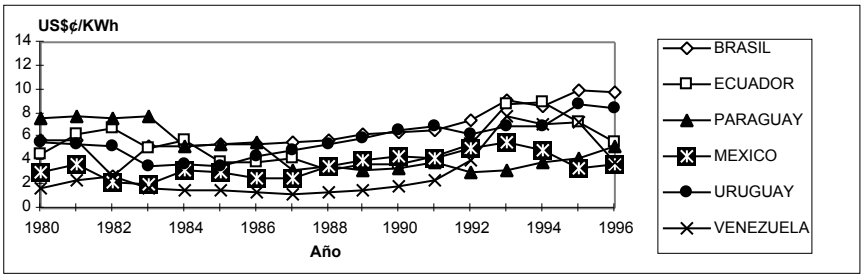


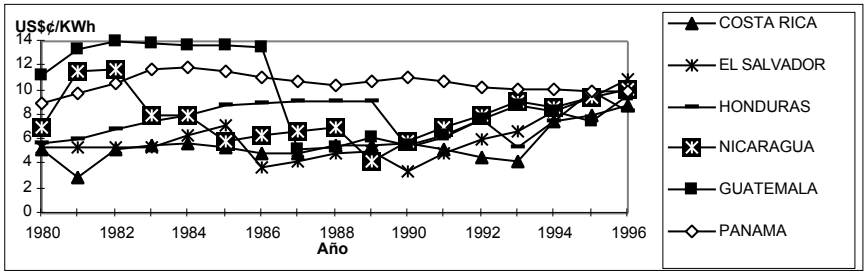


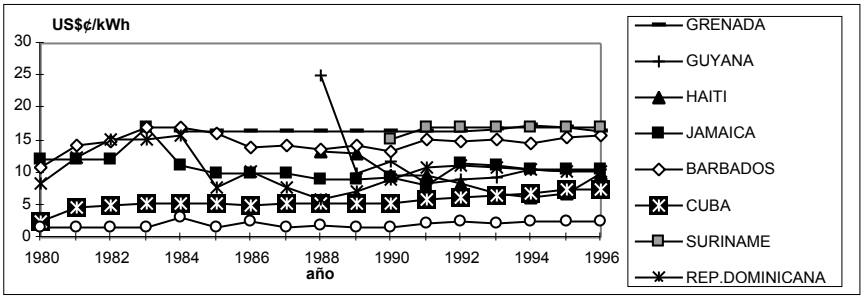
Source: OLADE-EC, SIEE

Chart VI.3: Average prices of industrial electricity









Source: OLADE-EC, SIEE

decided that the calculation would be made in U.S. dollars. This means, among other things, that exchange rate fluctuations will produce price variations even though there are no variations on the domestic market and in terms of prices of other products and services. What is of interest, in the first place, are changes in the price levels and trends, not so much the level itself, which could or not be related to cost level: average prices are calculated by means of a simple division of sales by amount sold.

In the first group, one can note a sharp increase in electric prices, in some cases closely related in time to effective reform (Chile, in 1988, six years after the legal reform, one year before the privatization of ENDESA; Argentina, in 1990, one year before the reform that started up the privatization process; Peru, in 1992, during the years of the reform and at the beginning of privatization; Colombia, in 1994, which was the year of the effective reform, with the establishment of a regulatory body), or in other cases stemming from changes in prices not directly related to the reform (Bolivia, increases in 1986 and 1989, with a reform passed in 1994; and increases in Peru in 1990).

After the initial rise in prices, averages continued to increase except in the case of industrial electric prices in Argentina. Apart from the latter case, the expected price reduction has still not taken place, at least not in terms of average prices. There are different reasons for this: price adjustment by phases during the course of reform implementation; gradual elimination of subsidies; averages that do not accurately represent the evolution that has taken place; effects apparently due to exchange rate variations, etc. All this would have to be examined in greater detail. The low residential price levels in Colombia reflect the persistence of a substantial subsidy that will be gradually scaled down over a period of several years and will be channeled to only a few population groups.

In the second group one can see an upward trend among average electricity prices starting at the end of the eighties, for the Southern Cone group (Brazil, Uruguay and, to a lesser extent, Paraguay), whereas in the other subgroup (Ecuador, Mexico and Venezuela), specific increases can be noted, eroded in real terms, possibly due to inflationary effects stemming from the exchange rate.

Within the group of Central American countries, what is most noteworthy is a tendency for prices to converge, which in the case of industrial electricity has implied a narrow price band since 1994. The other countries, regardless of the

profound reforms in the subsector, moved toward the electricity price level of Panama, which has traditionally been the highest. Likewise, the price reduction in Guatemala in 1987 is quite noteworthy, two years after a large hydraulic plant was commissioned. The scheme changes in Guatemala, El Salvador, and Panama are too recent to explain the price increases that have been applied since 1990. Something that might have contributed to this trend is the limited liberalization, involving the inclusion of third parties which has been implemented in the region for several years, under the single buyer principle, particularly in Guatemala, El Salvador, Costa Rica and Nicaragua.

In the Caribbean group we can observe constant average electricity prices. What stands out across-the-board is the high level of prices in Barbados, Grenada, Suriname and Jamaica, on the one hand, and the consistently low level of prices in Trinidad & Tobago, leaving Cuba, Haiti, the Dominican Republic and Guyana at an intermediate level. The type of fuel, its price and the generation technology seem to be essential determinants for electricity prices. Apparently, with the exception of some specific cases, tariffs were based on financial costs.

What has been observed with regard to the evolution of average prices leads to the following preliminary conclusions:

- Limited liberalization might have contributed to the need of increasing prices.

- Market liberalization and privatization involved profound reforms in countries with insufficient price levels, which led to abrupt and/or sustained increases.

- There is still no clear indication of price reductions taking place after the reforms.

- There seems to be an important subregional factor: in Central America and the Southern Cone a tendency toward price convergence can be noted, regardless of the reform.

3.1.2 Productive efficiency

Among the indicators that are relevant to assess the electric power sector's productive efficiency, we have productivity per employee, energy efficiency in

thermal generation, losses in the transport and distribution system, the relationship between available capacity and maximum load, and the technological structure of this capacity. The latter indicators also have to do with other criteria (structural efficiency, short-term supply quality and security).

There is no systematic, complete and updated data base for these indicators, thus limiting the possible scope of any assertion regarding this matter. It is highly advisable to conduct specific survey and data processing work.

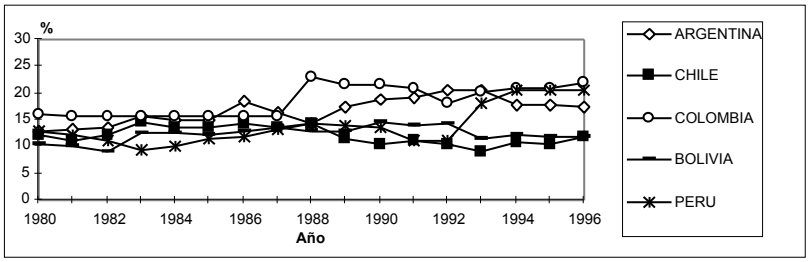
Based on specific information and preliminary series, the following can be asserted:

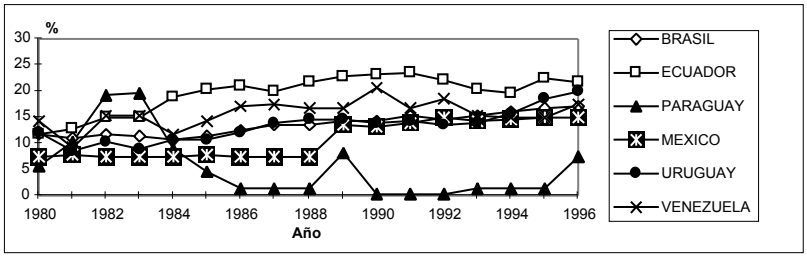
Labor productivity (measured by the indicator measuring the amount of sales per worker) has increased rapidly and drastically where there has been a company divestiture process. Over the last 15 years, however, labor productivity also increased considerably in non-privatized state companies.

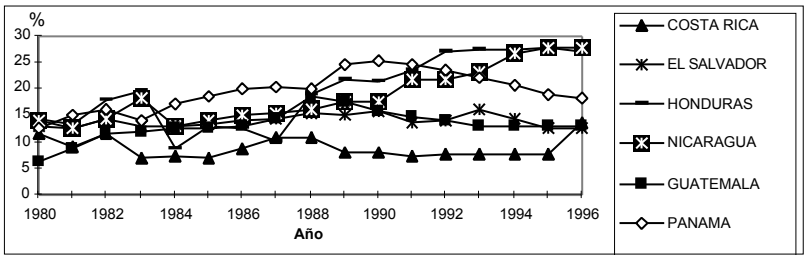
The data series on transport and distribution losses (Chart VI.4), in terms of aggregate data, do not provide any conclusive evidence about the impacts of profound reforms in the sub-sector: whereas loss reduction in Chile starting in 1988 and in Argentina starting in 1992 would seem to indicate positive impacts, the evolution in Peru and Colombia points to the opposite direction, contrary to the information about specific privatized cases. The data must be examined in greater detail to identify the reasons, which could be comprised of real events, like the incorporation of new transport lines, etc., or of statistical changes. Information from the utilities not only in Argentina indicate a highly substantial reduction in distribution losses, especially the eradication of theft and fraud. There are identical trends in the power utilities of Peru.

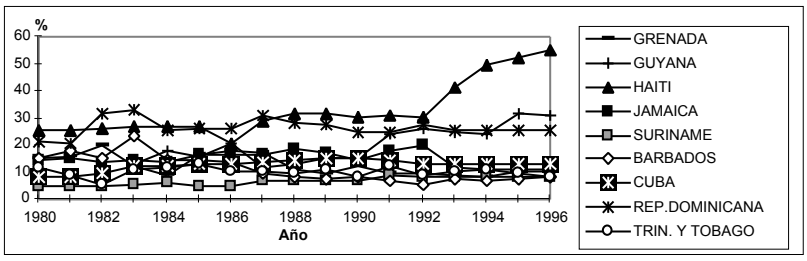
In general, different levels of losses have been detected in all groups. There is one group with losses under 15% (Chile, Bolivia, Paraguay, Costa Rica, Guatemala, El Salvador, Cuba, Trinidad & Tobago, Barbados, Suriname), another with losses of about 20%, and finally with higher losses (Nicaragua, Honduras, Dominican Republic, Guyana, Haiti). Apart from technical and managerial inefficiencies, there is a series of technical factors that determine the level of losses, particularly the configuration of the network with relation to consumption. Systems that benefit from the most favorable circumstances seem to be those that do not have long-distance transmission (island systems),

Chart VI.4: Losses in electric power transport and distribution systems









Source: OLADE-EC, SIEE

intermediate interconnected system with intense consumption (Chile, for example), and higher-transmission systems but without any extensive distribution (Paraguay). Systems in Europe with a high concentration of consumption record losses below 10%.

In some of the Central American and Andean countries, political upheavals leading to the destruction of transmission facilities and obstruction of maintenance during certain periods should also be taken into account

The major flaw in the data available on the reserve margin in the electric power systems of the Latin American and Caribbean countries is that only data on installed generation capacity is available, not on available capacity. If there is, within a given installed capacity, an important amount with lower availability (due to uncontrollable causes, like hydraulic regime variations), the ration between installed capacity and peak load could be high, without meaning that the margin is considerable. In fact, the available data series shows that there is an apparently sufficient ratio, with margins of at least 30%, even in those countries that have chronically experienced blackouts over the last few years.

In addition, very high figures of over 100% indicate a high idle capacity, unless part of this capacity is exported. Thus, in several countries, when installing a relatively important new capacity, compared to the system's size, idle capacity segments can be noted.

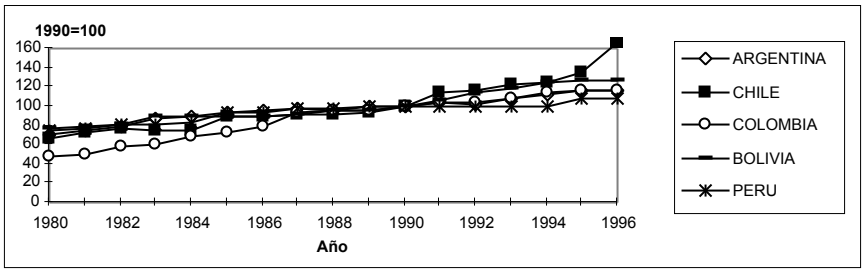
The issue of installing a capacity that is appropriate in size and structure deserves further in-depth analysis.

