

Energy Integration in Latin America and the Caribbean





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Latin American Energy Organization

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CONTENTS

Foreword	iii
Acknowledgments	vii
Executive Summary	ix
I. Introduction	1
II. The effects of globalization and of the formation of blocs on regional and hemispheric integration	2
1. The framework of reference	2
2. The effects of globalization and of the formation of blocs on regional integration	4
3. The effects of the formation of blocs on hemispheric integration	8
III. Regional energy integration	11
1. Reserves, production and consumption	14
2. Energy trade	31
IV. Perspectives for energy integration	36
V. Energy Investments: new forms of financing	54
1. Trends in the macro conditions for financing of the energy sector	54
2. Situation of the financial markets in Latin America and the Caribbean and access to the international markets	59

3.	Financing investments in electricity	61
VI.	Institutional aspects that are relevant for energy integration	69
1.	International energy organizations	69
2.	Relationship between national policies and energy integration	81
3.	Priorities given by the international organizations to energy integration	83
VII.	Guidelines for a regional energy policy	86
VIII.	Conclusions and Recommendations	93
1.	Economic integration	93
2.	Regional and hemispheric energy integration	95
3.	Investments and financing	103
4.	Institutional aspects	104
5.	OLADE's role in the regional and hemispheric integration processes	105

Foreword

The present book, being issued on occasion of ENERLAC 96, provides a thorough discussion of energy integration and its feasibility for Latin America and the Caribbean. It brings together valuable energy information, stemming from over a year of work of data compilation, analysis, and interpretation aimed at assessing the region's prevailing trends, retrieving concepts that are still valid, and generating several new bold proposals whose evaluation will help to determine their physical, economic, and financial viability and which players must implement them.

Since the oil crisis of the seventies, the region's countries have been changing their energy supply structure: they have been undertaking important hydropower projects, initiating energy integration processes on the basis of shared hydropower resources, reducing global environmental impacts, improving the regulatory regime of rivers, promoting irrigation in arid and unproductive areas, developing new energy sources and technology, and substantially curtailing dependence on external energy. The external financial debt that these projects and activities generated contrasts dramatically with the huge environmental debt that industrialized countries, the creditors of the above-mentioned financial debt, have incurred. Nevertheless, while we are paying with great difficulty the servicing of these financial debts, at the cost of major sacrifices for society, no one has acknowledged responsibility for the global environmental debt.

We should also recognize, however, our own errors and correct the widespread belief that only outside forces are to be blamed for our problems. The social debt, due to our neglect of health care, education, housing, and a regressive distribution of social product can only be imputed to our own social responsibility. This situation, which demanded special efforts to mitigate these problems, contributed to transforming our energy companies into social policy or

sectoral promotion instruments, such as the use subsidized energy prices and tariffs, undermining their ultimate purpose and converting them into anti-economical units, with severe maintenance problems. In some cases, the companies' own resources have been insufficient to cover debt-service payments, and in others they have become extensions of public bureaucratic structures or suitable mediums for political nepotism. Without acknowledging these mistakes, our moral authority in the eyes of the rest of the world is unconvincing, and therefore our negotiating stance to substantiate our claims on the environmental debt is also unconvincing.

During the eighties, a period also called the lost decade, multi-lateral banks reduced energy project financing. This led to lags in the timetables for installing facilities; along with the above-mentioned conditions, this induced rationing and energy impoverishment in terms of both quantity and quality in several countries.

Under these circumstances, in the early nineties, the region began a unique process: States were reformed or reorganized and energy companies were transformed to provide access to more effective means of producing, distributing, and consuming energy. In addition, financing forms more in keeping with new options and feasibility were made available. At the same time, the countries began to re-orient their development objective toward persons, providing a clearer notion of the final goal of economic activities and especially energy activities.

Within this context and in view of the globalization process, the States began bloc integration processes aimed at mitigating the impact of international competition for which we were not yet prepared, to avoid the disappearance of part of our industry, long accustomed to energy subsidies, poor service quality, limited production scales due to small markets, and indiscriminate protectionism that also favored low-quality and noncompetitive production, compared to the rest of the world.

But the response to these integration processes is gradually displaying progress in the region's insertion in international markets.

These processes could make further inroads if higher amounts of energy were made available to the production centers of goods and services under low-cost and low-risk supply conditions with adequate environmental protection.

For this purpose, the future energy configuration of Latin America and the Caribbean should also tend toward the physical integration of potential sources, such as electricity and natural gas. Economic and financial assessments of these projects should be conducted using a regional approach and aimed at ensuring long-term supply, on the basis of indigenous resources and potential, and inspired by a regional sustainable development approach to avoid falling once again under the shadow of energy rationing.

The players in this process, governments, public and private companies should therefore come to an agreement to harmonize national energy policies with regional ones, on the basis of a common energy agenda that would first facilitate making voluntary commitments stated in an Energy Charter for Latin America and the Caribbean and then formalize binding obligations by means of an Energy Treaty.

The topic of the present book was provided by the XXV Meeting of Ministers of the Energy Ministers of the Member States of OLADE. The Permanent Secretariat's efforts to prepare the present publication were complemented by the member countries and international agencies, which supplied information, contributions on this matter from the Project Energy and Sustainable Development in Latin America and the Caribbean being conducted jointly by OLADE, ECLAC, and GTZ under the auspices of Germany, and the specific tasks carried out by the German Technical Cooperation Agency (GTZ). A study conducted by an independent institution of the region, the Energy-Economic Institute (IDEE) associated to the Bariloche Foundation, was also involved in the implementing this project.

Although we believe that the time allocated for preparing the present topic has not enabled us to be as thorough or analytical as

we would have wished and the editing may be somewhat deficient, we have preferred sacrificing perfection to provide a sound overview of the subject. Otherwise, we would have lost the opportunity to reach the reader in a relatively short time, in view of the speed of the changes taking place in the region.

Francisco J. Gutiérrez
Executive Secretary

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- Central American Electrification Council (CEAC)
- Regional Electric Power Integration Commission (CIER)
- Economic Commission for Latin America and the Caribbean (ECLAC)
- Latin American Reserve Fund
- Financial Fund for Developing the River Plate Basin
- Andean Development Corporation (CAF)
- Central American Economic Integration Bank (BCIE)
- Latin American Iron and Steel Institute
- Cartagena Agreement Board (JUNAC)
- Latin American Integration Association (ALADI)
- Reciprocal Assistance of Latin American Oil Companies (ARPEL)

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Executive Summary

I. Introduction

The breakup into self-protected blocs that is apparent among industrialized countries and the barriers that some of them are erecting in international trade will not facilitate the development process of Latin America and the Caribbean, unless greater efforts are made to set up larger markets and to tie regional interests together by means of economic integration processes. It is evident that the region's energy sector has a comparative advantage in terms of availability of primary energy. This gives it an excellent vantage point from which to face the challenge of large-scale regional and hemispheric energy integration and to provide benefits that are relevant for economic and social development.

From the specific viewpoint of the energy sector, although the region is quite rich in oil, natural gas, and coal reserves and has considerable hydropower potential, it is dramatically poor in terms of installed electric power generation capacity and therefore in terms of consumption. This is a variable that explains and underscores the region's significant lag compared to industrialized countries, as well as the poor living conditions and few competitive opportunities this implies. In this sense, suffice it to see the linkage between electric power consumption and the degree of development in each case, even among the region's countries.

The sustainable development process of each country and the region as a whole requires more electricity. To ensure this, innovative ideas are needed and the old dilemma of what comes first must be resolved. Without abundant, safe, reliable, and low-cost electricity, it is not possible to think of installing industries or of competitive industries or of investors willing to run commercial risks. The costs involved in making available the minimum capacity needed to meet current consumption levels, the enormous energy losses, rationing with the installation of auxiliary plants to back up production, and the uncertainty of whether or not there will be shutdowns and low-quality service oblige most of the region's governments to find the means to provide this public service efficiently, fairly, and with a minimal environmental impact to ensure better supply conditions than have been available to date.

As part of this process, oil and products, natural gas, and coal are no less important. Their relevance for electric generation, the transportation sector, and industrial and agricultural use also underscore the need to guarantee their supply within the region.

Several countries will have to decide, however, whether they should continue with the concept of national energy autonomy, which involves large investments for exploration, identification of energy potential, and capacity creation, or replace it with regional energy autonomy. If a consensus on this last approach were to be reached, agreements could be drawn up to revert the above-mentioned lags on the basis of greater regional solidarity.

One of the ways to mitigate the deficiencies referred to above over the medium and long term is to foster energy integration processes right now, so that through the interconnections between countries and subregions we can gain access to existing surplus capacity and complementary hydropower, as well as the primary energy (oil, natural gas and coal) and hydropower potential that would enable electricity to be generated at a lower cost and ensure supply for the different socioeconomic sectors. Although these integration processes will not suffice to halt, over the short term, the region's relative backwardness compared to the industrialized world, at least the disadvantages will be reduced with the possibility of a safer supply and electrification of the society and more energy availability, to thus achieve a more competitive industry on international markets.

Energy integration processes require that projects be developed within a regional, subregional, and national perspective which, in addition to profitability, should ensure long-term supply. Thus, the governments will have better fulfilled their responsibility of ensuring this public service for the different socioeconomic groups. In turn, regional energy prospects should include the effects of these integration processes, which will certainly change the investment structures in each country.

Investments in new capacity will require financing from different sources and using modalities that are different from those of the

past. The financial engineering required for the current funding of new projects—particularly with regard to electric power generation and transport and the distribution and transport of natural gas—is highly sophisticated and complex. Therefore, those countries requiring these new forms of financing should use as a reference the experience of other countries in the region and broaden their knowledge.

OLADE, as the region's public energy forum, is an extension of the energy ministries of the region's member countries. It has experience in providing advisory services in its member countries, implementing international cooperation agreements, conducting regional studies, and setting up forecasting and information systems supported by the countries. This Organization provides adequate support for studies on project development and integration processes between the subregions. In addition, it is a natural forum to exchange experiences and implement regional energy integration agreements.

The region's public and private power and oil companies are also represented by regional nongovernmental energy institutions, such as the Reciprocal Assistance of Latin American Oil Companies (ARPEL), the Regional Electric Power Integration Commission (CIER) and the Central American Electrification Council (CEAC). However, interactions still need to be promoted to expand regional cooperation and to allow private enterprise in the sector, from service contractors and equipment manufacturers to independent energy producers, to increasingly participate and influence this sector's decisions in some countries, in keeping with guidelines set by the governments. The incorporation of new players in this activity should be considered in all links of the energy chain, including energy integration. OLADE has therefore begun a process of change aimed in that direction, at the specific behest of the Meeting of Ministers.

From a more general perspective, energy integration should be taken into consideration for national sustainable development strategies. Economic growth, social equity, and environmental protection are dimensions of sustainable development that should be enhanced individually, without jeopardizing the others. Within this context, the countries, in establishing regional energy policy guidelines,

could find a way of reconciling national energy policies with the policy of energy integration, thus facilitating integration processes.

II. Conclusions and Recommendations

Below we present a summary of the main conclusions drawn from the situation described above. We will tackle separately issues involving the economic and energy integration of oil and products, natural gas, coal, and electricity, and finally the role of OLADE in regional and hemispheric energy integration processes.

1. Economic integration

Integration initiatives within Latin America and the Caribbean have increased notably during the last few years. In addition to the renewal of existing subregional integration agreements, namely, the Central American Common Market (MCCA), the Andean Group (GRAN), the Caribbean Community (CARICOM), and the Group of Three (G-3), others have been established, such as the Southern Common Market (MERCOSUR). At the same time, over 20 bilateral agreements have been entered into since 1986.

The main trends or characteristics that stand out are the following:

Contrary to the first integration initiatives during the sixties, which gathered momentum within a protectionist context, and to overcome domestic market constraints and accounts imbalances characterizing the industrial substitution model, the new agreements are taking place within a framework of growing openness of national economies.

These new integration initiatives are characterized by strong subregional consolidation trends and the chaotic proliferation of bilateral agreements which, although implying more market liberal-

ization than in the past, could eventually obstruct more thorough regional integration. The term "open regionalism," coined by the Economic Commission for Latin America and the Caribbean (ECLAC), reflects the characteristics of this trend, where agreements based on positive terms have been replaced by those based on negative lists (except for free trade agreements).

As for subregional blocs (MCCA, GRAN, CARICOM, MERCOSUR and G-3), they have proposed ambitious integration objectives that go beyond mere liberalization to intra-bloc trade, in an attempt to achieve the status of a customs union or even a common market. However, in spite of growing macroeconomic stability in the area, in no case has the objective of a common external tariff been achieved.

Obviously, the unilateral openness policies that predominate in the area tend to facilitate attaining the objective of subregional trade liberalization. In this sense, all treaties include a timetable for the progressive elimination of obstacles to the intra-bloc trade proposed, with exceptions or special treatment granted to certain products. As a single external tariff has still not been adopted, more flexible criteria or standards would have to be set to ensure this trade liberalization.

The new integration initiatives reflect the existence of more sectoral agreements. They mainly involve industry and the agricultural sector and, in general, emphasize certain general trade agreements restrictions more than agreements on common strategies.

Since the end of the eighties, strong trade expansion was noted within the region, particularly in those countries comprising certain blocs (except in the CARICOM area). This tendency, however, seems to have been more due to the combined effect of more openness, decided unilaterally, and to the use of advantages stemming from geographical proximity or natural complementation opportunities, than to impacts of the agreements themselves.

Even when higher intra-regional trade is coupled with an increase in energy trade and integration initiatives, this does not

seem to be a direct or exclusive result of strategies established in the treaties or agreements.

2. Regional and Hemispheric Energy Integration

2.1 Assessment

Latin America and the Caribbean have an energy situation that could contribute substantially to improving the international competitiveness of their national industries and ensuring the region's sustainable development.

Primary energy sources (oil, natural gas, and coal), as well as the hydropower potential, are sufficiently abundant to induce economic growth. Insufficient electric power generation capacity and limited gas production infrastructure, however, are major obstacles to development.

The region's electricity consumption (500 KWh/inhabitant) is substantially lower than that of industrialized countries (5,000 KWh/inhabitant). In the region's countries, the informal economy has reached highly significant levels that are not always taken into account when forecasting both demand and the energy required to ensure better living conditions for the population as a whole. This situation has led to small national markets and a low generation capacity that generally responds to the needs of the formal economy.

There is an uneven distribution of primary energy reserves in the region, and certain comparative advantages can be noted among the subregions. In terms of magnitude and geographical location, the subregion of the Andean Group is the one with the best position in terms of oil, natural gas and coal. By contrast, however, the MERCOSUR or Southern Cone subregion is the first among the other subregions in terms of electric power generation, with an important hydropower component due to the lack of hydrocarbons and the large concentration of hydraulic potential in this subregion. In Central America, the progress achieved in electric interconnections is

creating the conditions needed to ensure electric power supply security for the subregion.

With respect to *oil*, the Andean Group and Mexico have considerable potential, with a good chance to create suitable conditions for regional supply security. The differences in the regional distribution of reserves and consumption provide broad potential for complementation.

Regarding *oil products*, one can see that in most countries processing capacity is not adapted to the consumption structure; because of this there are surpluses and shortages of oil products that are traded within the region, although at high freight costs. A project aimed at studying the problems that arise from under-optimization in the use of refinery capacity on the region's market could provide good opportunities for investments in process units, the relocation or installation of new refineries. Thus, business opportunities would be compatible with the region's long-term supply security objectives.

As for *natural gas*, the Andean Group has the highest amount of resources, with a privileged location in the region for its trading with Central America, similar to the situation encountered with the reservoirs in southern Mexico. The Andean Group is also a potential supplier for MERCOSUR, from Venezuela to Bolivia and Peru. A study of these aspects needs to be conducted for the region's countries to optimize supply and channel private investment to projects aimed at ensuring supply security over the long term. Lower natural gas transport capacity in the region is one of the main reasons for low consumption.

Coal is another energy source that has been forecast to give greater impetus to the region's energy trade, as producing and importing countries find the way to finance reconversion costs for clean uses. This would contribute to rationalizing and diversifying the energy balance of the countries and, in the case of oil-producing countries, would free an important volume of fuel oil to be exported to other regions.

With respect to *electric power*, the above-mentioned low generation capacity can be partially offset by subregional interconnections, which would allow hydrological complementation and the use of existing surplus capacities, whether shared or not, whose costs would thus be better distributed. The subregional and regional integration processes will create large markets with the expansion of transmission lines. Seasonalities could be compensated more effectively; hydrocarbon price fluctuations could also be neutralized by a safer supply that would not depend exclusively on thermal sources; better use would be made of the total installed capacity by supplying the peak demands scaled over time; idle capacities could be employed without having to transfer the cost overruns to users; and electric power supply would shed its monopolistic character, as electricity becomes a negotiable good on the continent.

Private enterprise will find more and more opportunities within this process to invest capital and technology, as is already occurring in some countries that have established a total openness or like others that are complementing state supply with private supplies.

These incipient regional integration processes have created energy trade currents with a major hike in exports of oil and products, as well as coal, in the region's countries. The largest increases starting occurring as of 1990, when trade was redirected to the regional market, with regards to the exports of the above-mentioned products. This has been possible, in part, due to assistance of financial institutions such as the Andean Development Corporation (CAF) and the Latin American Export Bank (BLADEX).

MERCOSUR and the Andean Group have been the most dynamic regions with regards to this new scheme, giving priority to exports to other countries within the same subregion. A similar trend can be seen in the MCCA, which although it is a net importing subregion has increased the countries' export shares between the countries of the same subregion, as has been the case of gasolines, diesel oil, fuel oil, LPG and asphalts. In these subregions, it is apparent that there are significant trade flows within subregional blocs.

These commercial trends, which do not depend on fixed networks, highlight the potential that electricity and natural gas have as regional physical integration processes intensify, with the elimination of prevailing barriers in the region regarding trade, regulatory frameworks, mobility of productive factors and capital flows.

2.2 Perspectives

Beyond the bilateral and subregional agreements, there is evidence of energy integration between the blocs that tends to favor regional integration. The most recent evidence is the series of agreements and studies taking place in the G-3 and which, in the energy sector, has led to an electric power interconnection project between three blocs: NAFTA, Central America, and GRAN, although within some of them there has still been no major advance in terms of interconnections. Likewise, the CIER studies on electric power interconnections in South America advocate the integration of GRAN, MERCOSUR, and Chile in one big ring that would optimize existing hydropower capacities and would grant priority to projects whose implementation by individual countries alone could not be justified. The Central American Electric Interconnection System (SIPAC), although it is subregional, will eventually enable inter-block interconnections.

Thus, the need to reformulate energy prospects as a result of integration policies between or within the blocs and to study the shared use of each country's natural resources, free trade through energy transport, the use of shared reservoirs and hydraulic resources, water rights and rights-of-way, the harmonization of regulatory processes, and the elimination of tariff and non-tariff barriers has emerged.

Energy integration processes should have a regional scope. Studies should be conducted considering the region as a whole, that is, after a series of analyses of the interconnections and gas pipelines both between subregions and within them, to finally detect the problems in the national interconnected systems or in the natural gas

transport networks. In turn, the viability of hydropower generation enterprises that have been identified should be established, or the generation alternatives and natural gas potentials and reserves. Thus, the projects will become the framework of reference for public and private investors or their partners, enabling the implementation of concrete transmission and generation or gas pipeline projects. This analysis would be even more consolidated if, in addition, the projects were to consider the interdependence between different energy sources, to optimize least-cost supply. Within these conditions it would be possible to increase the region's competitiveness, at least with regard to energy inputs.

The main actions carried out in each activity and that could lead to further or new actions are the following:

Oil and products. In *exploration* what stands out are the joint projects between PEMEX of Mexico and RECOPE of Costa Rica, as well as with Cuba. YPF of Argentina has also conducted exploratory work in Ecuador and is searching for hydrocarbons with PETROBRAS of Brazil and with the ENAP Chile subsidiaries. In the latter case, this has led to the joint exploitation of a reservoir in Argentina. Also noteworthy is the work of PDVSA of Venezuela and PETROBRAS of Brazil, geared to establishing a joint petroleum and natural gas exploration and production company.

With regards to oil *production*, in addition to the above-mentioned partnership between YPF of Argentina and ENAP subsidiaries in Chile, we can mention the participation of private Argentine companies in marginal areas of Venezuela.

In Central America, although there are different institutional situations, since some of the refineries are privately owned whereas others are state property, it would be worth analyzing some of the integration possibilities, such as the joint purchase of crude oil and/or oil products required by domestic markets, to obtain better prices than they are able to individually, or the possibility of building a refinery to supply the requirements of the entire Central American market, owned jointly through a joint venture between the countries and private companies. Although there are geopolitical difficulties

with this alternative, a study showing the economic convenience of such a decision, in comparison with continuing with current conditions, could provide the elements needed to surmount that difficulty.

The San Jose Accord was established between the Central American countries, Mexico and Venezuela, as a consequence of the high oil costs for oil-importing countries stemming from the oil price hike during the two oil shocks of 1973-74 and 1979-80. Although the oil-importing countries included in this agreement were initially able to ensure their supply of crude oil and the facilities specified therein during a period of scarcity and high prices, the subsequent oil market situation later rendered the agreement less attractive. In any case, this type of agreement can be a model to be followed, refined, and applied in future. To encourage intraregional trade of oil and products, however, it is important to include innovating mechanisms in the contracts to enable a reliable and stable provision that fosters these intraregional exchanges.

Trade involving the purchase of equipment and materials for the oil industry, amounting to about US\$7 billion a year, with almost 40% of it coming from outside the region, is another aspect that merits attention.

The trade of technological and managerial capacity could lead to an exceptional flow between the state oil companies of Mexico, Brazil, and Venezuela and private companies in Argentina and companies in countries with relatively lower petroleum development.

With regard to *natural gas*, the interconnection between the countries of the River Plate Basin and Chile would facilitate the development of a subregional market, through a gas pipeline network that enable trade under advantageous conditions.

MERCOSUR supply forecasts, based on the potential of Argentina, Bolivia and Peru, points to certain weaknesses that will become apparent over the medium term, due to the rather exaggerated assumption that 100% of the natural gas potential will be discovered. The supply from Venezuela, presumably toward Manaus, Brazil, for an interconnection with a Brazilian gas pipeline to Sao

Paulo, will allow greater coverage than that estimated for the MERCOSUR supply, ensuring supply security for the region's countries for a long period of time.

As has been indicated, the GRAN countries, due to their location in the continent, are in a privileged position to market the abundance of available natural gas, taking advantage of the huge trade opportunities for MERCOSUR and Central American markets.

As for *coal*, in view of the availability of Colombian coal that is apt for the iron and steel industry and the requirements of Argentina and Brazil for this type of use, it would be advisable to establish bilateral supply agreements to increase the regional trade.

With regard to *electricity*, shared hydropower developments under the current scheme have made a major contribution to integration. As a result of significant technological breakthroughs in electric power transport, especially high-voltage power over long distances, not only national hydropower potentials but also other forms of power generation, have made an important contribution to energy integration.

