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Contents

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Editorial

ENERGY SECURITY IN LATIN AMERICA AND THE CARIBBEAN

The Latin American and the Caribbean region has, among the assets it can tap for its development, a large share of the world's energy sources. The region has 22.7% of the world's hydropower potential, 13.6% of its oil reserves, 5.9% of its natural gas reserves, and 1.7% of coal reserves; in addition, its potential for using renewable sources of energy is also very high.

In this scenario, energy supply security for the region's countries depends on the efficient use of its own energy sources and the suitable complementation of its resources through the development of intra-regional markets.

To reach these objectives, in addition to the political will of the States, financial and technological resources coming from developed countries and the private sector will be needed.

At the start of the 21st century, the countries of Latin America and the Caribbean are making major efforts to develop their economies. In this context, energy is one of the mainstays of this process. Therefore, the issue of energy security should focus priority on general objectives of national development and the goals set forth in subregional and regional integration agreements.

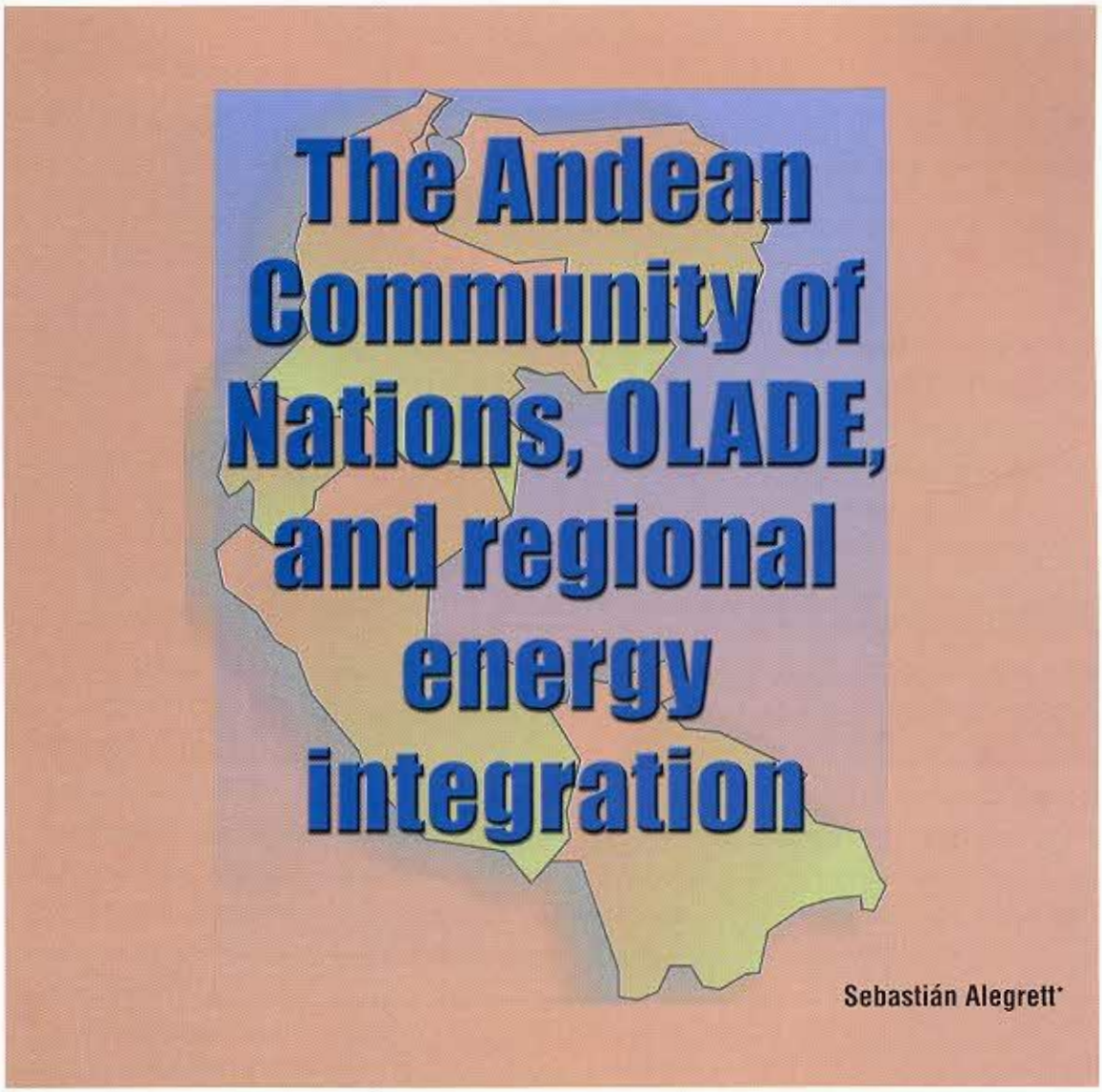
Latin America and the Caribbean have taken major steps for their economic integration. It is also evident that the political decision to consolidate regional markets must lead to the implementation of concrete projects. In the case of energy, these markets are indispensable for supply security and must incorporate not only the trade of natural gas, electric power, oil, coal, and other energy sources, but also the trade of sector-related goods and services.

The region's energy potential has to be developed efficiently and supply security can be ensured if markets are promoted as channels to ensure easily identifiable energy complementation and if, at the same time, opportunities are offered for the private sector to compete in the region under equitable conditions. To do this, trade will have to become attractive and persistent economic, legal, regulatory, and financial barriers to integration will have to be dismantled. These actions are easier to implement in an energy area that is not a "sensitive" sector or a sector calling out for protectionist measures.

To consolidate their energy security, the region's countries should also reckon with the most advanced technologies of the energy chain in all of its areas and with trained professional staff to handle them. They will also need capital flows to develop the sector and consolidate their markets. In both cases, the support of developed countries will be indispensable.

On the basis of the above-mentioned conditions, Latin America and the Caribbean will be able to use their own resources to ensure energy supply and achieve new economic and social realities, conserving the global environment and taking into consideration the needs of future generations, in the framework of a sustainable development scheme. With its energy surpluses, the region will also be able to contribute to supplying energy to other regions of the planet.

Dr. JULIO HERRERA
Executive Secretary



The Andean Community of Nations, OLADE, and regional energy integration

Sebastián Alegrett*

After 30 years of sustained efforts, especially over the last decade, the Andean countries have started to consolidate major advances in integrating their subregion. At present, the Andean Community is a customs union that is as yet unfinished, because only three of its members apply a common external tariff.

Nevertheless, in the Declaration of Machu Picchu of July 2001, the Presidents pledged to approve a new Common External Tariff for the next Presidential Summit in 2002. In any event, as a rule, subregional trade flows normally between the countries, under the aegis of a sound legal and institutional framework. The value of intra-Andean trade has grown more than fifty-fold since 1970 and by virtually four times over the last 10 years.

Furthermore, the evolution of institutions and regulations in the Andean Community is highly significant and covers a wide range of sectors. Important successful events in the financial area, such as the Andean Development Corporation and the Latin American Reserves Fund, have been complemented over the last few years by the creation of new organizations such as the Andean Council of Ministers of Foreign Affairs, a political decision making institution; the Advisory Council of Ministers of Finance, Central Bank Chairmen, and Economic Planning Directors, to deal with fiscal and

macroeconomic policy harmonization; and the General Secretariat as the executive organization for Andean integration.

Likewise, a wide range of community regulations have been developed focusing on technical standards, plant and animal sanitation norms, intellectual property, land transportation, border development and integration, services and policies for competition, among many others.

After the last meeting of the Andean Presidential Council held in Venezuela in June 2001, it is highly feasible that the Andean Common Market will come into force by the year 2005, as ratification of decisions on highly sensitive topics such as the circulation of persons, the establishment of a common Andean passport, and border integration will contribute to paving the way for this common market.

Regarding the common external tariff, the General Secretariat has proposed a new program that includes not only the establishment of tariffs but also a series of collateral measures such as regimes of exceptions, subsidies, etc., to ensure the efficient application of this instrument of political economy.

On this occasion, the immediate objective is to conclude a definition of the Andean Community as a trade group by having all the Member Countries adopt the new tariff system. This system has been set up using a modern approach, one involving open regionalism that strives, among other things, to stimulate competitiveness by reducing the dispersion of tariff levels and the average weighted protection of tariffs. As a reference, this protection would decline from the present level of 12% to close to 9%.

The same could be said for the harmonization of macroeconomic policies, which is progressing consistently thanks to a growing convergence of government goals for inflation and fiscal deficits.

In addition, more extensive harmonization of fiscal and financial policies is expected. The latter is of greater interest for the liberalization of financial services and capital flows. In this context, matters pertaining to financing the Andean Integration System should also be discussed.

The development of a common foreign policy, to be conducted by the Andean Council of Ministers of Foreign Affairs, and foreign economic and trade relations, which is to be dealt with by the Andean Community Commission, should also be mentioned.

The former is aimed at developing bilateral political relationships with countries or groups of countries, as well as multilateral relationships. For this purpose, the establishment of a political consultation and coordination mechanism recently agreed upon with Mercosur and Chile, as a result of the understandings reached at the Meeting of South American Presidents held in Brasilia in 2000, is noteworthy.

The Council of Ministers of Foreign Affairs has also focused its work on

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"As part of this proposal, along with OLADE, we have called for a coordination meeting of the Energy Ministers of the Andean Community, taking advantage of this magnificent forum to continue to look for common positions to facilitate the attainment of the objectives outlined in Brasilia and to effectively improve the region's energy conditions, a prerequisite that is indispensable to promote our people's economic and social development"

issues, such as the development of the social agenda, democracy building, human rights, security and trust, the development of an Andean Program for the Fight against Illegal Drugs and Related Crimes. Soon it also hopes to address matters involving the environment and sustainable development, as well as the transparency of public management in line with principles of democratic governance.

As for the Commission, it is working to encourage the joint participation of the Andean countries in negotiating the Free Trade Area of the Americas at the World Trade Organization and is furthering negotiations with Mercosur to establish a free trade zone that would be functioning as of January 2002.

The maturity over time of these processes that are crucial for Andean integration is a matter of great complexity and requires skillful technical and political management to ensure the full success of the ambitious objectives that the Member States have set for themselves.

At the XXIII Meeting of the Andean Presidential Council, held in Valencia, Venezuela on June 23-24, 2001, our Presidents instructed the Andean Council of Ministers of Foreign Affairs to coordinate the joint actions that are needed to fulfill the commitments that were made in Brasilia. They also expressed their satisfaction at the progress that was achieved in implementing the Plan of Action for the Integration of the Regional Infrastructure of South America in transportation, energy and communications.