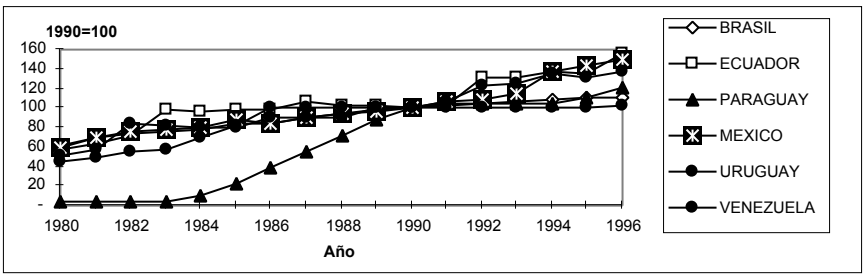
3.1.3 Increased capacity and investments

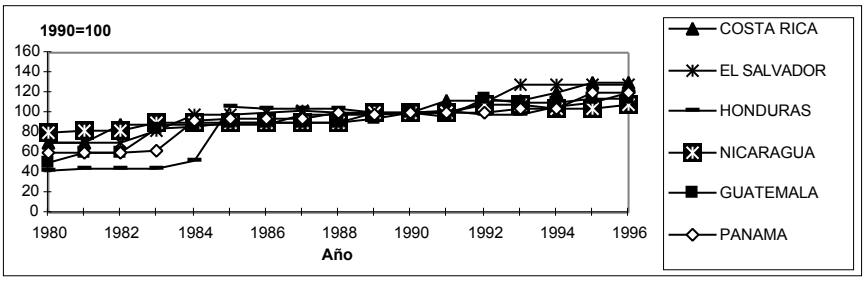
To compare the evolution of generation capacity, the capacity of all the countries is calculated and entered into an index based on 100 for the year 1990 (Chart VI.5).

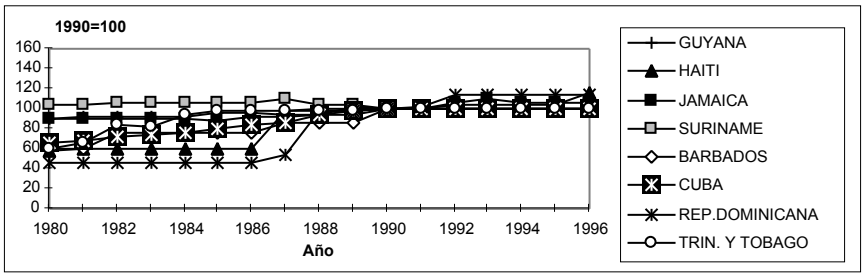
Until 1996 no clear increase in generation capacity can be noted in the systems where a profound reform took place, with the exception of Chile. In the other countries of this group, the increase is not unusual and, in part, as in the case of Argentina, this is the result of previous decisions. Due to the habitual time

Chart VI.5: Evolution of electric power generation capacity









Source: OLADE-EC, SIEE

lag in capacity additions, the effects are not visible until five years after the reform.

In Argentina, the new generation capacity incorporated by the private-sector players as of 1997 was higher than the incorporations made as a result of previous government decisions and facilitated a considerable improvement in availability.

It would be interested to have a series of data on investments in the electric power sector, which would enable capacity additions to be forecast in advance. Inset IV.1 provides the conclusions stemming from the specific analysis of Chile, taking into account investments and capacity additions being built. In addition to serving as an example of more extensive information about investment and projects under construction, it provides a more thorough analysis of the conditions and reasons for this development.

In the second group, the countries with the highest increases since 1990 are Mexico, Uruguay and Ecuador, whereas generation capacity in Venezuela, Paraguay and Brazil seems stable. Ecuador owes this increase to the addition of its most important unit, which did not have the positive impact expected due to lack of availability. The lack of additional capacity in Venezuela and Paraguay, in turn, is not alarming as sufficient levels were achieved before 1990, whereas the evolution of Brazil indicates deficient growth in capacity.

The data series for countries with small systems show the relative importance of each generation unit. The curve is determined by one or two major additions, which could depend on different situations. Likewise, it is not possible to distinguish the impact of a policy such as limited liberalization.

3.1.4 Generation structure

In several South and Central American countries (Brazil, Costa Rica, Ecuador, Honduras, Paraguay, Peru, Suriname, and Uruguay), the share of hydropower in electric power generation over the last ten years amounted to over 75%. Other countries, including Colombia, Chile, Guatemala, Haiti, and Panama, have achieved similar percentages, but with greater diversity (see Chart VI.6). This share is very high in comparison to international standards. It would seem that the centralized command-and-control and state investment scheme in a situation

of high liquidity could be the explanation for this high share. It is true that at the moment of taking the respective decisions, this scheme was already in force in all these cases. It is difficult to determined whether a market coordination scheme could have reached the same decision.

Inset VI.1: Investments in the Chilean electric sector

Annual investments in Chile's electric power sector, which amounted to US$350 million during 1982-1988 increased to US$600 million per year during 1989-1996, and forecasts for 1997-2000 indicate that these investments will rise to over US$1.2 billion per year. By the year 2000, projections for installed generation capacity amount to about 12,000 MW, which accounts for a growth of 100%, compared to 1995.

Conditions favoring this growth are:
- economic and political stability, and strong economic growth
- low-risk country
- Chilean market is a bridge for the regiontariff system guaranteeing high profitability
- regulation allowing vertical integration

Private-sector business benefited from:
- active participation of the State in granting incentives
- active participation in the formation of managerial groups
- access to funding
  * participation of AFPs (retirement funds)
  * consolidation of stock market
  * access to external funding

The benefits for users depend on:
- design of regulation system
- public capacity in managing this system

Source: Graciela Moguillansky: La gestión privada y la inversión en el sector eléctrico chileno, ECLAC working document, Santiago de Chile, 1997.

Argentina reached its highest share over the last three years, when the market scheme was in effect, but the decisions had been taken much earlier when there were rules favoring the use of hydropower capacity at the current dispatch.

Although most countries would encounter considerable financial difficulties in implementing larger hydropower projects, in Chile there is a large-scale project

of this kind being implemented, in spite of considerable opposition for environmental reasons.

Other electric generation possibilities based on renewable resources have reached a certain degree of relevance in Mexico and El Salvador, through the use of geothermal power, and in countries where self-production based on agricultural-industrial waste has been taken into account, like in Cuba, Guatemala, Haiti, Jamaica, and the Dominican Republic.

3.1.5 Air pollution

As a result of the high share of hydropower, the pollution intensity of electric power generation continues to be low in most countries of the region (see Chart VI.7 on CO2 emissions as a representative pollutant). The countries with the highest share of hydropower production, specified above, record levels below 200 kg/GWh. Only Caribbean countries, which have no choice but to use fossil energy sources, have bee recording levels of over 500 kg/GWh.

The thesis that market coordinated systems lead to higher air pollution has not been confirmed to date. On the contrary, in Chile and Argentina, where the use of natural gas as feedstock for power generation has increased over the last few years, emissions have remained at the same level, unless there are alterations due variations in the hydraulic regime of a given year.

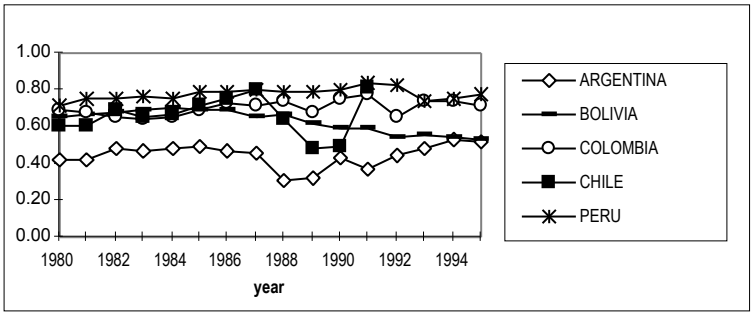
3.1.6 Comment and warning

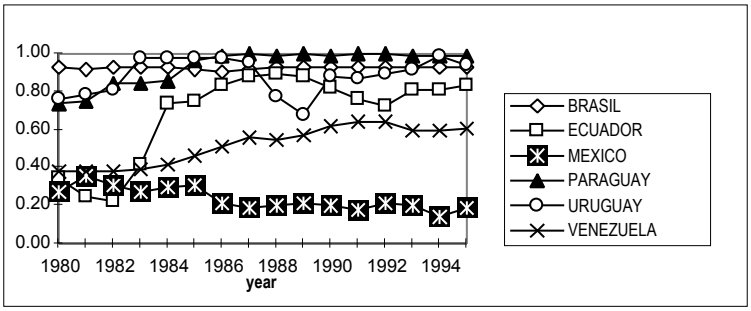
To end this section, it is necessary to make a brief observation on the methodological problem, which may also serve as a warning.

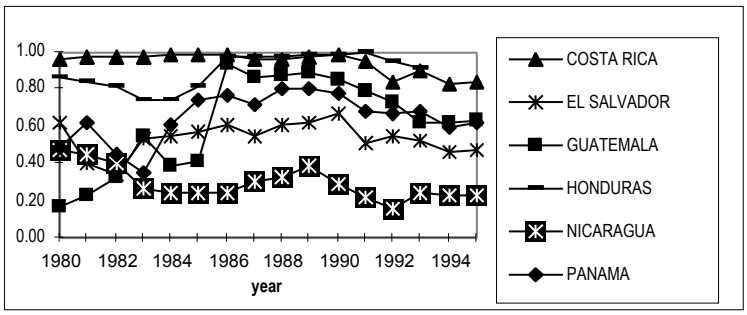
Because of the above-mentioned difficulties, regarding methodology, data, etc., it may seem that the analysis is not balanced. The voids involve, above all, the difficulty of appraising the productive and structural efficiency of the systems based on an estimate of the relative inefficiency. It is feasible to appraise the productivity of some items such as the labor factor, losses, etc., but one can sense the lack of a complete appraisal.

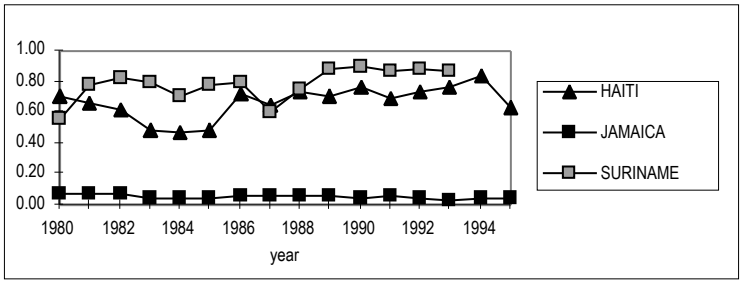
To measure efficiency precisely, one would have to know the ideal efficient system and its costs for each case or country, on the one hand, as well as the

Chart VI.6: Share of hydropower in electric power generation



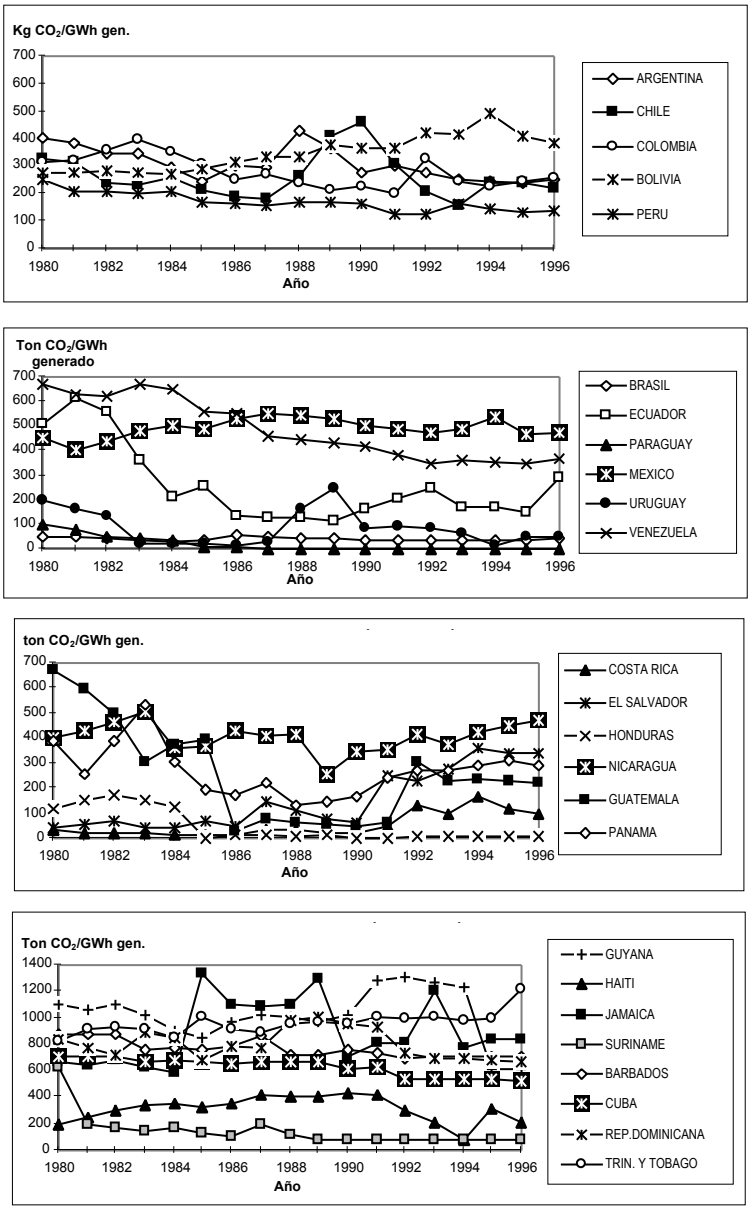






Source: OLADE-EC, SIEE

Chart VI.7: Air pollution as a result of CO_2 from electric power generation



Source: OLADE-EC, SIEE

effective costs of the system, and not prices, on the other hand. As this is not feasible even in the best of situations, this analysis must resort to other methods, including the comparison of partial indicators, among others.[3]

As a result, it must be warned that perhaps this analysis will implicitly underestimate the inefficiencies of the system, due to the impossibility of measuring them.