In addition, the interconnection between hydropower projects of different water basins will help to mitigate the random nature of rainfall and further foster integration possibilities or, as can be seen between Argentina and Brazil, complement the respective surpluses of thermal and hydropower capacity. Closing links in South America would envisage a future large interconnection between the Brazilian central-south and northeastern systems, extended to Manaus and Guri in Venezuela, which would allow linking the Andean and Atlantic zones. The link between Peru and the central-south of Brazil through Bolivia would close this big ring and allow the optimization of the hydropower resources in South America, both with regards to the better use of the climatic and time zone variations as well as with the better use of the equipment.

The Central American Isthmus power systems that are currently interconnected in two blocs are waiting for the interconnection between Honduras and El Salvador or between Guatemala and

Honduras to close up the system, thus ensuring supply for this sub-region.

Finally, the power systems of Mexico and Colombia have attained a high level of national integration, in which the main regional electric subsystems of each country are already interconnected. Here we can see two poles that would allow the interconnection between North and South America, going through the Central American isthmus.

Electric integration could be strengthened in several senses:

- Toward the joint operation of the generator park of those systems that are already interconnected.
- Toward more multilateral cooperation between the countries sharing developments in a same basin, exploring the possibilities offered by the coordinated management of cascade reservoirs and the benefits that derive from the further regulation of the basin.
- Toward more coordination in the use of the primary resources and in planning the expansion of the respective electric systems.

3. Investments and financing

Within the Latin American and Caribbean electric power sector there are new forms of financing that are already being applied. However, these new schemes are limited to medium-sized projects, typically about 100 MW of thermal generation. Larger projects being implemented are still being implemented under a conventional financial scheme. In most countries there are still quite a few barriers to the private-capital involvement and its range of options.

In addition to financing difficulties, leading to delays in starting up previously scheduled projects, there are other difficulties arising from the investments required by development programs to meet marginal urban needs and the needs of isolated communities in

terms of health, education, housing, social infrastructure, and the more sophisticated forms of electricity-intensive consumption that accompany economic growth.

The fact that the financial problems of electric power utilities have led to a resurgence of thermal generation, within a framework of innovative schemes, means that these forms are not neutral in environmental terms. The installation and operation of small and medium-sized thermal generation units, especially diesel plants for base load, in spite of their economic and environmental inferiority over the long term, leads us to conclude that certain new forms of financing in the electric sector do not contribute and are not enough to meet sustainable development requirements.

Energy integration processes in the region are thus a means to revitalize energy supply with hydropower, facilitate the penetration of natural gas in the subregions, restructure the capacity of the refineries, and find new technologies for the clean use of coal. The attractiveness of these projects for the countries, utilities and financing agencies could lead to a new approach to regional supply, one that would be more in tune with sustainable development objectives.

4. Institutional aspects

There is a wide variety of different international agencies involved in resolving regional energy issues. It is therefore important to ensure a more adequate division of the work, create a suitable communication network and complementary information systems to coordinate operations.

Although the issue of energy as a rule is essential for broad commercial, industrial and economic integration processes, the Ministers of Energy are not participating directly in all of the organizations or working groups where energy integration is being discussed and initiatives and decisions being taken. The same occurs with their participation in the region's energy organization. Because of this, the linkage between national energy policies and subregion-

al and regional energy integration processes is apt to be incongruent, thus becoming an obstacle to these processes.

Some of the organizations within which integration policies are being discussed and decided on do not deem that energy and energy integration are relevant issues, which means that low-cost energy is ignored as a factor to be considered in increasing the international competitiveness of the subregions.

It seems that, within some international organizations, there is more political and operational coherence with respect to subregional and regional integration. This would seem to contradict the commitments made by the region's Heads of State regarding hemispheric integration.

Physical integration (oil and gas pipelines, electric interconnections) is of primary importance for giving impetus to regional energy trade. However, projects are analyzed individually, without ensuring the supply of each non-renewable source over the long-term and without studying alternative sources in the event of their depletion.

5. The role of OLADE within regional and hemispheric integration processes.

The theme of the Second Energy Conference of Latin America and the Caribbean (ENERLAC 95) was Energy Integration and Private-Sector Participation. This was a propitious occasion because, in addition to technical discussions, there were new opportunities for energy negotiations in the private sector, which promoted this event, with OLADE playing an important role in fostering expectations.

As for OLADE, it was able to establish ties with public and private organizations for new projects in the region, focusing on the issues referred to above. As a result, a series of project proposals were prepared and submitted to public and private organizations from Europe, the United States and the region itself.

These projects, however, are not the result of an isolated interest of OLADE. They arise from concerns expressed in different Organization activities financed by UNDP, IDB, World Bank, European Union and member countries, as well as the results stemming from the ECLAC-OLADE agreement, sponsored by the German Technical Cooperation Agency (GTZ). On the basis of case studies conducted in Chile, Colombia and El Salvador, the latter project was able to identify those aspects involved in matching energy and development policies and achieving a convergence of these policies with a regional energy policy that would accompany economic integration processes.

More recently, the Summit of the Americas made commitments to carry out a series of common energy actions. The Presidents of the Group of Rio made it clear in their Quito Declaration of September 1995 that it recognizes the need to use regional energy sources as a priority. There is therefore a consensus that regional and hemispheric energy cooperation should be fostered by implementing plans and programs that are compatible with national strategies and as an instrument to achieve sustainable development objectives. Within this context, OLADE by virtue of its standing as the region's energy forum representing the energy ministers of the member countries, seems to be the appropriate instrument to coordinate and implement whatever common actions the Meeting of Ministers decides to undertake to reach these objectives.

In view of the above, it seems important for member countries to draw up an initial agreement without any binding legal obligation, referred to as the Energy Charter for Latin America and the Caribbean, to provide a common framework of reference to harmonize the national energy policies of each country with the region's overall energy policy, including energy integration processes. This would facilitate financing schemes from international financial institutions, promote capital investment without undermining the internal legislation of each country, and permit the use energy-efficient technologies essentially for the purpose of supporting the development of the projects required by the region in that sector. These actions should eventually lead to the establishment of a Energy

Charter Treaty, which would be legally binding and help to insert the energy sector into the economic integration process.

Thus the groundwork will have been created, through agreements between Energy Ministers of the member countries, to favor energy integration in the region and foster the private-sector interests and international cooperation efforts to ensure trade and investments using a sustainable development approach.



**Energy Integration in
Latin America and
the Caribbean**

I. Introduction

This document has been prepared by the Permanent Secretariat according to the instructions given at the XXV Meeting of Ministers, held in Trinidad and Tobago in November of 1994.

In section II the effects of globalization and of the formation of blocs on regional and hemispheric integration are analyzed.

Section III is a diagnosis of the energy integration situation in the region, using as a reference the reserves, production and consumption of oil and products, natural gas, coal and electricity, and of the intra-regional trade of these energy sources.

Section IV reports on the energy integration projects and their perspectives, based both on information provided by the Member Countries and found in the Organization's archives.

In section V, new forms of financing for investments in the energy sector are analyzed, as well as their possible implications for energy integration projects.

Section VI identifies the international, regional, and subregional government and nongovernmental organizations involved in energy issues, and provides considerations on the relationship between national, regional and hemispheric energy policies.

Section VII provides guidelines for a regional energy policy, to identify the elements that should be considered for a Latin American Energy Charter.

Finally, section VIII presents a summary of conclusions and recommendations derived from the previous sections.

II. The effects of globalization and of the formation of blocs on regional and hemispheric integration

1. The framework of reference

1.1 The current situation: A global study of international geopolitics points to a world that tends to consolidate itself gradually in sub-regional, regional and hemispheric blocs. The globalization process that favors multilateral trade is giving way to a new conception of large geographic-economic blocs that are more autarchic, set within strong political-strategic approaches.

Free competition in expanded markets is gradually substituted by the use of protectionist practices within the sphere of the blocs, protected by tariff and non-tariff barriers, which can be explained by the fact that competition is not compatible with certain geopolitical needs due to the sociocultural differences between nations, the political pressures of influential economic groups or economic spaces that for strategic reasons need to be given priority.

Figura 1: LOS BLOQUES ECONOMICOS EN 1995



An analysis of these processes shows that these blocs are still not consolidated, that they are still in formation, and are distributed geographically in Europe,¹ Asia,^{2 3} the Pacific⁴ and South Africa⁵ (Figure 1).

Among the latter, one can note a clear trend toward ensuring energy security through diversification in the use and savings of the different energy sources, rationalization of oil imports, contingency mechanisms and a renewed protectionism that privileges renewable and non-renewable energy sources located in the territories of those countries forming the blocs or in those that have a comparative advantage.

Within the American continent, the largest blocs are: the Southern Common Market,⁶ the Andean Group,⁷ the Central American Common Market,⁸ the Group of the Three,⁹ the Common Caribbean Market¹⁰ and the North America Free Trade Agreement.¹¹ The characteristics of these blocs will be described in the following sections.

1.2 Perspectives: Toward the year 2005, it is expected that there will be an expansion of the large world blocs:

1. European Union (EU): Germany, Austria, Belgium, Denmark, Spain, Finland, France, Greece, Holland, Italy, Ireland, Luxembourg, United Kingdom, Portugal, Sweden.
2. Association of South East Asian Nations (ASEAN): Brunei, Philippines, Indonesia, Malaysia, Singapore, Thailand, Vietnam.
3. Newly industrialized countries (NICs): Korea, Hong Kong, Singapore and Taiwan.
4. The Pacific Economic Cooperation Council (PECC): Australia, Brunei Darussalam, Canada, Chile, China, Colombia, Hong Kong, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Peru, Philippines, South Pacific Forum Island Nations, Russia, Singapore, Chinese Taipei, Thailand, the United States and Vietnam.
5. Southern African Development Coordination Conference (SADCC): Angola, Botswana, Lesotho, Malawi, Mozambique, Zambia, Zimbabwe, Swaziland, Tanzania, Namibia.
6. Southern Common Market (MERCOSUR): Argentina, Brazil, Paraguay and Uruguay.
7. Andean Group (GRAN): Bolivia, Peru, Ecuador, Colombia and Venezuela.
8. Central American Common Market (MCCA): Costa Rica, Nicaragua, Honduras, El Salvador and Guatemala.
9. Group of Three (G-3): Colombia, Mexico and Venezuela.
10. Caribbean Common Market (CARICOM): Antigua, Barbuda, Barbados, Guyana, Trinidad & Tobago, Dominica, Grenada, St. Kitts-Nevis-Anguilla, St. Lucia, St. Vincent, Jamaica, Montserrat, Grenadines, Belize and Suriname.
11. North American Free Trade Agreement (NAFTA): Canada, the United States of America and Mexico.

- The European Union, with the foreseeable inclusion of Turkey and its expansion to Eastern Europe. Also expected is the continuation of preferential relations with countries of colonial origin, like those from Subsaharan Africa, the Lower Antilles in the Caribbean and Polynesia, and with some subregions in Latin America.
- Japan and the recently industrialized Southeast Asia, with a possible redirecting of its trade with the West to the markets of Russia and China.
- The Pacific bloc, where Austria and New Zealand, Japan, Southeast Asia and the western part of the American continent will try out particularly intense commercial relations, within a free trade context.
- The Americas Free Trade Zone, which would try to be consolidated by the year 2005, uniting the Yukon with Tierra del Fuego, according to the commitments made in the Summit of the Americas (1994).
- South African Area, where trade agreements will be consolidated.

Other economic spaces observe the process without reaching a defined position.

2. The effects of globalization and of the formation of blocs on regional integration

The region has experienced the effects of two sequential processes over time, both of them well differentiated in the rest of the world: *globalization* and the *formation of blocs*.

The *globalization* process that favors multilateral, open and competitive trade, with a tendency to generalize market freedom, has been advocated by the GATT and coincides with a politically and

economically *new conceptual framework* that gives a different content to the development ideas and practice of each country in Latin America. This coincidence in both aspects points qualitatively in the same direction, although with different intensities, in every country. In politics one can see the predominance of the State-Society concept over the State-Government, which facilitates the growing consolidation of democratic and social participation processes. There is a more dynamic legislative process and more effectiveness of the juridical guarantees, along with more international credibility of the better compliance of commitments assumed, which tends to reduce the country and regional risks.

At the same time, transcendental changes have taken place that are affecting the economic structure of the countries, due to:

- The return of economic liberalism, more legal guarantees for the private ownership of property, a greater economic involvement by private players, the gradual restoration of market forces as a means to set prices and allocate economic resources.
- The substitution of centralized planning for decentralized planning, based on the prospects of the framework of reference and on the viability of financing.
- The redefinition of the role of the State, trying to relocate it more as an arbiter and less as a player within the economic scenario. This has involved the modernization or privatization of state companies, in an attempt to achieve more productive efficiency and therefore more national and international competitiveness, reducing state investments and decentralizing national functions toward the provinces and municipalities.
- The crisis of economic models based exclusively on protected domestic markets that led to liberalization and the search for mechanisms to facilitate international competition.

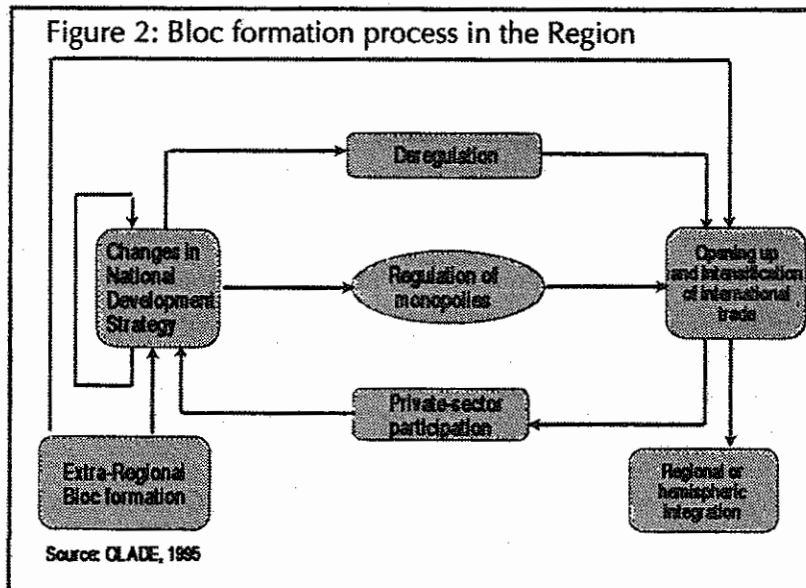
The conceptual framework that has been described and the globalization process have a direct influence in some countries on the State reform processes under way through the concrete participation of private companies. This has taken place in a particularly

intense way in Argentina, Chile and Peru. In other countries, the transition has been more cautious and the effects of this process are still being analyzed.

In turn, the extra-regional *bloc formation* process leads, in Latin America and the Caribbean, to new efforts to protect itself from the new forms of the international market. The creation of subregional blocs appears as a protection mechanisms that the governments and private sector design as events take place, in a kind of action and reaction chained effect. Whereas the political concepts are maintained, the economic ones take on a new direction:

- Open models are reoriented toward markets formed into blocs or macro blocs, where national protection changes to the concept of a broader subregional protection.
- The blocs tend to consolidate themselves and an attempt is made within them to simulate the characteristics of the free trade market, whereas outside of them the protectionist practices are reinforced.
- Within the blocs, the barriers that hindered or limited the expansion of the multinational companies, their productive integration strategies and the possibility of them taking root in countries with large natural resources become more flexible.

The integration process in Latin America and the Caribbean is not, like the case of Europe, the result of a predetermined will on the part of the governments of a series of countries, nor like the Asian case, the result of a model of chained technological transfers. Rather, it is the consequence of a series of practical relations where the private sector and the governments interact together, creating a not always foreseeable dynamic and that has involved an interaction between the following elements at stake:



- i. Changes in the national development strategy.
- ii. Deregulation.
- iii. Regulation of monopolies.
- iv. Openness and intensification of international trade.
- v. More private participation.
- vi. Explicit integration agreements between groups of countries, which include preferential clauses between the parties with relation to third countries.

Figure 2 shows the cause and effect relations of the elements indicated above.

According to the contents and scope of those elements, the integration agreements could lead to a growing independence guided by the signs of the market and directed to a better insertion in the international economy. Strengthening of the links between these ele-

ments of the game would allow, over the long term, a process of growing regional economic interrelations that the ECLA has referred to as "open regionalism."

Due to the circumstances already indicated here, "open regionalism" would seem to be a defense mechanism vis-à-vis the protectionist practices of the extraregional macro blocs pursuing political, economic, commercial and technological leadership, as the result of a relentless competition ending in globalization. This reality leads one to think that there is still much to be done in the region, toward the inside and from the inside out, if the right environment is created for regional and hemispheric integration.

3. The effects of the formation of blocs on hemispheric integration.

The *Americas Free Trade Zone* is the current framework of reference for the countries that committed themselves, in Miami, to eliminate barriers to trade and investment in the continent by the year 2005.

This zone was created as a means, with strategic purposes, in a world where the extraregional blocs are competing for the international markets and attempting to reach a stable and sustained growth. As a strategy, it involves strengthening North America's relative position within the new economic world order. In a more general way, the zone responds to common interests involved in the integration of this hemisphere. While the United States seek to ensure its access to the Latin American markets, the Latin American countries find in the zone a possibility through which to reduce their image as high risk countries, to facilitate the operation of existing business, trade and new investments.

The consequence of this process is that there has been an acceleration of subregional integration initiatives in Latin America. From this we can see the growing commercial movement and new investment opportunities opening up within the subregions. The expectation of each country or of the blocs is to belong to one of the largest markets of the world.

However, the Americas Initiative is one of NAFTA's potential business fronts. There is also an openness-oriented conception toward the Pacific, based on its active participation in the cooperation fora of that zone. The particularly intense integration processes taking place in Southeast Asia and Oceania could lead to possible inclusions in the Free Trade Treaty. While these possibilities are being assessed, the European Union is analyzing possible free trade associations with the GRAN and MERCOSUR, to reinforce commercial relations with its traditional Latin American markets. The results of the treaties reached in the end, will give way to a crossing-over of interests, more than due to prior agreements through the path of events.

Within this framework, the countries continue to strengthen the regional and hemispheric integration processes, with different degrees of progress according to the commitments made to other regional or extraregional blocs. These integration processes are supported by the presidents of the Group of Rio who, in the September 1995 Declaration of Quito, manifested being in favor of the integration and cooperation processes in Latin America and the Caribbean, highlighting the dynamics acquired by these processes during the last few years and affirming the importance of continuing to support said efforts on the part of the regional organizations aimed at the expansion of the integration processes and considering existing bilateral, subregional and regional agreements and their convergence, according to the commitments made at the Summit of the Americas and in the World Trade Organization. In this sense, they reiterated the interest expressed at the Summit of advancing toward

a free and transparent trade at the latest by the year 2005.¹² In this sense, the Summit of the Americas, its Declaration of Principles and its Action Plan are of historical importance, as well as the convenience of carrying out the commitments made at the Summit and of perfecting mechanisms that will allow the fulfillment of the objectives.¹³

12. Group of Rio, "Quito Declaration," section 14, Ecuador, September 1995.

13. Group of Rio, *op.cit.*, section 8.

III. Regional energy integration

Within this context, Latin America and the Caribbean have an energy situation that could substantially contribute to the international competitiveness of the industry and to the region's sustainable development.

The energy integration process, with the market expansion this would involve, places Latin America and the Caribbean in a privileged situation in comparison to other regions of the world. One only has to see its energy reserves and flows, based on its energy balances to understand that this is a self-sufficient and independent region, capable of supplying its energy needs, and that this abundance of energy is the main source to reduce its industrial costs and increase its international competitiveness, as well as a formidable base from which to give impulse to a process of sustainable and sustained growth, that is, that will favor economic growth, social equality and the protection of the environment.

Table 1: Reserves and Production in Latin America and the Caribbean at December 31, 1994

	Reserves	Production	Reserves Production (Years)	Total world reserves %
Petroleum (Millions of barrels)	143037.3	2893.1	49	14
Natural Gas (Billions of cubic meters)	7367.2	138.1	53	5
Coal (Millions of tons)	16600	38.3	433	2

Source: OLADE-EC, Energy-Economic Information System (SIEE), September 1995

The main energy sources (petroleum, natural gas and coal), as well as the hydropower potential, are abundant enough to induce economic growth, but the insufficient electric power generation capacity is a barrier to development. In addition, the region's electric

consumption is substantially low when compared to that of industrialized countries. This situation indicates that in the latter group of countries, electricity has a high incidence on economic activities and, in addition, that the population has reached living conditions that exceed the fulfillment of basic needs. This behavior can also be reproduced when one compares the consumption of the countries in the region considering their degree of relative development.

This electric generation capacity was established in the past based on solvent consumption estimates reflected in the national accounts or directly by the foreseeable evolution of the Gross Domestic Product, as an indicator of the activities of the formal economy. However, the informal economy in the countries of the region has reached high levels and should be taken account in the discussion on the functions of demand. The energy required as an inducer factor of the better living conditions of the low-income population should also be considered. Without electricity, that population does not have access to the appliance market nor to the mass media, and is left out of the market economy system. The methodologies used to estimate demand were in general the same used by the industrialized countries, who do not have these registration problems because of their more homogeneous and solvent population.

In view of these considerations, in addition it would be necessary to identify what the mechanisms would be for State subsidization, as well as the commercial strategies that energy and domestic appliance producers could design for the expansion of the national and regional market.

In turn, the region's primary available energy is not distributed in a uniform way, and one can note certain comparative advantages between the subregions. The GRAN is the one who, in terms of magnitude and geographical location, has the best position with regards to petroleum, natural gas and coal, although energy integration is still incipient within this subregion, with the exception of progress made with regard to interconnections between Venezuela and Colombia.

As to electricity, the MERCOSUR stands out from the other subregion, with a strong incidence of hydropower, since the Latin American and Caribbean's highest potential is concentrated in that subregion. Energy integration, however, is also incipient, although it is also advancing due to the large joint hydropower developments. In the MCCA, progress in electric interconnections is creating the conditions needed for a safe subregional electric supply.

Within the region, Paraguay is the country with the sufficient amount of electricity needed to begin a quick process of industrial growth and the generalized electrification of its population, in addition to the current advantages it has from exporting higher quality energy at a lower global environmental impact.

To change in part the situation described above, the energy integration processes would have to be intensified to gain access to surplus conventional primary energy sources, as well as fully using electric surplus capacities, while the conditions are created to give an impulse to the development of the industry and to include in the market those sectors of society whose lack of solvency does not lead to their commercial provisioning.

As a positive aspect we can see that the changes taking place during the last few decades in the structure of the region's energy provision, due to the higher penetration of hydropower, has contributed to reducing the global environmental impact, whereas there are still specific aspects from the relatively lower development of the region.