They also instructed the Andean Ministers in charge of these matters to act in a coordinated fashion, with support from the General Secretariat, to ensure an optimal articulation of the Andean subregional space with the rest of South America.

As part of this proposal, along with OLADE, we have called for a coordination meeting of the Energy Ministers of the Andean Community, taking advantage of this magnificent forum to continue to look for common positions to facilitate the attainment of the objectives outlined in Brasilia and to effectively improve the region's energy conditions, a prerequisite that is indispensable to promote our people's economic and social development.

Ministers and delegates of the member countries of OLADE, I would finally like to express my wish that this important meeting of reflection lead to substantial progress in achieving the purposes that we have set for ourselves, in the midst of a difficult international situation that is forcing us to join efforts to find our own joint solutions that will enable us to be important players on the current global stage.

* *Presentation of the Secretary-General of the Andean Community, Ambassador Sebastián Alegrett, at the XXXII Meeting of Ministers of OLADE, in Quito, on October 19-20, 2001.*

UNITED NATIONS AND OLADE PROMOTE THE DEVELOPMENT OF GEOTHERMAL ENERGY IN THE ANDEAN COMMUNITY

Dr. Gustavo Cuéllar, Consultant for the United Nations, held a working meeting with OLADE's Executive Secretary, Dr. Julio Herrera, on February 25, 2002 at the Organization's headquarters, to examine the situation of geothermal energy in the Andean Community of Nations.

Dr. Gustavo Cuéllar, United Nations consultant and expert in geothermal energy, held a working meeting at OLADE's Permanent Secretariat on February 25, 2002

As a result of this meeting, the possibility of carrying out a plan to achieve systematic and sustainable development of geothermal energy in the subregion, based on an analysis of the present situation and the prospects for tapping this energy resources, was proposed.

This initiative was submitted to the consideration of the Energy Ministers of Colombia, Ecuador, and Peru, which are the countries with the highest geothermal potential in the Andean Community of Nations, which has not been tapped.

Instrumentation of this plan will benefit from the interest and support of the United Nations Department of Economic and Social Affairs (UNDESA), OLADE, and the Global Environment Facility (GEF).

The project is aimed at facilitating the participation of the private sector in the production of geothermal energy resources by dismantling existing barriers in the regulatory framework, officially confirming the current status of the principal areas of geothermal interest in Ecuador, Colombia, and Peru, and drilling deep wells in one or two areas where the major economic advantages and the possibility of immediate transfer to the private sector have been demonstrated.

Studies carried out by different institutions interested in the subject indicate that, in the subregion, geothermal energy resources for electric power generation purposes could amount to a minimum installed capacity of 2,500 MW. It should be emphasized that geothermal energy can replace other sources of electric power generation, with the special advantage of not triggering any CO2 emissions into the atmosphere, which means that it is an environmentally friendly energy resource.

The project would involve two components:

- The first is technical and consists of developing, at a similar level, the geothermal areas identified in Colombia, Ecuador, and Peru, which would give incentives to private-sector investors.
- The second refers to the definition and official confirmation of regulatory frameworks and institutional capacity building for the management and concession of geothermal resources.

Energy and international trade: toward sustainable development

Reinaldo Figueredo*

Energy is central to achieving the interrelated economic, social and environmental aims of sustainable human development, and energy services play a crucial role in providing efficient access to energy in support of development. They also constitute the value added in the energy chain, from exploration to consumption. Developing countries are thus faced with the challenge, on the one hand, of achieving more reliable and efficient access to energy and, on the other hand, of obtaining a greater share of the energy "business." The pursuit of both goals requires access to knowledge, expertise, technology and managerial know-how. The Expert Meeting on Energy Services and International Trade: Consequences for Development, held in Geneva, Switzerland in July 2001 addressed the elements of an energy services sector strategy for developing countries, with the following objectives: a) to ensure efficient access to energy by all segments of the population; b) to strengthen their competitive position in the supply of energy services at the various stages of the energy chain; and c) to negotiate commitments and additional provisions in the ongoing multilateral negotiations on trade in services supportive of these objectives.

The Meeting reviewed various studies and documents focusing on energy as an element that determines the quality of our daily lives and drives economic development. Access to adequate, affordable energy is essential for eradicating poverty, improving human welfare and increasing living standards worldwide; however, it varies dramatically between countries and regions. Around one billion people in the industrialized countries consume nearly 60% of the total energy supply. The lack of access to modern and sustainable energy is a major cause of environmental degradation in vast areas of the developing world, and a major impediment to sustainable development.

According to the World Energy Assessment conducted by UNDP and WEC, the current energy system is not sufficiently reliable or affordable to support widespread economic growth. The productivity of one third of the world's people is compromised by lack of access to commercial energy, and perhaps another third suffers economic hardship and insecurity due to unreliable energy supplies.

Energy is probably the biggest business in the world economy, with a turnover of at least US$1.7-2 trillion a year. The World Energy Council estimates that global investment in energy between 1990 and 2020 will total some US$30 trillion at 1992 prices. Until quite recently, however, governments worldwide considered the sector too crucial to be left to market forces. At present, countries in all regions are unbundling vertically integrated utilities previously engaged in the inter-related chain of energy activities and are often concurrently transferring ownership/ management of formerly state-owned energy facilities to the private sector.

Energy services are required at each step of the energy chain from the location of the potential energy source to its distribution to the final consumer, constituting the value added in the energy chain beginning with upstream services such as exploration, extraction, drilling, derrick building and other construction services (identified in the General Agreement on Trade in Services (GATS) under "services incidental to mining, rendered on a fee or contract basis at oil and gas fields"). The second stage relates to the transportation of energy, in some cases an undifferentiated segment of maritime transport, but in other cases specific to the energy sector, such as the GATS category of "transportation via pipeline of crude or refined petroleum and petroleum products and of natural gas." The third stage, that is, downstream activities, includes the services involved in delivering energy to the final consumer (such as the GATS category "services incidental to energy distribution"), which refers to "transmission and distribution services on a fee or contract basis of electricity, gaseous fuels and steam and hot water to household, industrial, commercial and other users."

The process of structural reform of the energy sectors in both developed and developing countries, which has resulted in the breaking up of integrated energy systems, the introduction of competition and the privatization of previously state-owned enterprises, especially in the downstream segments of natural gas and electricity, has led to the externalization of previously integrated services_such as energy transmission and distribution_and the demand for new services to take advantage of the opportunities of a freer market for energy, for example, the operation of power pools, the provision of continuous information on energy prices, energy trading and brokering, and energy management. Additional services have emerged related to greenhouse gas emissions reductions and trading of emission rights.

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The formulation of policy objectives with respect to energy services and their pursuit in trade negotiations will involve both the development dimension, i.e., how the strengthening of the energy services sector contributes to better and wider access to energy in developing countries and how structural reform in the latter's energy sectors can impact on their own development perspectives, and the trade dimension, i.e., how to strengthen developing countries' competitiveness in the world market for energy services, as well as an assessment of the implications that the deregulation of the energy sectors in the major developed countries could have on their markets for energy goods and services.

SECTORAL MARKETS OF ENERGY AND ENERGY SERVICES

The petroleum, natural gas, coal, nuclear energy, renewable energy, and primary and secondary electricity sectors each provide a specific market for energy services.

Petroleum

In the petroleum and natural gas sectors, large vertically integrated multinationals engaged in the extraction, refining and distribution of oil and gas products contract out the services that they need in order to find, develop and deliver oil and gas, such as the initial determination of likely sub-surface reserves, drilling services, derrick erection, well casing, specialized construction services to build pipelines and refineries, and services to remove impurities from oil and to liquefy and re-gasify natural gas. In 1999, large oil firms' activities related to the search for oil and gas made up only a fifth of their revenues, but contributed two

third of their profits. In contracts, refining and retailing have become even less profitable in recent years because of stringent environmental regulations and fierce competition from new entrants. New environmental requirements also apply in the shipping sector, with the result that capacity utilization of the world's tanker fleet was 97% in 2000, the highest figure since 1973.

Natural gas

Natural gas is undergoing rapid expansion because of its contribution to environmental protection and energy diversification. Gas is usually transported and traded via pipelines, while very long-distance and overseas transportation often takes place by sea, the gas being in the form of liquefied natural gas (LNG). Only 24% of natural gas production is internationally trade, compared with 70% for crude oil, because of high transport costs and legal and logistical problems related to the construction and management of pipelines. The capital-intensive and long-term nature of investments in pipeline construction and the complexities involved in evaluating the costs and benefits of allowing gas transportation make it difficult for transit countries to negotiate advantageous agreements on gas transportation, and many of those countries are particularly poorly equipped for the task.

Natural gas exploration and production are closely linked to oil exploration and production. However, the characteristics of natural gas transmission and distribution are rather different from those of oil transmission and distribution, and more similar to those of electricity transmission and distribution. The gas sector has been traditionally dominated by state-owned vertically integrated utilities; however, the introduction of competition in some countries has altered this pattern, allowing the emergence of independent operators. In liberalized markets, gas transport via pipeline_which remains a natural monopoly_has been separated from the other functions, namely production, wholesale and retail. Regulated third-party access gives any gas producer the ability to transport its product to the end market and any customer the ability to buy gas from any producer or wholesaler. Open access to transport and such services as storage have stimulated the appearance of large numbers of traders. By buying gas from one or several producers and reselling it later to others, who in turn may then sell it again, traders are more than just middlemen in the supply chain_they compete with the traditional suppliers.

Coal

Coal is the most abundant fossil fuel and the cheapest source of energy in many countries. Internationally traded coal flows correspond to little more than 10% of total consumption. Service firms perform coal mining and preparation services for others on a contract or fee basis. Coal appears to be transported and distributed in the same way as other goods. The coal industry's demand for services is increasing as the sector becomes more capital- and technology-intensive to improve efficiency and to reduce its negative impact on the environment.

Electricity

Within the electricity sector, four main functions can be singled out. The first of these is generation, the conversion of primary energy into electrical energy_which includes the operation of power stations and the procurement of primary energy. The second is transmission_the transfer of electrical energy in bulk from generators or import sources to the distribution level and to certain large final customers, including the transfer of electrical energy between electricity grids and/or between countries. The Transmission System Operator (TSO) is the entity responsible for running the high-voltage transmission grid and is the technical center of any electricity system. Distribution, the third function, is the transport of electrical energy from the transmission network to final customers through medium- and low-voltage distribution lines. The fourth function_supply_is the selling of electricity to end-users, metering and billing, and the provision of information, advice and financing. Since transmission and distribution remain natural monopolies over given geographical areas, access to the grid on non-discriminatory terms is essential for new suppliers in the electricity market. All reform plans in the sector include some degree of separation between grid management and the generation of electricity to prevent former monopoly utilities from retaining privileged access to the grid for their own electricity transactions.