3.2 Evidence in the petroleum sector

3.2.1 Modality and prices of oil products

Regarding the analysis of results and impacts in the oil subsector, it is better to regroup the two first groups. Chile and Colombia continue with a state enterprise coordination scheme, with more influence from market forces in the first group, and are placed in group 2 (see Chart VI.8).

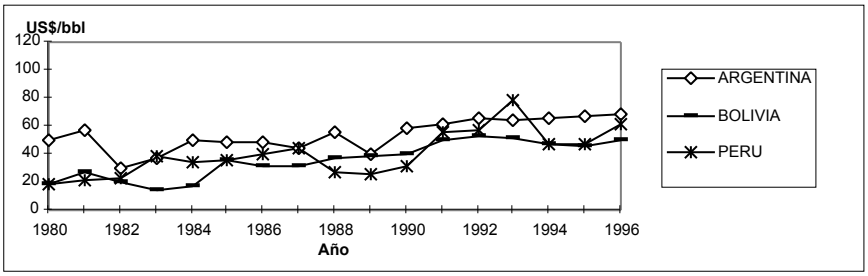
The average prices for oil products in the subsectors coordinated by the market tended to remain at a level of about US$60 during the nineties.

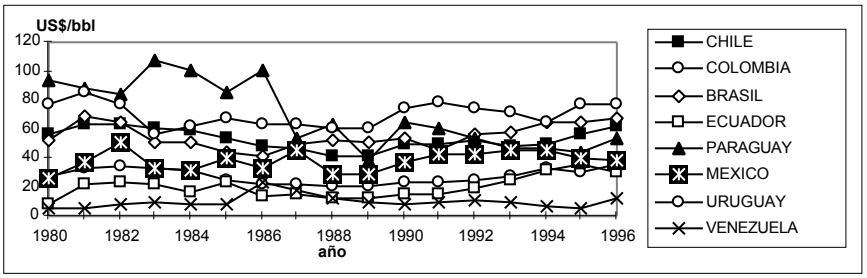
In the group of countries that continue under state influence in managing the subsector, four levels can be differentiated:

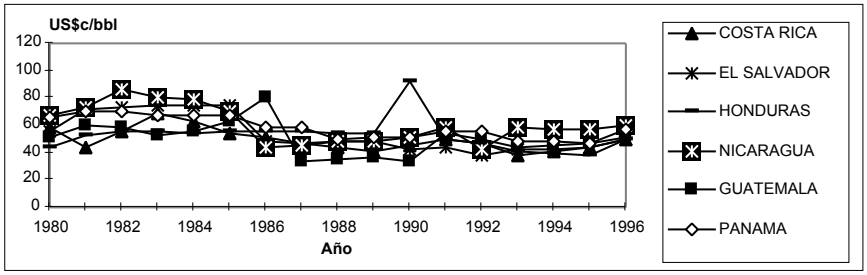
- About US$20 (Venezuela, until 1992, and also Colombia and Ecuador)
- About US$40 (Colombia, Ecuador, Mexico and most of the Caribbean countries)
- About US$60 (Brazil, Paraguay, Uruguay and all of the Central American countries)
- a level of US$100 (Barbados)

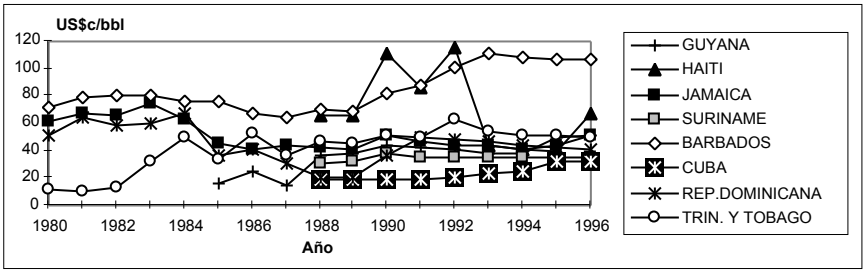
Barbados, on the one had, has a clear policy of setting an important tax on oil products. In Venezuela, on the other hand, average prices for products do not add up to the sum of prices on the world market for crude oil plus processing and

Chart VI.8: Average prices for oil products









Source: OLADE-EC, SIEE

marketing costs. The other exporting countries, on average, base their prices on costs.

As in the case of electricity prices, the convergence of prices for oil products in Central America, over which a slight tax is levied, is noteworthy.

Also, the Southern Cone countries, including Bolivia and Peru, regardless of the coordination scheme used, tend to have the same average price level for oil products.

Regarding the centralized control scheme group, producer countries are the ones with the lowest level. On their domestic markets, however, producers try to achieve price levels in keeping with the world market. Venezuela is still at the beginning of this process.

3.2.2 Importance of petroleum in primary supply

It is evident that, as a rule, the share of oil in primary supply amounts to 40-50% in all the oil-producing countries, except Ecuador on the one hand and Guatemala on the other (see Charts VI.9).

In net importing countries, there is greater diversity, ranging from 0% to 65-70% in Barbados and Jamaica, depending on the existence and capacity of refining capacity.

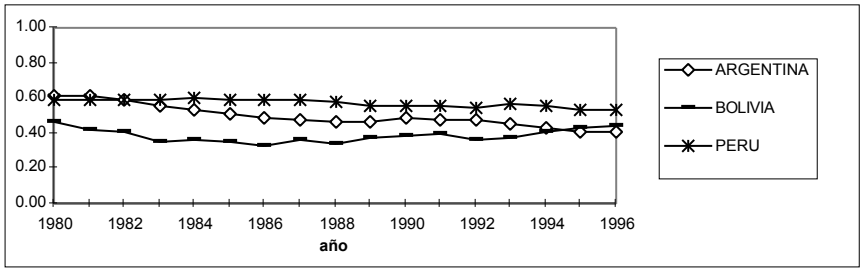
A percentage below 50% seems desirable and it has been observed that almost all the producing countries have reached this level during the eighties, with the state coordination scheme.

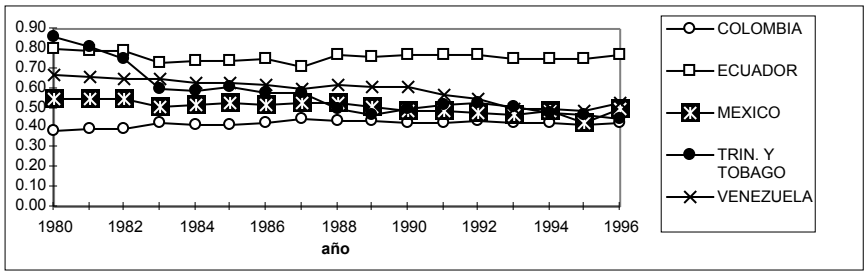
The change of scheme in Argentina, Bolivia, and Peru did not entail any change in this structure.

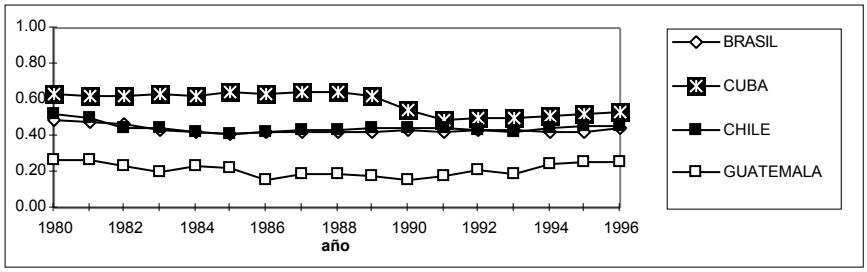
3.2.3 Long-term availability of resources

The evolution of production with relation to the reserves of the countries that have liberalized their upstream activities more extensively, on the contrary, shows indicators that should be avoided (see Charts VI.10 and VI.11). Except for natural gas in Peru, due to the discovery of the Camisea field reservoir, oil