In the following sections we will analyze, by energy sources and subregions, aspects related to energy abundance and shortage and the opportunities for energy integration.

1. Reserves, production and consumption¹⁴

1.1 Petroleum: In some spheres there still prevails the assumption that over the long term *"energy security will continue to depend on supplies from a group of Middle Eastern and North African countries, characterized by a highly complex political, ethnic, and religious situation."* This viewpoint is substantiated by a long series of events that confirm the permanent instability and uncertainty linked to this large volume of reserves and which is periodically transmitted to the market.

Nevertheless, after the 1973 crisis, the world situation has changed. Oil resources and reserves in 1989 were already quite similar between OPEC and non-OPEC countries.¹⁵ Regarding the latter, independent producers can make available, at prices ranging from US\$12 per barrel to US\$25 per barrel, large volumes that could substitute OPEC production. As a result, the argument that energy supply security is a major ongoing problem is somewhat relative.

In addition, the region has an important potential in terms of liquid hydrocarbons, with excellent possibilities of creating the conditions needed for a safe regional and hemispheric supply. Latin America still has a petroleum capacity able to cover a good part of the energy needs of North America. This fact is complemented by the abundance of capital and technology that exists in that region and sets the foundations to give a real content to the concept of hemispheric energy integration.

The oil reserves of LAC, by the end of 1994, accounted for 14% of the world's total. Between 1988 and 1993, LAC reserves

14. For further details, see GTZ/IDEE, "Integración Energética en América Latina y el Caribe en un contexto de Desarrollo Sustentable," Bariloche, July 1995 (pp. 23-31).

15. OPEC: 792.5 billion barrels (10⁹ bls); non-OPEC: 749.5 billion barrels (10⁹ bls), respectively. See Masters and others, "World Resources of Crude Oil and Natural Gas," 13th World Petroleum Congress, Buenos Aires, 1991.

grew cumulatively by 0.4% per year, whereas as total world reserves grew by 1.9% per year; thus LAC's relative standing has been gradually declining. Of these reserves, only two countries accounted for 91.4%, namely, Venezuela (50.3%) and Mexico (40.4%), holding the fifth and seventh positions, respectively, in the world. In order of importance, the other Latin American oil-producing countries are Ecuador (2.9%), Brazil (2.9%), Argentina (1.6%), and Colombia (1.2%).¹⁶ The remaining countries¹⁷ with reserves account for individual shares of under 1% and together account for a total of only 1.6% in LAC. Although Latin American oil production does not amount to a potential that would allow it to autonomously influence international prices or any other key variable of the oil industry, it is an autonomous region with a substantial surplus.

In 1994, oil production accounted for 13% of world total, with a growth of 2.4% between 1988 and 1993, whereas world total grew by 0.8% over the same period, which indicates a greater penetration of LAC in world supply.

The reserves-production ratio for total LAC will enable the region to enjoy ample supplies for 49 years, which is greater than the world average, but that could be extended if petroleum is substituted for other sources and with the better management of demand and the rational use of energy at the regional and global levels. Further exploration efforts do not seem to be too urgent if the integrationist trends and expected oil price levels continue, except that for strategic reasons the region does not want to lose its position with regard to the other sources of supply in the rest of the world.

Subregional consumption indicates that, except for the Andean Group and Mexico, the other subregions and countries clearly suffer from shortages. As indicated in the section on oil trade, supplies for

16. In Colombia, the Cusiana and Cupiagua reserves are not included.

17. Trinidad and Tobago, Chile, Bolivia, Cuba, Guatemala, Suriname, and Barbados.

Table 2: Oil reserves, production and consumption by December 31, 1994 (million barrels)

	Reserve	Production	Consumption	Reserves Production (Years)	Surpluses (Shortages)
GRAN	75517.9	1362.9	426.2	53.2	936.7
Mexico	63220.0	980.1	675.3	64.5	304.8
MERCOSUR	6358.1	485.3	688.2	13.1	(202.9)
CARICOM	519.8	50.2	61.0	10.4	(10.8)
Chile	287.0	4.5	66.6	63.8	(62.1)
Cuba	80.0	7.4	61.8	10.8	(54.4)
MCCA and Panama	54.5	2.7	52.0	20.2	(49.3)
TOTAL LAC	143037.3	2893.1	2031.1	49.4	862.0
World Total	1023237	22938	22934	44.6	4

Source: OLADE/EC, Energy-Economic Information System (SIEE), September 1995

these deficits come from different origins, including the rest of the world, depending on the subregion. Nevertheless, the different regional distribution of reserves and consumption indicates that there is a potential for complementation.

Petroleum transport between subregions and countries takes place through tankers which apparently do not have any restrictions in terms of freight reserves. In February 1994, however, with the commissioning of the oil pipeline between Puesto Hernández, in the province of Neuquén, in Argentina, and Puerto Concepción, in Chile, the first private-sector integration was achieved by this means, thus increasing trade in the Southern Cone, comprised of an initial transport capacity of 18,000 m³/day, with a purchase commitment on the part of Chile for 8,000 m³/day and an option of up to 50% for the remaining petroleum. Whatever surplus Chile does not purchase will be exported through the Pacific ports.

1.2 Oil products: The region's refining capacity in 1994 accounted for 9% of the world's total (Table 3). Between 1988 and 1993,

capacity grew by 1.4% per year, a rate that is 3.4 times higher than world growth.

MERCOSUR has the highest processing capacity (Brazil 24.4% and Argentina 10.5%), followed by the Andean Group (Venezuela 18.7%) and Mexico (22%), which as a whole accounted for 87.1%. The remaining 12.9% is concentrated in the other subregions and countries. These processing capacities, in most cases, are not adapted to the consumption structure; because of this, there are surpluses of oil products that are the object of intra-regional trade or exported to the rest of the world.

Table 3: 1994 Refinery capacity

	In thousands of barrels/day	%	% Utilization
MERCOSUR	2327	35.8	79.0
GRAN	1812	27.9	97.1
Mexico	1520	23.4	90.0
CARICOM	347	5.3	52.3
Cuba	176	2.7	
MCCA and Panama	162	2.5	50.2
Chile	161	2.5	
Total LAC	6505	100.0	86.4
World Total	74333		

Source: CLADE/EC, Energy-Economic Information System (SIEE), September 1995

In 1994, the Andean Group and Mexico had almost fully used its refining capacity whereas MERCOSUR in less proportion, but in Central America and the Caribbean the utilization shares were on the order of 50%. The refinery structure of the latter group of countries was designed for a context that was different from the current one. While oil exporting countries have low processing capacities which leads them to export products with a low added value, Venezuela has reversed this process by purchasing refineries in the United States and Europe, which has enabled it to market in the United States, by means of 13,000 of its own service stations, oil products stemming from its crude oils. Importing countries such as those of Central America and MERCOSUR have refineries that do not match

the domestic market structure, and due to their low conversion capacities, the dismantling of protectionist barriers, and current international prices, the direct import of oil products is more advantageous. This has generated idle capacity.

This situation points to the need of optimizing the operation of the existing capacities within the regional context and of changing the structure of the processing units, not only within the subregions but also looking at the region as a whole. Certainly, the elimination of the restrictions on international trade will bring about important structural changes in the composition of the capacities. However, the energy authorities will have to set the rules of the game, to preserve regional interests over the safe supply, under competitive conditions for the private and public utilities operating in the region.

A project aimed at studying the problems arising from the under-optimized use of refinery capacities, with relation to the regional market, could provide a good orientation for investments in process units, or for the relocation or installation of new refineries. In this way, business opportunities would be compatible with the long-term safe supply objectives of the region. Such a study should not ignore the strong penetration of natural gas and the potential penetration of coal as substitutes for semi-heavy oil products for thermal electric generation, or the eventual joint or national hydropower developments that, through the subregional interconnected systems, will substitute thermal generation and, as a consequence, its inputs.

1.3 Natural gas: Natural gas is one of the energy products that displays the highest potential for integrating the region. The design and construction of subregional gas line networks and their linkages is a major project that could ensure the development of LAC's energy development and could help to rationalize the countries' energy balance. In this case, private capital and technology will be decisive, as well as the political will to give impetus to its implementation by the countries in the region.

Table 4: Natural gas reserves, production and consumption by December 31, 1994

	Reserves 10(9)m3	Production 10(6)m3	Consumption 10(6)m3	Reserves Production (Years)	Not used 10(6)m3 ¹⁸
GRAN*	4364.2	60655	40189	72.0	11466
Mexico	1936.9	37463	35755	51.7	1708
MERCOSUR	662.4	3092.3	29966	21.4	957
CARICOM	286.0	6589	5672	43.4	917
Chile	116.8	2444	2257	47.8	187
MCCA and Panama	0.6	10		66.7	10
Cuba	0.3	39	39	7.9	0
TOTAL LAC	7367.2	138123	122995	53.3	15128
WORLD TOTAL	140967	2084151	2051914	67.6	32237

Source: OLADE/EC, Energy-Economic Information System (SIEE), September 1995
 * Do not include Camisea in Peru and Volcanera in Colombia

At the end of 1994, LAC's natural gas reserves accounted for 5.0% of world total (Table 4). In turn, three countries held 87.0% of all Latin American reserves: Venezuela (51.6%), Mexico (27.8%), and Argentina (7.6%). The cumulative yearly growth rate of reserves between 1988 and 1993 was three times greater than that for oil but was four times below the evolution of world reserves. When gas reserves discovered in Camisea, Peru and Volcanera, Colombia are confirmed, it is estimated that the above-mentioned figure for 1995 can rise by no less than 5%.

In 1994, the region's share of world production was 7%. Production grew between 1988 and 1993, at cumulative yearly rate of 20%. The major producer in LAC is Venezuela (31.6%), followed by Mexico (26.7%) and Argentina (19.9%). These three countries accounted for 78.8% of production. Latin American natural gas reserves are greater than those of the United States and Canada together, but they are currently under-exploited. Therefore the real potential for this wealth is quite high.

18. Includes blowouts and losses.

In 1994, consumption accounted for 6% of world total. Between 1988 and 1993, it grew at an annual cumulative rate of 4.1%, almost two times higher than the growth of oil products. This is definite evidence of the growing importance of natural gas in the substitution of liquid hydrocarbons and of the excellent prospects for gas in the future. The expansion of natural gas consumption in the world has developed at an annual pace of 1.9%, three times higher than oil consumption. Only three countries accounted for 83.3% of the region's total consumption as follows: Mexico (31.1%), Venezuela (28.8%), and Argentina (23.3%). The countries with the broadest distribution of natural gas consumption in socioeconomic sectors are Argentina, Venezuela, and Colombia.

The Andean subregion has the highest amount of gas resources and, along with Mexico and its southern deposits, is geographically well located to set up gas trade ties with the Central American isthmus. The Andean subregion could also be a potential supplier for Brazil, on the basis of which MERCOSUR as a whole could be a prime beneficiary of this line of supply, in view of its lower reserves to ensure projects under way. As will be shown later on, in the section on integration perspectives, the reserves and potential of Argentina, Peru and Bolivia will not be enough to guarantee the future supply of that subregion, and contributions will be required in the future from Venezuela. A study of these aspects would seem necessary and deserves the careful consideration of the countries of the region, to optimize the supply and direct private investments to projects that ensure a supply security over the long term.

Table 5: International gas pipelines in operation

Countries	Sections
Bolivia-Argentina	Santa Cruz (Bolivia)-Yacuiba (Argentina)
United States-Mexico	Peñitas (USA)-Matamoros (Mexico) Mc Allen (USA)-Reynosa (Mexico) Hidalgo (USA)-Reynosa (Mexico) Naco (USA)-Naco (Mexico) Eagle Pass (USA)-Piedras Negras (Mexico)

Source: OLADE, September 1995

The small natural-gas-carrying capacity in the region is one of the reasons for its low consumption. Except for Bolivia and the United States, which export to Argentina and Mexico, respectively, the remaining countries have no installations whereby they can market their surpluses. Nevertheless the commercial potential of natural gas has generated a series of projects described in the section on integration perspectives.

The gas line between Bolivia and Argentina has been operating for 20 years and in 1994 had carried more than 2 million cubic meters, with a utilization factor of 77.4%. Investments made in 1971 amounted to US\$56.3 million. The gas line system between Mexico and the United States started in 1979 to supply the industrial area in northern Mexico. The current network permits the import of 1.05 billion cubic meters of natural gas from the United States and the export of 0.03 billion cubic meters.

1.4 Coal: Another energy source that has prospects for giving impetus to the region's energy trade is coal, as long as producing and importing countries find the way to finance reconversion costs for clean uses. This would contribute to rationalizing and diversifying the region's energy balance and, in the case of oil producing countries, would free a large volume of fuel oil for export to other regions.

At the end of 1994, coal reserves in LAC accounted for almost 2% of world total. They had grown by 19% per year between 1988 and 1993, whereas world growth amounted to 1.6%. However, Colombia accounted for 39.2% and Brazil 32% of Latin American reserves. These countries are followed by Mexico with 11.3% and Venezuela with 10.2%. These four countries held 93% of all LAC reserves in 1994.

The region's production in 1994 accounted for 1% of world total. Between 1988 and 1993, production grew by 16.7%, which is four times below the world total. Colombia (55%), Mexico (20%), Venezuela (10.2%), and Brazil (9.7%) accounted for 95% of LAC pro-

duction. The reserves-production ratio in all cases was over 100 years and the average figure for the region is 433 years, which is almost twice the world ratio.

In 1994, consumption accounted for 2% of world total. As for previous figures, 94% of regional consumption was concentrated in Brazil (54.3%), Mexico (20%), Colombia (13.5%), and Chile (6%). Low consumption of the region's primary energy (4.4%) stems from the poor quality of the coal from importing countries for use by the iron and steel industry, surpluses in liquid and gas hydrocarbons, transport drawbacks, and pollution problems that have not been resolved.

The estimated coal production and consumption balance for 1994 indicates that the Andean Group holds a surplus, mainly because of Colombia, whereas the other subregions display shortages. It also indicates that the region's net balance should be covered by imports from the rest of world, which is actually absurd if one takes into account the available surpluses in Colombia.

Imports to Brazil (87%) and Argentina (6%) were aimed mainly at the iron and steel industry since the coal produced has no coking properties. Electric power generation was the second destination of these coals. The exports for 1994 were made by Colombia (84%) and Venezuela (16%).

Table 6: Coal reserves, production and consumption by December 31, 1994

	Reserves 10(6)tn	Production 10(3)tn	Consumption 10(3)tn	Reserves Production (Years)	Surpluses (Shortages) 10(3)tn
GRAN	8272	24943	5794	332	19149
MERCOSUR	5850	4256	22387	1375	(18131)
Mexico	1876	7405	8893	253	(1488)
CARICOM	333	-	168	-	(168)
Chile	206	1733	3486	119	(1753)
Cuba	-	-	153	-	(153)
MCCA and Panama	55	-	52	-	(52)
TOTAL LA & C	16600	38337	40833	433	(2596)
WORLD TOTAL	1049057	4435437	2071553	237	2363884

Source: OLADE-EC, Energy-Economic Information System (SIEE), September 1995

The European experience in the use of coal and the development of clean coal technologies may help to convert this energy source into a fuel for thermal generation that would help to mitigate demand pressures on natural gas in this use, freeing large volumes to obtain gasoline, in petrochemical uses and gas tanks to supply remote areas and marginal urban sectors to substitute firewood consumption. These processes could be oriented by adequate pricing policies and incentives that would enhance the competitiveness of the region's coal transport and use.

1.5 Electric power: Economic and social development will continue to be closely linked to the electricity sector. For this purpose, multilateral banks are reviewing the causes that have led to the imposition of financial constraints in this activity in the recent past and are in the process of designing new forms of financing that would include the private sector. There is still much to be done, as indicated by the coverage of electrified population (Table 8) in some of the region's countries.

The higher the degree of electric power development the higher is the human development index (Figure 1). This process is analogous to what occurs in the industrialized countries; in addition, there is evidence of growing efficiency as indicated by the evolution of energy intensity, expressing the efforts, albeit insufficient ones, being made by the region in the rational use of electricity. Nevertheless, electric power consumption in LAC is low (500 kWh per inhabitant) compared to the industrialized countries (5,000 kWh per inhabitant). Reciprocally, the lower availability of electricity con-

Table 7: Electrification coverage

	Residences Thousands	Residences Served Thousands	%
MERCOSUR (1993)	52193	41640	79.8
GRAN (1993)	19359	13448	69.4
MCCA and Panama (1994)	507	3218	56.5

Source: CIER and ECLAC

stitutes an obstacle to economic growth and well-being of the population.¹⁹

Studies linking energy to the degree of development indicated that, up to 1,500 kWh per inhabitant, energy is a factor for speeding up development, but this tends to be neutral over 3,000 kWh. As

Figure 3

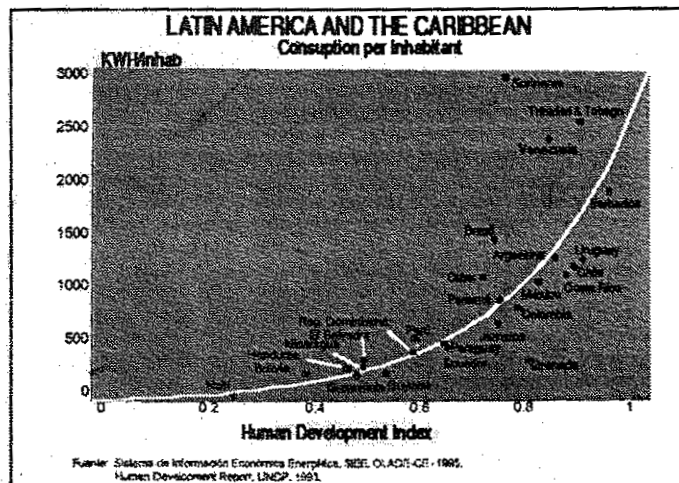
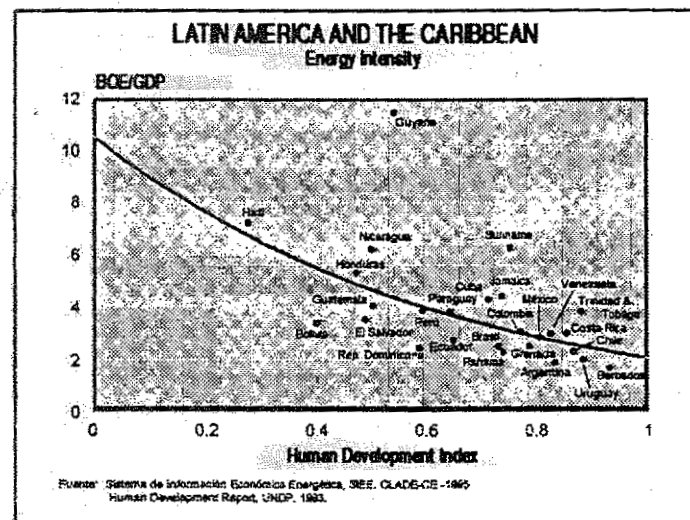


Figure 4



19. See several considerations of this issue in Byron Granda, Francisco Figueroa de la Vega, and Paul H. Suding, "Energy and Human Development in Latin America and the Caribbean: Statistical Evidence," *Energy Magazine*, OLADE, January-April 1995. See also OLADE, "Energy and Development: Preliminary Ideas on Elements that Could Be Part of a Plan of Action for the Region," October 1994.

up development, but this tends to be neutral over 3,000 kWh. As shown in these figures, consumption per inhabitant in LAC is on average on the order of 500 kWh, with still many countries below this figure.

The growth of installed capacity since 1970 has been especially significant, but it is insufficient in some countries to meet the needs of coming years stemming from economic growth, demographic growth, and the lags of previous years. By means of integration, capacity and its utilization are enhanced, thus facilitating a more efficient use of installations, promoting greater competitiveness between systems and, as a result, border prices that will limit those aspects not reached by sector regulations in some countries and that hinder opportunities for greater international competitiveness in electricity-intensive industries.

The region's installed capacity is predominantly hydroelectric (60%) and then thermoelectric (38%), both together accounting for 98% of total. Hydropower generation, because of its characteristics as base service, accounted for 67% of total generation whereas thermoelectric generation accounted for 30%, meaning a combined generation capacity of 97% of total. The region's capacity utilization factor was 46.9%, which is the weighted average of unified national load dispatches. The highest efficiency is apparent in hydropower generation.

Energy inputs for hydro generation, distributed among run-of-river stations and reservoir stations, accounted for 36.3%, whereas inputs for thermal generation accounted for 45.5%. Regarding the latter, natural gas, fuel oil, and coal were the most widely used inputs. Nevertheless, thermal inputs are those recording the lowest efficiency in electric power generation, as well as consuming nonrenewable sources that could be destined to other uses. The region has a hydropower potential which accounts for 22.7% of world total, although only 14% of this amount is actually used.

Table 8: Installed capacity and electric generation in 1994

	Capacity (MW)					Generation (GWh)					Utilization Factor*
	Hydro	Therm	Geot	Nucl	Total	Hydro	Therm	Geot	Nucl	Total	
MERCOSUR	64226	17566	1	1675	83468	311852	37027		8362	357241	48.9
GRAN	21921	13733			35654	96544	43072			139616	44.9
Mexico	8847	21533	753	675	31808	27705	95880	7061	5161	135807	48.7
CARICOM	585	4680			5265	2485	13915			16404	35.6
Chile	3546	2052			5598	17487	4904			22391	45.7
MCCA & Panama	2723	1917	175		4815	14145	4818			18963	45.0
Cuba	49	4033			4082	165	10817			10982	30.7
Others	62	155			217	293	69			362	19.0
TOTAL LA & C	101959	65669	929	2350	170907	470680	210502	7061	13059	701766	46.9

* Relationship between generation and power per 8760 hrs/year.
Source: OLADE-EC, Energy-Economic Information System (SIEE), September 1995

LAC water resources also show the highest potential for supplying inputs to the region's integration process not only through shared hydro resources but also through the interconnection of national hydropower resources by means of international transmission lines. The importance of the hydropower potential in river basins that involve shared areas is shown the table.