Wholesale buying and selling of electricity may be regulated either by bilateral contracts or by a pooling mechanism which functions as a predetermined multilateral contract amongst market

participants. The power pool is an open-access, competitive market for electrical energy, which functions like a stock market. The idea of establishing competitive wholesale markets for electricity is gathering momentum: electricity pools are now in operation in several European countries, in the province of Alberta, Canada, and in Australia, Chile and Argentina. Power pools need to be carefully structured through regulations to guarantee open and non-discriminatory access to the pool to all players and to prevent the abuse of market power.

Services firms are now specializing in wholesale purchases of electricity on

behalf of end-customers. Several sites are nowadays available to provide direct trading and brokering services of electricity and other energy products. Traders and brokers of electricity aggregate supplies of energy trade one form of energy for other energy forms or services; for instance, they provide supplementary energy during peak hours of electricity use.

Electricity can be regarded as both a good and a service. Although the drafters of the General Agreement on Tariffs and Trade (GATT) chose not to classify it as a good, some GATT Contracting Parties later included electricity in their tariff bindings

Energy services companies are offering packages of goods and services aimed at energy savings, identifying and evaluating energy-saving opportunities, which are paid for through savings. The establishment of most wholesale electricity markets has been accompanied by the development of financial markets to manage the risks inherent in any commodity trading. Effective financial markets for electricity have become a crucial tool in the management of price fluctuations.

Electricity can be regarded as both a good and a service. Although the drafters of the General Agreement on Tariffs and Trade (GATT) chose not to classify it as a good, some GATT Contracting Parties later included electricity in their tariff bindings. While the Harmonized Commodity Description and Coding System (HS) developed by the World Customs Organization (WCO) considers electrical energy a commodity, it is an optional heading, so that WCO countries are not required to classify it as a commodity for tariff purposes, which reflects the fact that some countries do not regard it as a commodity but a service. In the Canada-United States Free Trade Agreement and the subsequent North American Free Trade Agreement (NAFTA), electricity is subject to the disciplines on trade in goods. At present, most agree that the production of primary and secondary energy does not constitute services subject to the GATS, but it results in goods whose trade is regulated by GATT rules. Transportation and distribution, on the other hand, are commonly regarded as services if they are provided independently.

Nuclear power

In the 1970s, nuclear power appeared to be stable and economic source of energy. Its growth, however, has since stalled, on account of lower fossil-fuel prices and increasing public concern. Nevertheless, an increasing number of experts now believe that it will have to be seriously considered if the world is going to meet the forecast sharp rise in energy demand and reduce carbon dioxide emissions. The main nuclear services, usually provided by different suppliers, related to the transformation process; engineering and project management services; inspection and maintenance services; nuclear safety services; services related to the disposal of nuclear fuel wastes; research and development (R&D).

Article XIV bis of GATS includes among the security exceptions Members' action to protect essential security interests "relating to fissionable and fusionable materials or the materials from which they are derived." It is unclear whether an essential security interest could be at stake in the international trade in nuclear energy services for peaceful purposes.

Renewable energies

Renewable energies include non-hydro renewables such as bioenergy, thermal and photovoltaic solar energy, wind energy, mechanical and thermal ocean energy, and geothermal energy. Small and micro hydro applications are also included within the common definition of renewables.

Renewable energies are more evenly distributed than conventional energy sources and tend to be more environmentally friendly. The current installed renewable capacity reflects only part of the estimated potential. The capital, skills and technology that will be required as countries shift to renewable energies to meet part of their energy shortfall and achieve environmental goals may be expected to lead to an increasing demand for activities such as engineering, consulting, R&D, design, feasibility study, environmental impact assessment and environmental monitoring.

Non-commercial energy accounts for about 2% of energy consumption in industrialized countries, but an average of 30% in developing countries. In some low-income developing countries, traditional biomass accounts for 90% or more of total energy consumption.

RESULTS OF THE MEETING OF EXPERTS

The Meeting of Experts on Energy Services and International Trade: Consequences for Development also addressed issues involving international trade of energy services and the obstacles to trade; energy services and the General Agreement on Trade in Services (GATS). It also reviewed the debate on these issues in the World Trade Organization (WTO).

After examining the above-mentioned items, the Meeting suggested measures that the Member States of UNCTAD would

have to adopt for regulatory instruments and strategies; international trade negotiations, analytical work, and complementary activities. It should be noted that all the views that were expressed were not necessarily shared by all the experts; nevertheless they are hereby recorded without detriment to the official position taken by the governments thereafter.

The experts noted the crucial role that energy plays with regard to sustainable development and the very limited access that important segments of people in developing countries have to commercial energy. They considered that the lack of access to modern and sustainable energy is a major cause of environmental and health hazards in vast areas of the developing world and a major impediment to quality of life, while recognizing both the fundamental role of energy as the largest component of gross domestic product in several countries and the very rapid changes taking place in that sector. Moreover, they recognized that these changes fundamentally underlie economic competitiveness, and that building domestic capacities is fundamental to the next stage of exporting value-added energy services, especially for developing countries.

Policy Instruments and Strategies

The experts made, inter alia, the following suggestions for consideration by governments:

- Action is needed to promote wider and, wherever possible, more efficient and affordable access to energy for people and industry, especially in many developing countries. Among other means, this can be achieved through regulatory reform. Investment in the energy sector is a precondition for achieving the goal of making energy available to the poor, and thus the necessary environment to attract domestic and foreign investors should be established.

- Measures are needed to increase the competitiveness of suppliers of energy services, particularly in developing countries, and to foster the development of the networks of small and medium-sized enterprises (SMEs) so that those suppliers can increase their share in the energy services markets, and provide a source of innovation.

- Strategic alliances between local and foreign firms and between large companies and SMEs should be encouraged in order to enable the identification of market opportunities. The participation of local knowledge and talent should serve to build trust and long-standing business relationships. Large companies' purchasing practices can provide a stimulus for SMEs.

- Progressive liberalization of market access conditions for energy services should be pursued, taking into account differences among countries in their level of development, regulatory frameworks, and market realities. The process of liberalization should be carried out under the appropriate regulatory framework with a view to ensuring the achievement of national policy objectives, including public services obligations, and the establishment of fair competition conditions. Liberalization should not necessarily be equivalent to deregulation. It should entail re-regulation in order to ensure the attainment of the above-mentioned goals.

Strategic alliances between local and foreign firms and between large companies and SMEs should be encouraged in order to enable the identification of market opportunities.

- Transfer of technology in the energy sector is essential. However, the technology that is transferred should be appropriate to the situation of the receiving country in terms of level of development and environmental situation. Access to technology should be affordable and may include licensing or other procedures relating to its use. Local firms should contribute to making foreign technology suited to domestic conditions and benefit from technological spillover.

- Renewable energies may help in addressing shortages of electricity, especially in rural areas. An assessment of their affordability, sustainability and appropriateness may be suitable before opting for this alternative.

- Support should be given to energy services companies, especially SMEs in developing countries, including through the creation of local venture funds.

- Temporary admission of specialized equipment could facilitate the provision of energy services. If this is provided by countries, they should pursue non-discriminatory treatment of local and foreign energy services suppliers in order to put them on an equal competition basis.

International Trade Negotiations

Experts expressed the view that multilateral and regional negotiations on energy services should be pursued in recognition of the role that energy plays in development and taking into account the development policies and objectives of developing countries.

Experts addressed a number of issues that are under discussion in the General Agreement on Trade in Services (GATS) negotiations in the light of the current negotiating proposals. These included proposals for clarification of the scope of

energy services and improvement of current classification, including through a possible "checklist" which could be used as a tool to facilitate negotiations in the World Trade Organization (WTO) and at the regional level.

Analytical Work

In the most energy-related studies, the energy services component has been neglected, and the ongoing international negotiations on energy services would be greatly facilitated by analytical work in this area and by data about market reality.

Experts identified a number of areas for further study and analysis, with the understanding that the Commission on Trade in Goods and Services, and Commodities may select the priority areas where UNCTAD may carry out additional analytical work according to its mandate, namely:

a) Analysis of the main structural characteristics of the energy services markets; key aspects of technological change; and the role of international and national standards and regulations on trade in energy services.

b) National experiences with structural reform of the energy sector in developing countries, and potential difficulties and opportunities for domestic energy services suppliers resulting from it; analysis of the impact of energy-related subsidies on development and trade.

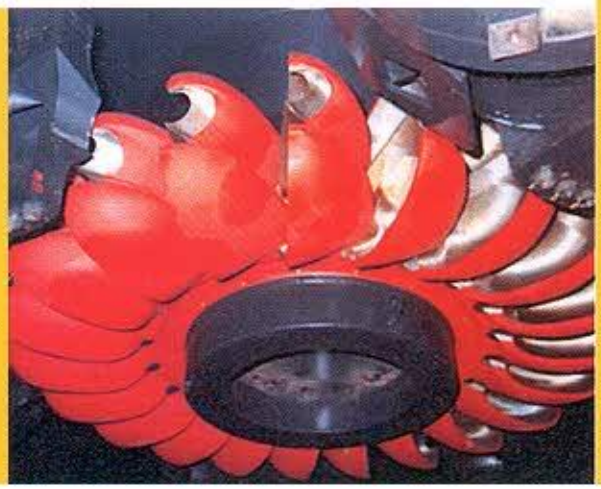
c) Compilation and analysis of a list of successful experiences of developed and developing countries in the energy sector from the investment, technology, enterprise development and other viewpoints. This could include the role of SMEs in the energy services sector, and possible disciplines to strengthen them and further their market participation.