Chart VI.9: Share of oil in primary supply

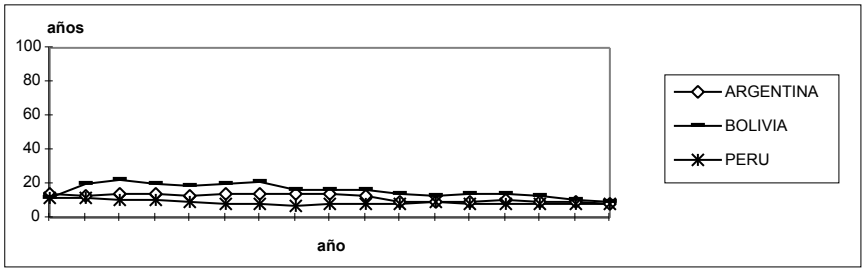


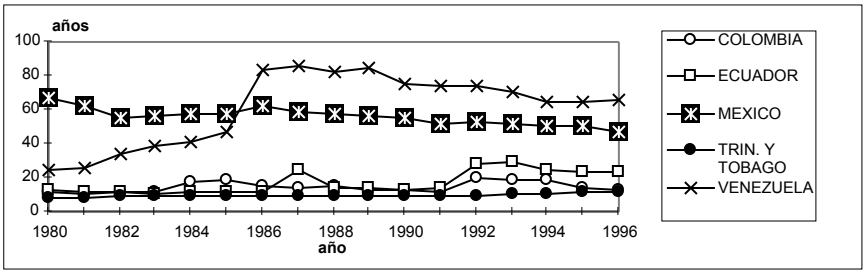


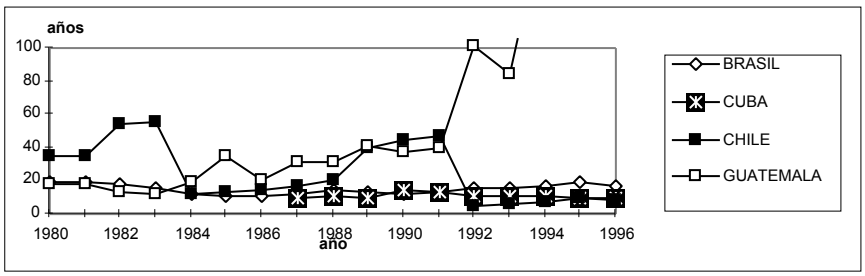


Source: OLADE-EC, SIEE

Chart VI.10: Reserves/oil production ratio

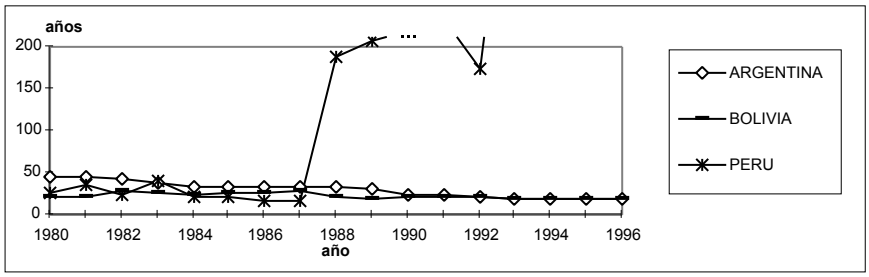


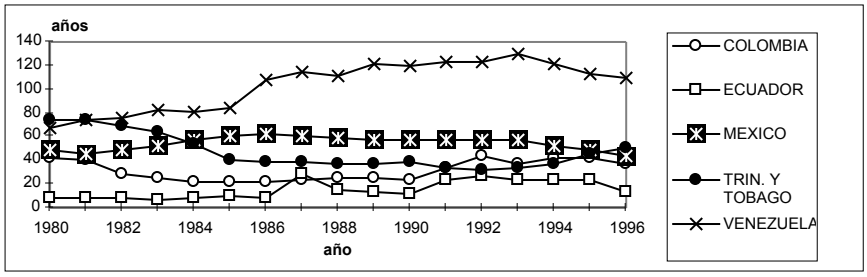


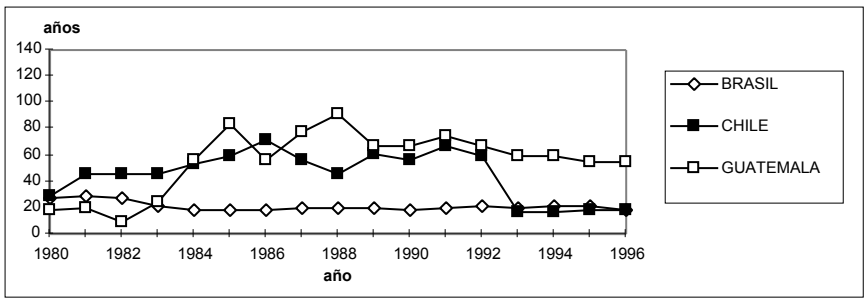


Source: OLADE-EC, SIEE

Chart VI.11: Reserves/natural gas production ratio







Source: OLADE-EC, SIEE

reserves/production ratios continue to decline in Argentina, Bolivia, and Peru to under 10 years.

Exporting countries and Brazil, in turn, show more conservative ratios, which in some cases, like Venezuela and Mexico, are favored by a broad resource base. By the mid-nineties, a critical reduction of the reserves/production indicator could be seen in Colombia.

Inset VI.2: Petroleum, natural gas and coal resources, reserves and production in Mexico and the Andean Group

The identification of fossil resources is deduced from the exploration policy, on the basis of the results obtained from discoveries and with regard to their use. From the policy implicit in the discovery curve, one can infer longer oil production horizons than those resulting from the static reserves/production ratio. In natural gas, these horizons usually come close to each other, indicating a similar forecast between reserves and production. On the contrary, static coal production ratios are more optimistic in the case of horizons obtained through the dynamic approach..

On the basis of the characteristics of the curves, different situations can be inferred for the different countries:

- In the case of *petroleum*, the results of this approach are as follows. If Mexico continues with its policy of the last few years, it will reach its peak petroleum production in 20 years and will lose its export capacity in 30 years. For Ecuador, this critical situation s would reached ten years earlier, whereas for Colombia the outcome would be similar to that of Mexico. Peru's oil future still needs to be defined, after long years of very little exploratory activity. It is clear, however, that a situation similar to that of Mexico or Venezuela can be expected. Only Venezuela can continue for a longer period as an important exporter.

- In the case of *natural gas,* high sustainability of the current policy is only apparent in Venezuela and Peru. Bolivia's export programs cannot be sustained for more than 20 years and will have to eventually rely on Peru's reserves. Mexico and Colombia could continue to develop gas for their domestic markets if they intensify exploration and development of their gas resources. Ecuador will have enough resources to develop a limited domestic market.

- As for *coal*, Colombia could continue with its policy without any constraints over the long term, due to the resources it has available

Although there might be specific arguments in the energy policy of each country with respect to each resource, apparently there is no explicit policy regarding the comprehensive management of resources. In countries with an abundance and diversity of resources, the discovery of reserves and oil exploitation are a priority. Although we do not wish to emit any value judgment, we feel the process should not be sequential, but rather simultaneous, to prioritize diversity using a comprehensive resource management approach, which could provide more opportunities to the region's most vulnerable economies.

Finally, the ratio between annual production and expected domestic consumption tends to close up the export gap in almost all the countries, due on the one hand to the characteristics inherent to the decline of petroleum and, on the other hand, to the intensification of domestic consumption.

Source: Francisco Figueroa de la Vega, Bernhard Bösl, "Non-renewable energy production, reserves and resources in Mexico and the Andean Group," OLADE/ECLAC/GTZ, 1996 (published in English in *Natural Resources Forum*)

The evolution for other producing countries is very erratic, probably due to the small amounts, producing high fluctuations in the reserves/production ratio.

This coefficient is a static concept that reacts with a high inertia to political changes and does not take into account the expectations of production on the one hand and of ultimate resources on the other. In an effort to improve it, a model has been prepared; this model takes into consideration the current production pattern, exploration results in the form of additions to reserves, production forecasts for domestic consumption and export, and the ultimate resources estimated by international experts. The preliminary results provide a more detailed picture for the discussion of exploration and production policies (Inset VI.2).

3.3 Evidence of the general effect

3.3.1 Energy intensity

Chart VI.12 indicates energy intensity trends in the Latin American and Caribbean industrial sectors. In most countries, the specific energy consumption of industry per production unit has been virtually constant over the last 15 years. In some countries there is an intensification trend, starting at the end of the eighties. This has occurred in Brazil, Paraguay, Venezuela, El Salvador, Trinidad & Tobago and Cuba. In a few countries, albeit with very different characteristics, the energy intensity of industry fell slightly, as happened in Chile, Mexico, Costa Rica, and Guyana.

Anyone expecting a significant increase in productivity will be disappointed by these trends. In addition, it is disconcerting that these tendencies do not coincide either with the selection of a scheme or a specific price evolution.

There could be different reasons for this. One probable reason is the structural change in production. To assess it better, we also need to analyze in detail the influence of industrial output accounting in terms of U.S. dollars, which makes the indicator vulnerable to exchange rate fluctuations.

The initial affirmation about the productive sector is all the more true for other sectors, especially the transportation sector and evolution in general: there are no indications of higher energy productivity in Latin America and the Caribbean. This assertion could trigger an entire field of detailed energy analysis to know the reasons and decisive factors for this.

3.3.2 Supply and competitiveness

Apart from prices, energy supply quality for the production sector depends on reliability, energy supply quality at the moment of service delivery, and the variety of energy resources available.

Regarding reliability, it is best to have statistics on electric power supply outages or on loss of load probability. There is the latter indicator specifically in certain countries and for certain periods. It would be possible to eventually determine the

former and if outages persist in some countries, the conclusions to be drawn from that are quite clear.

As for the quality itself of energy resources, especially electric power voltage stability, there are no general statistic.

On the basis of the industrial consumption structure, an indicator has been established for energy supply quality; it is considered to be the best for high-quality energy resources like electricity, natural gas, and liquefied gas, since they account for a major share of energy supply (see Chart VI.13).

Different levels can be differentiated for 1996:

- A high percentage of over 50% (Venezuela, Trinidad & Tobago, Argentina, Bolivia and, during the last few years Jamaica). Clearly, other factors come into play in these high percentages, among them the location of certain petrochemical processes in the industrial sector or in the energy transformation sector. Usually the presence of natural gas is decisive for this classification, except for the case of Jamaica, where electricity accounts for an unusually large share.

- An intermediate level, of 20% to 30%, where with the exception of Paraguay the South American countries can be found, and Costa Rica, basically due to the considerable percentage of electricity.

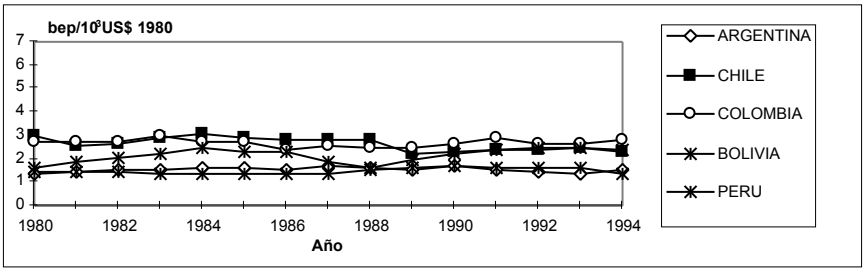
- An intermediate level, of 10% to 20%, with the other Central American countries and some of the Caribbean countries.

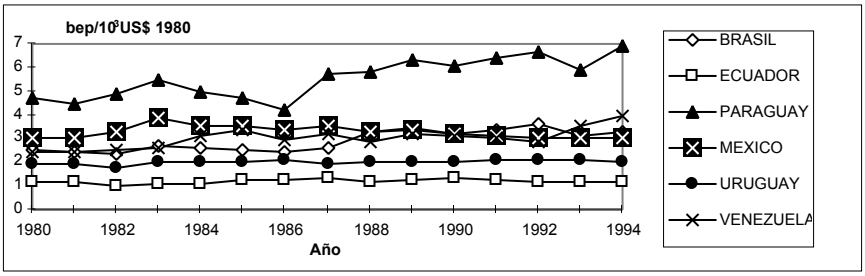
- A very low level in the case of Haiti, Cuba, Guyana and Paraguay, where biomass prevails as an industrial energy resource.

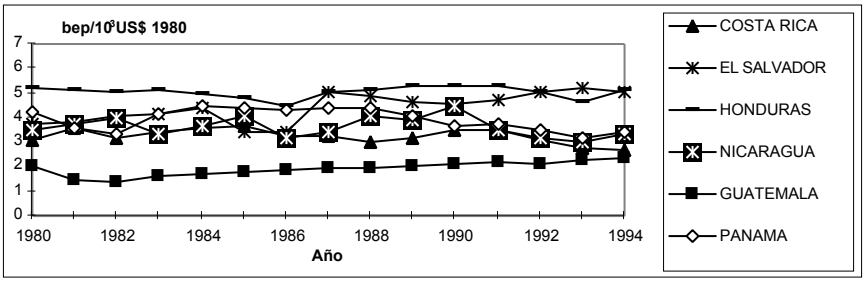
Obviously, supply factors combine with demand factors and intermingle in this indicator. Belonging to either one or the other intermediate group is not determined by factors related to demand and industrial structure.

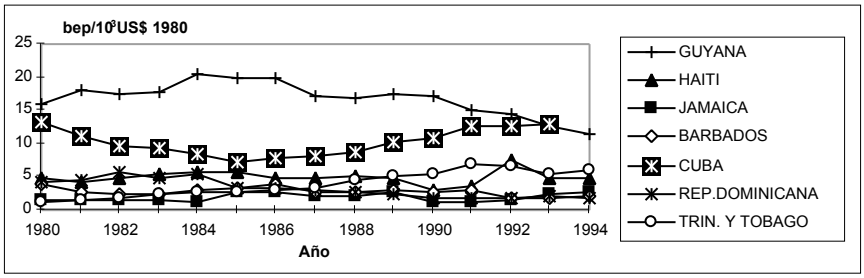
We are still not able to distinguish clearly the effects of modernization on quality. There are only a few indications:

Chart VI. 12: Energy intensity of industry



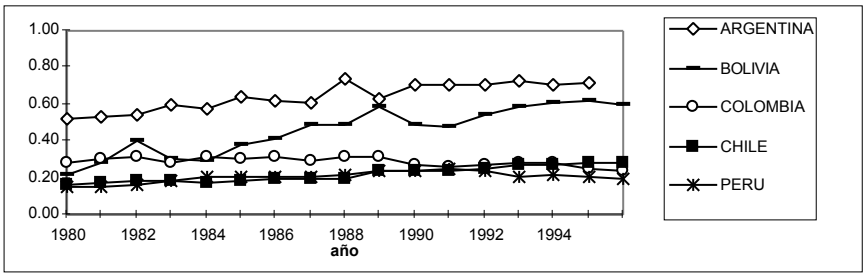


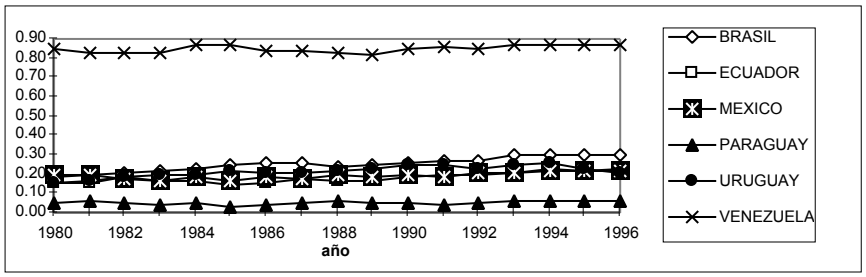


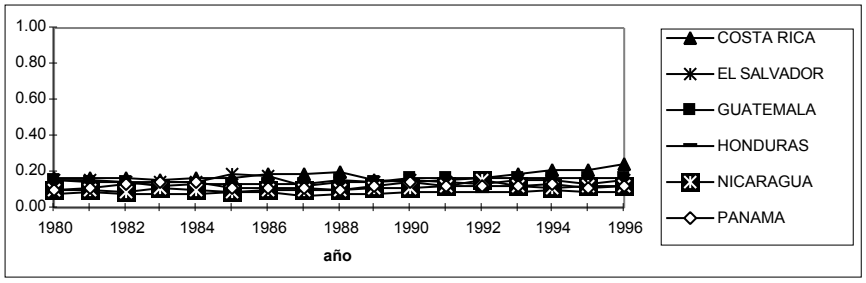


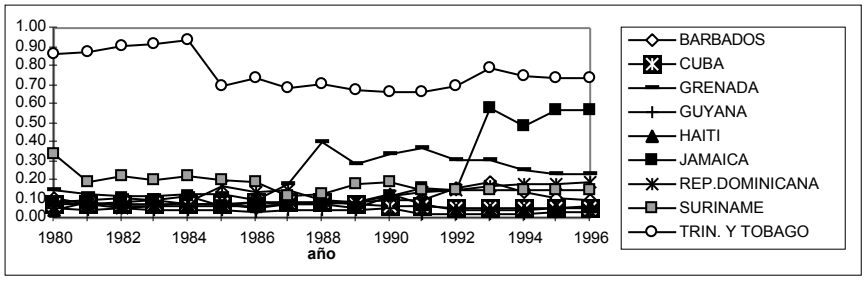
Source: OLADE-EC, SIEE

Chart VI.13: Diversification of industrial energy consumption









Source: OLADE-EC, SIEE

- Chile's interconnection and supplies with natural gas from Argentina and Bolivia will, in a few years, take this country to group 1. This could also occur in Colombia and Brazil, with different limited liberalization schemes.

- The loss of load statistics in Argentina during the last few years have reached an extraordinary level, whereas the interconnected systems in Brazil reveal a tendency to deteriorate.

The availability of natural gas for industry in Argentina, Bolivia, Trinidad & Tobago and Venezuela is due mostly to the existence of this energy source. Decisions made under a state coordination scheme are what contributed to this evolution. In countries that import natural gas, this evolution has not been observed. The new supply dynamics of these countries are partially due to the business dynamics of the private sector. Nevertheless, the case of Brazil demonstrates that a system under centralized control can be responsible for this development.

3.3.3 Residential and social supplies

The same type of indicator for energy resources diversity can provide information on residential sector supply quality (see Chart VI.14).

Here we can also see groups with a high, intermediate and low share of higher-quality energy resources, although broken down differently:

- high share: Argentina, Venezuela, Trinidad & Tobago, Barbados

- intermediate share:
  - high: Brazil, Mexico, Grenada
  - medium: Chile, Colombia, Ecuador, Uruguay, Costa Rica, Panama, Jamaica, Suriname
  - low: Dominican Republic, Cuba

- low share: El Salvador, Honduras, Nicaragua, Guatemala, Paraguay

- very low share: Guyana, Haiti

What stands out is the high growth of high-quality energy supplies in Brazil or other countries with centralized coordination schemes.

The diversity of energy resources, combined with the intensity of their residential consumption, results in useful energy figures. When linked to the number of inhabitants, useful energy is an indicator for the coverage of energy needs (see Chart VI.15). Six groups can be differentiated:

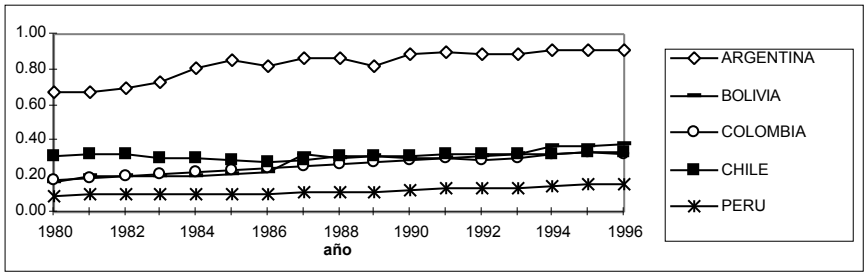
- Argentina at 0.9 BOE per capita
- Chile, Venezuela, Uruguay, Panama, Mexico, (over 0.5 BOE per capita)
- Barbados, Suriname, Trinidad & Tobago (0.4-0.5 BOE per capita)
- Paraguay, Brazil, Ecuador, Colombia, Costa Rica, El Salvador, Grenada (0.3-0.4 BOE per capita)
- Peru, Bolivia, Guatemala, Honduras, Nicaragua, Cuba, Guyana, Jamaica (0.2–0.3 BOE per capita)
- Haiti (below 0.1 BOE per capita)

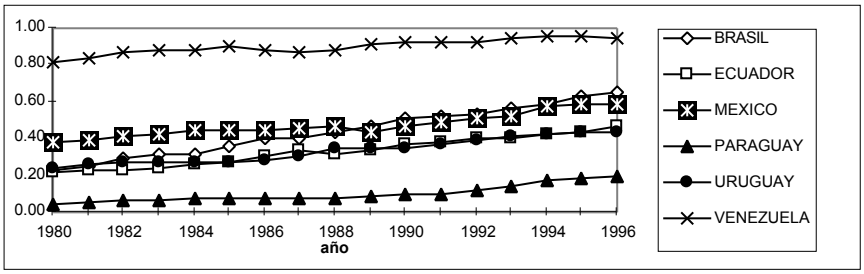
The stagnation of residential consumption of useful energy in Bolivia, Peru, Guatemala, Honduras, El Salvador, Nicaragua, Cuba, Guyana and Haiti is distressing, particularly because the average level these countries have achieved is barely above what is considered to be the necessary minimum (about 0.2 BOE per capita).

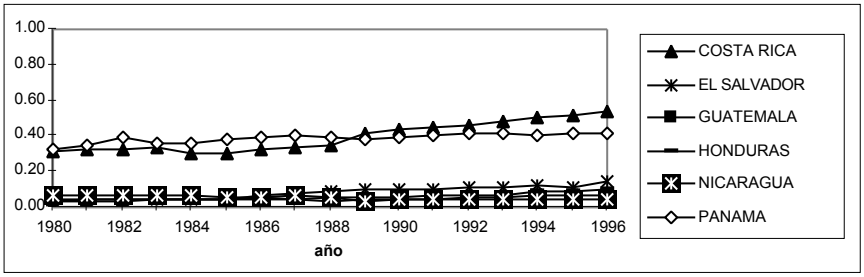
Sector modernization may have contributed to improving social supplies in Argentina, Chile and Colombia, or at least did not stop growth. In turn, there is no sign of improvement in Bolivia and Peru, whereas in South American countries under centralized coordination, social supplies improved gradually, as in several countries of the Caribbean and in Panama and Costa Rica.

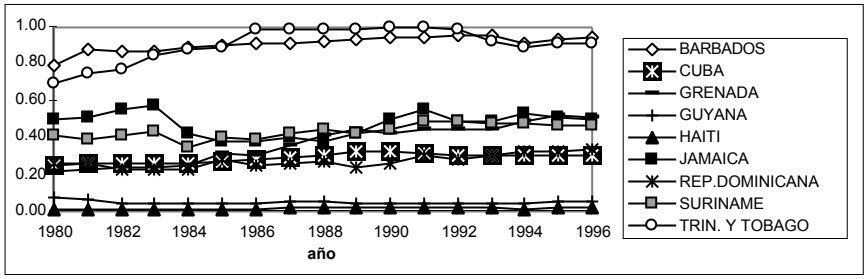
The largest obstacle seems to be poverty itself, which in Haiti and some Central American countries obliges a large part of the population to use wood, which in turn becomes more and more scarce.

Chart VI.14: Diversification of residential energy consumption



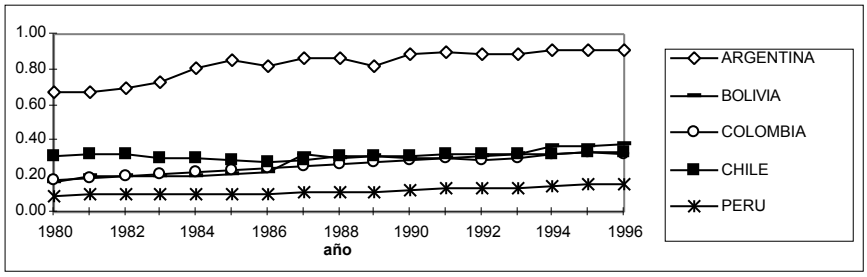


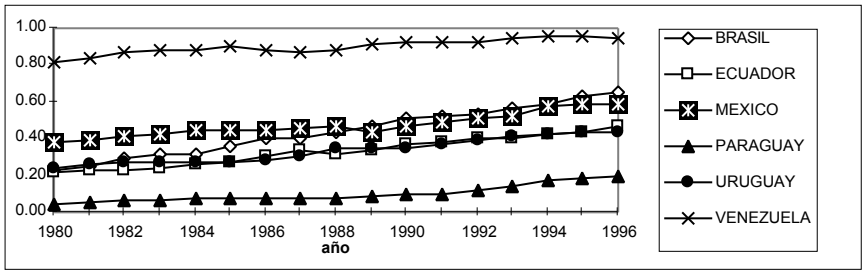


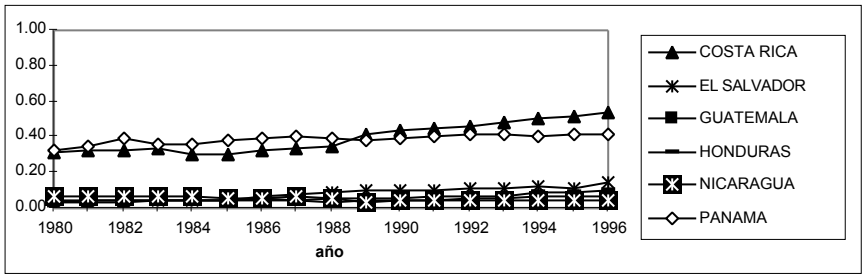


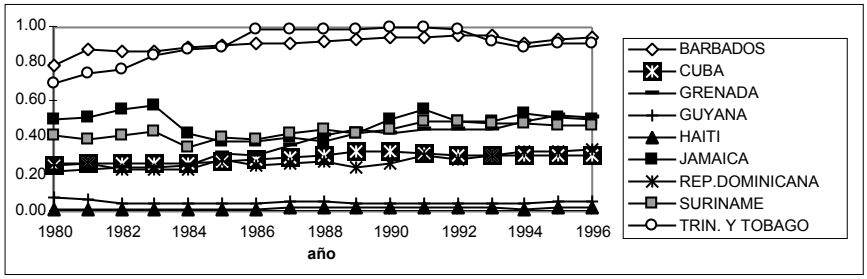
Source: OLADE-EC, SIEE

Chart VI.15: Useful per capita energy end-use









Source: OLADE-EC, SIEE

3.3.4 Macroeconomic impacts

Studies have been made on a series of macroeconomic indicators to identify the effects of the energy sector's management on fiscal balance, external equilibrium, price stability, employment, and the productive transformation process. These indicators are still preliminary.

a. Fiscal balance

For the fiscal balance, complete, high-quality statistics exist for the region's countries (IDB, ECLAC), such as fiscal surpluses or deficits, government transfers and subsidies, total investments, the debt servicing ratio, etc. The difficulty lies in associating the performance of these indicators to energy sector events, a matter which merits in-depth analysis.

As for direct results, it is evident that the allocations to the energy sector were reduced in the state budget because of declining investments by the State in the energy sector and the curtailment of open and hidden subsidies.

Energy sector project financing structures and schemes have changed radically. Whereas at the beginning of the eighties the State intervened directly or indirectly as lender or guarantor for loans from commercial and multilateral banks, most of the projects are now financed by project financing schemes and increasingly by non-recourse financing, whether in a framework of total or limited liberalization. Although the previous form contributed decisively to the indebtedness of the states, the debt from current energy projects is minimal. Therefore, the energy sector is not contributing to any increase in debt servicing, which is the highest item on the state budget.