Table 9: LAC electric power generation balance in 1994

Inputs and product	Hydro	Therm	Geot	Nucl	Total	%
Oil		5174			5174	0.6
Natural gas		126655			126655	13.9
Coal		45530			45530	5.0
Hydroenergy	304449				304449	33.4
Geothermal			6157		6157	0.7
Nuclear				148702	148702	16.3
Diesel Oil		29178			29178	3.2
Fuel Oil		191903			191903	21.0
Gases		30743			30743	3.4
Other		23695			23695	2.5
Total 10(3)boe	304449	429183	6157	148702	831910	100
Electricity GWh	465921	206673	7943	12318	692854	-

Source: OLADE-EC, Energy-Economic Information System (SIEE), December 1995

About 55% of the surface area of the basins involve shared areas in some stretch of the main waterway. The approach implicit in Table 11 was that the contribution to the integration process was bilateral rather than multilateral, and therefore the possibility of shar-

Table 10: Distribution of hydrographic basins and of hydropower potential by subregions

Subregion	Total surface (thousands of km ²)	Surface of International Basins (thousands of km ²)	%	Hydropower Potential (MW)	Percentage of Utilization %
MERCOSUR	11871	6886	58	329277	19.5
GRAN	4721	3582	76	261130	8.4
MCCA & Panama	134	46	34	50157	5.4
Mexico	1967	85	4	53530	16.5
Chile	757	198	26	26046	13.6
Caribbean	9.3	-	-	9077	7.7
TOTAL LA & C	19460	10797	55	729217	14.0

Source: OLADE-UNDP, 1988; and SIEE-OLADE, September 1995

ing, through transmission lines, hydropower resources or surpluses generated by other inland stations in the different countries of the region was not considered at that time. Because of this at present it seems more reasonable to think of using existing excess capacity, whether shared or not, whose costs could be better distributed and of optimizing the use of hydropower resources to also minimize generation and transport costs in the use of these resources. Thus, it is possible that, in addition to energy savings effects stemming from a more effective management of demand and the rational use of energy among large consumers, investments in generation in large-scale projects will be better distributed over time and that greater financ-

Table 11: Shared hydropower developments (SHD) in operation by 1995.

SHD/ Countries	Basin	Capacity (MW)	Power (GWh)	Reservoir		Year of service startup
				Useful Vol. (km ³)	Surface (km ²)	
Itaipu (Brazil- Paraguay)	Parana River	12,600	70,000	19	1,460	1985
Yacyreta (Argentina- Paraguay)	Parana River	2,700	17,500	5	575	1994
Salto Grande (Argentina- Uruguay)	Uruguay River	1,890	6,500	6	78.3	1979

Source: OLADE-UNDP

ing can be allocated for power generation using renewable energy sources to meet the needs of remote population groups and transmission lines.

At present, in MERCOSUR, there are large operating capacities, among which the Itaipú station, which is the largest in the world. Nevertheless, integration actions using electric power system interconnections between subregions has made little progress, beyond border interconnections and shared hydropower developments. This is due to the fact that, within the countries, the concept of closed economies fostering the development of national interconnected systems in accordance with their respective characteristics prevailed. This expansion was associated to the development of large hydro resources on the basis of a strategy to preserve nonrenewable energy sources, basically hydrocarbons, or to neutralize the effects of price hikes of these hydrocarbons.

The above-mentioned scheme therefore promoted the emergence of bilateral shared hydropower development projects, both currently operating and in the process of being implemented, involving the development of interconnections to take advantage of surpluses stemming from the asymmetrical demand structure among the countries of each binational agreement. Another form of binational interconnection arose from the need to resolve power deficits located on the border with thermal systems, such as the first interconnections between Colombia and Venezuela or between Brazil and Uruguay. In Central America, the situation was different, closer to the current multilateral energy integration approach that strives to use the subregion's power generation capacity more adequately.

Nevertheless, at present, although the economic approach has shifted to open regionalism, subregional transmission networks are the outcome of previous projects. This shift of approach has given a challenge to countries, one that implies a new concept in generation facilities and the linkage of consumption centers with new transmission line projects. The upshot of this new approach was that, at the

beginning of State reform, with deregulation and privatization in Argentina, the large hydropower stations ran the risk of turning into idle capacity owing to the lower financial benefits stemming from their commercial operation compared to generation based on natural gas. Subregional integration has started to overturn these risks, and hydropower stations now appear as an interesting source of business with the expansion of the electric power market.

Probably the most interesting effect, however, of the above-mentioned evolution, however, has been the following stage, that is, regional and hemispheric integration. The large stations will have a huge market when transmission lines are extended throughout the region. Seasonality can be neutralized even more effectively; The fluctuation of oil and gas prices can also be neutralized as a result of greater supply security, which will no longer be exclusively dependent on thermal sources. Advantage will be taken of differences in use schedules that spread out peak demand schedules. Likewise, idle capacity can be employed without transferring cost overruns to end-users. Finally, the electric power market will lose its monopolistic power when electricity becomes a *tradable* commodity on the continent.

The private sector sees in this process growing opportunities to contribute capital and technology. This is already occurring in various countries that have completely liberalized their economy or in others that are complementing state supply with private-sector supply.

The degree of private participation will depend on the sovereign decisions of each State. In this sense, there are no blanket formulas. The fact is, however, that there is participation and it is relevant for supply decisions in some countries. The question is how to harmonize the interests at stake in order to achieve the ultimate goal, which is to ensure the greater well-being of the population based on the increased electrification of each country and, as a consequence,

of the region, reducing the costs of electric supplies for industrial uses.

At present, almost all countries in the region are involved in cross-border electric power trade. The most complete interconnection systems are the Central American isthmus, MERCOSUR, and Mexico-United States. The northern Brazil circuit is the least devel-

Table 12: International electric interconnections in operation or under construction during 1995.

Subregions	Countries	Location	Voltage (KV)
MERCOSUR	Argentina-Bolivia	Pocitos-Yacuiba Villazon-La Quiaca Aguas Blancas	33(Ar)-6.9(Bo) 33(Ar)-24.9(Bo) 33(Ar)-6.9(Bo)
	Argentina-Brazil	Libres Pass-Uruguayana	132(Ar)-230(Br)
	Argentina-Paraguay	Clorinda-Guarambere Posadas-Encarnacion El Dorado-Carlos A.Lopez	132(Ar)-220(Py) 33 132(Ar)-220(Py)
	Argentina-Uruguay	Ayui-Ayui Col. Elia-San Javier Concordia-Sello Concepcion del Uruguay- Paysandu	500 500 30 132(Ar)-150(Uy)
	Brazil-Paraguay	Itaipu Foz do Iguazu-Acuray Campo Grande-Ponta Pora	500 138 60(Br)-66(Py)
	Brazil-Uruguay	Quaray-Arugas Livramento-Rivera Chui-Chuy Rio Branco-Jaguarao	MT MT MT MT
	Brazil-Bolivia	Cortiza-San Mateo Corumba-Posito Eadras-Puerto Suarez	34.5 13.8
	Bolivia-Peru	Desaguadero I-Yunguyo	25(Bo)-13.2(Pe)
	Colombia-Brazil	Leticia-Tabatinga	13.8
	Colombia-Ecuador	Ipiates-Tulcan Ibarra	115(Co)-138(Ec)
GRAN	Colombia-Venezuela	SE Zulia-SE La Fria II Arauca-Guasdalito	115 13.8
	Chile-Argentina	Pto. Natales Rio Turbio Chile Chico-Los Antiguos	MT ad
	Honduras-Nicaragua	1976	230
	Nicaragua-Costa Rica	1982	230
MCCA	El Salvador-Guatemala	Ahuchapan-Guatemala Este	230
	Costa Rica-Panama	1986	230
	Mexico-Estados Unidos	Tijuana-San Miguel La Rosita-Imperial Valley Falcon-Prasa Falcon Nuevo Laredo-Laredo Piedras Negras-Eagle Pass Matamoros-Brownsville Ciudad Juarez-El Paso Tijuana-San Isidro Nogales-Nogales Ojinaga-Prsidio	230 230 138 138 138 66 66 66 13.8 12
NAFTA	Mexico-Belize	Chetumal-Belize	34.5

oped and the Andean Group has made little progress, except for the interconnections between Colombia and Venezuela.

2. Energy trade

Energy trade flows between 1988 and 1993 indicated that there was a substantial increase in the export of oil and products, as well as coal, between the region's countries (Table 16). The largest increase took place as of 1990, when initiatives were launched toward the regional market regarding the destination of the exports of the above-mentioned products.

MERCOSUR and the Andean Group have the two most dynamic regions regarding this new scheme, giving priority to exports

Table 13: Regional energy exports and imports in 1993 (in thousands of barrels)

	Exports			Imports			Balance with rest of the world
	LAC	World	Total	LAC	World	Total	
Petroleum	118,905	1,177,170	1,296,075	118,905	180,004	298,909	997,166
Fuel oil	26,126	137,219	163,345	26,126	67,377	93,503	69,842
Gasolines	20,530	86318	106,848	20,530	64,520	85,050	21,798
Diesel oil	34,687	61,686	96373	34,687	44,734	79,420	16,952
Kerojet	4,784	38,232	43,016	4,784	6,203	10,987	32,029
LPG	11,746	22,789	34,535	11,746	15,427	27,172	7,362
Asphalts	366	6,261	6,627	366	49	415	6,212
Lubricants	1,460	1,918	3,378	1,460	299	1,759	1,619
Natural Gas (mill,m3)	2,092	52	2,144	2,092	1,002	3,094	(950)
Coal (thous, tn)	391	21,027	21,419	391	19,221	19,221	1,806

Source: GTZ-IDEA, July 1995.

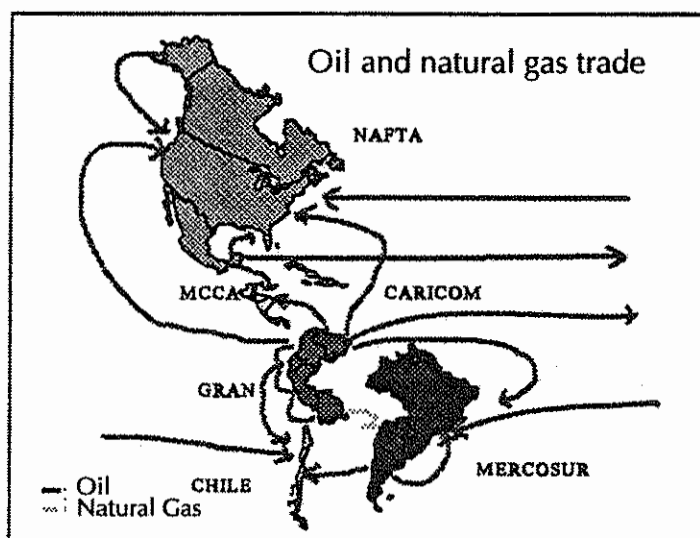
aimed at the countries of the same subregion. A similar trend has been observed in the Central American Common Market, which although a net importing subregion has increased its share of exports between the countries of the same subregion in the case of gasoline, diesel oil, fuel oil, LPG, and asphalt. In the above-mentioned subregions, trade within subregional blocs has been considerably enhanced. In CARICOM, however, the higher current share of gasoline, diesel oil, and LPG exports is aimed at the rest of LAC.

In the case of Mexico, it is apparent that only for diesel oil has the share of exports to LAC increased whereas for oil, gasoline, kerosene/jet fuel, and LPG, priority continues to be granted to the rest of the world. The same is taking place in Chile, with its small exportable surpluses. Since 1988, LAC has been less dependent on oil and products coming from the rest of the world, except asphalt. Imports of oil and products by the different subregions from the rest of LAC grew essentially in MERCOSUR, the Central American Common Market, and CARICOM. In the Andean Group, imports of gasoline, diesel oil and kerosene/jet fuel from LAC also increased.

Mexico has increased its imports of gasoline and fuel from LAC, the only products that it imports. In Chile, by contrast, oil imports from LAC have declined although the origin structure for the import of other products has not varied.²⁰

2.1 Oil and products: Six of the region's countries are net exporters whereas the remaining 20 countries are net importers. Of the 3,473,000 barrels per day of oil and the 1,228,000 barrels per day of oil products, Venezuela and Mexico accounted for 77% and the other four countries (Ecuador, Colombia, Argentina, and Trinidad and Tobago) accounted for 18%. The remaining 5% comes from net importing countries such as Brazil, Panama, Peru, Barbados, Costa Rica, Cuba, Chile, El Salvador, Jamaica, Suriname, and Paraguay, which mainly exported fuel oil and gasoline owing to the characteristics of their refineries and the structure of their domestic markets.

20. For greater detail, see GTZ/IDEE, *op. cit.*



Among the net importers, Brazil stands out since alone it has received 44.4% of the region's imports, whereas Cuba received 9.1%, Chile 8.2%, the Central American countries 8.3%, the remaining Caribbean countries 8%, and the other South American countries 5.7%. Total imports of the above-mentioned countries accounted for 83.7% of imports of crude oil and products. Net exporting countries imported the remaining 16.3% due to the structure of their refining capacity that cannot meet demand.

2.2 Natural gas: The transport of natural gas at current prices can only be viable by means of gas pipelines. The only regional gas trade in 1993 was conducted from Bolivia to Argentina for an equivalent of 9% of consumption of the latter country. Mexico, due to the distance of its reservoirs from its industry, imported 3% of its consumption from the United States. Total imports of the region in 1993 amounted to 3.094 billion cubic meters, which accounted for 3% of the region's consumption.

2.3 Coal: In 1993, 19.6 million tons of coal, equivalent to 51% of total regional consumption, were imported. Of this total, Brazil imported 87%, followed by Argentina (6%). The remaining importers were Chile, Peru, Cuba, the Dominican Republic, Panama, Jamaica, Mexico, and Uruguay. Most of Brazil's and Argentina's imports were

directed first to their iron and steel industry, since local coal displays no coking properties, and then to electric power generation. Exports by 1993 had amounted to 21.4 million tons and accounted for 58% of regional production. Colombia supplied 84% and Venezuela the remaining 16%.

2.4 Electricity: The most important trade flows are between MERCOSUR countries that are linked to the major shared hydropower developments (Itaipú and Salto Grande). In the other continental subregions, there are medium-sized interconnections but exchanges have not been significant.

Table 14: Electricity exports and imports (MWh)

Subregions	Exports	1985	1990	1993
	Imports			
MERCOSUR	Exports	5544	27672	30472
	Imports	4632	29296	28853
MCCA	Exports	204	443	219
	Imports	198	371	184
Panama	Exports	8	90	106
	Imports	30	204	192
Mexico	Exports	237	1945	2015
	Imports	135	576	909

Source: IDEE data base, 1995

2.5 Value of regional energy exports and imports: 86.7% of exports generated the inflow of foreign currencies into the region from the rest of the world. Oil is the one energy product that generates the largest amount of foreign currency revenues from its export, that is, 71% of total foreign currencies generated by exports to the rest of the world .

Table 15: Regional energy exports and imports during 1993
(in millions of US\$)

	Exports			Imports			Balance with rest of world
	LAC	World	Total	LAC	World	Total	
Petroleum	1.734	17.318	19.052	1934	2938	4872	14.380
Gasoline	481	2.008	2.489	550	1.729	2.279	279
Diesel oil	717	1.278	1.995	755	976	1.731	302
Fuel oil	247	1.297	1.544	282	727	1.009	570
Kero/jet	116	916	1.032	132	170	302	746
LPG	144	277	421	172	227	399	50
Lubricants	162	212	374	169	35	204	177
Asphalts	7	125	132	7	1	8	124
Natural Gas	88	2	90	94	78	172	(76)
Coal	15	883	898	18	859	877	24
TOTAL LAC	3.711	24.316	28.027	4.113	7.740	11.853	16.576

Source: GTZ-IDEA, July 1995

On the other hand, imports generated an outflow of foreign currencies that accounted for 65.3% of total imports. The net balance is positive in the amount of US\$16.576 billion. Of this balance, oil accounts for the major source of income, followed by kerosene/jet fuel and fuel oil.

IV. Prospects for energy integration

Beyond bilateral and subregional agreements, there is important evidence of energy integration between blocs that tend to favor regional integration. The most recent evidence is the agreements and studies that are in the process of being consolidated in the Group of Three and which, in terms of energy, are leading to an electric power interconnection project between three blocs, the North American Free Trade Agreement (NAFTA), Central America, and the Andean Group, even when within some of them progress in interconnections is not significant²¹. CIER studies on electric power interconnections in South America are aimed at integrating the Andean Group, MERCOSUR, and Chile by means of an enormous ring that would help to optimize existing hydropower capacity and give priority to projects whose implementation could not otherwise be justified in isolated countries²². The Central American Electric Power Interconnection System (SIPAC), although subregional in nature, will facilitate progress in inter-bloc interconnections.

OLADE and UNDP²³ have highlighted shared hydropower developments through a study whose purpose has been to present the conceptual elements that have in large measure allowed the energy integration effort in the region, as well as to explain the nature of these developments as a form of collaboration between the countries of the region, including the expansion of the national electric markets through multinational interconnections. OLADE has also highlighted shared hydrocarbon developments, contributing new elements to the integration process in this aspect.

21. Group of Three, Informe de la décimo segunda reunión del Grupo de Trabajo de Interconexión Eléctrica, Electric Cooperation Committee, Mexico, June 1995.

22. Rodolfo R. D'Amado Campos, Relevancia Geopolítica de la Hidroelectricidad en la Región de la CIER, Regional Electric Power Integration Commission, Uruguay.

23. OLADE-UNDP, "Aprovechamientos Hidroeléctricos Compartidos," Quito, July 1988.

Existing natural gas transportation projects and those under way between the GRAN, MERCOSUR and Chile also point to a strong integrationist trend, as well as the oil pipeline between Chile and Argentina or the San Jose Agreement, through which Mexico and Venezuela grant financial facilities to the Central American countries for crude oil provisions.

Thus, energy forecasting must be reformulated within a context of inter- or intra-bloc integration policies. The shared use of each country's natural resources, free trade by means of energy transport, the use of shared deposits and hydro resources, water rights and rights-of-way, the harmonization of regulatory processes, and the elimination of customs and noncustoms barriers are all matters that must be studied.

Energy integration projects should have a regional dimension. Studies should be conducted keeping in mind the region as a whole, that is focusing on the sequence of interconnections and gas pipelines between subregions and then within them to end up detecting problems in national interconnected systems or in natural gas transport networks. In turn, the feasibility of identified hydropower generation projects or generation alternatives and natural gas potential and reserves should be determined. Thus, the projects will constitute a framework of reference for investors, whether public or private and their partners, that would permit implementing concrete transmission and generation projects or gas lines. The studies, in addition, should facilitate the preparation of bidding documents for international projects in those sections deemed to be priority by the governments.

This approach would be further consolidated if, in addition, the projects were to consider the interdependence between the different energy sources in order to optimize least-cost supply. Under these conditions, it would be possible to enhance the region's industrial competitiveness, at least with respect to the cost of energy inputs.

These aspects are experiencing less and less government restrictions, bearing in mind the regional interests that seek energy assurance, low energy costs, higher efficiency and an environmental quality that will favor industrial competitiveness in the international market.

At the same time, the Americas Free Trade Zone will favor access to technology and to intra-regional investments, creating a new market dimension with potentially interesting perspectives.

In addition to all this, we must remember that the region carried out its energy projects with a high percentage of its own human resources, which have been trained during over two decades and that places it in the best situation to face new challenges.

1. *Oil and products:* The main actions carried out with respect to this activity and that could strengthen it or lead to new actions are the following:

The San José accord was established between the Central American and Caribbean countries with Mexico and Venezuela, as a result of the high oil bill of the importing countries, caused by the increase in oil prices during the two shocks, in 1973-74 and 1979-80. Through this agreement, Mexico and Venezuela give to beneficiary countries 20% of the oil bill in the form of soft loans, to be destined to social and economic development projects. With this agreement, although the importing countries initially included in it were securing a safe provision of crude oil and the facilities that have been indicated during a period of scarcity of crude oil and high prices, the future situation of the oil market did not make it attractive any longer.

Some of the objections presented by several of the importing countries were related to the type of crude oil supplied by Mexico and Venezuela, that was too heavy for the structure of the refineries in the receiver countries and for the structure of their domestic market for oil products.

This situation caused a strong imbalance with regards to fuel oil (bunker) surpluses and gasoline and gas oil shortages. Toward the mid-eighties, the price of crude oil and oil products fell significantly in the international market, the number of suppliers grew, the structures of the refineries in the importing countries were not changed, fuel imports were privatized in some of them and all of these events detracted very much from the initial advantages of the San José Accord.²⁴

So the type of exchanges decreased and the countries or private oil companies acting in them went back to their practice of importing the so-called "reconstituted crude oil" or of directly importing oil products, closing down refineries in some cases.

Lately, in May of 1995, Honduras, a country that been experiencing a very special economic crisis, became interested in renewing imports amounting to 8000 bls/day from Venezuela, within the framework of the San José Accord, through sale/purchase relations between private Honduran importers and the government of Venezuela. In any case, this type of agreement would seem to be a path to be perfected and continued to be followed in future.

Also within the Central American subregion integration possibilities appear, as a result of the technological obsolescence and the lack of scale economies of the refineries in those countries. These characteristics cause structural imbalances between the supply and demand of oil products, which the countries tend to resolve importing the oil products strictly required by their internal markets, since the economic result is no more unfavorable than the importation of crude oil and its processing in those plants.

In spite of the institutional situations, some refineries belong to multinational oil companies and others are state-owned, for which reason it would be advisable to study some integration possibilities.

24. See also the ECLA-GTZ study: "Utilización y Beneficios del Acuerdo de San José para el Istmo Centroamericano," México, July 1994.

The first would be the joint acquisition, on the part of the countries, of the crude oil and/or oil products required by their internal markets, to obtain better prices than they would be able to individually. The second would consist in analyzing the possibility of building a refinery to supply the requirements of the entire Central American market, of joint property, through a joint venture between the countries and the private companies. Although this alternative faces geopolitical difficulties, a study to show the economic convenience or not of this decision, based on the current situation, could provide elements to overcome that difficulty.

Oil integration between the Caribbean countries is more difficult, because of the separation of its territories. But the alternatives indicated for Central America could well be analyzed for these countries, too.

In South America, within the countries of the Andean Pact, solidarity actions have taken place as a consequence of natural disasters or attempts that have caused damages in the pipelines and that made it impossible to transport the crude oil from the fields in jungle areas to the seacoast, for their exportation. The collaboration between bordering countries like Ecuador and Colombia, as well as between Ecuador and Venezuela, based on the loan of crude oil from the latter country, points to the solidarity of this type of action.

A priority issue has to do with the commercial exchanges of crude oil and oil products between the countries of the region. These exchanges have increased during the last decade and if one bears in mind that the annual imports of Latin America and the Caribbean amount to US\$10.8 billion and exports to US\$27 billion, the magnitude of this market can be appreciated, as well as the enormous possibilities that exist to increase these exchanges. However, to encourage intra-regional exchange it is important to stabilize prices, because when they fall they harm exporters and when they go up, the problem is pushed on the importers.

Another aspect related to this activity is the assurance of supplies on the part of the countries and that can only be achieved through reliable and stable supplies that privilege intra-regional exchanges. As examples of these situations we can mention the exports of crude oil from Argentina to Brazil, Uruguay, Chile and Paraguay which, due to the distance, have made of Argentina the second supplier of Brazil and of the countries mentioned, the beneficiaries of most of Argentina's crude oil exports.

Since 1994 an important amount of crude oil imported by Chile is transported through an oil pipeline fed with petroleum from the Neuquen basin in Argentina.

The imbalances between the refinery structures and the respective markets have also led to an exchange of oil products between the countries. For example, there have been sales of gasoline from Brazil to Colombia and of fuel oil from Brazil to Argentina.