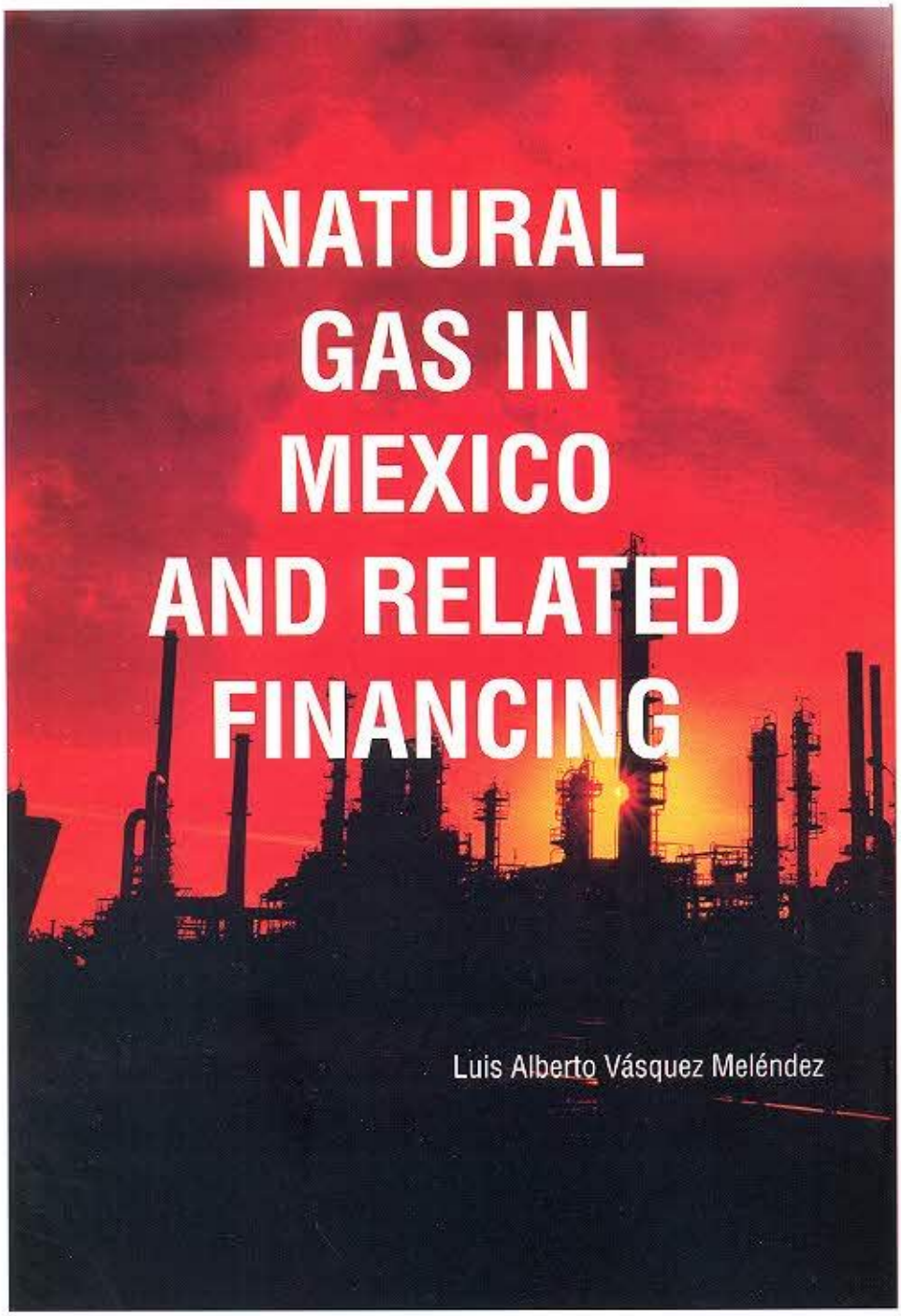
d) Analysis of the main issues as identified in the current GATS negotiating proposals on energy services and their possible implications for developing countries, taking into account the overall framework of WTO disciplines and the ongoing services negotiations.

e) Analysis of issues arising from cross-border transit of energy.

* *Paper presented by Dr. Reinaldo Figueredo, Advisor to the Director General of the United Nations Conference on Trade and Development (UNCTAD) and former Minister of Foreign Affairs of Venezuela at the XXXII Meeting of Ministers of OLADE, held in Quito, Ecuador, in October 2002.*

Dr. Figueredo's presentation is based on documents reviewed at the Meeting of Experts on Energy Services and International Trade: Consequences for Development, and the results of this Meeting, which was held in Geneva, Switzerland, in July 2001.





Introduction

The present article first provides a description of Mexico's legal traditions in respect to the evolution of the production of nonrenewable natural resources and their importance for current and future conditions in oil and gas exploration, production, transport, and marketing and specifically focuses on natural gas.

In Mexico, the principal activities involving oil and gas are carried out by the State, through Mexico's state oil company, Petróleos Mexicanos (PEMEX), which has an integrated corporate structure comprised of the following companies: Pemex Exploration and Production, Pemex Gas and Basic Petrochemicals, Pemex Refining, and Pemex Petrochemicals, as well as its subsidiaries.

Afterwards, the article highlights the importance of natural gas for Mexico since current supply and projections for upcoming years in view of present conditions indicate that demand will not be met. As a result, it is of the utmost importance to implement programs and projects that contribute to meeting current and future gas needs.

A third part of the article reviews how gas activities have been financed and what possible innovations are being proposed by Mexican authorities.

1. Legal traditions

Mexico's legal traditions have, and have had, prime importance for operating the country's main oil and gas company. That is why the historical background to these traditions is described below:

1.1 Historical background

To fully understand how natural resources are produced and transformed in Mexico, it is important to go back to the country's legal traditions, which have imposed their conditions and, at the same time, supported these activities.

The majority of natural resources in this country, including natural gas, are deemed to be national assets vested in the State. Therefore, to understand the above-mentioned concept, it must be understood that its origins virtually hark back to the colonial era and this concept is "legally" substantiated by the three papal bulls issued during the papacy of Pope Alexander VI: a) Inter caetera or Eximiae devotionis sinceritas, b) Inter caetera noverunt

universi, and c) Hodie siquidem, all released in 1493. These bulls give legitimacy to ownership of the both the land and ground in the Americas and, therefore, in Mexico.

These bulls are important for the history of land ownership in Mexico, because they were taken into consideration when drafting of Article 27 of the Political Constitution of 1917 was discussed. The legal basis for this was that Mexico inherited Spain's legal rights to the land and that the land and ground had been part of the King's assets.

This can be inferred from reading the motivation that led to the drafting of Article 27 of Mexico's Political Constitution of 1917, which maintains the concept that original ownership of the land and ground belonged to the Spanish Crown, which in Mexico granted to individuals a restricted and precarious right to the land;[1] this is quite different from the concept of absolute ownership under Roman law.

It is evident that the three above-mentioned bulls were the beginning of a legal tradition that has prevailed throughout Mexico's history. Under this tradition, the Royal Ordinances on Mining of New Spain, enacted by Charles III and which established the King's ownership over mineral resources, are also important.

When the country obtained its political independence from Spain, the ownership tradition, including the notion of National Rights, was embodied in the Code of 1865, whose first Article provides that "no one can exploit the salt mines, salt water sources or wells, coal, bitumen, oil, and precious stones without having previously obtained an express and formal concession from the competent authorities and with approval of the ministry of development."

The first specific technical provision for hydrocarbons appeared in the Law for Petroleum of 1901, which was complemented with the decree on the classification and regime of federally owned real estate of December 18, 1902 during the dictatorship of Porfirio Díaz. During the Mexican Revolution, matters regarding oil and gas regulation were also a subject of concern and they were dealt with by decrees and regulations such as the Decree of June 3, 1912, that of July 11, 1912, that of March 19, 1915, and the Regulations of October 8, 1914, all of which were aimed at consolidating the State's original property rights. These elements were consolidated by Article 27 of the Constitution of 1917, which established that "in the Nation is vested the direct ownership of all minerals or substances, which in veins, ledges, masses or ore pockets, form deposits distinct from the components of the earth itself, such as the minerals from which industrial metals and metalloids are extracted; deposits of precious stones, rock-salt and the deposits of salt formed by sea water; products derived from the decomposition of rocks, when subterranean works are required for their extraction; mineral or organic deposits of materials susceptible of utilization as fertilizers; solid mineral fuels; petroleum and all solid, liquid, and gaseous hydrogen carbons." In addition, the same Article 27 of the Constitution provides that "ownership by the Nation is inalienable and imprescriptible."

Mexico's legal tradition in respect of its national assets is further reinforced by the General Law on National Assets, which specifies that national assets are composed of: a) publicly owned assets of the Federation; and b) the Federation's privately owned assets. The same Law refers to the specifications on assets envisaged in Article 27 of the Constitution. These elements were considered in the Decree on Oil Expropriations of March 18, 1938.

1.2 Current legal aspects

The concrete reality involving Mexico's legal tradition with respect to hydrocarbons, in recent times necessarily refers to Articles 25, 27 and 28 of the Political Constitution of the United Mexican States. Article 25 indicates that "the public sector will

"The first specific technical provision for hydrocarbons appeared in the Law for Petroleum of 1901, which was complemented with the decree on the classification and regime of federally owned real estate of December 18, 1902 during the dictatorship of Porfirio Díaz"

have exclusive responsibility over the strategic areas pointed out by Article 28, with the Federal Government maintaining ownership and control over the organizations that are established in this case* and Article 28 of the Constitution specifies that oil, solid, liquid, and gaseous hydrogen carbons, among others, are strategic.

Article 27 also has a Regulatory Law, which among its principal manifestations, establishes the following:

1. The Nation has direct, inalienable and imprescriptible ownership over all hydrogen carbons located on the national territory, including the continental shelf, in ledges or ore pockets, whatever may be their physical state, including intermediate states, and that make up crude mineral oil, what accompanies it or what is derived from it.

2. Only the Nation will be able to carry out different activities for exploiting hydrocarbons, which constitute the oil industry, in accordance with the following terms:

   a) First-hand exploration, exploitation, refining, transport, storage, distribution, and sale of oil and the products stemming from its refining.

   b) First-hand exploration, production, elaboration and sale of gas, as well as the transport and storage that are indispensable and necessary for interconnecting their production and elaboration.

   c) First-hand elaboration, transport, storage, distribution and sale of those oil and gas products that are susceptible to serve as basic industrial raw materials and that constitute basic petrochemicals such as ethane, propane, butane, pentanes, hexane, heptane, raw material for lamp black, naphthas and methane, when they come from hydrogen carbons, obtained from deposits located on the national territory and are used as raw material in petrochemical industrial processes.

"The current regulations permit the participation of individuals in the following activities: natural gas transport, storage and distribution. The activities reserved for Pemex are first-hand exploration, production, and sales"

Furthermore, the Organic Law for Federal Public Administration grants to the Energy Secretariat the following responsibilities, among others:

- Conducting the country's energy policy.
- Exercising the rights of the Nation in respect to oil and all the solid, liquid, and gaseous hydrogen carbons, nuclear energy, as well as in respect to the development of natural assets and resources that are required to generate, carry, transform, distribute, and supply electrical energy aimed at delivering public electricity services.
- Carrying out activities of para-state institutions whose purpose involves the production and transformation of hydrocarbons and the generation of nuclear-based electricity, in compliance with legislation on ecological matters.