The number of cases with effective and substantial subsidies has strongly decreased since the early nineties in the region's countries. The rule prevailing in the past involved generalized and hidden subsidies in the form of prices that did not even cover financial or economic costs. The gap between price and cost was covered by direct state investments in the sector and other kinds of transfers. This practice has not been completely abandoned, not even in countries where a profound reform was applied, but an attempt has been made to create transparency, reduce subsidies and concentrate them. The states were therefore

able to reduce the payment of explicit transfers to the energy sector, as well as implicit subsidies.

In addition, in some cases payments received from the sale of state energy utilities has been partially incorporated into the state budget (see the macroeconomic function of energy divestiture in Chapter I).

If modernization has helped to reduced part of the burden on the State's budget, then it has also helped to ensure fiscal balance. In fact, from general data we can see a clear improvement in the fiscal balance of most of the countries of the region during the nineties. It is impossible, however, to determine to what extent this is due to energy sector modernization without a more detailed quantified analysis. What is apparent is that some countries that implemented a more intense modernization of the energy sector, like Argentina, Chile and Peru, belong to the group that show the soundest fiscal balance data, whereas those countries that abstained from carrying out this reform did not achieve any improvement in their fiscal deficit until 1996. What causes concern in this picture is that some countries improved their situation even without any major reform of the electric sector, whereas others who did implement reforms continue to record major deficits.

b. External balance

As to the impact of the external balance, a reliable indicator has been found explaining the incidence of energy on foreign trade. To date, there is only a series of indicators available for the eighties. This shows how some countries, particularly Brazil, were able to reduce energy incidence in a decisive way during those years. In addition, the effect of the reduction of oil prices had a quantitative effect due to the substitution of energy imports.

c. Price stability

The issue of the impact of energy prices on price stability or on inflation is also a complex issue. Although the participation of energy resources in the consumption basket and in intermediate products does not seem to be important, there could be dynamic effects of inflation, stemming from subjective popular perceptions and speculation that also act as inflationary agents.

d. Employment

The share of the energy sector in employment is not significant in quantitative terms or with respect to the total labor force. With respect to the more highly skilled work force, the energy sector is an important employer since, in some local cases, the economy virtually depends on energy activities.

e. Productive transformation and coordination

The statistical analysis of the importance of energy in productive transformation processes, based only on the share of energy in value added or in production costs, would lead to an assertion similar to the one about employment: energy costs seem to be significant only in some sectors or places.

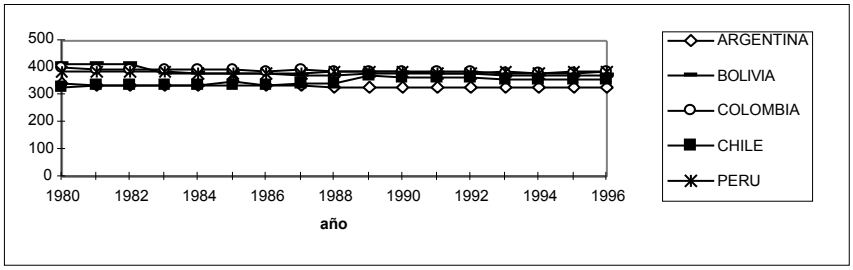
These assertions, however, could lead to erroneous conclusions. In growth policies, energy deserves special attention as a production factor (albeit sometimes as a constraint) and because energy production activities and rational energy consumption can become the driving forces behind economic activities, and therefore should be developed, but not only in those countries where it accounts for a large part of production.

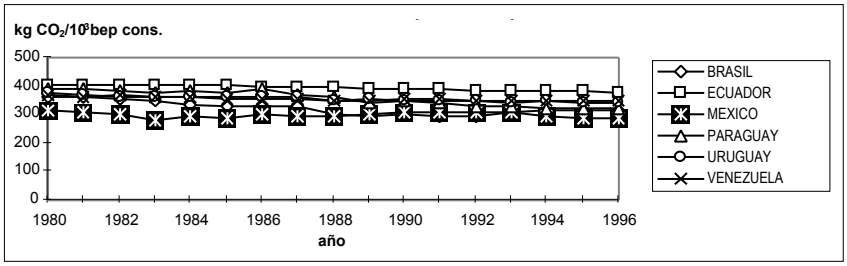
Due to methodological difficulties, we still do not have a quantitative assessment on how sector modernization has affected other parts of the economy. Among the direct results we must identify the reduction of state transfers and subsidies to the energy sector, the relative reduction of energy imports, price increases, and downsizing in the sector. Nevertheless, we still do not have precise information about the scope of these and other aspects, such as the revenues taken by the state. Therefore, a concluding analysis would be needed about the results of modernization and its effects on the fiscal situation, the external debt, the price levels, employment and the productive process in general, and particularly of its regional or structural dimensions.

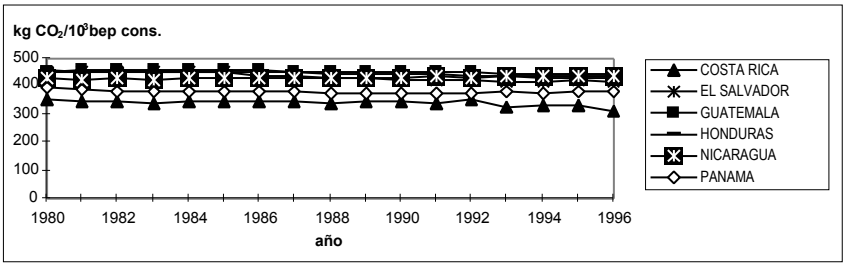
3.3.5 Social impacts

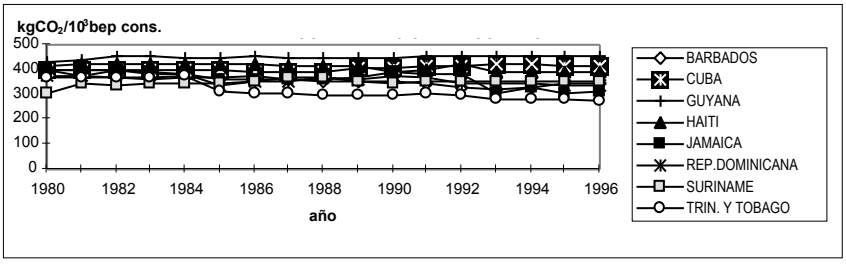
A specific effort is required to take the social analysis beyond the social supply results discussed in item 3.3.3 of the present chapter and to focus on opposition of groups affected by the modernization described in Chapter V, including the redistribution effects of sectoral modernization and the economic effects. There

Chart VI.16: CO_2 air pollution stemming from energy end-use









Source: OLADE-EC, SIEE

are several hypotheses about the way in which modernization has affected redistribution. For example, there is the thesis the living standards of the middle and lower classes declined substantially as a result, among others, of the increase of energy prices, in combination with higher prices for other public and private services, which led to associated adjustments in other sectors (rent, telecommunications, transportation, health, education, retirement); in some cases this deterioration was aggravated by the loss of full-time employment.

The scope of these effects and the energy sector's contribution to them would have to be confirmed through a more in-depth analysis.

3.3.6 Environmental impacts

The series of data on air pollution from energy end-use are not conclusive enough to identify changes resulting from modernization (see Chart VI.16).

If we apply as an indicator specific CO_2 emissions, correlating them statistically to other pollutants, we can see that in all of the countries they are in a relatively narrow band, between 300 and 450 kg CO_2 per BOE from 1980 to 1996. Within this band, the lowest emissions can be currently found in Mexico, Jamaica, Brazil, Argentina, Costa Rica, etc. Cuba, Guatemala, Guyana, Honduras and Nicaragua have the highest specific emissions. As a whole, taking into consideration emissions from energy production and transformation, among them the electric power generation indicated above, Brazil, Costa Rica, and Uruguay appear to be among the cleanest countries, in terms of air pollution from the energy sector. Brazil, in addition, along with Barbados, Paraguay, the Dominican Republic, Uruguay and Venezuela, is the country that achieved a considerable reduction of its specific emissions since 1980,.

In addition to the effects on the air, among other environmental impacts we must take into account those affecting soil and water quality. The problem in including them lies in the fact that they entail specific effects and that pollution is cannot be determined on the basis of the average figures of a country. This is particularly true with respect to indirect impacts of energy activities on local erosion and pollution problems, for example, triggered by energy projects (hydropower plants or hydrocarbon exploration) or enlarged due to the use of fuelwood.

In many sectors there is a concern that the environmental protection achieved, even though not always effectively, under a centralized coordination scheme for the energy sector, could suffer a setback due to the change in rules and the influence of the modernization of the energy sector.

4. A sort of interpretation

The preliminary comparative analysis of energy evolution and its economic, social, environmental and political consequences in the different countries, confirms the importance of background conditions, particularly with regards to coordination schemes, forms of private-sector participation, and pricing policies.

The existence of other factors, which exert considerable influence on the results, is also noteworthy: structural factors (level of economic development, social output distribution profile, endowment of natural and human resources, political culture, and economic and social organization, etc.) and specific temporary factors (extent of macroeconomic imbalance, fiscal emergencies, experiences of hyperinflation, etc.).

These latter factors also have an influence on how the selected schemes are implemented. To a certain extent, the way in which they are applied has an incidence on the results that could be more important than the scheme itself. In other words, the centralized control scheme works well under certain conditions and fails under others. It is possible that the risk of negative consequences under the centralized control scheme is higher than under the market scheme. This, however, does not necessarily hold true in all cases.

Another conclusion that can be drawn is that each scheme has its strengths and weaknesses. Therefore, the results taken into account for the assessment also depend on the priorities given to the objectives. The latter in turn depend on the situation of each specific country. For example, in a country with incipient energy development, supply objectives have a high priority. By contrast, in countries that already have a highly developed energy system, the whole issue of efficiency and/or resource protection has priority.

In the next few pages, we will try to provide explanation for these brief reflections. The analysis presented below focuses on the two most frequent schemes found in the region's energy subsectors.

4.1 Impact of compensation and cost; risk processing under different coordination schemes and its impacts

To carry on with the interpretation of the results and effects of sectoral coordination schemes and other factors, the explanation below focuses on the structure and incidence of benefits and costs and the sensitivity to risk of the different coordination schemes.

4.1.1 Centralized control tending to large development programs

The centralized control scheme prevailing in the region's energy systems before modernization showed capacity for the implementation of large-scale development projects and programs.

Most of the Latin American and Caribbean countries took advantage of the economic and political power that could be wielded by a highly centralized energy sector or subsector to carry out large-scale projects and programs for development purposes. Thus, many countries expanded their electric power systems relatively quickly. Other results are: oil sector development and expansion of the natural gas subsector until maturity in Argentina, the alcohol program and the expansion of oil production in Brazil, the large hydropower projects in the Southern Cone, on the Caroní River in Venezuela, and the chain of hydropower plants extending from Ecuador to Guatemala.

It can therefore be asserted that the centralized command-and-control scheme, at least up to a certain point, favored energy supply and regional and social coverage and, due to the priority given to hydropower schemes, contributed heavily to the reduction of emissions in the region.

This form of coordination has also favored focusing efforts of other objectives, such as the rational use of energy and the higher use of renewable energy resources, in addition to hydropower. The rational-use-of-energy programs in

Mexico and Brazil, the use of geothermal resources in Mexico and Central America, and several solar energy projects are examples of this.

This does not necessarily imply that other coordination schemes do not provide the facilities for carrying out these specific programs. The integrated system regulation modality (IR) is very good for demand-management programs or to give impetus to the massive application of renewable energy technologies, as seen from the experience of other regions.

In the United States and in some European countries, the regulatory bodies, whose mandates come from policy objectives, reached an agreement with the regulated enterprises to implement specific demand-management and other programs, such as the installation of emission mitigation equipment, in exchange for price increase negotiations. The successful programs aimed at introducing a larger share of wind generation in the electric power systems of Holland, Denmark, Germany and the State of California operate on the basis of specific regulations or agreements.

An example within the region is Costa Rica's policy of allowing private-sector participation in the installation of small hydropower generation plants, which is a specific program in an IR type coordination system.