With regards to exploration, there has been some outstanding joint work between the Mexican company PEMEX and RECOPE of Costa Rica. The Argentine state company YPF also carried out exploratory activities in Ecuador and has been looking for hydrocarbons with the Brazilian PETROBRAS and with the Chilean ENAP subsidiaries, for the joint exploitation of a field in Argentina.

With regards to petroleum production, in addition to the association indicated between YPF and the Chilean ENAP subsidiaries, we can mention the participation of private Argentine companies in marginal areas of Venezuela.

About two years ago, a proposal was made to create a Latin American state petroleum multinational, formed by PDVSA of Venezuela, PEMEX of Mexico and PETROBRAS of Brazil, which are among the 15 most important companies of the world. Although this initiative still has not taken shape, there is a growing interest in associations or purchases of companies. The most recent case was the

acquisition of the United States' Maxus company by YPF of Argentina.

The exchange with regards to the purchase of equipment and materials for the oil industry, amounting to US\$7 billion per year with almost 40% of them coming from outside the region, is another aspect that deserves special attention.

The exchange of technological capacity and management could lead to an outstanding flow between the state oil companies of Mexico, Brazil and Venezuela and the private ones from Argentina with those existing in countries with relatively less petroleum development, particularly with regards to PETROBRAS developments in exploration and offshore production, and of the others in seismic in 3D and of Venezuela in the drilling of horizontal wells. Private companies currently acting in different countries of the region, particularly with regard to exploration and production, could contribute to the transference of their management capacity to state companies so requiring it.

For the training of people in the oil sector, there are in the region itself outstanding representatives at the National Autonomous University of Mexico and the Mexican Petroleum Institute; at the Federal Rio de Janeiro University and its Industrial Economics Institute in Brazil; in Argentina, at the Institute of Energy Economics, the Mosconi Institute and the Petroleum Institute of Argentina, as well as petroleum and natural gas institutions in Venezuela and Colombia, with their own managerial training programs.

The Latin American and Caribbean oil exporting countries formed an informal group that has carried out actions with regards to the trade of oil products, industrial complementing between Mexico and Venezuela, cooperation and assistance in the event of oil accidents between Venezuela and Trinidad & Tobago, hydrocarbon spill control between Venezuela and Colombia and the commercialization

of fuel oil between those same countries. This group is formed by Colombia, Ecuador, Mexico, Trinidad & Tobago and Venezuela.

Within the GRAN and through the OLADE Permanent Secretariat, meetings have been held between the Ministers of Energy to cooperate in technological complementing and the commercial exchange of capital goods, services and inputs for the petroleum industry.

2. *Natural gas:* In Latin America and the Caribbean there are natural gas developments in Mexico, in several South American countries and in Trinidad & Tobago. Argentina is where natural gas has reached the highest levels of dissemination among the different population groups, with a significant expansion of the residential networks.

**Table 16: MERCOSUR and neighboring countries:
Natural gas resources in 1994**

Country	Resources (million cubic meters)				Production Mcm 5	Reserves/ Production Years 6
	Reserves 1	Probable 2	Potential(*) 3	Total 4		
Argentina	526	113	636	1275	27773	18.9
Bolivia	108	46	189	343	4365	27.3
Brazil	147	52	1143	1342	7024	20.9
Chile	117	-	81	198	2712	43.1
Peru	202	183	500	885	1287	157.0
Total	1100	394	2549	4043	40451	27.2

Source: On the basis of OLADE data, December 1995.

(*) The potentials were calculated on the basis of dataa from Charles D Masters, Emil D. Attrasi and David H. Root, U.S. Geological Survey, National Center, Reston, Virginia, USA, reprint in Proceedings of the 14th World Petroleum Congress, Stavanger, Norway, John Wiley and Sons Ltd., 1994

The penetration of liquified petroleum gas, on the other hand, can be seen in practically all the countries of the region.

The gas interconnection in the River Plate basin and between Argentina and Chile would allow developing a subregional market formed by Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay, through a network of gas pipelines that would allow exchanges under advantageous economic conditions. The average area of these

countries is of 15 million km², with a population of 232 million inhabitants growing at an annual average rate of 2%.

The existence of this potential and the advance achieved in the development of the transportation and distribution infrastructure, as well as the interest in substituting the use of oil products, led the countries in the subregion to begin negotiating the supply of this energy source. It is estimated, however that particularly with regards to potential MERCOSUR supplier countries (Argentina, Bolivia and Peru), significant investments in exploration would be required to ensure the supply.

A global analysis of the MERCOSUR supply forecast, based on the potential of Argentina, Bolivia and Peru, show certain weaknesses that would appear in the next 15 years. The weakness of this forecast is the assumption, in excess, that 100% of the natural gas potential indicated in the previous table will be discovered. The calculations show that the supply from Venezuela, presumably towards Manaus, Brazil, to interconnect with a Brazilian gas pipeline projected toward Sao Paulo, will allow a higher coverage than that estimated for the MERCOSUR supply and guarantee the countries in the subregion a safe supply over the long term. This can be seen in the following table.

Central America, in turn, could benefit from the natural gas wealth of the countries in the Group of the Three (Mexico, Colombia and Venezuela). Mexico, the second largest country in the region with regard to proven resources and production, is in turn a natural gas importer, bringing it in from the United States, since its fields are located much farther away than the United States is from its industrial consumption centers. Thus, 90% of Mexico's natural gas production is located in the southeastern part of the country, but the largest industries are in the north. In view of the lack of large enough gas pipelines to join the southern region with the north of Mexico, some experts affirm that it is cheaper to import gas from the United States than to build those gas pipelines. In any case, an integration alterna-

tive that should be studied carefully would be the construction of a gas pipeline going from the southeast of Mexico to supply the Central American countries.

Table 17: MERCOSUR and neighboring countries: Natural gas imports and exports estimated for the year 2010²⁵

Countries	Production thousand cubic meters 1994 (*)			Per capita consumption cubic meters/year (1994) (4)	Production thousand cubic meters 2010 (**)			Per capita consumption cubic meters/year (2010) (8)
	Total Demand (1)	Export (Import) (2)	Total (3)		Total Demand (5)	Export (Import) (6)	Total (7)	
Argentina	30030	-2257	27773	886	45355	8810	54165	1090
Bolivia	2243	2257	4500	283	3953	9800	13753	338
Brazil	7024		7024	46	29761	-8000	21761	138
Chile	2712		2712	193	13902	-8600	5302	755
Paraguay	-		-	-	1300	-1300	-	149
Peru	1287		1287	55	1726	0	1726	49
Uruguay	-		-	-	710	-710	-	198
Total	43296	0	43296		96707	0	96707	

Source: (*) On the basis of data of OLADE, SIEE, December 1995. (**) Own estimate.

Colombia also has abundant natural gas reserves that it expects to develop mainly for internal provisioning, beginning with thermal power generation. The alternative should eventually be considered of Colombia supplying the Central American countries.

Venezuela is the main country in the region with regards to natural gas reserves and production. Its use is mainly for the oil industry, electricity generation and industry, with relatively little development for residential uses. Beyond those LNG projects for export, the proven natural gas availability well deserves studied in terms of an alternative gas pipeline supply for the Central American countries, moving through Colombian territory.

25. It is assumed that the total supply (column 6) will satisfy the consumption per capita (column 10), which has implicit the intermediate, own and final consumptions of the socioeconomic sectors. Total production (column 9), in turn, has been calculated based on expected reserves, taking off 50% of the potential and on the basis of a reserve horizon of 15 years for all the countries, with the exception of Venezuela. Non-used natural gas (column 8) is based on the assumption of 15% blowouts and losses. Exports and imports are obtained from the difference.

The most important natural gas integration project in South America is undoubtedly the one that would join the Bolivia and Argentina fields with Paraguay and southern Brazil. In this aspect, there are many ideas and sections, some of them still not totally defined, such as:

- The gas pipeline between Santa Cruz de la Sierra, in Bolivia, until Rio Grande do Sul, in Brazil. These two countries signed a contract in February of 1993 to build a gas pipeline to export natural gas from the Bolivian fields. The gas pipeline going from Santa Cruz de la Sierra to Campinas is 3,400 km long and has a diameter of 32", and can possibly be expanded to 36" to supply the Sao Paulo electric utilities. The forecasted supply amounts to 8 million m³/day and could be increased to 12 million m³/day.

Table 18: Projected international gas pipelines

Countries	Sections	Length (km)	Diameter (inches)
Argentina-Brazil	San Gregorio-Puerto Rico Iguazu-Sao Paulo	2300	3542
	Parana-Concepcion del Uruguay-Paso de los Libres-Alegrete-Porto Alegre	1140	
	Madrejonas-Porto Alegre	2735	
Argentina-Uruguay	San Gregorio-Montevideo	644	
Argentina-Chile	Neuquen-Santiago	1200	2426
	Ramos-Antofagasta	640	
	Mendoza-Santiago	410	
Bolivia-Brazil	Santa Cruz-Sao Paulo	2300	3236
Bolivia-Chile	Villamontes-Antofagasta-Santiago	1126	20
Bolivia-Paraguay	Vuelta Grande-Asuncion	901	12
Peru-Bolivia	Camisea-Santa Cruz	1300	30

Source: OLADE

- Gas pipeline between Yacuiba, in Bolivia, which goes through Paraguay until Rio Grande do Sul. From there on it would connect

with Sao Paulo and Rio de Janeiro. The latter gas pipeline could eventually connect with the Camisea field in Peru.

- Argentina and Brazil have also analyzed options for the construction of two gas pipelines. The first, between San Geronimo-Puerto Iguazu-Sao Paulo, 2,300 km long, would be able to transport a volume of 6 million m³/day. The second one, following the direction of Parana-Concepcion del Uruguay-Paso de los Libres-Alegrete-Porto Alegre, would be 1,140 km long. The supply to Paraguay and Uruguay would depend on the implementation of the projects already mentioned and on the way their energy markets develop.
- Argentina and Chile have decided to build at least two gas pipelines to join these two countries. One of them, the most important one, would inject gas from the Argentine Neuquen basin and would go into Chile through Neuquen, with a length of 820 km, and an alternative one, 410 km long, going from the Argentine province of Mendoza. With this gas pipeline it is expected that within two years Chile's central zone will begin to receive Argentine gas for residential and industrial uses and for thermal power generation. Another smaller gas pipeline that has practically been decided upon, would be built in the southern part of Argentina, to feed a petrochemical industry in Chile involved in methanol production. There have also been negotiations between both countries to build a 640 km long gas pipeline going from northeastern Argentina to the north of Chile. These projects add up to US\$ 3.1 billion, to be financed mainly with private capital.
- There is a 980 km long gas pipeline project between Bolivia and Chile, involving an investment of around US\$350 million. This would also be financed with private capital.
- The Mesopotamia gas pipeline would be expanded to Uruguay. This gas pipeline could receive supplies from northeastern Argentina, after passing through the provinces of Formosa,

Corrientes and Entre Rios, and even be interconnected with a derivation to Paraguay and with the gas pipeline to Brazil that comes from Bolivia.

- There is integration potential in the northern part of South America, between Venezuela, Colombia and Ecuador, who would have to await the development of the internal markets, based on large investments in distribution networks.
- Trinidad & Tobago has an interesting level of proven natural gas reserves, amounting to almost twice as much as Bolivia. Part of them are located in territorial waters, in a field controlled by British Gas and Amoco. These companies are planning to build a LNG plant to export to the United States, Puerto Rico and possibly Europe. The main inconvenience is that the price of gas, which should be over 3 US\$/10⁶ BTU, is currently at 1.5 US\$/10⁶ BTU.

3. *Coal:* Eight countries in the region have proven coal reserves, mainly in Colombia and Brazil, who together have 71% of them.

There are only two net exporting countries: Colombia and Venezuela. Colombia, with its El Cerrejon mine, absorbs 84% of regional exports.

The main import markets are Brazil, with 87%, and Argentina, with 6%. The remaining 7% is distributed between Chile, Peru, Cuba, the Dominican Republic, Panama, Jamaica and Mexico.

Bearing in mind the availability of appropriate coal for the Colombian iron and steel works and the requirements of Argentina and Brazil for this type of use, it would be convenient to establish bilateral supply agreements to increase regional exchange.

For electric generation uses, another possible market would be the Caribbean countries, like Cuba, Jamaica and the Dominican Republic, three strong oil importers. The inconvenience that would

have to be overcome in these cases would be the environmental impact caused by the use of coal in generating electricity, requiring the adaptation of the burning facilities, combustion operation and capture of solid particulates, hindering their emission into the air. The development of a research project on these aspects, similar to that carried out in Brazil for sea exploration to place the country's coal in the world market, would be a priority issue for Colombia, with cooperation from Argentina and Brazil as potential large-scale consumers

4. *Electricity*: Shared hydropower project developments considered here have to do with those on which there is information about capacity or power. Other projects indicated²⁶ are still at the level of preliminary studies or ideas.

Of these, the Garabi and Corpus projects stand out, which are in their final project level and about to be bid on. Another six projects are at the prefeasibility level. The total capacity of these eight projects would be of 11,384 MW, which gives an idea of the effects on the subregion's development, in addition to the contribution of clean energy.

In Central America, studies have already been carried out with respect to the El Tigre development, which would allow El Salvador and Honduras to in part resolve their supply problems and contribute to the subregional interconnected system.

Shared hydropower developments have currently become an important contribution to integration. Based on the important technological advances accomplished with regard to the transportation of electric power, particularly for large capacities and over long distances, not only are national hydropower potentials important contributions to energy integration, but also other forms of generation. Transmissions in direct current have allowed inconveniences to be

26. OLADE-UNDP, op.cit.

overcome, although at higher costs per MV. With this respect, Brazil has the interconnection experience between Foz de Iguazu and Sao Roque (792 km), which has proven to be successful.

There are also new possibilities to exploit important renewable resources in the region to reduce the consumption from non-renewable sources in another distant region, with a high demand and a different load curve structure.

In spite of the effects of the large hydropower developments on the climate, soil, quality of water, flora and fauna, which have still not been fully assessed, there is no doubt about the contribution of these developments with regard to gas and particulate emissions, to such a point that they have added significantly to the reversal of specific emissions within the Latin American energy systems. These developments have avoided an annual emission of around 56 million tons of CO₂ and 250 thousand tons of NO_x, in comparison to the alternative of thermal generation.²⁷

The perspectives suggested by projects under study and works in operation, seem to point to the following electricity commercialization hubs:

- Electric interconnection in the MERCOSUR: Binational interconnections between Argentina and Uruguay stand out, as the result of shared generation in Salto Grande, between Brazil and Paraguay, in Itaipu, between Argentina and Paraguay, in Yacireta, and other smaller developments along border towns. Due to the integration process, these four countries have good possibilities of complementing each other, both due to the load diversity as well as to the supply.

27. Carlos Suárez, "Impactos ambientales del sistema energético de América Latina y el Caribe, 1970-1990 1990-2010," OLADE-CCE, September 1993.

Tabla 19: Shared hydropower projects (SHP) being planned

SHP Countries	Basin	Capacity (MW)	Energy (GWh)	Reservoir		State
				Useful volume (km3)	Surface (km2)	
Corpus Cristi (Argentina-Paraguay)	Parana River	4600	20100	5	575	Feasibility
Italia-Itacora (Argentina-Paraguay)	Parana River	1660	11290	n d	1850	Pre-feasibility
Compensador Salto Grande (Argentina-Paraguay)	Uruguay River	400	2000	n d	n d	Inventory
Roncador Panambi (Argentina-Brazil)	Uruguay River	2700	9300	n d	930	Pre-feasibility
Garabi (Argentina-Brazil)	Uruguay River	1800	6100	n d	920	Feasibility
San Pedro (Argentina-Brazil)	Uruguay River	750	3700	n d	1000	Pre-feasibility
Paso Centurion (Brazil-Uruguay)	Merin Lake	32	130	n d	n d	Inventory
Talabera (Brazil-Uruguay)	Merin Lake	8	n d	n d	n d	Inventory
Astilleros (Argentina-Bolivia)	Bermejo River	121	n d	1	54.3	Pre-feasibility
Arsayal (Argentina-Bolivia)	Bermejo River	166	n d	0	37.4	Pre-feasibility
Las Pavas (Argentina-Bolivia)	Bermejo River	147	n d	0	22.6	Pre-feasibility
Cachoira del APA (Brazil-Paraguay)	Paraguay River	23	n d	1	n d	Inventory
Antures-Maipures (Colombia-Venezuela)	Crinoco River	2000	17000	n d	n d	Inventory
El Tigre (El Salvador-Honduras)	Lempa River	526635	n d	n d	n d	Inventory

Source: OLADE-UNDP and data from countries

The Atlantic coastal center, from central-southern Brazil to the Comahue region in Argentina, links the Brazil, Paraguay, Uruguay and Argentina national systems through several interconnections.

- Interconnection of the Argentine and Chilean electric systems: Mendoza (AR) - Santiago (CH) and Comahue (AR) - Lakes region (CL).
- Interconnection between the Bolivian and Argentine systems.

Table 20: International electric interconnections being planned

Subregions	Countries	Location	Tensions (kV)
MERCOSUR	Argentina-Brazil	Santo Tome-Sao Borja Yacireta-Itaipu	132(Ar)-230(Br)
	Brazil-Paraguay	Mundo Novo-Salto de Guayra	34.5
	Brazil-Uruguay	Livramento-Rivera Chui-Chuy Rio Branco-Jaguarao	AT 150 AT
GRAN	Colombia-Venezuela	Corozo-San Mateo Cuestecita-Maracaibo	230 230
	Brazil-Bolivia	Corumba-Puerto Suarez	230
	Brazil-Venezuela	Roraima-El Guri Manaus-Macagua II	AT 400/500
	Chile-Argentina	Santiago-Mendoza Region de Los Lagos-Conahue	220 sid
	Chile-Peru	Emelari-Sur Peru	MT
MCCA & Panama	Honduras-El Salvador SIPAC	Guatemala-Honduras- El Salvador-Costa Rica- Nicaragua-Panama	230/115/46 500
G-3	Mexico-Central America-Colombia- Venezuela		500

Source: CIER and information provided by the countries

- Electric interconnection of the GRAN: Already in operation between Venezuela and Colombia we have the Sevilla-San Antonio interconnection line, between the cities of Cúcuta (CO) and San Antonio (VE). There are also plans to interconnect Ecuador with Colombia and Peru and studies have been carried out for interconnections between Bolivia and Chile, going from the Caribbean to the south Pacific, in one large network.
- The closing links in the southern part of the continent point to the large interconnection between the central south and northeastern systems of Brazil, extending to Manaus, which will link the Andean and Atlantic zones. The feasibility of a future Guri (VE) - Manaus (BR) link is being studied, with a further link between Peru and central-southern Brazil, going through Bolivia. The closing of this large ring would allow an optimization of the hydropower resources in South America, with regard to the better use if its climatic and time-zone diversity and as well as to the capacity of its equipments.

- Central American interconnection: The Central American electric systems are interconnected in two blocs: on the one hand, Guatemala with El Salvador, in the North, and then Honduras, Nicaragua, Costa Rica and Panama, in the South. There had been plans to finance a 230 KV interconnection between Honduras and El Salvador with funds from the San Jose Agreement, as this was the only section left to interconnect the six electric systems in Central America. As an alternative, there could also be a possible interconnection between Guatemala and Honduras.

Finally, the power systems of Mexico and Colombia have achieved a high level of national integration and are interconnected to the main regional electric subsystems of each country. Thus, two poles can be identified that would allow for an interconnection between North and South America, moving through Central America.

Electric integration could be strengthened in several ways: toward the joint operation of the generator park of the systems that are already interconnected; toward more multilateral cooperation between countries that share developments along the same basin. In this sense, the countries have shown their willingness to exchange information and avoid harming third countries with the construction of projects in their territories and with their further operation. However, the possibilities of a coordinated management of the cascade reservoirs have not been explored, nor the benefits from the further regulation of the basin, for a better coordination of the use of these primary resources and to plan the expansion of their respective electric systems.

V. Energy investments: new forms of financing²⁸

Investments needed for energy integration projects face the same financing difficulties and complexities that the energy sector faces in each country in the region. Those projects, however, could be an additional attraction for financing sources due to the long-term commitments each country involved in those projects has to assume to guarantee that the developments, whether public and/or private, will be carried out within the contractual obligations.

In the following sections we will briefly present the different forms of financing for energy investments and the options for energy integration projects.

1. Trends in the macro conditions for financing of the energy sector

In the course of the last few years there have been and continue to be changes in the organization of the energy sector, which basically modify the function and financing options of this sector: the corporatization of the public utilities, the inclusion of private companies within a more open framework related to the order and structure of the sector, the privatization of utilities and, more recently, the energy integration projects.

Until the eighties, the generalized scheme in terms of sectorial organization, both related to the electric as well as petroleum sub-sectors, had been of a state monopoly, where the utilities formed part or depended directly on the state budget. Thus, the utilities depended on state budgetary criteria for their investment plans. In addition, self-financing, which is an important basis of financing, was subject to political criteria due to its strong intervention in the for-

28. See: Arnaldo Vieira de Carvalho, Paul Suding and Francisco Figueroa de la Vega, "Nuevas formas de financiamiento en el sector eléctrico de América Latina," OLADE, CEPAL, GTZ, abril 1995.

mation of internal prices. The income, which oftentimes was generated by exporting petroleum companies, went into the state's general budget, financed investment programs for other sectors or even covered the operational expenses of other state enterprises.

This scheme had a strong incidence on the financing structure and forms. Utilities dependent on the internal markets face more and more difficulties in raising enough funds. The financing structure of these utilities evolved, due to the lack of loans from private banks and then from multilateral banks, to a very special structure, with high percentages of its financing provided by the government. The financing structure of the sector's exporting oil companies was weakened, with the exception of the largest ones that were able to relatively maintain their independence.

A first step toward change has been the partial openness to the participation of private enterprise under "Build-Own-Transfer" (BOT) or similar "Power Purchase Agreements" (PPA) agreements in the electric sector. Contracts related to services, risks, association, concession in the petroleum sector, etc., often precisely to surmount the financing problems. This did not really represent a fundamental change in the organization of the sectors.

Another step that has had more incidence is the corporatization of previously public utilities, followed by their privatization. Corporatization without privatization implies the disintegration of state-owned companies until its links to the company are reduced to a normal shareholder-company relationship. If at the same time as the corporatization there is a price reform that allows reasonable self-financing and the reduction of state participation, the company can go back to normal financial structures. The guarantee that an owner state can give under good financial conditions would allow a reduction of its own capital to lower levels.

The privatization of a utility involves another important step for its financing. To be viable, it involves sufficient setting of tariffs in the

event of a regulated monopoly. In the case of competitive markets, the price is self-regulated by the market's own forces. Both cases allow sufficient self-financing and for the making of healthy financial structures. However, for financing sources, private companies have a limited access to development bank funds.