Specifically regarding the para-state company, Petróleos Mexicanos, its organic law has the following provisions among its general provisions:

1. The State will undertake the activities that come under its exclusive responsibility in the strategic areas of oil, other hydrocarbons and basic petrochemicals, through the state oil company Petróleos Mexicanos and the decentralized subsidiaries in accordance with the terms provided for by the Law and in accordance with the Regulatory Law of Article 27 of the Constitution in the area of oil and its regulations.

2. Petróleos Mexicanos, set up by decree on June 7, 1938, is a decentralized institution, with its own legal status and assets, whose purpose is to exercise, in conformity with the provisions of this Law, central conduction and strategic direction of all activities covered by the state oil industry in accordance with the terms of the Regulatory Law of Article 27 of the Constitution in the area of oil.

3. The following decentralized technical, industrial, and commercial

organizations, with their own legal accountability and assets, were created. They have the following purposes:

Pemex – Exploration and Production: Oil and natural gas exploration and production; oil transport, storage in terminals, and marketing.

Pemex – Refining: Industrial processes for the refining and elaboration of oil products and byproducts that can be used as basic industrial raw materials, storage, transport, distribution, and marketing of the above-mentioned products and byproducts.

Pemex – Gas and Basic Petrochemicals: Natural gas processing, natural gas liquids and artificial gas; storage, transport, distribution, and marketing of these hydrocarbons, as well as byproducts that can be used as basic industrial raw materials.

Pemex – Petrochemicals: Industrial Petrochemical processes whose products are not part of the basic petrochemical industry, as well as their storage, distribution, and marketing.

The strategic activities that this Law has entrusted to Pemex - Exploration and Production, Pemex - Refining, and Pemex - Gas and Basic Petrochemicals can only be carried out by these organizations.

Petróleos Mexicanos and its decentralized organizations, depending on their respective purposes, can enter into all kinds of documents, agreements and contracts, and can sign credit documents, keeping exclusive hold over Mexican State's ownership and control over oil and gas, subject to applicable legal provisions.

Specifically regarding the regulatory framework of natural gas in Mexico, it is comprised as indicated below: first, there is Article 27 of the Constitution, followed by the Regulatory Law of Article 27 of the Constitution in the area of oil, which is followed immediately afterward by the Law for the Energy Regulation Commission and then by the Regulations for Natural Gas, and finally the directives, among which the most noteworthy are: 1) for pricing and tariff-setting, 2) for accounting, 3) for the determination of geographical zones, and 4) for first-hand sales.

The current regulations permit the participation of individuals in the following activities: natural gas transport, storage and distribution. The activities reserved for Pemex are first-hand exploration, production, and sales.

It is therefore evident that Mexico has a long-standing legal tradition regarding the ownership of natural resources, whereby hydrocarbons are considered and safeguarded by the Political Constitution as strategic assets. Under these conditions, any proposal for change or for the introduction of any new financial operation instruments becomes exceptional and sensitive. As a result, it is important to analyze natural gas from a perspective that includes the above-mentioned tradition and current and future operational and financial challenges. Because of this it is necessary to describe the importance of gas in Mexico.

2. Importance of natural gas in Mexico

Primary energy supply in Mexico, during the period 1995-2000, was comprised as follows: 54% oil and condensates, 18% natural gas, 5% electricity, 3% biomass, 2% coal, and 8% imports. Therefore, natural gas ranks second in primary energy supply.

According to proven reserves at January 1, 2001, Mexico ranks 21st in the world in terms of natural gas. The characteristic of these reserves is that 83% of the gas is associated to oil and 17% is comprised of non-associated gas. It should be underscored that these reserves have shown a declining trend over the last few years. For example, the evolution of dry gas reserves has been characterized by the figures indicated in the table at the left.

As for gas production, the country ranks ninth in the world. Natural gas extraction from 1998 to 2001, by region, is indicated in the table below at the left.

The highest extraction during the period from 1998 to 2001 took place in the southern and seacoast regions, owing to their correlation with the crude oil production structure. As for

Proven reserves of dry gas by region 1998-2001*
(billion cubic feet)

Region	1998	1999	2000	2001
Norte	18,034	17,873	16,402	16,311
Sur	9,105	8,231	9,237	8,655
Marina norte	2,815	2,584	3,308	3,063
Marina sureste	1,385	1,376	1,447	1,476
Total	31,339	30,064	30,394	29,505

*Figures at January 1 of each year.
Source: Secretariat of Energy, Energy Sector Program 2001-2006 and Natural Gas Market Forecasting 2001-2010

Natural gas extraction by region 1998-2001
(million cubic feet per day)

Region	1998	1999	2000	2001*
Sur	2,067	1,997	1,857	1,743
Marinas	1,686	1,570	1,557	1,530
Norte	1,038	1,224	1,265	1,238
Total	4,791	4,791	4,679	4,511

*Figures for oil indicators
Source: Pemex annual reports

the country's northern region, the most dynamic extraction is taking place in the Burgos basin.

As indicated, reserves are declining, on the one hand, and extraction is rising, on the other hand. Expansion in the use of natural gas in Mexico over the last decade is due, among other reasons, to the introduction of new technological developments, specifically the use of energy generation based on combined cycle stations, which are more efficient than conventional technologies for producing electrical energy.

During the period from 1993 to 2000, domestic natural gas supply met on average 98% of domestic consumption demand and the remaining 2% was covered by imports. It is important to indicate that gas is imported as a result of two factors:

- The first involves logistics, as it turns out to be more economical to import gas from the United States to meet the needs of northern Mexico than to carry gas from the major production centers located in southeastern Mexico.

- The second factor is that gas imports are aimed at covering any shortfall that national supply cannot meet. Part of this consumption occurs mainly in the country's central region, which is comprised of Mexico City and the States of Hidalgo, México, Morelos, Puebla and Tlaxcala.[2]

According to the forecasts made in the document on natural gas prospects for 2001-2010, at the end of the forecasting period, national gas supply will amount to 7,551 million cubic feet per day, and demand will amount to 9,451 million cubic feet per day. It is estimated that 55% of the rise in demand is due to electric power projects, which means that national supply can only meet 80% of needs, whereas the remaining 20% will have to be complemented by imports. This implies estimated gas imports amounting to 1.9 billion cubic feet per day, of which 50% will be made for logistic reasons and the other 50% to meet shortfalls, as long as current conditions are not substantially changed on the supply side (such as the incorporation of new reserves and their corresponding extraction). It is important to mention that forecasting on the supply side was conducted before drilling of the Playuela 1 and Lancahuasa 1 wells, which are included in the Strategic Gas Project of Petróleos Mexicanos.

3. Financing

To meet Mexico's project natural gas needs, an investment amounting to US$21 billion will have to be made in the period between 2000 and 2009, according to estimates appearing in the Energy Sector Program for 2001-2006.

Financing of investment spendinges by project in Pemex Exploration and Production, in the period 1998-2000, was as follows:

Investment spending	1998	1999	2000
Programmable	48%	36%	41%
Pidiregas	52%	64%	59%

Source: Petróleos Mexicanos, Statistical Report 2000

As indicated by available data, in 2000, 41% of investment expenditures was financed by budget resources allocated through the Budget of Expenditures of the Federation and 59% was financed by extra-budgetary resources, as in the case of the scheme of Project of Deferred Impact in the Expenditure Register (Pidiregas). It is important to mention that this type of financing has its roots in Mexico's financial constraints during the period 1994-1995, which led to amendments to the Laws on Public Debt, Budget, Accounting and Public Expenditures, and its Regulations; Financial Information Norm No. 9 (NIF-09), which specifies the accounting treatment for investments in projects of this type, was issued.

The original conception for this investment financing scheme is that the projects will be financed with resources generated by the sale of goods and/or services of the project itself and which do not affect the federal balance during its implementation. In other words, it involves a contingent debt. This opens up major opportunities for private-sector participation in financing long-term investment projects, with the respective financial cost that this implies.

Regarding the projected financing of US$21 billion for the above-mentioned period, the country will have to make a huge effort to meet the growing need for natural gas. Evidently this requires more and better financing schemes for long-term investment projects. One alternative proposed in this direction by the Management of Petróleos Mexicanos is the multiple services contract, which is to be applied first of all to increase non-associated gas reserves and production. According to information available to date, these contracts do not constitute a private investment in Petróleos Mexicanos, rather they are a public investment financing instrument.

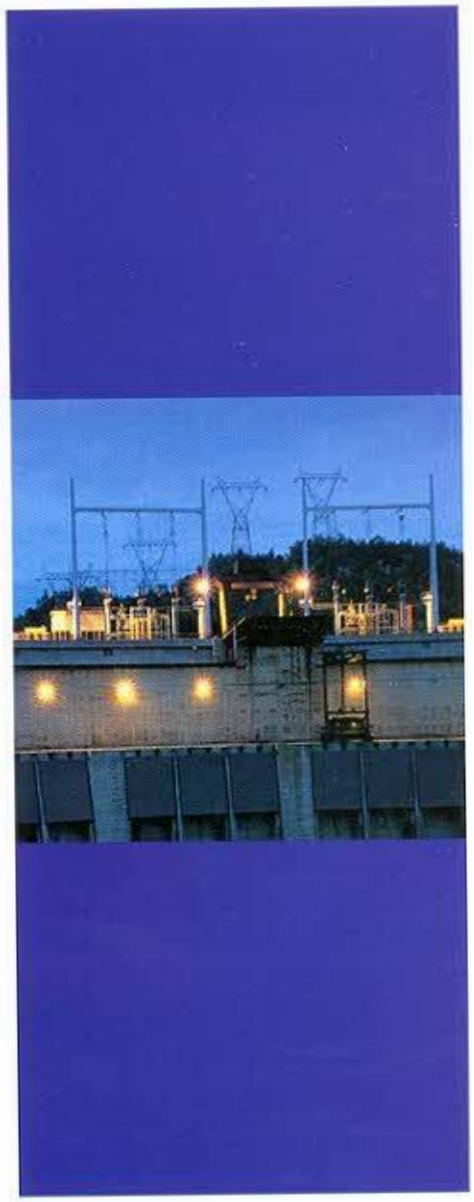
The type of contracting referred to would be implemented in three stages and over a maximum term of 20 years. The first stage envisages bidding processes for the second semester of 2002, which would focus primarily on a development program of the Burgos basin, with a capacity of one billion cubic feet of gas per day during the period from 2005 to 2011. According to estimates of Petróleos Mexicanos, this first stage is profitable until taxes are levied, which would mean changing the fiscal regime that is currently being applied to the para-state company to ensure its economic viability.

The other alternative that is being proposed involves amending the fiscal regime of Petróleos Mexicanos, so as to enable this public enterprise to have its own resources for the development of its investment projects, considering that currently Pemex accounts for more than 35% of fiscal incomes.