The change over to the market scheme has put an end to these options of implementing specific programs in a coordinated (CC scheme) or negotiated (IR scheme) fashion . Nevertheless, there are several instruments available to achieve the rational use of energy and to utilize renewable energy resources also in the market coordinated scheme. These instruments can be included as part of the regulatory framework, such as the elimination of access barriers or even the prioritization of technologies and energy resources, for example, that contribute to sustainable development, the provision of adequate tariff structures, the creation of pertinent norms and standards, etc. Other options consist of promotion by means of information and education, specific taxes or subsidies to internalize external impacts, etc. To date, these instruments have virtually not been used in Latin America and the Caribbean.

It is difficult for the sector managing the market to handle the problem of rural energy supply. This requires a specific effort on the part of the State.

4.1.2 Consideration of risk in a centralized coordination scheme

The capacity to organize important programs, as well as the will to carry out actions that tend to favor certain types of development, does not necessarily mean that these programs or actions are always the best ones. Although it is true that a program or project can be evaluated definitively only after it has been implemented and that in the decision making process there is always uncertainty as to the future, experience shows us that some of these decisions have clearly been inadvisable.

Errors may have arisen from a wrong appraisal of border conditions or in identifying objectives that should have determined the decision or simply because the project was decided on the basis of partial interests, without due assessment of the advantages and disadvantages of implementing the project.

The CC scheme tends to be more prone to neglecting the steps needed to correctly and rigorously evaluate actions to be taken within a decision-making process, especially when, on the one hand, decision makers may benefit from certain compensations if they are successful, for example in the form of electoral votes, and, on the other hand, when the process is not very transparent and there is no clear cost accountability for mistaken decisions.

The possibility exists of transferring the cost of a mistaken decision to society as a whole. In other words, the cost will ultimately be covered by the taxpayers and/or other groups that eventually could be affected as a consequence of it by the deterioration of social services.

Thus, the higher economic risks of large-scale projects do not exert a dissuasive impact on decision making under the centralized coordination scheme.

Theoretically, the technical capabilities and control agencies under a CC coordination scheme should avoid mistaken decision-making. In many cases, however, experience shows that the contrary has occurred. Precisely, the complex decision making processes that involve central planning, approval by the executive power, auditing by the comptroller, and the legislative branch, “culturally” favor larger-scale and higher-risk projects. The implementation of these programs or large-scale projects often require lobbying in favor of certain

arguments that once formulated can become ideological positions that are not easily overcome.

It is clear that these considerations are not applicable across the board to all cases. In the group of systems coordinated by the CC scheme, some seem to be "better organized," that is, they have more institutional stability, there is little turnover of their technical staff, and what is even more important, responsibilities are assigned on the basis of decision-making impacts. Thus, accountability for achievements and failures is ensured.

The latter condition can be achieved by means of the effective legal and organizational breakup of state enterprises, a condition that has existed in some countries and subsectors and that has led to better results.

By contrast, in those systems where there is little transparency in the decision-making processes, unclear allocation of responsibilities, a high turnover of management staff, and few opportunities for critically examining decisions, the risks are enormous.

In summary, the preference for large-scale programs, combined with the higher possibility of transferring the costs of a mistaken decision, are a systematic source of risk in centralized control schemes.

Examples of this type can be found in the following situations: installation of hydropower stations in regions where there are wide fluctuations in hydraulic conditions and where there are no complementary facilities needed to ensure supplies in critical weather conditions, as in Central America, Colombia and Ecuador. Chronic outages and energy supply rationing underscore the consequences of these decisions.

On the contrary, Brazil with its orderly centralized coordination scheme and clear allocation of responsibilities—and in spite of an even higher percentage of hydraulic generation—was able to avoid this type of problem, at least until now, due to more prudent technical planning and approach.

Other examples of Brazil's capacity to carry out large projects are the PROALCOL program and the increase in oil production aimed at reducing energy imports. Although the advisability of the former could be argued, in view

of current conditions in the international oil markets, as well as of some environmental impacts, there is no doubt that the latter has been and continues to be very useful. The question is why did Brazil not consider in the past a program aimed at increasing the share of natural gas in its energy supply mix.

The comparison with large-scale programs, their implementation in centralized coordination schemes, and their further assessment indicate that mistakes are not necessarily a consequence of this type of coordination. Risks, however, do seem to be higher and, as important programs are involved, damage can be considerable.

4.1.3 Consideration of risk in market coordination schemes

The consideration of risk in market coordination schemes is very different. There is a much higher sensitivity to risk than in integrated management schemes for state-owned energy companies, but this sensitivity is also higher in the case of enterprises that enjoy certain independence and responsibility inside the state system.

Theoretically, in the case of market coordination there is a complete identification between the decision maker and the person accountable for results. In business organizations, the shareholder interests determine decision-making priorities.

It is apparent that decisions characterized by a higher degree of sensitivity to risk favor investment opportunities with shorter recovery horizons and higher profitability rates. Thus, certain investment projects that, over the long term, could be economically and socially more profitable and ecologically more desirable are often dropped.

As demonstrated in the case of Chile, where both hydropower and coal-fired thermoelectric plants are being built, investments of this kind are not discounted if border conditions exist: considerable reduction of the country risk and commercial risks and a higher inclination to provide sufficient profitability (see Inset VI.1).

It can be deduced that, with a market coordination scheme, the possibility of a divergence between private-sector objectives and social purposes in resource

allocation decisions is enhanced when there are a higher political and business risks in the country.

On the positive side, it can be pointed out that the global costs of mistaken decisions are usually lower. On the one hand, the magnitude of the risks themselves is constrained, because in a decentralized decision-making scheme the possibility of accumulating large mistakes is much lower than in state programs that can also be affected by one single program error. This modality also excludes the coordination of projects implemented solely for political reasons.

These considerations once again highlight the need for intelligent policymaking, one that can complement the market coordination scheme in order to influence the type and course of investments.

4.2 The influence of other factors

4.1.2 Variety of results from the CC scheme in domestic supply and determinant factors

The centralized control scheme involves a wide variety of results and objectives or criteria adopted to lead the decision making processes. In most subsectors that had been managed according to this modality, there was at least one period of time in which results in terms of domestic energy supply were clearly positive: coverage of energy requirements improved significantly, supply and infrastructure expanded substantially, and electricity service was provided to marginal population groups.

All of this contributed decisively to creating the conditions for, and giving impetus to, economic and social development. Some systems of this type have been able to ensure, to date, satisfactory evolution of supplies. In others, problems emerged and quickly worsened, especially as of the early eighties.

Some of the factors producing this disparity in the results have already been mentioned. Among other factors, the most noteworthy are the lack of transparency, the lack of correlation between decision makers and those held accountable for the decisions taken, the lack of institutional stability, and the high turnover of professional teams. In addition, in an assessment of the historical

experiences of some countries the sociopolitical and macroeconomic situation prevailing in the eighties has to be taken into account. Central America and Peru, for example, sustained political upheavals and civil war, which evidently affected the sector's operation.

A common problem in most domestic energy supply systems using a centralized command-and-control scheme has been their inability to sustain financing, which has undermined their capacity to expand their systems. This financial erosion of the system has appeared with different intensity in the different countries and has always occurred at the same time.

The pricing policy has been identified as one of the determinant factors in this problem, as well as its degree of intensity. Nevertheless, one must not forget the influence of drastic changes in international financial market operations and in the policies of multilateral credit organizations at the beginning of the eighties.

4.2.2 The importance of the pricing policy

There is no doubt that the pricing policy is a key factor in the ability to expand the systems. Therefore, it is also evident that the pricing policy is of utmost importance for the sound operation of the system, a key factor in the differences between results. The pricing policies in Latin America and the Caribbean (see diagrams VI.2, VI.3, VI.4) can be differentiated on the basis of certain criteria determining their main orientations:

1. Fixed prices based on the economic costs of energy resources and to a lesser extent associated with a subsidy policy based on social equity considerations.

2. Prices aimed at applying an industrial development policy and, more recently, increasing national competitiveness on the global market.

3. Fixed prices based on the assumed payment capacity of consumers or aimed at addressing the costs of a supply expansion strategy within the framework of the state's budget.

4. Use of price mechanisms to distribute energy revenues in oil-producing countries.

In the electric subsector, few countries continued with a pricing policy based on economic criteria or any well-defined rationale. An OLADE study on the situation toward the end of the eighties showed that most of the countries kept their price levels below long-run marginal costs. There were some exceptions among which several Caribbean countries, which always kept an economically rational pricing policy, in spite of their high generation costs based on small diesel facilities.

- At that moment, only Chile had switched its electric system coordination scheme to the market scheme, a change that involved adjusting price in terms of financial costs. During the eighties, most of the countries, with the exceptions already indicated, had allowed electric prices to evolve away from financial costs, which in turn had increased due to growing capital costs.

- Since then the situation has changed repeatedly in different countries. In those that continue with the centralized command-and-control scheme, the change was only partial, whereas in others like Argentina, Peru and Bolivia the adoption of the market scheme and widespread divestiture drastically changed the situation.

- Brazil adopted the policy of bringing its prices closer to economic costs, although keeping the prices of some tradable energy resources below international prices. Apparently, in the case of the electric sector, prices have not been enough to help meet long-term power generation expansion requirements, and this has disrupted the hydropower expansion program and enhanced the likelihood of a capacity deficiency over the medium term.

- Venezuela was able to apply a pricing policy that combined both the oil revenue redistribution scheme and the objective of favoring national industry expansion on the basis of cheap energy. With this incentive, the degree of electrification, diversification, accessibility to high-quality sources, residential electricity consumption and useful energy consumption have reached very high levels in this country, although it is also probable that inefficiency in energy use has consumed part of the comparative advantage fostered by lower prices. These pricing levels did not promote the incorporation of technological innovations in production, and the population became used to inefficient practices. Thus, the costs of this policy continue to grow and are apparent not only in terms of its fiscal impact but also in terms

of the lack of competitiveness at the moment of commercial liberalization, when the industry should have addressed global competition.

- Ecuador continues with its strategy of favoring residential consumption to the detriment of industrial consumers and the national budget. In fact, the different price hikes were imposed exclusively in response to budgetary needs. The positive aspect of this is evident in the wide diversification and high quality of energy resources for residential consumption. The penetration of liquefied gas, a relatively high electricity coverage, and the relatively low consumption of woodfuel for residential consumption, have contributed to preserving the forests. The economic costs of this strategy are less and less sustainable, particularly because of the burden on the State's budget, the lack of funding in the electric power sector, and the import of liquefied gas.

In the case of electricity, financial costs are very close to economic costs. Therefore, if the gap between prices and economic costs becomes increasingly large, then extensive additional funding from the national budget will be needed. Therefore, being able to sustain this policy will depend on the degree of divergence between prices and economic costs and on the State's capacity to withstand the resulting deficits.

In the case of oil products, producer countries have the option of supplying their domestic market by setting prices that are at the same level as financial costs, that is, by waiving revenues that prices based on opportunity costs would bring. The financial costs of this strategy are lower, and this policy seems to be more sustainable. The effects on energy efficiency and emissions, however, as well as on the use of natural resources, could be negative. In addition, waiving revenues more in tune with opportunity costs would also involve relinquishing the possibility of balancing the public budget.

In addition, the social impacts of transferring these revenues to consumers of oil products are not necessarily positive. Usually these revenue transfers do not reach the neediest sectors of the population. Those who would seem to benefit most from this policy are those who consume the most. In theory, it would be preferable to have a more transparent redistribution system, such as a direct social allocation system. Nevertheless, the precariousness of social security systems of the region's countries means that the use of prices as a mechanism for income redistribution is the instrument that is least viable.

In any case, in some countries like Peru, Bolivia, Chile, and Argentina, the situation prevailing at the moment of the reform enabled them to drop the tradition of applying subsidies on the energy resource prices without any major conflict. In other countries, on the other hand, like Ecuador, Colombia and Venezuela particularly, the population considers that certain low energy resource prices are a social benefit rightfully acquired and that, if this entitlement were abandoned it would not be replaced by any other alternative redistribution system. The population therefore clearly perceives that any change in this sense will be detrimental.

This involves certain "cultural" characteristics that must be taken into account when assessing the consequences of modernization.

4.3 Centralized control and open market schemes in the upstream oil sector

In exporting countries, the centralized command-and-control scheme applies an approach to the petroleum sector's upstream activities that is very different from that applied to activities involving the supply of oil products to the domestic market. As seen in Chapters II and III, the adoption of this coordination modality is aimed principally at ensuring revenues for the State.