In the electric subsector there is the typical problem of high capital intensiveness, which requires complex negotiations for its financing, particularly for the private companies. The financing of large capital intensive projects with long amortization terms (for example, hydropower generation or transmission projects) is not very operational within the companies' financial schemes because they force an advisable structure. For this and other reasons, "project financing" and other "out of balance" forms of financing become necessary. The changes described did not take place in all the countries. However, there are several examples for each stage of changes in the Latin American and Caribbean energy sector.

Changes in the sectoral structure and ownership have resulted in changes regarding the function of financing. In some countries, the problem no longer lies in obtaining financing in sufficient amounts for the investments needed, but rather in selecting several options in terms of the financial structure and instruments to be used. The design of the financing structure is chosen base on criteria related to costs, risks, control and terms, taking into account the effect on control due to eventual interventions on the part of the government.

Traditional financing sources for energy investments in Latin America and the Caribbean have consisted of bank loans.²⁹ Financing for the development of infrastructure in the countries of the region has had the following primary sources:

- Multilateral banks, with the implicit warranty of the government of each country.

29. Ortiz Durán, Edison, "Instrumentos de Mercados de Capital para Empresas de Energía Eléctrica," prepared by OLADE, Quito, February 1993.

- Private banks, with the explicit warranty of each government.
- The governments of industrialized countries or of countries relatively more developed with respect to those in the region.
- Credit from suppliers.

The *multilateral banks* -the World Bank (IBRD), the Inter-American Development Bank (IDB), the Andean Development Corporation (CAF)- as traditional financiers of energy projects, are facing more and more difficulties in fulfilling this purpose, due to financial and prioritization reasons linked to activities subject to financing. On the other hand, these institutions, and particularly the World Bank and the IDB, look for funds in the international capital markets and, due to the low-risk rating, this favors the interest rate levels with which they lend their funds. It is argued that if certain governments or larger companies of the developing countries fulfill the requirements of the capital market, a so-called disintermediation of the banks would take place, even of the multilateral ones, there would be direct access to the share and capital markets. Therefore the tendency to privatization, demonopolization and coparticipation of the private sector.

Private banks withdrew during the decade of the eighties, but are currently sponsoring the comeback of some countries in the international markets.³⁰ They are made up of commercial and investment banks, particularly in the industrialized countries, and have participated in financing energy projects almost always with other banks, in consortium, or also with multilateral banks, or associated to government-to-government financing. In some cases, such as the financing of petroleum projects, it was ensured with the debt service a warranty, as occurred with the income from the export of oil and products. With the crisis of the debt during the decade of the eighties, most private banks withdrew from the market of loans to countries or state companies, due to the uncertainty of payments and the

30. Ortiz Durán, Edison, op.cit.

frequent moratoriums of different countries. Since they have entered regularization processes with respect to debt payments, which include the previous agreements with the International Monetary Fund (IMF), World Bank and the agreements of the Paris Club, private banks are sponsoring the comeback of certain countries in the development of international financial markets, acting as underwriters for the issue of Euro-bonds and shares. However, there is a clear preference for financing of private enterprises in the developing countries and not for governments or state companies.

The *governments of industrialized countries* or of those with a relatively higher development with respect to the region have created mechanisms to support their export goods and services, which normally involve credits for exports through the central and export-import banks (Eximbanks). However, fiscal restrictions have been affecting export supporting institutions, limiting this means of financing the infrastructure of other countries.

Credit from suppliers, an important source from service, machinery and equipment suppliers, was always questioned due to the difficulty of differentiating financial charges from supply charges.

All traditional alternatives have reduced their participation in the last few years. The main reasons for this were the influence of the governments of the industrialized countries on the decisions of the credit and multilateral organizations, in the sense of restricting capital increases or budgetary allocations for those purposes, the trend to bank disintermediation and the search for financing in the capital markets, since the argument was that state bank financing was a way of transferring subsidies of the rich countries to the developing countries in detriment of their own competitiveness. This situation moved the countries in the region to develop new internal and external economic and financial strategies and initiatives, in addition to adopting real rates, along with a reduction of costs, improvements in the productive efficiency, in transportation and in the use of energy, leading to adjustments in the net flows of funds.

2. Situation of the financial markets in Latin America and the Caribbean and access to the international markets

A large amount of foreign capital is required by the Latin American and Caribbean energy sector. In spite of its rapid growth in some countries, like Chile, Argentina, Mexico and Colombia, the capital markets of the region are far from being able to satisfy the demand of capital of the energy sector. The private electric utilities are already approaching the foreign capital markets, not only to finance projects but enterprises in general. The Chilean electric utilities in particular operate with American depositary receipts (ADRs), which give them access to the U.S. stock market.

In the case of Chile, institutional investors, particularly the retirement funds, played a decisive role in the constitution of the capital markets, which in that case took place alongside the privatizations. The institutional investors, including the insurance companies and common investment funds, develop and contribute also in other countries, like Argentina, with backing from multilateral banks, to attend the companies' need for resources over the long term and for infrastructure purposes.

A central problem of the capital markets is the lack of internal savings in the Latin American and Caribbean countries. The other side of the coin is the existence of a large amount of private Latin American capital abroad, estimated at between US\$200 billion and US\$300 billion.³¹ To channel these capitals to infrastructure projects in Latin America, it is necessary to develop strong local capital markets, preferably bond-types.

The issue of *bonds* abroad were the instruments that pushed Latin America and the Caribbean forward in the international capital

31. See Pedro-Pablo Kuczynski, "International Capital Flow to Latin America. What is in the Promise?" in World Bank, Annual Conference on Development Policy, 1992 proceedings, Washington 1993, pp. 323.

market, under the influence of the Brady initiative.³² Long-term financing sources of at least ten years had to come from bilateral agents like the Eximbanks of the United States, Japan and others, like Hermes in Germany, or from their guarantees to private banks.³³ Latin America and the Caribbean constitute the largest growing region in the market of Eurobonds. Close to 145 issues of Eurobonds have been carried out during the 1989-1992 period, representing US\$ 13.3 billion in nine types of currencies. The five countries of the region that participated in the bond markets until 1991, Argentina, Mexico, Brazil, Venezuela and Chile, captured during that year, via the issue of bonds, approximately US\$ 7.2 billion, in comparison with US\$ 2.7 billion during 1990. In 1992 and 1993, the first four countries achieved US\$ 12.4 billion.³⁴

A similar alternative is the issue of *convertible bonds*, which will probably be used by those companies that want to help the entry of foreign investors or the return of national capital that flowed outside the countries in the past. This convertible bond is a quasi-patrimonial instrument that can be totally or partially converted into a specific number of common shares of the issuing entity. Where these convertible bonds are treated like patrimony, this could favor the debt/capital relation and the company's financial position.

The ADRs and the *Global Depositary Receipts* (GDRs) become negotiable certificates operated and called out in the United States of America, in the case of the ADRs, or also in other markets, in the case of the GDRs, usually European ones. The ADRs represent the ownership of a specific number of shares in a company where the majority of the capital is not North American but can be registered or listed in the U.S. markets (according to Rule 144A and Regulation "S" of

32. Ortiz Durán, Edison, op. cit.

33. Luiz, R. "Fuentes de Financiamiento para el Desarrollo de Generación Eléctrica Privada," seminario "Brasil E.U.A. sobre el Desarrollo de Energía Eléctrica, Consejo Mundial de Energía (CME), Comité Nacional Brasileño, Asociación de Energía de los Estados Unidos, Río de Janeiro, abril 1992.

34. Ortiz Durán, Edison, op. cit. CEPAL, Panorama Económico de América Latina 1994, Santiago de Chile, 1994, p. 14.

the Stock Act of 1993 of the U.S.A.). The issue of ADRs is authorized by the U.S. Stocks and Bonds Commission through the Securities and Exchange Commission (SEC). For this, several legal figures come into play: the company that issues the majority of non-U.S. bonds and shares, a custodial bank that keeps under its control the shares that endorse the issuance of the ADRs, the correspondent U.S. depository bank that issues them, the stock exchange of each country that follows up and registers the ADRs quotes in comparison with their collateral values in each country, a securities deposit that carries the register of investors, exchange houses as brokers in each market, stock brokers and investors. Mexico, Brazil, Chile, Venezuela and Argentina participate in these programs, through 30 companies until 1992. In 1994, 50 companies negotiated deposit certificates, in spite of the losses experienced by the shares in some Latin American countries.³⁵ The telephone, cement, petroleum and electric companies are the ones with the best possibilities of gaining access via the ADRs and GDRs to the larger markets.

3. Financing investments in electricity

Despite the introduction of new rules and the application of new forms of financing, the electric power sector is still facing a enormous financial gap. In the years from 1991 to 2010, LAC will have to invest, according to OLADE estimates, US\$466 billion.³⁶ This means an annual average investment of about US\$23 billion up to the year 2010.

The annual average investment required is US\$19 billion until the year 2000 and, for the following decade, an annual average of US\$28 billion. Annual investment requirements for the subsector are therefore more substantial than total foreign investment in oil, natur-

35. ECLAC, *Panorama Económico*, op. cit. p. 10.

36. OLADE, *Energy Prospects and Economic Development in the 21st Century: The Outlook for Latin America and the Caribbean in a World Context*, June 1991.

al gas, electricity, mining and telecommunications obtained by LAC, which amounted to only US\$17.7 billion in 1992.³⁷

Multilateral banks are self-restricted to a contribution of no more than 20% of project volume. With the stagnation of contributions from the State, this means the need for an unprecedented amount of funds from the private sector, customers, national and international capital markets, and commercial banks.

Corporate financing: With the incorporation and emergence of private-sector electric power utility companies, the financing structures of companies have changed. The traditional sources of electric power sector financing were: multilateral banks (World Bank, IDB, CAF), commercial banks (for countries that have resolved their debt problem), governments and bilateral loans, supplier credits, granting of loans or capital contributions from governments, and the internal generation of funds by means of tariffs. Private enterprises do not have the same options because they have no access to government contributions and bilateral and, especially, multilateral cooperation bank loans. A private-sector company that is mature in operational, financial, and service terms, however, seeks other options.

Some electric power companies are already obtaining their funds directly from society.³⁸ Commercial and multilateral banks are adopting a facilitating role: underwriting operations for the issuance of debt, bonds, and shares that are tradable on international capital markets. The instruments to resolve their external debt problems include corporate bonds and shares, and ADR and GDR mechanisms for indirect transactions of shares from Latin American corporations or companies. The interest in these instruments on foreign capital

37 OLADE, Reforming, Restructuring, and Regulating the Electric Power Subsector of Latin America and the Caribbean, Central Topic for the XXV Meeting of Energy Ministers of OLADE, Port-of-Spain, Trinidad and Tobago, November 1994.

38 Edison Ortiz, *Access to Capital Markets: Possibilities, Instruments, and Restrictions*, ENERLAC 93 Proceedings, OLADE, 1993.

markets has been confirmed. International commercial banks have developed specific activities to support electric power utilities.

Whereas the problem with the international capital markets consists in access to them, within the region the problems has to do with the attraction of internal savings and the formation of capital markets, for which there are two generalized systems: the retirement funds and the national banking system. En the case of Chile, the privatizations of the electric utilities, with the intervention of the retirement funds (supported by the capitalization of the retirement pensions of the workers in that same sector) have been the decisive moments in the formation of the capital markets. In other countries, these capital markets are still not strong.

Multilateral banks, through their specialized affiliates (IFC of the World Bank, IIC of the IDB and CAF) participate under certain conditions in the capital of new enterprises or dispense loans for private projects (always as the minority counterpart in companies with a local or regional majority).³⁹ In addition, multilateral banks support with endorsements and warranties for the issuance of documents, which is an important element in the development of the utilities' capitals.⁴⁰

The political risks find insurance in agencies like the Multilateral Investment Guarantee Agency (MIGA) of the World Bank and the Overseas Private Investment Corporation (OPIC) of the United States. Most developing countries have agreements with these agencies that define the rules and type of risks that the host country wants to insure.⁴¹ With support from the OPIC, "growth funds" were established and continue to exist to date for Russia, Asia and Africa, with the purpose of participating in the capital of projects and in the expansion of companies.

39. See chapter 4 of DELPHOS, AD Power and Money, US ECRE and NREL, Washington 1994.

40. See the presentations of panel 2.1 of ENERLAC 1993, OLADE 1993.

41. For a critical appreciation, see BEHRENS, A. Cheaper Energy at Lower Cost, in Energy Policy, January 1992.

Other sources for corporate financing can be private funds, "investment funds" and even sectorial ones. These funds include electric utility shares (ADRs) or bonds in their portfolios. Finally, the electric utilities of other regions look for shares in the Latin American and Caribbean utilities.

Project financing: Instead of the classical financing within the framework of the company, project planning deals with the project as if it were an individual company. It has its own financial structure, with its own (risk) capital and lent capital, and as such, all forms of corporate financing are open to it. As the electric utility gains control of the project, it should be consolidated into its balance.

This form has existed since the seventies in the electric sector for the financing of large projects and has currently been displacing the traditional form of corporate financing which seems not to be too feasible, since the companies and promoters of these projects do not have the same financial capacity as do corporations or individuals to guarantee repayment of the loans.

In project financing⁴² there is a sponsor who runs the commercial risk. This is normally an electric utility that plans on operating a generation plant or transmission line. In the case of a joint venture, two or more sponsors for the project get together, preferably local utilities or utilities from other countries or multinationals.

To ensure the economic viability, a Power Purchase Agreement (PPA) is signed, which is a long-term contract for the purchase of electricity, with utilities that distribute electricity or with large consumers.

A group of advisors provides counsel for the sponsor in legal, tax and financial matters. The financial advisor, which can be the

42. See Special Supplement: Project Financing in Latin America July/August 1993. LATINFINANCE, September 1993

agency of a commercial bank (international) or of a multilateral bank (IFC, for example), puts together the project's financial structure and often plays the role of "arranger", that is, of organizing the financial contributions.

There are several potential sources of financing. Traditionally, credit exportation agencies (like the U.S. EXIM-Bank) contribute an export credit as the cornerstone of the structure. Important contributors of both own capital (but with a minority participation) as well as of loans can be the "arrangers", the multilateral or bilateral development bank (IFC, but also banks like KfW, of Germany, for example), the commercial bank. Second in line as loan contributors are the capital goods suppliers, large clients, etc. The parts of the financial structure with least coverage are signed by groups (trade unions) of the private banks. The banks share lesser parts of these loans, which do not have guarantees due to the lack of liquidity of assets, etc. to minimize their risks ("limited or non-resource financing").

The political risks are often covered by MIGA or OPIC; the commercial risks of suppliers could be covered by export insurance in the form of an endorsement or guarantee (EXIMBank, Hermes, of Germany, etc.).

Finally, capitals for large projects come from the capital markets in the form of bonds or as loans from groups of the commercial banks. The main providers of capital underwrite this contribution.

New mechanisms of multilateral banks: The "Global Environmental Facility" (GEF) provides, among others, non-refundable contributions for investment projects with incremental costs, to reduce environmental damages. Among the four focal areas, the reduction of greenhouse gases could be applicable for electric generation projects.

The Multilateral Investment Fund (MIF) was created by the 21 IDB member countries. This fund has two goals. The first is to

“reduce the social costs of the transition to the open market economy, which does not apply directly to the sector. The second is to “give impulse to activities of the private sector, to make the public sector’s institutions agile and to help the companies to enter into the world market” and can open up a space for the cofinancing of certain investments in the sector.

An alternative could be the joint operation of multilateral banks and the private sector. According to what has already been mentioned, multilateral banks have historically granted loans to the governments of their member countries or that have been guaranteed by their governments. This has hindered direct loans for the development of private energy projects, leading to the action of the multilateral banks for the private sector, as is the case of the International Finance Corporation (IFC). However, the World Bank and the IDB have developed a method to finance private energy projects, providing resources through a local government fund.⁴³

Among other financing options available to the sector we have: the utilization of local capital markets, or developing them in the event that they do not exist; including the placement of bonds in the market; using forms of leasing for new equipment and facilities; involving local and external resources and agents; promoting joint ventures between new and existing electric utilities and local and external investors; promoting alternative independent energy and cogenerator producers; promoting the demand management and rational use of electric power; creating conditions for the operation of “Energy Services Companies (ESCOs) and the constitution of mutual funds; arranging conversion schemes for foreign debt into new investments; increasing the financial share in the expansion of

43. This scheme is being tested for the first time in Kingston, Jamaica, in the 60 MW Rockfort project, with diesel motors belonging to the Jamaica Private Power Company, through the National Investment Bank of Jamaica. This scheme was based on the Hub River’s 1,300 MW project in Pakistan, where funds will be transferred from the World Bank to the Private Sector Energy Development Fund of Pakistan. The entire financial scheme has still not been defined, although the project is already under construction. The experience of the Rockfort project will serve as a model for other projects, as is the case of the 250 MW project being analyzed by the Dominican Republic.

the system on the part of new and existing clients (including anticipated energy purchase contracts); and the sale of part of the assets of the electric utilities, as is indicated below.

New players: Project Developers, Independent Power Producers and ESCOs. Due to the openness of the electric markets, space was opened up for new players to come on scene, some of them created based on other realities, as that existing in the industrialized countries. This is the case of the new players in the electric sector known as project developers, independent power producers and ESCOs (energy services companies).

Project Developers: These are companies that look for investment opportunities in the local and international markets and bring the necessary and most appropriate participants together to develop a project, that is, the retainer of the concession, the main investor, the sources of financing, the operator, the builder, the equipment, service and fuel suppliers (when applicable), the company that is going to buy the generated power and that one that will accept the new power facility, in the event of a cogeneration project.

Independent Power Producers: The independent producers are those who operate in a similar way to those described above, but who stay on in the project as operators and owners of a part of the facility. These types of players have significantly increased their participation in the U.S. market.⁴⁴ Since 1980, the capacity of the independent industry has increased by 19% per year, reaching 43,000 MW in operation by 1992. During the 1990-1991 period, these independent utilities installed almost 11,500 MW. This was the first time that the additional capacity installed by independent utilities was higher than that of the traditional concessions installed during the same period.

44. Cox, Marc, Tendencias de la Industria de Energía Eléctrica Norteamericana, Seminario Brasil E.U.A. sobre el desarrollo de Energía Eléctrica, op. cit.

ESCOs: To understand the operation of the Energy Service Companies, one must remember that there is sufficient capacity and power savings potential in each energy user system. With investments in the user system to materialize this potential, the investment for the expansion of the supply system would be at least superfluous. Meanwhile, there is a situation of competition between new Megawatts and "Negawatts".⁴⁵ In the schemes of demand side management (DSM) and integrated resource planning (IRP) that are often required by the regulatory body, the electric utilities in the United States began to deal with the clients to reduce their electric demand. Now there are different kinds of programs: client information and assistance, rate measures to encourage savings, "purchase" of the client's power savings, "sale" of power savings.

45. The purchase of megawatts is considered to be "the payment of electric concessionaires to their clients or representatives (like the ESCOs) for them to demand management and rational use of energy programs, based on proposals to reduce consumption or capacity, under the same competitive conditions as the proposals for the sale of power on the part of independent producers or cogenerators.

VI. Institutional aspects that are relevant for energy integration

The countries and power companies of the region have created international energy bodies to facilitate mutual cooperation and assistance, to act together in the international fora and basically to promote the bilateral and multilateral integration processes. However, one can see different perceptions in these organizations and in the ministries of energy regarding their functions, according to the relative importance they assign to each of the purposes mentioned.

In this sense, we will first provide a brief although not exhaustive summary of the existing bodies.⁴⁶ Secondly, we will analyze some of the difficulties these bodies face as a result of the lack of interaction between the economic-social policies, the national energy policies and the energy integration policies, as well as the participation and commitment of the energy authorities to these policies. Thirdly, we will analyze the way in which the organizations view the integration processes, the priority they give them in their agendas and their perspectives regarding regional and hemispheric integration, as well as the perception that the international organizations have regarding the guidelines to be taken into account in defining a regional energy policy.

1. International energy organizations

In trying to define an order in the universe governmental and non-governmental, formal and informal agreements that have something to do with energy issues, one notes a dispersion according to the spheres of action, as is indicated in the next table. In addition, in analyzing the purpose of each organization, one can note hetero-

46. Here we have considered those who have an energy objective in their By-laws or that cover aspects linked to the energy sector and give certain priority to them in their different functions.

geneity. Some of those organizations do not have a specific energy purpose, but all of them have some power unit and many of them carry out work that could superimpose that of the others. The list only shows organizations that have been formally constituted and mentions some agreements.

The existing diversity and heterogeneity have caused a lack of coordination among the international bodies that can be explained, in part, by the way in which the energy integration processes have taken place.

In the first place, the first attempts at energy integration had to do mainly with the implementation of projects to use shared hydropower developments that arose from the creation of bilateral organizations whose experience in some cases has not been used well, as the professional capacity acquired in these undertakings was not capitalized upon within that process. This involved new learning, overcoming old mistakes and, in the last instance, starting over in each case.

Secondly, due to the rapid development of the subregional integration agreements (GRAN, MERCOSUR, MCCA, CARICOM, G-3), specific power units are required to resolve different aspects arising from energy complementing between signatory countries and where not only public but private interests are at stake, which means that these organizations require a legal framework to become involved in integration processes. In some of these organizations, integration studies and projects have been and continue to be carried out, where common problems to the countries are identified. These experiences, however, do not seem to move on to other spheres with similar problems, for which reason there is a repetition of what occurs at the bilateral level. The lack of communication seems to be the central issue in these processes.

Thirdly, the incipient regionalization process is beginning to demonstrate the benefits of energy integration between subregions, requiring the coordination of studies and subregional cooperation. These, however, do not take place as the result of coordinated

Table 21: International organizations and agreements tied to energy

	Governmental	Non Governmental
Hemispheric	Organization of American States (OAS) Inter-American Development Bank (IDB) Americas Free Trade Zone	
Regional	Latin American Economic System (SELA) Group of Rio Latin American Integration Association (ALADI) Economic Commission for Latin America and the Caribbean (ECLA) Latin American Energy Organization (OLADE)	Latin American Entrepreneurial Reciprocal Petroleum Assistance (ARPEL) Electric Regional Integration Commission (CIER)
Subregional	Southern Common Market (MERCOSUR) Financial Fund for the Development of the River Plate Basin (FONPLATA) Cartagena Agreement (JUNAC) Andean Development Corporation (CAF) Andean Energy Coordination Committee (CACE) Central American Common Market (MCCA) San Jose Agreement Central American Integration Secretariat (SIECA) Regional Energy Forum for Central America (FREAC) Hydrocarbon Cooperation Committee for Central America (CCHAC) Northern Triangle Central American Economic Integration Bank (SCIE) Caribbean Common Market (CARICOM) Group of the Three (G-3)	Central American Electrification Council (CEAC)
Bilateral	Energy Integration Agreements Mixed Commissions for Shared Hydropower Developments	Private Energy Integration Agreements
National	Ministries of Energy	State and Private Power Utilities Entrepreneurial Energy Chambers and Associations

Source: OLADE, September 1995

actions between the organizations, and what can be noted is that they all try to do everything.