Obviously, any alternative that is proposed will have to consider some of the guiding principles of the energy policy indicated in the Energy Sector Program for 2001-2006, which for the case of gas are basically as follows:

1. Energy sovereignty. Not only for historical reasons, but also because of its economic advisability, ownership, production, management, and regulation of national energy resources will continue to be vested in the State and State-owned companies will continue to be public enterprises.

2. Supply security. Supply security is required not only for the economic development of the entire modern nation but also to ensure international competitiveness (all the more so for gas because of its involvement in electric power generation).



3. Social commitment. Energy is a fundamental element not only for economic growth but also to improve the daily living conditions of all citizens.

It should be mentioned that any proposal for solution, so that it can be politically viable among the players of the executive and legislative branches of government and so that it can benefit from the support required for its instrumentation, will have to consider, among other aspects, Mexico's legal tradition and the above-mentioned guiding principles. If these aspects at least are not considered, any proposal, no matter how technically sound it may be, will have less chance of being implemented, because of Mexico's inherent political, economic, and social characteristics.

On the basis of the above, the following summary can be made:

1. In view of current conditions and the forecasting that was made, supply is not enough to meet the demand expected for the year 2010.

2. That the rise in current and expected demand for natural gas is sustained, among other factors, by the greater use of combined cycle technology for electric power generation, as a consequence of the greater advantages this technology offers compared to traditional technology.

3. That to meet growing needs for natural gas in the country, major financial resources are required, resources that promote the development of programs and projects to incorporate more reserves and a higher volume of extraction. In this sense, Mexican energy authorities will have to make a considerable effort in using financial instruments that are capable of meeting requirements, that is, they will have to use a range of instruments, from the traditional instruments such as allocations in the Budget of Expenditures of the Federation, the Pidiregas scheme, the proposal of multiple services contracts, once the latter have been duly agreed upon between the executive and legislative branches of government, and Mexican society as a whole, and other instruments that will surely arise from the financial creativity of Mexicans. So that they can be viable, they will have to consider Mexico's legal tradition and the guiding principles of energy policy.

4. It is important to wait and observe real potential stemming from the drilling of the Playuela 1 and Lancahuasa 1 wells, and the results as a whole of the Strategy Gas Project of Petróleos Mexicanos, which could possibly influence national gas supply in the future.

"It should be mentioned that any proposal for solution, so that it can be politically viable among the players of the executive and legislative branches of government and so that it can benefit from the support required for its instrumentation, will have to consider, among other aspects, Mexico's legal tradition and the above-mentioned guiding principles. If at least these aspects are not considered, any proposal, no matter how technically sound it may be, will have less chance of being implemented, because of Mexico's inherent political, economic, and social characteristics"

Notes

1 Ándres Molina Enríquez, drafter of the original motivation, historical archives of the Nation.

2 Source: Energy Secretariat, Natural Gas Forecasting Marketing 2001 - 2010.

* *Luis Alberto Vásquez Meléndez, a Mexican national, holds a doctorate in public finance from the University of Vera Cruz and has held financial and administrative posts in Mexico's state oil company Petróleos Mexicanos (PEMEX) from 1988 to 2001. At present he is OLADE's Internal Auditor.*

Brazilian ambassador to Ecuador visits OLADE'S headquarters

Dr. Sergio Abreu e Lima Florencio, who recently came into office as Ambassador of the Federal Republic Brazil in Ecuador, visited the headquarters of the Latin American Energy Organization on March 4, 2002.

Ambassador Abreu e Lima Florencio was received by OLADE's Executive Secretary, Dr. Julio Herrera, who apprised him of the Organization's principal activities.

One of the subjects that was of special interest for both officials was the actions taken by the Initiative for the Integration of Regional Infrastructure in South America (IIRSA), which is currently being chaired by Brazil.

Regarding this, the importance of the energy component that will be part of the report that will be submitted to the Presidential Summit that will be taking place in Guayaquil, Ecuador next July was highlighted.

On this occasion, the Brazilian Ambassador reiterated his country's support for the energy sector integration efforts of the Member States of OLADE.

SEARCH CONFERENCE ON WOMEN IN THE DEVELOPMENT OF ENERGY AND ENVIRONMENT WILL CONTINUE IN 2002

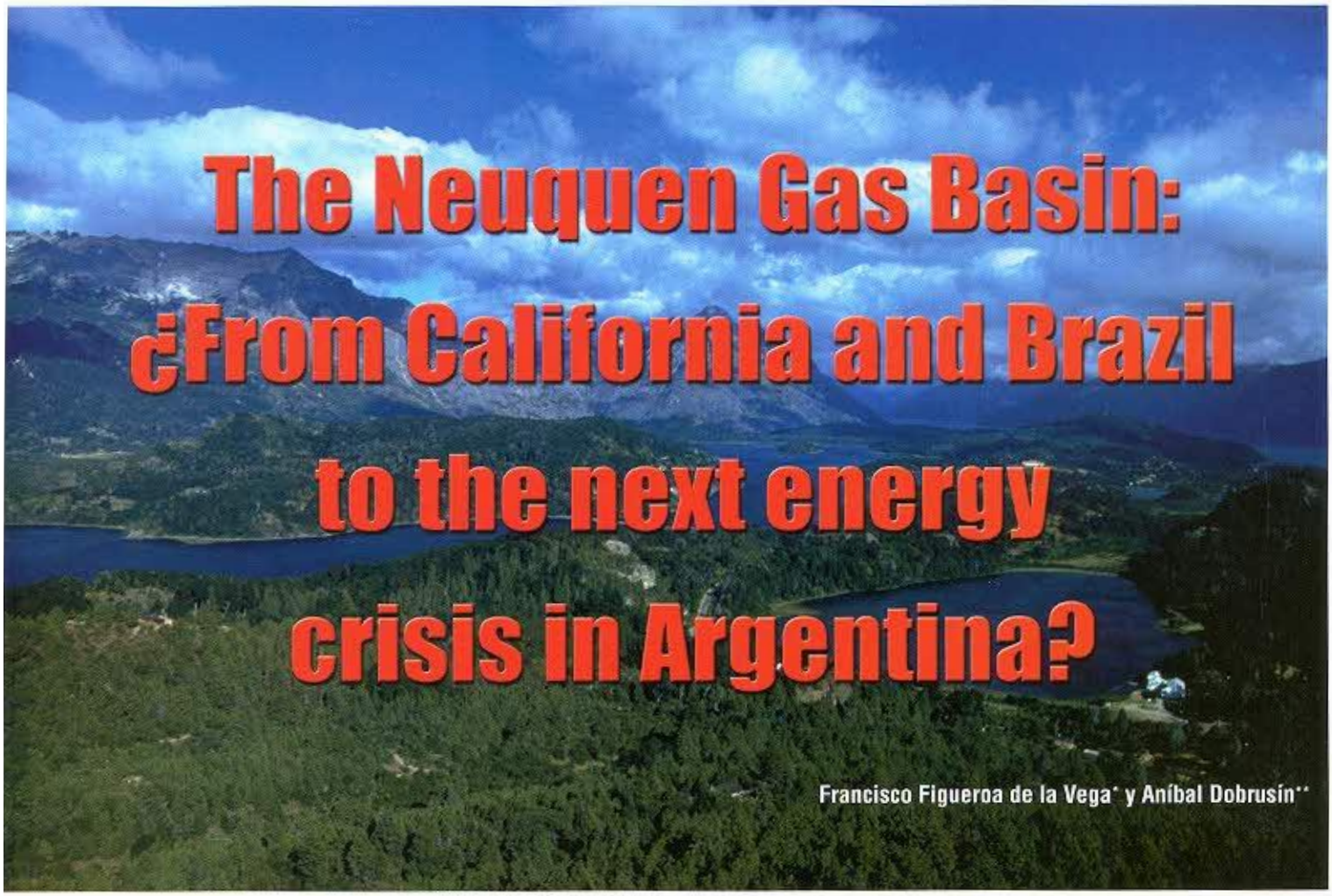
In 2001, Uruguay, Brazil, Peru, and Ecuador hosted the event Search Conference on the Role of Women in the Development of the Energy-Environmental Sector.

This activity is part of the gender component of the Energy and Environment Project that OLADE is implementing with the University of Calgary with support from the Canadian International Development Agency (CIDA).

The objective of these conferences, which are held in the member countries of OLADE, is to contribute to the designing of new policies to promote the participation of women in energy activities in Latin America and the Caribbean by comparing the region's experiences with those of Canada.

In 2001, installments of this Conference took place in Uruguay, on October 25-26; in Brazil on October 29-30; in Peru on November 19-20; and at OLADE headquarters in Quito, Ecuador, on December 11-12.

OLADE and the University of Calgary are in the process of coordinating similar events with other Member States of the Organization during 2002.



The Neuquen Gas Basin: ¿From California and Brazil to the next energy crisis in Argentina?

Francisco Figueroa de la Vega* y Aníbal Dobrusín**

1. Introduction

The forecasting exercise conducted by the Energy Secretariat of Argentina for the period 2000-2010 indicates that natural gas production will have the capacity to meet market needs. When the horizon is extended to the year 2020, however, the situation is indeed a matter of concern. Our review of this forecasting exercise shows that the Neuquen Basin in particular will be facing supply difficulties as of the year 2010 unless its resource base is expanded.

The consequences may lead to severe upsets in gas supplies to domestic and foreign markets and for the economies of the provinces that depend on the royalties coming from the basin. To this must be added the decline in taxes, duties and contributions paid by the companies involved and the rising unemployment rate, among other impacts. To avoid these impacts, research has to be conducted on the potential of reserves and significant investments in exploratory activities, which should be promoted by an active energy policy.

On the basis of the above, in the following paragraphs, we will be referring first to the domestic and foreign needs for natural gas and then the possible supply difficulties that the producers of the Neuquen Basin will eventually have to address. In this context, the repercussions of the energy supply capacity crises in California and Brazil and the factors that were at their origin cannot be ignored.

2. Brief description of the industry at present

Natural gas resources: The subject of resources is essential, because it is the platform for the future evolution of natural gas activities. Natural gas is classified as follows: recovered, discovered, identified, and unidentified gas, depending on the risk assumed for each category. The matter is highly complex and even controversial because some authors claim that unidentified resources cannot be included in the category of reserves and therefore cannot be considered in the estimates of productive potential. In this paper, the

Table 1: Gas resource base in the Neuquen Basin (MMMcm)

Date of Estimate	Cumulative production (*)	Proven reserves	Original discovered reserves	Identified reserves (**)	Unidentified resources (***)	Ultimate resources
	1	2	3=1+2	4	5	6=3+4+5
1993 (1)	187	323	510	274	396	1180
1996 (2)	242	341	583	95	216	894
1999 (3)	310	377	687	97	200	984

(*) Based on data from Yrigoyen, 1994; (**) probable and possible reserves; (***) hypothetical and speculative resources.
Source: (1) Yrigoyen, 1994; (2) Novara, 1998; (3) SE and M, 2001.

view that has been adopted is that unidentified resources can potentially be transformed into reserves.