In any case, as also indicated, there have been important changes in the coordination schemes of the oil industry. Whereas Argentina and Peru introduced a type of market coordination scheme and offered concessions for the ownership of onsite resources, the oil-exporting countries made minor changes and did not do away with the centralized control system at this point. In addition to the restructuring of enterprises, private-sector players were given opportunities to participate under different schemes, such as the sale of services, partnerships, participation, and strategic alliances.

The more drastic changes taking place in Peru and Argentina can be explained by the critical condition reached by the petroleum industry in the former country and the urgent need for funds to achieve macroeconomic stability in the latter country.

4.3.1 Evolution of reserves and production under different schemes

After reviewing the evolution of crude oil production over the last 17 years in the entire region, the following is the most noteworthy: the increase of reserves and production in Brazil during the eighties; increased production in Argentina over the last few years; the growing and stead trends of reserves and production in Colombia; the reversal in the evolution of these variables in Peru and Bolivia after long years of decline; and the reassessment of reserves in Venezuela and Mexico.

These events took place under different circumstances and coordination schemes: some occurred in situations of complete centralized control (with one only state and integrated enterprise), where in others they occurred as a result of limited liberalization or driven by the change of scheme, by privatization and/or the conclusion of domestic political strife. There is no doubt that there is some randomness in the discoveries, particularly in the case of the large deposits. Nevertheless, the main exploration efforts triggered by framework conditions have played a decisive role in this. It is therefore impossible to attribute the success in terms of production and exploration to a specific coordination modality.

4.3.2 Increased productivity and changes in the mission

We also have to take into account the fact that the petroleum history of each country is very different. From the very start, Argentina and Brazil developed their domestic production on the basis of national enterprises, whereas other countries nationalized and transferred to the State a large part of previously existing activities that had been in the hands of multinational companies.

For example, the model for developing the petroleum sector in Argentina was very different from that of Venezuela. The YPF state enterprise, in addition to expanding hydrocarbon reserves and production to ensure the country's domestic supply, was entrusted with developing the desert regions, which is where these resources are located. The organization and infrastructure created for this purpose were therefore very important and included many services that apparently had little to do with the petroleum sector but which were essential to promote national development. Strictly from the sector's microeconomic perspective, productivity of this enterprise was of course lower than that of

multinational petroleum companies. Using a more global viewpoint, however, there is no doubt that the comparative result would be different.

Limited liberalization in the upstream activities of the oil sector of exporting countries has a long history. It is noteworthy that it does not entail major inconsistencies or problems such as those encountered when the scheme is applied in the electric power sector, as it is apparent below, and it is able to work suitably in its different forms.

It can be surmised that the private service system coordinated by the state enterprise served to train, stabilize and ensure the professional capabilities of an entire system of enterprises and agents. In Argentina, in the past, this type of structure facilitated the development of local oil companies which, with total liberalization, acquired more autonomy and formed a private oil sector capable of developing new fields, producing, transporting and refining, a sector that has now diversified its activities of other subsectors in the country and/or abroad. Although there are concerns regarding the economic and political power of these groups, it should be noted that they have become a factor for the financial and technological development of the country and even of the region.

In any case, the effects on microeconomic productivity, as well as the social impact stemming from the shift of coordination scheme and the divestiture of assets in the Argentine energy system, have of course been very important, since this transformation also involved a change in the mission of the enterprise. A large number of social conflicts occurring in these regions over past years is related to this change.

The increased productivity of YPF after the change, measured in terms of production per employee, seems to be quite substantial compared to other companies like PEMEX, PDVSA, or PETROBRAS, which were also able to considerably improve their productivity from 1985 to date, although on a different basis. The social impacts of this change, in terms of a higher social and spatial concentration of wealth and the deterioration of regional development conditions, are also much more important.

4.3.3 Taking oil earnings

As to the appropriation of revenues, the different forms of divestiture seem to have had different consequences. In the case of Argentina, revenues from fields were handed over in concession to private companies, except for the part corresponding to royalties or taxes levied by the provinces and the national State. This scheme would have been appropriate if the value of the reservoirs or fields granted in concession could have been calculated accurately. It is probable that the Argentine state was unable to capture through this scheme the present value of future discounted revenues. Without questioning the use of the amounts received or swapped for debt, a significant amount of revenues could have been transferred to private-sector players.

In this sense, the policy applied by Bolivia seems to have been different, one aimed at ensuring that revenues from hydrocarbon resources would end up in the hands of the population: every Bolivian is entitled to an equal share, in the form of a pension plan, while keeping a share in future earnings from the profits that allow them to increase this retirement fund.

4.4 Limited liberalization in the electric power sector

4.4.1 Different outcomes stemming from different initial conditions

What has been generally asserted about the centralized command-and-control scheme also holds true for limited liberalization in the electric power sector, which is conceived essentially as means to involve private-sector participation in financing power sector expansion investments and, in the best of cases, in transferring technology without doing away with the above-mentioned coordination scheme. The results are highly diverse, depending on the point of departure and the extent to which private-sector players were allowed to take advantage of the opportunities offered by the new conditions.

In those cases where independent producers have been contracted under emergency situations due to capacity or energy shortages or due to supply constraints, the results seem not to have been too favorable. The technology used—normally a turbine using diesel as feedstock–was not the most efficient one possible, economic costs were quite high, the impacts on the market of this

diesel fuel triggered imbalances, and contract terms caused suboptimal operation. Although these contracts helped to meet short-term emergency needs, they neglected the possibility of applying long-term solutions and led to even further imbalances.

When the groundwork for this liberalization was laid with caution and when power generation technologies, such as natural gas combined cycle, were used with a highly structure contract scheme, the situation was quite different. The cases of Colombia and Mexico can be cited as examples. As indicated by the experience of Costa Rica, limited liberalization with a long-term scope can help to reach specific objectives such as hydropower generation expansion.

4.4.2 Limited liberalization: transition toward total liberalization?

The dynamic consequences stemming from the partial liberalization strategy for electric power systems raise a question about whether this might not be a step toward total liberalization of these system, that is, the open market scheme.

A first element to bear in mind is that the introduction of independent generators, which are guaranteed a price to cover all of their costs and earn a certain profit margin, cannot be sustained with a scheme that operates on the basis of subsidized prices for consumers. In the case of small systems, this imbalance can force a general price adjustment.

In Guatemala, limited liberalization ultimately led to the introduction of the market scheme. Likewise, Colombia shifted from limited liberalization as an intermediate phase toward a major overhaul. In other Central American countries and in Ecuador, it seems that something similar will take place.

4.5 Total liberalization of the electric power sector

4.5.1 Investment dynamics and the risk of single-fuel schemes using natural gas

One of the most important positive consequences emerging from the as yet brief experience with open market scheme, particularly in Argentina and Chile, has been the marked investment dynamics of new private-sector players. This is

particularly true when bearing in mind the high degree of uncertainty involved in the operation of bulk markets due to the high share of hydropower generation and the marked randomness of hydraulic conditions.

In addition, this dynamic investment trend has enabled Argentina—as well as other countries like Colombia, Bolivia, Peru, and possibly Chile that have low-cost natural gas—to quickly incorporate a new generation of technologies that have much higher energy efficiency. The availability of low-cost natural gas, in addition to encouraging the investment process and the use of new technologies, is a very important factor in promoting competition through the participation of new generators.

In Argentina, new investments have been an instrument for competition between the new private-sector players. Although at the time of the reform the hydropower plants under construction were expected to ensure supply for a period of about eight years, the new private-sector actors installed, or offered to install, about 4000 MW in thermal plants between 1992 and 1998. In general, these are players involved in the natural gas "business" or having access to gas at favorable prices. Thus, these investments contributed, in a proportion almost equal to those of the State, to the considerable increase in excess installation of facilities, which compounded by higher efficiency in the installations and greater availability of gas led to a further drop in prices.

The availability of equipment and machinery, which assumes a reduction in the classic relationship between capital intensity and greater thermal efficiency, along with higher discount rates used by the new private players, could contribute to reducing the competitive potential of hydropower resources, with the resulting impact on non-renewable natural resources like natural gas.

4.5.2 Explanations about the performance of prices

As for the consequences of the open market scheme for end-user prices, the little time that has elapsed does not yet enable a clear assessment of the results to be conducted. If we wish to go beyond mere observation (see Charts VI.2 and VI.3), we can only formulate some preliminary considerations based on the experience of Argentina, Chile, and possibly Colombia.

In Chile, the bulk market price is regulated on the basis of long-run marginal costs and, apart from the fluctuations stemming from variable hydraulic conditions, has showed a slightly upward trend. By contrast, in Argentina, bulk market operations within the new conditions have led to a downward trend in the corresponding prices observed on the wholesale market. As indicated in Charts VI.2 and VI.3, retail prices have not followed this trend.

In the case of Colombia, this trend was accompanied by a marked volatility due to strong seasonal variations in hydraulic conditions. There is no doubt that stronger competition has played an important role in the behavior of prices. The presence of other factors, however, prevents us from drawing any clear conclusion regarding the results. For example, in Argentina it is feared that, once the impact of the start-up of the Yacyretá hydropower plant (3100 MW) has dwindled, wholesale prices will once more go up.

As for retail prices, the regulatory difficulties involved in controlling the profit margins stemming distribution have led to real price hikes, as in Chile, or the failure to incorporate bulk price reductions to retail prices, as in Argentina and Colombia.

4.6 Some general conclusions

The conditions in which the reforms have been carried out, the different points of departure, and other types of factors have exerted as much, or even greater, influence on the results as the coordination schemes adopted. We can therefore conclude that the type of scheme is less important than the way in which it is implemented.

Nevertheless, it is also true that the schemes considered here seem to work better under certain conditions in contrast to others and that they seem to obtain certain results instead of others. The open market scheme seems to foster discipline in energy policymaking, especially pricing policies. The latter is of special importance since one of the main factors for the sound operation of an energy system is precisely tied to the adequate management of pricing policies.

In countries that have opted to continue with centralized command-and-control schemes as their predominant coordination scheme for all or some of the energy

subsectors, pressures to implement reforms had the virtue of giving impetus to a separation between business management of state-owned enterprises and the State's central administration and triggering improvements in performance auditing and monitoring.

In addition, in those case where the reforms involved an option in favor of the OM scheme, certain weaknesses have been noted in the operation of the regulatory bodies and in the use by the State of indirect instruments for intervention enabling social objectives to be reached.

As a rule, the proposals set forth at the beginning of this section can be confirmed. Rather than emit some kind of judgment on the advantages of one scheme over another, what seems most important is to invert the judgment procedure and try and identify those concrete conditions that have favored the success of one coordination scheme over another and those objectives that were at the basis of the preference for selecting these objectives. It must be emphasized here that the intelligent application of the different schemes can help avoid negative impacts in terms of certain dimensions or objectives.

NOTES

1. See a presentation and reflection on this indicator in Annex II of the publication of the project OLADE/ECLAC/GTZ, "Energy and Sustainable Development in Latin America and the Caribbean: Approaches to Energy Policy," Quito, 1997.

2. Regarding, OLADE, with support from the countries, will be updating the study made at the end of the eighties with the World Bank. See OLADE/World Bank, "Evolution, Situation and Perspectives of the Electric Power Sector in the Latin America and Caribbean Countries," The World Bank/OLADE, Washington/Quito 1991.

3. See, for example, the econometric analysis of changes in productivity of all of the factors and the appropriation of productivity earnings, induced by the divestiture of state assets, in Ahment, Galal et al, "Welfare consequences of selling public enterprises: an empirical analysis," published by the World Bank, New York, 1994.

4. As for prices for the natural gas subsector, please refer to the analysis in paragraph III.3.

5. See quantitative analysis in OLADE, "The External Debt of the Energy Sector in Latin America and the Caribbean," Quito 1988.

6. As a result, on the one hand, using energy prices as an instrument for stabilization has not been successful and, on the other hand, the impact of price adjustment is not very high. See OLADE, UNDP, World Bank: Study on pricing policies for oil and products in Latin America and the Caribbean, OLADE, Quito 1991.

7. Within the framework of the OLADE/ECLAC/GTZ project, work has begun on analyzing these matters in the national case studies of El Salvador, Colombia, Bolivia and Brazil. See references in the summary of the OLADE/ECLAC/GTZ project, Energy and Sustainable Development, op. cit.

8. See on this subject the chapter "Energy and Natural Resources", in the OLADE/ECLAC/GTZ project, Energy and Sustainable Development, op. cit.

9. It would be interesting to study the provisions incorporated by the Scandinavian countries and Great Britain into their regulatory frameworks for the electric subsector.

10. OLADE/World Bank, op. cit.