Fourthly, besides these processes a more ambitious project is about to take place, in the form of the Americas Free Trade Zone, which requires a specific organization to coordinate the regional efforts and which until this moment does not have a formal coordination with regards to energy.

As a result of this diversity and heterogeneity, the governments have lost sight and even knowledge regarding their own institutions. Consequently, they create new structures and agreements,⁴⁷ super-

47. To date, over 20 bilateral energy integration agreements have been terminated.

imposing functions and hindering the integration process as they emit unclear or contradictory messages.

As a consequence, it would seem that there is a need to put a stop to this dynamic and to start reflecting on how to deal with the diversity, heterogeneity and their interactions to find the best solution. Openness to the subregions that have a regional, continental and world-wide projection demands that the governments work in a coordinated fashion within each specific activity, including energy. Neither does it seem viable that there will be an adequate view of the regional problems within the ministries of each country, except with regards to matters of national interest.

There is therefore a need to revise the functions of the international organizations, to better distribute the work, creating an adequate communication network between them, to achieve a coordinated operation within an environment of cooperation.

Next we will briefly refer to the characteristics of the main energy organizations in the region who have a specific statutory objective within this field.

1.1 Regional government organizations: the Latin American Energy Organization (OLADE)

Of all the international and regional government organizations indicated in the Table, OLADE is the one with a specific energy purpose. Since its creation, on 2 November 1973, through the Lima Agreement ratified by 26 Latin American and Caribbean countries, it covers a broad area of Latin America⁴⁸ which, when compared to the area covered by the International Energy Association (IEA) that the

48. Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad & Tobago, Uruguay and Venezuela.

OECD industrialized member countries are associated with, is not to be ignored. The creators of the Organization set the following objectives:

- a) To strengthen solidarity and coordinate actions for the rational use and defense of the energy resources of the countries and of the region as a whole.
- b) To foster the development of the energy resources and jointly attend to the different problems related to their efficient and rational use, to better help in the economic and social development of the different countries.
- c) To promote regional energy integration.
- d) To propose forms to reduce negative energy impacts on the environment.

The maximum authority of the organization is constituted by the Meeting of Ministers, formed by the Ministers of Energy or their equivalent, of the Member countries. The Permanent Secretariat is the executive body, with headquarters in Quito, Ecuador, and is headed by the Executive Secretary, who is elected by the Meeting of Ministers.

Since its creation and under the auspices of the European Union, it has gradually developed an Energy-Economic Information System (SIEE), with information on the history and prospects of the region, placed firstly at the service of the international organizations specialized in this topic and providing updated information on the energy structure and evolution of each country and of the region, with data provided by the ministries of energy of the Member Countries. In addition, it has carried out and continues to carry out energy studies and technical assistance, at the request of the Member Countries and of international cooperation.

During the last Meetings of Ministers, most of the Member Countries felt that it was necessary for the Organization to reorganize itself, adapting its activities to the new global energy situation, to the integration processes and to the new economic and institutional realities of the countries in the region, where private enterprise is particularly active.⁴⁹ This adaptation should allow the active participation of all public and private energy players, the interrelationship between those players, the transfer of technology and the development of commercial and business relations in the energy sector.

Based on the challenges indicated, therefore, it was decided to concentrate the organization's efforts activities aimed at providing assistance, involving all energy players and mutually involving the specific areas those players might require.⁵⁰

The inclusion of public and private energy utilities in the organization will allow creating a place where they can act as a part of it, contribute to it and benefit from what it has to offer.

The sphere of action for the utilities in Organization projects and activities, as well as in the dissemination of information on the evolution of the energy sector's restructuring process and on private and public participation in energy integration projects in the Member Countries, will create a synergy between the different players of the sector that will give impulse to their efforts.

OLADE cooperation, in turn, with relation to the public and private energy utilities, has the purpose of promoting their initiatives with regard to energy conservation issues, investments in energy supplies, production of equipment within certain standards of efficiency and quality, transfer of technology, energy integration projects. OLADE's participation will allow the technical, economic and financial identification and assessment of energy projects within the

49. See the different Resolutions of the Meetings of Ministers, from 1992 to 1994.

50. See "OLADE: Strategies for the inclusion of public and private actors of the regional energy sector," Quito, February 1995.

context of development defined by each country or within the integration agreements, which constitute the endorsement for each enterprise and for the obtainment of financing

OLADE's technical cooperation, in addition, will attempt to share efforts with research centers, universities and energy consultants in Latin America and the rest of the world, to attend projects in the region, reducing its technical contribution to the level of project management and auditing and thus establish quality control, directing the work to specialized centers.

1.2 Subregional Government Energy Organizations

1.2.1 The Southern Common Market (MERCOSUR):⁵¹ The sub-regional policies and decisions regarding their implementation are under the Common Market Council (CMC), which is the body in charge of the political direction and decisions aimed at complying with the objectives of the Asunción Treaty. The Council is formed by the Ministers of Foreign Affairs and Economy of the member countries.

The Common Market Group (GMC), which is the body in charge of carrying out the decisions of the Council, is formed by representatives of the Ministries of Foreign Affairs and Economy and the Central Banks.

The Working Subgroups (SGT) carry out the different tasks set by the GMC. Among them we have the SGT-9, whose function consists in recommending the energy policies for the MERCOSUR aimed at fulfilling the objective of the Treaty in energy matters.

In March of 1993, a Work Plan was drawn up with the intention of setting the guidelines for the subregion's energy policy. At the

51. Argentina, Brazil, Paraguay and Uruguay.

moment, studies and integration projects are being carried out in which common problems related to the institutional, legal and juridical frameworks are being identified, the asymmetry between the energy systems of the member countries is assessed, comparative energy prices and their taxation are analyzed, as well as the incidence of energy on selected productive sectors, rationalization, quality, productivity and technical standards, legislation and the environmental framework, and technological development, among other matters.

1.2.2 Andean Group (GRAN):⁵² The Quito Meeting of September 1994, involving the Presidents of the Andean Group, ordered the creation of the Andean Integration System. The Board, which had been its technical body, was to be substituted by a General Secretariat, including in the System those organizations that had already been operating.

To deal with aspects related to energy integration, the Board created the Andean Energy Integration Program (PAIE) in 1994. Actions planned to fulfill these aspects are geared to promoting the exchange of information and experiences between the Member Countries, propose Andean technical standards for efficiency and study physical integration projects, within a strategy aimed at forming an Andean Common Market. Activities in 1995 have taken place in two large areas having to do with Energy Cooperation and Energy Use, within the framework of sustainable development.

On 16 July 1994, the VI Meeting of Ministers of Energy of the Member Countries approved the creation of an Andean Energy Coordination Committee (CACE), whose objective is to coordinate, complement and integrate the GRAN's energy sector, through the optimization of existing technical and financial resources at the sub-regional level.

52. Bolivia, Colombia, Ecuador, Peru and Venezuela.

The CACE is formed by the Board of the Cartagena Agreement (JUNAC), which will probably be replaced by the General Secretariat of the Andean Integration System, the Andean Development Corporation (CAF) and the Latin American Energy Organization (OLADE), which acts as a Technical Secretariat. To achieve the sub-regional energy integration objectives, CACE functions were set within the following actions:

- Establish the common long-term objectives defined in the Andean Energy Agenda.
- Adopt common measures.
- Finance the integration process.

1.2.3 Central American Common Market (MCCA):⁵³ During the last few years there have been important advances in the consolidation of the Central American integration process. On the current agenda, the following actions are being considered: i) reactivation of economic integration; ii) establishment of sectorial actions; iii) support for productive modernization; iv) modernization of the public sector, and v) coordination of negotiations with third countries. To carry out these actions, the importance of external cooperation has been acknowledged.

Within the energy sector the actions of the electric and hydro-carbon sectors stand out. In the first, the main results have been the development of binational electric interconnections, studies and initiatives for their completion and reinforcement, and the consolidation of the Central American Electrification Council (CEAC), a body formed by authorities from the national electric utilities of the six countries, that is in charge of giving impulse to and coordinating actions for subregional electric integration.

53. Costa Rica, El Salvador, Honduras, Guatemala and Nicaragua.

The creation and installation, in 1991, of the Regional Central American Energy Forum (FREAC), formed by the Ministers in charge of the energy sector, has promoted the sector's intra-regional integration and cooperation. One of its first actions was the creation of the Central American Hydrocarbon Cooperation Committee (CCHAC), formed by representatives of this subsector in each country. Problems arising from their condition as net importing countries of petroleum products and of their provisioning has become the main point on the Committee's agenda. The results of these discussions have been presented to the FREAC, which has recognized the importance of external cooperation in the region and the need to coordinate and direct it to maximize its contribution for the development of the countries.

1.2.4 Group of the Three (G-3):⁵⁴ In October of 1990, the Vice-ministers of energy of these three countries formed the Energy Cooperation Committee of the G-3, formed by several Working Groups (coal, hydropower, electric interconnections and natural gas). The Central American countries have been invited to participate in these groups, whose activities have been aimed at assessing the energy potential and identifying complementary schemes for energy development.

The Electric Interconnection Working Group (GTIE) was created to study development schemes for the electric systems, to evaluate the benefits of electric interconnection and to form a joint portfolio of generation projects that would allow a better use of the energy resources through electric interconnection.

This group is formed by the Federal Electricity Commission (CFE) of Mexico, Electric Interconnection (ISA) of Colombia, the Ministry of Energy and Mining (MEM) and the EDELCA and CADAPE companies of Venezuela. Due to the fact that the interconnection of the electric systems of the G-3 countries requires the inclusion of the

54. Colombia, Mexico and Venezuela.

Central American electric system, representatives of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama also form part of the GTIE, through the Central American Electrification Council (CEAC), ECLA and the corresponding electric utilities.

1.3 Non-government Organizations

1.3.1 Regional Electric Integration Commission (CIER): It was formed in 1964, through the initiative of the directors of the electric sector of Uruguay, who called together a congress of representatives from companies in charge of electricity services in Latin America. At this meeting it was agreed to form the CIER to be a natural forum for the exchange of information, knowledge and experiences on the problems of the electric sector in the region, as well as to share ideas about possible bilateral or multilateral endeavors.

Ten National Committees from the South American countries⁵⁵ form the CIER as full members. Also participating as associate members are the companies of the UNESA Group of Spain, EDF of France, CFE of Mexico and ENEL of Italy.

According to its by-laws, the objective of the CIER is to promote and encourage the integration of the electric sector in the region.

The creation of the CIER took place during a historical moment characterized by the abundance of petroleum dollars that financed integration projects of world-wide importance, like the hydropower plants of Itaipú, the largest in the world, built by Brazil and Paraguay; Salto Grande, built jointly by Argentina and Uruguay; Yacyretá, between Argentina and Paraguay, as well as countless border inter-connection lines.

55. Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Paraguay, Peru, Uruguay and Venezuela.

1.3.2 Central American Electrification Council (CEAC): This organization is formed by the authorities the national electric utilities of the six Central American countries⁵⁶ and is in charge of giving impulse to and coordinating subregional electric integration actions.

Its main objective is to achieve a better use of the energy resources of the member countries, through the efficient, rational and appropriate generation, transmission and distribution of electric power.

Since the creation of the CEAC, binational electric interconnections have been developed, as well as studies and initiatives for their completion and reinforcement.

1.3.3 Reciprocal Assistance of Latin American Oil Companies (ARPEL): It was created on 2 October of 1965 in Rio de Janeiro, as a non-governmental association of Latin American state companies. Its by-laws are modified in the 28th Ordinary Assembly, held in Asunción, Paraguay, in 1993, to allow the inclusion of private oil companies of the region.⁵⁷ The objectives of the new by-laws are to encourage cooperation between its members in areas of common interest and benefit, as well as mutual assistance aimed at regional integration, managerial development, increased efficiency, environmental protection and progress of the Latin American petroleum industry within the global context.

56. The Costa Rican Electricity Institute (ICE), the Executive Hydropower Commission of the Lempa River (CEL) of El Salvador, the National Electrification Institute (INDE) of Guatemala, the National Electric Power Company (ENEE) of Honduras, the Nicaraguan Electricity Company (ENEL) and the Institute of Hydraulic Resources and Electrification (IHRE) of Panama.

57. ARPEL members are: National Fuel, Alcohol and Portland Administration (ANCAP) of Uruguay, Fuel Union (CUPET) of Cuba, Colombian Petroleum Company (ECOPETROL), National Petroleum Company (ENAP) of Chile, Argentina State Gas, Mexican Petroleum Institute (IMP), Petroleum Corporation of Jamaica (PCJ), Petroleum of Venezuela (PDVSA), Mexican Petroleum (PEMEX), Brazilian Petroleum (PETROBRAS), Petro-Canada, Petroecuador, Nicaraguan Petroleum Company (PETRONIC), Paraguayan Petroleum (PETROPAR), Peru Petroleum (PETROPERU), Costa Rican Petroleum Refinery (RECOPE), State Oil Company Suriname N.V. (STAATSOLIE), Trinidad and Tobago Oil Company Ltd. (TRINTOC), Fiscal Petroleum Fields (YPF) of Argentina, Fiscal Bolivian Petroleum Fields (YPFB).

2. Relationship between national policies and energy integration

The OLADE Member Countries have expressed their will for energy integration within the Lima Agreement, based on a broad series of objectives. However, not all the countries give a high priority to the issue of energy integration. In general, it can be noted that the countries' aspirations for regional integration are not compatible with their national energy policies.

From this one can infer that the energy integration process is taking place in some cases with many difficulties and in others spontaneously, within what has been called an open regionalism where private players are more dynamic in generating commercial and investment agreements for the sector once the government opens up, and where the bureaucratic structure needed to guide the integration processes according to the needs of each country is, in general, weak and with little participation on the part of the ministries of energy. These matters translate into a series of gaps that do not favor the combination of expectations and facts, as expressed on the Lima Agreement. Some of these lacks are presented next:

- **Legislation and standards:** In general, in the countries of the region the hydrocarbon laws and those governing the electric sub-sector do not contain express provisions with regards to energy integration. This situation creates a juridical gap that does not allow for dynamic energy integration projects at the regional and subregional levels. This translates also into a lack of specifications with regards to standards of origin, reciprocity, exchange currency, forms of payment and compensation, joint investments, anti-dumping standards, capacity and energy optimization in the integrated area, among others.
- **Applicable prices and taxes:** There has been little advance in the region with regard to the setting of uniform prices, rates and taxes. This aspect constitutes a barrier for the energy integration process-

es. The setting of tariffs for energy imports has the following characteristics: in general, the countries tax hydrocarbon imports exclusively, with ad-valorem taxes. There is an enormous disparity in the rate levels, and some oil exporting countries maintain high tariffs on the importation of reconstituted gasolines and diesel oil and refined crude oil. Hydrocarbon exports, in general, are not subject to taxation except in some countries. In general, electricity imports and exports are not subject to taxation.

In any case, most of the countries seem to be advancing toward tributary neutrality so that the tributary load will be the same both for raw materials as well as for end products.

The lack of a relationship between the energy integration policies and the national energy policies of some of the countries in the region also has negative effects on the possibility of identifying the means and opportunities that benefit the countries through energy integration. In this sense, among the means, we have the international government organizations as an extension of their own national organizations, and the non-governmental ones, as an extension of their companies (public and private). The vision that these organizations have of the energy integration processes, due to their permanent interactions in the subregional, regional and global processes, gives them a global view of the energy problems that are often not perceived from the national optics.

In addition, the Ministers of Energy do not participate directly or indirectly in most of the international governmental organizations involved in the issue of integration, with the exception of the Latin American Energy Organization (OLADE) and the Central American Regional Energy Forum (FREAC). Neither is there active and direct participation of most of the Ministers of Energy in the fora where, in their own right, they should have the possibility of analyzing common problems with their counterparts and to design and facilitate energy integration processes.

If to this we add the lack of participation of the ministries of energy in discussions related to resolving the energy commitments subscribed by the Presidents in the Summit of the Americas in Miami, in December of 1994, the situation would seem particularly complex, since the forum in which these mandates—as they relate to energy—should be discussed and coordinated, has not been established. Since the Summit of the Americas, the governments have expressly admitted that sustainable development requires hemispheric cooperation in the field of energy.⁵⁸ For this, the governments made the commitment to encourage cooperation aimed at studying the ways to develop the energy industry in the hemisphere and that are compatible with the national strategies for a less costly energy and with the activities described in the “Alliance for the sustainable use of energy,” in the following fields:

- Consideration of the means through which to use the energy sector in promoting sustainable economic growth.
- Cooperation to study ways of optimizing and enabling financing mechanisms on the part of the international financial institutions, to support the development of projects in the energy sector, particularly those related to improving efficiency in energy use and those related to unconventional renewable energy.
- Cooperation to promote investments and encourage the use of innovative financial mechanisms to increase investments in the energy sector and increase efficiency in the use of energy and of unconventional energy, according to the laws and development needs of each country.
- Promotion of the use of efficient and non-contaminating energy technologies, both conventional as well as renewable, leading to a higher level of knowledge and technical experience in this field.

58. Group of Rio, *op. cit.*, section 17.

- Consideration of the expansion of efforts under way to establish electric facilities and other of other types of energy, according to the internal regulatory frameworks and, whenever applicable, following the regional agreements.

For this, the *Alliance for the Sustainable Use of Energy* states that the governments and the private sector will promote more access to reliable, clean and lower-cost energy services through activities and projects that fulfill the economic, social and environmental requirements, within the context of the national goals for sustainable development and within the national legal frameworks.

Under this spirit of cooperation, the countries are required to share their experiences and discuss the advances achieved in carrying out the Action Plan.

3. Priorities given by the international organizations to energy integration

For some of the international organizations, energy issues or energy integration are not a priority and have little relevance outside of broader issues.

For others, the issue decidedly is not a priority, although they have units dedicated to studying these processes. In the same way, other organizations have energy units because they give priority to energy integration processes over other issues.

Those organizations who give priority to the energy issue first examine physical integration, based on the joint financing and construction of oil and gas pipelines and of electric interconnections, as a mechanisms through which to obtain dynamic energy trade trends between the countries. Secondly they look at technical cooperation, training and transfer of technology, both within the hydrocarbon as

well as electric sectors. Thirdly, they weigh the application of quality standards in the petroleum and gas sector, whereas in the electric subsector they give priority to subregional interconnection studies.

With regards to integration, one can see a tendency to privilege subregional and regional integration over hemispheric integration.

Finally, the international organizations in general recognize that the most important elements in an energy agenda are:

- The rationalization of the regional energy balance, by increasing the natural gas and hydropower production.
- The use of energy integration as an instrument to achieve the broader objectives of social and economic development.
- The priority utilization of regional energy resources.
- Meeting regional energy demands.
- More energy assurance and reliability.
- Increase of the general efficiency levels of the energy sector and of the other productive sectors.

VII. Guidelines for a regional energy policy

1. Energy integration as part of a regional sustainable development strategy

The international organizations have promoted, at the indication of the governments or through the initiative of the companies themselves, energy integration projects about which there is a consensus as to their benefits, based on the shared hydropower developments where both Central America as well as the MERCOSUR have made big efforts that today are concrete works. But this is not enough. Energy and energy integration, in particular, are the means to achieve sustainable development, which with regard to its main dimensions is identified with economic growth, social equality and good environmental management, within a context where some of these dimensions can be improved without jeopardizing the others.

In view of the rapid changes that have given way to the integration processes, plus those taking place within the countries, the governments are hardly able to carry out the adapting and coordination required to optimize the energy supply. Seemingly, the governments give priority to internal reforms, for urgent problems. Within this context, energy supply planning loses importance and there is less attention given to this activity. Energy, however, is at the foundation itself of development. Therefore, the solution of domestic energy problems requires, in a world of market openness with dimensions never seen before, an analysis of the interaction between the external and internal energy potentials to satisfy the future energy demands created by economic growth and the needs of a population that does not have access to the market, all of this within a reasonably protected environment that favors the people's habitat.

This region is immensely rich in oil, natural gas and coal reserves, as well as in hydropower potential. It is poor in terms of electricity generation capacity, which is another indication of the degree of development. Although the distribution of energy

resources is unequal and although the subregional and regional integration processes could compensate for this in part, these processes in themselves are not enough to eliminate the relative backwardness of the region with respect to the industrialized world. Therefore, the competitive disadvantages will continue if appropriate measures are not adopted.

Energy integration is in itself a partial objective of sustainable development. However, the analysis should be seen as a series. Energy integration projects should have a regional dimension. There are subregional efforts, in the MERCOSUR, GRAN, MCCA and Group of the Three, for electric and gas interconnections between subregions. However, these studies instead of looking for the profitability of individual projects should be carried out looking at the region as a whole, thinking additionally in terms of a safe supply, following the sequence of analysis of the interconnections and gas pipelines between subregions and then within them to finally detect the problems in the national interconnected systems or in the internal natural gas transportation networks. Likewise, they should establish the feasibility of hydropower generation developments that have been identified or the thermal generation alternatives and natural gas reserves.

In this way, the projects will become a framework of reference for potential public or private investors or for their associations, which will allow to reconcile general and individual interests and carry out concrete transmission and generation or gas pipeline and field development projects.

This whole analysis would have more consistence if, in addition, projects were to consider the interdependencies between the different energy sources, to optimize provisions at the lowest cost, preserving non-renewable sources and ensuring the supply. Under these conditions it would be possible to increase the region's industrial competitiveness in the international markets, at least with regards to the cost of energy inputs, and foster economic growth.

If, in addition, the projects consider their environmental viability, within certain standards that do not jeopardize the other dimensions of regional development, they will also have contributed to the end purpose.

However, within this context the governments should not forget their responsibility with regard to social equality. During times when it would seem that the market resolves everything, it seems attractive to think that an invisible hand will take care of the dispossessed. Within these responsibilities, the energy sector has to identify and propose ways to meet the energy needs of the urban marginal and isolated rural areas.

There is also a need to reformulate energy prospects within the context of the integration policies, between or within the blocs, and to study matters related to the use of the natural resources of each country, free trade through energy transportation, the use of shared fields and hydraulic resources, water and crossing rights, the harmonization of regulatory processes and the elimination of tariff and non-tariff barriers.

These aspects are experiencing less and less government restrictions, due to the support to the regional interest of a safe energy supply, low energy costs, more efficiency and environmental quality, to favor industrial competitiveness in the international market. These efforts, however, need to be coordinated.

It is precisely in analyzing these activities, among others that make up cooperation, that the international energy organizations should strengthen their activity and adapt their organizations to the structural changes taking place in the region, to be in better conditions to face these processes in a participatory way, with the private players whose participation in this activity becomes more and more relevant within the Latin American energy scenario.

2. Elements for a Latin American Energy Charter

The member countries are convinced that energy is a central factor in socioeconomic activities. Because of this, the identification of national energy policies with regional objectives is viewed as pivotal for a joint energy policy.