The sum of all these categories provides an estimate of the basin's ultimate resources at the date of their calculation, and the weighting of each category by the respective risk factors, not only discovery but also recovery, provides the ultimate recoverable resources that can be forecast for delivery to the market. We refer to risk factors, not to random factors, because the quantification of the former factors is determined on the basis of the experience of qualified experts (geologists and reservoir engineers), whereas the latter involve a game of chance.

There are various national studies that have quantified ultimate resources of natural gas in the Neuquen Basin (Table 1). Data are expressed in billion cubic meters (MMMcm).

Some of these studies involve estimates made by the authors themselves, whereas others bring together scattered confidential information from operating companies and assessors of reserves and infer the results. It is not our intention to enter into a discussion about the validity of the data, which we believe should be analyzed by a committee of experts in the matter, but rather to analyze the evolution that is expected for future production, in view of market needs, based on the gas potential of the Neuquen Basin.

It should be recalled that, as our knowledge grows, resources automatically step up from this category to that of possible reserves and then to probable reserves, before discoveries are made which transform these reserves into proven reserves (developed or to be developed). This dynamic process is not automatic, nor is it necessarily sequential, and it can explained by a set of assessments leading to a quantification of resources in their different categories.

If the volumes of ultimate resources that have been quantified to date reflected their definitive availability, it could be expected that undiscovered reserves and resources, as they are transformed into proven reserves, would become increasingly smaller and proven reserves increasingly larger. Nevertheless, it can be observed that ultimate resources fluctuate depending on the more extensive knowledge that is being provided by advances in exploration technology. Nevertheless, since it is increasingly less likely that large deposits will be found, it can be expected that the expansion of ultimate resources will also be smaller as they come closer to reaching their definitive ceiling. The process implies increasing knowledge about the potential (undiscovered resources and reserves) so that it can be transformed afterward into capacity (recoverable reserves).

The situation is all the more complex because this capacity is depleted as a result of production. This element has been examined in the past [Marshall, 1890] in respect to mining production: "The product coming from the soil in a field is somewhat different from the ground, because the former, if it is properly cultivated, keeps its fertility, whereas the product of a mine is a part of the mine itself." Therefore, in view of natural gas production, growing discoveries of reserves will be required not only to replenish the capacity but also to facilitate supply in keeping with growing market needs. Nevertheless, it is not enough to have a resource base. In addition, the components between original reserves and ultimate resources have to be expressed in terms of recoverables (Table 1). Original reserves have already been partly extracted and the rest, once developed, have the conditions to be taken to the surface, with a high probability that this will actually occur. The question is how much of the remaining reserves and resources can be recovered. For this purpose, in this paper we have adopted the criterion applied by DeSorcy [quoted by Novara, 1998].

From Table 1, we selected the estimate of reserves and resources of row (2), coming from various sources of information and which are sufficiently broken down and updated for the purposes of this work. This leads to the following quantification for the Neuquen Basin (Table 2).

Table 2. Gas reserves and resources in the Neuquen Basin at January 1, 1997 (MMMcm)

Production basin	Reserves			Identified reserves	Unidentified resources
	Proven	Probable	Possible		
	1	2	3	4=1+2+3	5
Neuquen	341.1	75.5	19.3	435.9	215.6

Source: Based on data from Novara, 1998.

Table 3: Estimate of recoverable ultimate resources at December 31, 2000 (MMMcm)

Production basin	Net yearly production (*)	Cumulative production (**)	Proven reserves (***)	Discovered original reserves	Recoverable identified reserves (****)	Recoverable unidentified resources (*****)	Recoverable ultimate resources
	(1)	(2)	(3)	(4)=(2)+(3)	(5)	(6)	(7)=(4)+(5)+(6)
Neuquen	25.8	336	353	689	23.7	37.3	750

(*) Net of reinjection into the formation; (**) estimate based on data from Yrigoyen, 1994; (***) data from SIEE, OLADE, 2001, with information provided by the Energy Secretariat; (****) estimate at 1997 based on data from Novara, 1998, including probable and possible reserves; (*****) based on data from Novara, 1998, including estimated potentials
Source: Own elaboration

Recoverable ultimate resources estimated for the Neuquen Basin (Table 3), for the year 2000, indicate that they account for 43.9% of the country's recoverable gas resources, estimated on the basis of the same methodology. What happens in the future with the gas supply from the Neuquen Basin is therefore important.

The data for original reserves from Table 3 seem to be highly reliable and the error

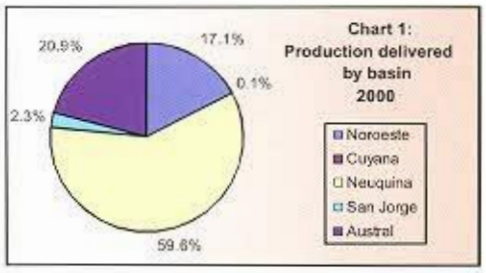


Table 4. Gas pipelines operating and being built that are exporting gas to the Neuquen Basin

Countries of destination	Segments in Argentina	Start-up of operations	Investments in Argentina (MMUS$)
Chile Gasandes	La Mora-Paso del Maipo Long: 313 km; Diam: 24"; Cap: 10 MMcmd	6/97	162.0
Uruguay Petrouruguay	Gto. Entrerriano-Pte. Internac. Gral. Artigas Long: 15 km; Diam: 10"; Cap: 1 MMcmd	10/98	4.0
Chile Pacífico	Yac. Loma La Lata-Paso Buta Mallín Long: 296 km; Diam: 20"&24"; Cap: 3.5 MMcmd	12/99	150.0
Brasil TGM	Aldea Brasilera-Uruguayana Long: 450 km; Diam: 24"; Cap: 2.8 MMcmd	8/00	125.0
Uruguay Casablanca	Gto. Entrerriano/Cruce Río Uruguay Long: 10.5 km; Diam: 16"; Cap: 2 MMcmd	Construction	1.0
Uruguay Cruz del Sur	Punta Lara-Colonia Long: 93 km; Diam: 24" y 18"; Cap: 6 MMcmd	Construction	40.0

Source: Based on data from the ENARGAS Quarterly Report. December 2000.

Table 5: Exports from the Neuquen Basin to neighboring countries

	Exports (MMcm)			
	Chile	Brazil	Uruguay	Total
1997	114.0	0.0	0.0	114.0
1998	1176.0	0.0	2.0	1178.0
1999	1971.0	0.0	23.0	1994.0
2000	2096.0	171.0	37.0	2304.0

Source: Secretariat of Energy and Mining, Forecasting 2000

can be within reasonable margins. The identified reserves and the unidentified resources correspond to 1997 data and may show a higher margin for error because, between that date and 2000, new reserves that have provided further information and that may have changed the data have surely been identified.

It is interesting to highlight that, in 2000, original reserves of the Neuquen Basin accounted for 91.9% of the recoverable ultimate resources that we have estimated, whereas the margin yet to be discovered was 8.1%. Therefore, the Basin's future is highly predictable if no new resources appear and if estimates are confirmed.

In order to facilitate a dynamic analysis of discoveries and production compared to future requirements, we will rely on data from Table 3. It is important to point out that the degree of maturity of the exploration of the Neuquen Basin will have a major incidence on the rate of discoveries and future production. That is why it is important to have adequate knowledge about the universe of resources

Production: By 2000, the Neuquen Basin had produced, since the start-up of production in 1918, 44.8% of recoverable ultimate resources and had delivered production to the market for a volume that accounted for 59.6% of the country's total production. The other major contributions were from the Austral and Noroeste Basins (Chart 1).

Exports: In 1997, natural gas started being exported to Chile, and up until 2000 new gas pipelines have been added to the country and interconnections with Uruguay and Brazil have been incorporated (Table 4), which has led higher export volumes (Table 5).

The investments in gas pipelines stemming from expectations for natural gas exports from the Basin accounted for 38.1% of the investments in gas pipelines made in the country, also for export.

Exports from the Basin account for 49.7% of the country's total gas exports in 2000. Therefore, the future of this Basin is important for neighboring countries.

Regulation: Wholesale market prices are set freely by contracts between suppliers and consumers, whereas on retail markets and the transport and distribution services markets, the prices and tariffs are regulated by the National Gas Regulation Agency (ENARGAS). The evolution of well-head prices (Table 6) indicates that the Neuquen Basin has the highest price compared to the rest of the basins.

City gate prices for gas received in Buenos Aires from the Neuquen Basin were estimated to be, on average US$1.93/MMBtu for the year 2000 and average transport costs from the Neuquen Basin were estimated to be US$0.61/MMBtu.

3. Natural gas supply outlook for 2000-2020

After analyzing official prospects for the natural gas market in Argentina [Energy Secretariat, 2001], we are presenting results that we believe may be of interest for the energy decisions makers and operators of the gas industry.

The principal results refer to:

- The durability of natural gas resources to ensure long-term supply to the domestic and foreign market.
- Impacts of durability of resources on natural gas sale prices at the head of the pipeline and on city gate prices.

Regarding this, two scenarios are being examined. The first is the reference scenario, which assumes a business-as-usual growth with slight adjustments and with an availability of resources such as the one estimated in Table 3. The second scenario involves the expansion of ultimate resources, with everything else remaining the same.

3.1 Domestic and foreign market requirements

In both scenarios, domestic natural gas requirements of the socioeconomic sectors grow during the period 2000-2020 at a yearly cumulative rate of 3.4%. In the commercial and public, industry and petrochemicals, electricity and exports sectors, the growth rates forecast by the Energy Secretary have been adopted [SE y M, 2001]. For the residential and transportation sectors, saturation functions with yearly cumulative growth rates of 2.1% and 3.4% between 2000 and 2020, respectively, have been adopted. The reason to calculate the two latter sectors independently is the maturity of Argentina's gas market. The remaining sectors tend to follow the expected economic growth trend although, with the financial crisis at the end of 2001, it now seems to be optimistic. Expansion of the external market depends on long-term contracts and authorizations from the Energy Secretariat.

The requirements of the Neuquen Basin (Table 7) have been allocated in accordance with the gas delivery structure of the basin in the year 2000. These deliveries, in terms of million cubic meters (MMmc), depend on the capacity of gas pipelines currently operating at that time.