The framework of reference is made concrete through the attempt to harmonize the following objectives: *Meet the needs of users equitably and at a minimal cost, ensuring supply security and adequate environmental protection.*

With regard to the players in this process, the goal to be reached focuses on the convergence of national, subregional, regional, and hemispheric policies, reinforces competitiveness, and establishes private-sector and government responsibilities.

The external energy dependence currently prevailing in some of the Latin American and Caribbean countries and subregions should be gradually curtail by means of agreements ensuring regional security supply, since the region as a whole is self-sufficient in terms of oil, natural gas and coal, and has an enormous hydropower potential, although it does suffer from low electricity supplies that determine its low level of development and as a result undermine its competitiveness with respect to the industrialized countries. To resolve this problem, efforts have to be renewed to interconnect the countries and subregions so as to better use their resources and idle capacities.

The environmental impact stemming from the use of fossil resources, the environment of hydropower resources, and transport and distribution networks forces us to recognize that social and economic development cannot continue without the adoption of environmental protection measures.

To contribute to environmental protection, the effects stemming from competitiveness should also be harmonized, reasonable limits and taxes accompanied by fiscal incentives should be established to internalize costs without jeopardizing competitiveness. At the same time, the transfer of technology and its contribution to higher energy efficiency should be promoted.

Technological change and increased energy efficiency will enable a more moderate growth of energy consumption. Certain low consumption levels, however, cannot be restricted by conditions that slow down regional development because of global emissions. This region is the one that has invested the most in this aspect and the one that has contributed the most to reducing global emissions, at the expense of heavy financial debts, whereas the industrialized countries, with an enormous debt to the global environment, are the creditors of the regional financial debt. This situation requires greater cooperation and the reconciliation of mutual interests to facilitate the region's development.

To encourage the sound operation of energy markets, regulations should be limited to a bare minimum, so that industrial consumers can have access to low-cost energy and meet the objective of protecting public services while valuing energy efficiency.

Within the framework of the objectives mentioned above, we propose the following priority actions:

- To consolidate the regional market as a privileged instrument to achieve the needed balance under better economic conditions, limiting government intrusiveness to ensure the subordination to the common interests.
- To promote a dialogue between the regulatory authorities of each country, propitiate access to transport networks, eliminate monopolistic barriers, and search for the necessary financial and fiscal harmony.

- To reduce wood and biomass exploitation, to the extent that they alter environmental balance, and to promote their substitution for natural gas, liquefied petroleum gas, and other renewable energy sources, and foster the use of a wide variety of sources.
- To encourage the development of regional energy transport networks, particularly regarding electricity and natural gas.
- To promote the solution of conflicts arising from increased competitiveness and the need for environmental protection.
- Promote energy efficiency financially and technologically energy efficiency.

With regards to supplies, actions in the region should be aimed at the following:

- Regarding oil, the region should encourage long-term trade agreements and ensure an appropriate environment for investments in exploration-exploitation and the transport of crude oil and products, and adaptation of refinery structures that best respond to subregional and regional interests.
- In the area of natural gas, the construction of networks between countries and subregions should be developed, using financial mechanisms that promote investments whose profitability will be seen over the long term.
- In the area of coal, it is being proposed that the region's importing countries agree with the exporting countries to conduct an intensive research project to find clean coal technologies that could be used for electric power generation.
- As for electricity, the interconnection between countries and subregions needs to be developed, to optimize the use of existing

capacities and encourage investments in renewable forms of energy that favor sustainable development.

Regarding the coordination of previous government actions and their interaction with the private sector, the following is proposed:

- Develop cooperation agreements between OLADE and ALADI to coordinate general regional integration policy with energy integration policy.
- Develop OLADE cooperation agreements with subregional integration agencies (MERCOSUR, GRAN, MCCA, G-3, CARICOM) in order to coordinate the development of energy integration projects between subregions, transfer of technology, and methodologies favoring energy integration processes.
- Develop OLADE cooperation agreements with ARPEL, CIER, and CEAC to conduct energy integration studies focusing on oil, natural gas, and electricity that provide an inventory of projects for potential public and/or private investors.
- Draw up agreements between OLADE, energy companies operating in the region, and cooperation agencies of industrialized country for the transfer of technology to ensure higher efficiency, enhance energy supply, and reduce environmental impacts in each link of the energy chain, from the exploitation of potential and reserves to sector consumption.
- Develop agreements between OLADE and multilateral banks to identify new forms of financing for public and/or private regional energy integration projects, that would ensure their implementation within reasonable periods of time and attain the objectives of the present proposal.

A common energy policy for the region, applied by all the member countries, would facilitate fairness, security, environmental soundness, and prices that would enhance the overall competitiveness of Latin America and the Caribbean.

VIII. Conclusions and Recommendations

Below we present a summary of the main conclusions drawn from the situation described above. We will tackle separately issues involving the economic and energy integration of oil and products, natural gas, coal, and electricity, and finally the role of OLADE in regional and hemispheric energy integration processes.

1. Economic integration

Integration initiatives within Latin America and the Caribbean have increased notably during the last few years. In addition to the renewal of existing subregional integration agreements, namely, the Central American Common Market (MCCA), The Andean Group (GRAN), the Caribbean Community (CARICOM), and the Group of Three (G-3), others have been established, such as the Southern Common Market (MERCOSUR). At the same time, over 20 bilateral agreements have been entered into since 1986.

The main trends or characteristics that stand out are the following:

Contrary to the first integration initiatives during the sixties, which gathered momentum within a protectionist context, and to overcome domestic market constraints and accounts imbalances characterizing the industrial substitution model, the new agreements are taking place within a framework of growing openness of national economies.

These new integration initiatives are characterized by strong subregional consolidation trends and the chaotic proliferation of bilateral agreements which, although implying more market liberalization than in the past, could eventually obstruct more thorough regional integration. The term "open regionalism," coined by the

Economic Commission for Latin America and the Caribbean (ECLAC), reflects the characteristics of this trend, where agreements based on positive terms have been replaced by those based on negative lists (except for free trade agreements).

As for subregional blocs (MCCA, GRAN, CARICOM, MERCOSUR and G-3), they have proposed ambitious integration objectives that go beyond mere liberalization to intra-bloc trade, in an attempt to achieve the status of a customs union or even a common market. However, in spite of growing macroeconomic stability in the area, in no case has the objective of a common external tariff been achieved.

Obviously, the unilateral openness policies that predominate in the area tend to facilitate attaining the objective of subregional trade liberalization. In this sense, all treaties include a timetable for the progressive elimination of obstacles to the intra-bloc trade proposed, with exceptions or special treatment granted to certain products. As a single external tariff has still not been adopted, more flexible criteria or standards would have to be set to ensure this trade liberalization.

The new integration initiatives reflect the existence of more sectoral agreements. They mainly involve industry and the agricultural sector and, in general, emphasize certain general trade agreements restrictions more than agreements on common strategies.

Since the end of the eighties, strong trade expansion was noted within the region, particularly in those countries comprising certain blocs (except in the CARICOM area). This tendency, however, seems to have been more due to the combined effect of more openness, decided unilaterally, and to the use of advantages stemming from geographical proximity or natural complementation opportunities, than to impacts of the agreements themselves.

Even when higher intra-regional trade is coupled with an increase in energy trade and integration initiatives, this does not

seem to be a direct or exclusive result of strategies established in the treaties or agreements.

2. Regional and Hemispheric Energy Integration

2.1 Assessment

Latin America and the Caribbean have an energy situation that could contribute substantially to improving the international competitiveness of their national industries and ensuring the region's sustainable development.

Primary energy sources (oil, natural gas, and coal), as well as the hydropower potential, are sufficiently abundant to induce economic growth. Insufficient electric power generation capacity and limited gas production infrastructure, however, are major obstacles to development.

The region's electricity consumption (500 KWh/inhabitant) is substantially lower than that of industrialized countries (5,000 KWh/inhabitant). In the region's countries, the informal economy has reached highly significant levels that are not always taken into account when forecasting both demand and the energy required to ensure better living conditions for the population as a whole. This situation has led to small national markets and a low generation capacity that generally responds to the needs of the formal economy.

There is an uneven distribution of primary energy reserves in the region, and certain comparative advantages can be noted among the subregions. In terms of magnitude and geographical location, the subregion of the Andean Group is the one with the best position in terms of oil, natural gas and coal. By contrast, however, the MERCOSUR or Southern Cone subregion is the first among the other subregions in terms of electric power generation, with an important

hydropower component due to the lack of hydrocarbons and the large concentration of hydraulic potential in this subregion. In Central America, the progress achieved in electric interconnections is creating the conditions needed to ensure electric power supply security for the subregion.

With respect to *oil*, the Andean Group and Mexico have considerable potential, with a good chance to create suitable conditions for regional supply security. The differences in the regional distribution of reserves and consumption provide broad potential for complementation.

Regarding *oil products*, one can see that in most countries processing capacity is not adapted to the consumption structure; because of this there are surpluses and shortages of oil products that are traded within the region, although at high freight costs. A project aimed at studying the problems that arise from under-optimization in the use of refinery capacity on the region's market could provide good opportunities for investments in process units, the relocation or installation of new refineries. Thus, business opportunities would be compatible with the region's long-term supply security objectives.

As for *natural gas*, the Andean Group has the highest amount of resources, with a privileged location in the region for its trading with Central America, similar to the situation encountered with the reservoirs in southern Mexico. The Andean Group is also a potential supplier for MERCOSUR, from Venezuela to Bolivia and Peru. A study of these aspects needs to be conducted for the region's countries to optimize supply and channel private investment to projects aimed at ensuring supply security over the long term. Lower natural gas transport capacity in the region is one of the main reasons for low consumption.

Coal is another energy source that has been forecast to give greater impetus to the region's energy trade, as producing and importing countries find the way to finance reconversion costs for

clean uses. This would contribute to rationalizing and diversifying the energy balance of the countries and, in the case of oil-producing countries, would free an important volume of fuel oil to be exported to other regions.

With respect to *electric power*, the above-mentioned low generation capacity can be partially offset by subregional interconnections, which would allow hydrological complementation and the use of existing surplus capacities, whether shared or not, whose costs would thus be better distributed. The subregional and regional integration processes will create large markets with the expansion of transmission lines. Seasonalities could be compensated more effectively; hydrocarbon price fluctuations could also be neutralized by a safer supply that would not depend exclusively on thermal sources; better use would be made of the total installed capacity by supplying the peak demands scaled over time; idle capacities could be employed without having to transfer the cost overruns to users; and electric power supply would shed its monopolistic character, as electricity becomes a negotiable good on the continent.

Private enterprise will find more and more opportunities within this process to invest capital and technology, as is already occurring in some countries that have established a total openness or like others that are complementing state supply with private supplies.

These incipient regional integration processes have created energy trade currents with a major hike in exports of oil and products, as well as coal, in the region's countries. The largest increases starting occurring as of 1990, when trade was redirected to the regional market, with regards to the exports of the above-mentioned products. This has been possible, in part, due to assistance of financial institutions such as the Andean Development Corporation (CAF) and the Latin American Export Bank (BLADEX).

MERCOSUR and the Andean Group have been the most dynamic regions with regards to this new scheme, giving priority to

exports to other countries within the same subregion. A similar trend can be seen in the MCCA, which although it is a net importing subregion has increased the countries' export shares between the countries of the same subregion, as has been the case of gasolines, diesel oil, fuel oil, LPG and asphalts. In these subregions, it is apparent that there are significant trade flows within subregional blocs.

These commercial trends, which do not depend on fixed networks, highlight the potential that electricity and natural gas have as regional physical integration processes intensify, with the elimination of prevailing barriers in the region regarding trade, regulatory frameworks, mobility of productive factors and capital flows.

2.2 Perspectives

Beyond the bilateral and subregional agreements, there is evidence of energy integration between the blocs that tends to favor regional integration. The most recent evidence is the series of agreements and studies taking place in the G-3 and which, in the energy sector, has led to an electric power interconnection project between three blocs: NAFTA, Central America, and GRAN, although within some of them there has still been no major advance in terms of interconnections. Likewise, the CIER studies on electric power interconnections in South America advocate the integration of GRAN, MERCOSUR, and Chile in one big ring that would optimize existing hydropower capacities and would grant priority to projects whose implementation by individual countries alone could not be justified. The Central American Electric Interconnection System (SIPAC), although it is subregional, will eventually enable inter-block interconnections.

Thus, the need to reformulate energy prospects as a result of integration policies between or within the blocs and to study the shared use of each country's natural resources, free trade through

energy transport, the use of shared reservoirs and hydraulic resources, water rights and rights-of-way, the harmonization of regulatory processes, and the elimination of tariff and non-tariff barriers has emerged.

Energy integration processes should have a regional scope. Studies should be conducted considering the region as a whole, that is, after a series of analyses of the interconnections and gas pipelines both between subregions and within them, to finally detect the problems in the national interconnected systems or in the natural gas transport networks. In turn, the viability of hydropower generation enterprises that have been identified should be established, or the generation alternatives and natural gas potentials and reserves. Thus, the projects will become the framework of reference for public and private investors or their partners, enabling the implementation of concrete transmission and generation or gas pipeline projects. This analysis would be even more consolidated if, in addition, the projects were to consider the interdependence between different energy sources, to optimize least-cost supply. Within these conditions it would be possible to increase the region's competitiveness, at least with regard to energy inputs.

The main actions carried out in each activity and that could lead to further or new actions are the following:

Oil and products: In *exploration* what stands out are the joint projects between PEMEX of Mexico and RECOPE of Costa Rica, as well as with Cuba. YPF of Argentina has also conducted exploratory work in Ecuador and is searching for hydrocarbons with PETROBRAS of Brazil and with the ENAP Chile subsidiaries. In the latter case, this has led to the joint exploitation of a reservoir in Argentina. Also noteworthy is the work of PDVSA of Venezuela and PETROBRAS of Brazil, geared to establishing a joint petroleum and natural gas exploration and production company.

With regards to *oil production*, in addition to the above-mentioned partnership between YPF of Argentina and ENAP subsidiaries in Chile, we can mention the participation of private Argentine companies in marginal areas of Venezuela.

In Central America, although there are different institutional situations, since some of the refineries are privately owned whereas others are state property, it would be worth analyzing some of the integration possibilities, such as the joint purchase of crude oil and/or oil products required by domestic markets, to obtain better prices than they are able to individually, or the possibility of building a refinery to supply the requirements of the entire Central American market, owned jointly through a joint venture between the countries and private companies. Although there are geopolitical difficulties with this alternative, a study showing the economic convenience of such a decision, in comparison with continuing with current conditions, could provide the elements needed to surmount that difficulty.

The San José Accord was established between the Central American countries, Mexico and Venezuela, as a consequence of the high oil costs for oil-importing countries stemming from the oil price hike during the two oil shocks of 1973-74 and 1979-80. Although the oil-importing countries included in this agreement were initially able to ensure their supply of crude oil and the facilities specified therein during a period of scarcity and high prices, the subsequent oil market situation later rendered the agreement less attractive. In any case, this type of agreement can be a model to be followed, refined, and applied in future. To encourage intraregional trade of oil and products, however, it is important to include innovating mechanisms in the contracts to enable a reliable and stable provision that fosters these intraregional exchanges.

Trade involving the purchase of equipment and materials for the oil industry, amounting to about US\$7 billion a year, with almost 40% of it coming from outside the region, is another aspect that merits attention.

The trade of technological and managerial capacity could lead to an exceptional flow between the state oil companies of Mexico, Brazil, and Venezuela and private companies in Argentina and companies in countries with relatively lower petroleum development.

With regard to *natural gas*, the interconnection between the countries of the River Plate Basin and Chile would facilitate the development of a subregional market, through a gas pipeline network that enable trade under advantageous conditions.

MERCOSUR supply forecasts, based on the potential of Argentina, Bolivia and Peru, points to certain weaknesses that will become apparent over the medium term, due to the rather exaggerated assumption that 100% of the natural gas potential will be discovered. The supply from Venezuela, presumably toward Manaus, Brazil, for an interconnection with a Brazilian gas pipeline to Sao Paulo, will allow greater coverage than that estimated for the MERCOSUR supply, ensuring supply security for the region's countries for a long period of time.

As has been indicated, the GRAN countries, due to their location in the continent, are in a privileged position to market the abundance of available natural gas, taking advantage of the huge trade opportunities for MERCOSUR and Central American markets.

As for *coal*, in view of the availability of Colombian coal that is apt for the iron and steel industry and the requirements of Argentina and Brazil for this type of use, it would be advisable to establish bilateral supply agreements to increase the regional trade.

With regard to *electricity*, shared hydropower developments under the current scheme have made a major contribution to integration. As a result of significant technological breakthroughs in electric power transport, especially high-voltage power over long distances, not only national hydropower potentials but also other forms

of power generation, have made an important contribution to energy integration.

In addition, the interconnection between hydropower projects of different water basins will help to mitigate the random nature of rainfall and further foster integration possibilities or, as can be seen between Argentina and Brazil, complement the respective surpluses of thermal and hydropower capacity. Closing links in South America would envisage a future large interconnection between the Brazilian central-south and northeastern systems, extended to Manaus and Guri in Venezuela, which would allow linking the Andean and Atlantic zones. The link between Peru and the central-south of Brazil through Bolivia would close this big ring and allow the optimization of the hydropower resources in South America, both with regards to the better use of the climatic and time zone variations as well as with the better use of the equipment.

The Central American Isthmus power systems that are currently interconnected in two blocs are waiting for the interconnection between Honduras and El Salvador or between Guatemala and Honduras to close up the system, thus ensuring supply for this sub-region.

Finally, the power systems of Mexico and Colombia have attained a high level of national integration, in which the main regional electric subsystems of each country are already interconnected. Here we can see two poles that would allow the interconnection between North and South America, going through the Central American isthmus.

Electric integration could be strengthened in several senses:

- Toward the joint operation of the generator park of those systems that are already interconnected.

- Toward more multilateral cooperation between the countries sharing developments in a same basin, exploring the possibilities offered by the coordinated management of cascade reservoirs and the benefits that derive from the further regulation of the basin.
- Toward more coordination in the use of the primary resources and in planning the expansion of the respective electric systems.

3. Investments and financing

Within the Latin American and Caribbean electric power sector there are new forms of financing that are already being applied. However, these new schemes are limited to medium-sized projects, typically about 100 MW of thermal generation. Larger projects being implemented are still being implemented under a conventional financial scheme. In most countries there are still quite a few barriers to the private-capital involvement and its range of options.

In addition to financing difficulties, leading to delays in starting up previously scheduled projects, there are other difficulties arising from the investments required by development programs to meet marginal urban needs and the needs of isolated communities in terms of health, education, housing, social infrastructure, and the more sophisticated forms of electricity-intensive consumption that accompany economic growth.

The fact that the financial problems of electric power utilities have led to a resurgence of thermal generation, within a framework of innovative schemes, means that these forms are not neutral in environmental terms. The installation and operation of small and medium-sized thermal generation units, especially diesel plants for base load, in spite of their economic and environmental inferiority over the long term, leads us to conclude that certain new forms of

financing in the electric sector do not contribute and are not enough to meet sustainable development requirements.

Energy integration processes in the region are thus a means to revitalize energy supply with hydropower, facilitate the penetration of natural gas in the subregions, restructure the capacity of the refineries, and find new technologies for the clean use of coal. The attractiveness of these projects for the countries, utilities and financing agencies could lead to a new approach to regional supply, one that would be more in tune with sustainable development objectives.

4. Institutional aspects

There is a wide variety of different international agencies involved in resolving regional energy issues. It is therefore important to ensure a more adequate division of the work, create a suitable communication network and complementary information systems to coordinate operations.

Although the issue of energy as a rule is essential for broad commercial, industrial and economic integration processes, the Ministers of Energy are not participating directly in all of the organizations or working groups where energy integration is being discussed and initiatives and decisions being taken. The same occurs with their participation in the region's energy organization. Because of this, the linkage between national energy policies and subregional and regional energy integration processes is apt to be incongruent, thus becoming an obstacle to these processes.

Some of the organizations within which integration policies are being discussed and decided on do not deem that energy and energy integration are relevant issues, which means that low-cost energy is ignored as a factor to be considered in increasing the international competitiveness of the subregions.

It seems that, within some international organizations, there is more political and operational coherence with respect to subregional and regional integration. This would seem to contradict the commitments made by the region's Heads of State regarding hemispheric integration.

Physical integration (oil and gas pipelines, electric interconnections) is of primary importance for giving impetus to regional energy trade. However, projects are analyzed individually, without ensuring the supply of each non-renewable source over the long-term and without studying alternative sources in the event of their depletion.

5. The role of OLADE within regional and hemispheric integration processes.

The theme of the Second Energy Conference of Latin America and the Caribbean (ENERLAC 95) was Energy Integration and Private-Sector Participation. This was a propitious occasion because, in addition to technical discussions, there were new opportunities for energy negotiations in the private sector, which promoted this event, with OLADE playing an important role in fostering expectations.

As for OLADE, it was able to establish ties with public and private organizations for new projects in the region, focusing on the issues referred to above. As a result, a series of project proposals were prepared and submitted to public and private organizations from Europe, the United States and the region itself.

These projects, however, are not the result of an isolated interest of OLADE. They arise from concerns expressed in different Organization activities financed by UNDP, IDB, World Bank, European Union and member countries, as well as the results stemming from the ECLAC-OLADE agreement, sponsored by the German

Technical Cooperation Agency (GTZ). On the basis of case studies conducted in Chile, Colombia and El Salvador, the latter project was able to identify those aspects involved in matching energy and development policies and achieving a convergence of these policies with a regional energy policy that would accompany economic integration processes.

More recently, the Summit of the Americas made commitments to carry out a series of common energy actions. The Presidents of the Group of Rio made it clear in their Quito Declaration of September 1995 that it recognizes the need to use regional energy sources as a priority. There is therefore a consensus that regional and hemispheric energy cooperation should be fostered by implementing plans and programs that are compatible with national strategies and as an instrument to achieve sustainable development objectives. Within this context, OLADE by virtue of its standing as the region's energy forum representing the energy ministers of the member countries, seems to be the appropriate instrument to coordinate and implement whatever common actions the Meeting of Ministers decides to undertake to reach these objectives.

In view of the above, it seems important for member countries to draw up an initial agreement without any binding legal obligation, referred to as the Energy Charter for Latin America and the Caribbean, to provide a common framework of reference to harmonize the national energy policies of each country with the region's overall energy policy, including energy integration processes. This would facilitate financing schemes from international financial institutions, promote capital investment without undermining the internal legislation of each country, and permit the use energy-efficient technologies essentially for the purpose of supporting the development of the projects required by the region in that sector.

Thus the groundwork will have been created, through agreements between Energy Ministers of the member countries, to favor energy integration in the region and foster the private-sector interests

and international cooperation efforts to ensure trade and investments using a sustainable development approach.