The basic hypothesis that was adopted is that, over the long term, demand will be facing a supply that will determine the origin of the supplies and that the pipelines will be adjusted in keeping with a business rationale in a market context that can change the direction of supply flows and even close down some gas pipelines.

Table 6. Average well-head prices by basin, without taxes (US$/MMBtu)

	Country average	Noroeste	Neuquen	Austral
1995	1.125	1.163	1.249	0.964
1996	1.165	1.219	1.319	0.967
1997	1.163	1.215	1.313	0.968
1998	1.160	1.200	1.320	0.970
1999	1.150	1.170	1.300	0.970

Source: Gas & Gas, various issues

3.2 Exports by destination

Between the years 2000 and 2010, the export forecasts estimated by the Energy Secretariat have been adopted. Between 2010 and 2020, the continuity of these exports has been assumed. The Energy Secretariat expects that supplies will be made in line with what was agreed upon between the consumers and the suppliers in the contracts and in compliance with the authorizations granted by the government up to the end of 2000.

As indicated in Chart 2 and Table 8, the destinations of the above-mentioned exports from the Neuquen Basin are Chile, Uruguay, and Brazil.

3.3 Production

a. Possible production trends versus production required by domestic and foreign markets

After reforms in the natural gas sector (1992), producers have reacted with a growing annual production that has met domestic and foreign market requirements. This is reflected in the possible maximum production (PMP), which indicates the adaptation to requirements by the acceleration of production in the recent past (Chart 3). Nevertheless, to ensure production required by the consumers, this acceleration process will have to enhanced as indicated by the PMP in the future.

Tabla 7: Natural gas requirements on the Neuquen Basin (MMcm)

	Domestic and foreign markets						
	Flaring	Consumption at deposits	Retention at plants	To be carried for domestic consumption	Subtotal	Exports	Total production required
1990	643	759	106	12492	14.000		14.000
1995	835	967	138	16234	18194		18194
2000	619	1231	172	21514	23536	2304	25840
2005	823	1473	207	25850	28353	5391	33744
2010	956	1715	241	30094	33006	6180	39186
2015	1092	2008	282	35228	38610	6180	44790
2020	1248	2342	329	41086	45005	6180	51185

Source: Based on data from OLADE, the Energy Secretariat, and own elaboration

It is possible that, as a result of the crisis, these additional exports may be higher in the future, if the capacity of the pipelines permits it, in order to compensate for the possible decline in domestic market needs.

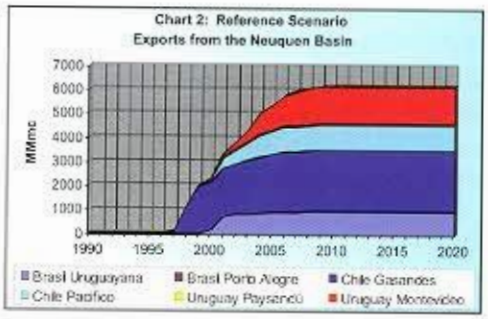
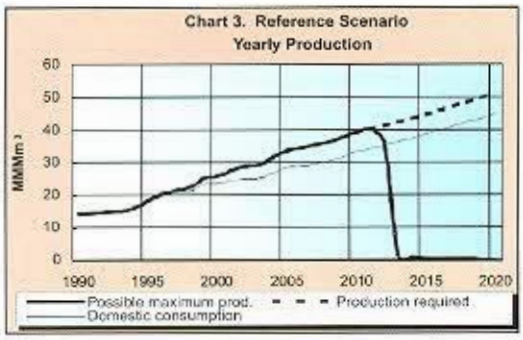
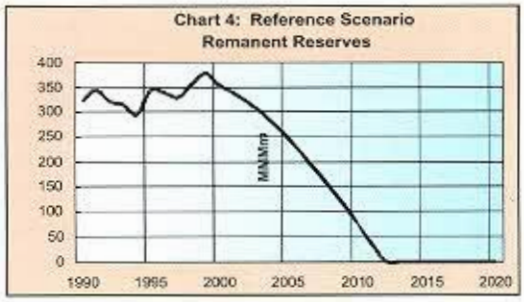


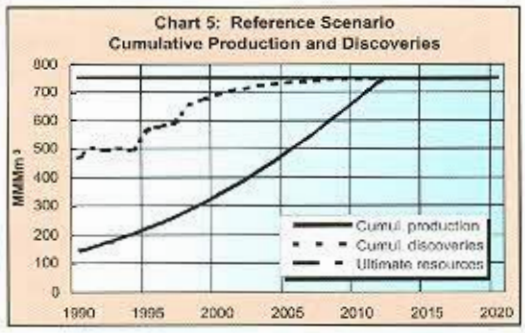
Table 8. Reference scenario for exports from the Neuquen Basin

	Brazil	Chile	Uruguay	Total
2000	171	2096	37	2304
2005	899	3386	1106	5391
2010	950	3576	1654	6180

Source: Based on data from the Energy Secretariat, 2001







Despite the limit of productive efforts, in view of the recoverable ultimate resources estimated in this scenario, the PMP would reach its peak by the year 2012 and then would decline steeply. This analysis has assumed that the production acceleration process of production does not involve any technical exploitation difficulties. Nevertheless, it is a powerful assumption that should be analyzed.

The integral of the PMP is equal to the volume of reserves that were discovered and that are to be discovered, which are indicated as remanent reserves. As observed, they already began to decline in 1999 (Chart 4).

Recoverable reserves come from the difference between cumulative discoveries and production (Chart 5) whose expected evolution in the future is based on the assumption that the pace of discoveries keeps up with the trends of the recent past (1995-2000) whereas production has been forced in order to meet expanding domestic and foreign requirements.

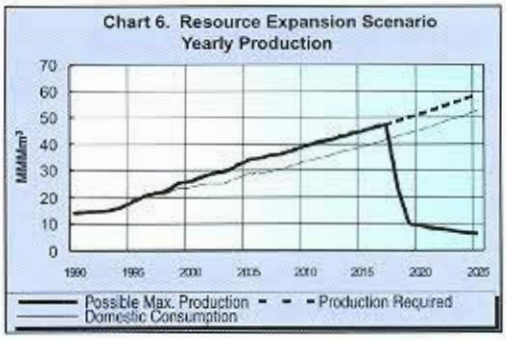
Furthermore, the stability of the regulatory framework that permitted this expansion of production in the past may have been altered by the current debt crisis and increased investors' aversion to risk owing to the legal insecurity that is perceived in the business world.

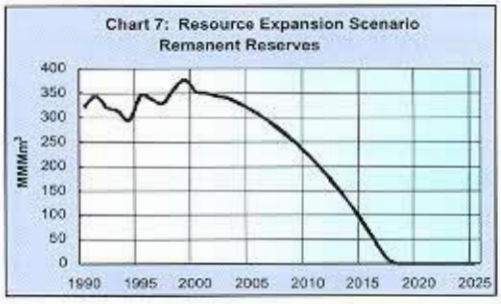
In any case, the possible evolution of the PMP would involve the need to confirm the estimates of recoverable reserves in order to take timely decisions to avoid the impacts of energy crises such as the recent ones in California, after market liberalization [Laurie, 2001], and in Brazil, owing to the delay in implementing regulatory frameworks that would offer an energy business environment attractive to investors [Pinto, 2001]. It should be pointed out that there had already been forewarnings of the possible gas supply crisis in Argentina, earlier [Figueroa, 1999] and more recently [Thouin, 2001] and [Beicip Franlab, 2001].

b. Possible production trends versus the expansion of ultimate resources

This is a scenario where reality competes with fantasy. The approach in this scenario is to determine what would happen with the durability of the PMP if the ultimate resources of the Neuquen Basin increased as a result of successful exploration by the companies. Regarding this, it has been arbitrarily assumed that the recoverable resources of this basin could be higher by 50% than the estimates of Table 3. This would increase the availability to 1125 MMMcm of gas. It is assumed that the Neuquina Basin holds a potential on the periphery of the fields now being produced and at greater depths, which could be discovered if new investments are made.

If this hypothesis is confirmed, the horizon for possible maximum production (Chart 6) could be extended to the end of next decade and thus meet the requirements until almost 2020.





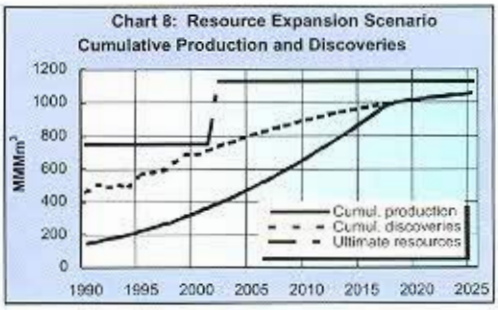


Table 9. Comparison of possible maximum production with required production (MMcm)

Years	Possible maximum production		Production required	
	Reference scenario	Resource expansion scenario	Reference scenario	Resource expansion scenario
2000	25840	25840	25840	
2005	33744	33744	33744	
2010	39186	39186	39186	
2015	388	44791	44791	
2020	105	8996	51185	

Remanent reserves (Chart 7) would also have reached their peak in 1999, then would have declined systematically at a slower pace than in the reference scenario until the end of the next decade.

Accumulated production and discoveries (Chart 8) show a growing gap until 2005, even with forced production to meet the requirements being made on the Basin. It is clear that the importance of suitable knowledge of recoverable ultimate resources can lead to decisions that are more appropriate than those that would be taken on the basis of proven, probable, and possible reserves, as indicated in some publications. The periodical assessment of these resources is a determining factor not only for the business decisions of supply but also for the decisions taken by the provinces regarding expectations of earnings to finance their respective budgets.

The fact that natural gas is a depletable resource cannot be ignored. It can be argued that the quantified volume of ultimate resources is low or high, but in any case, whatever the volume assigned to estimates, the rate of natural gas production and discoveries will sooner or later hit a ceiling, indicating definitive limits of availability. It cannot be argued, however, that there will always be natural gas, at least not economically exploitable gas, either because the volumes available do not justify their production or because of technologies that will be replacing the source. This last argument has been a determining factor for the fast monetization of oil and gas reserves by many companies in view of the speed with which technology has been finding clean and renewable substitutes in the more advanced countries.

c. Comparison of possible maximum production scenarios with production required by the domestic and foreign market

A comparison of *possible maximum production* trends, described above, with required production to meet domestic consumption and export needs enables us to appreciate that, in any case, it will not be possible to meet long-term requirements (Table 9) and that the contingency will have to be taken into account.

The hypothesis implicit in many studies is that possible maximum production will be adjusted automatically to the production that is required if investments are made in exploration. This is a naive and risky assumption. As indicated previously, the resources may not necessarily be where they are expected to be, even if there are no financial constraints to investments in exploration activities.

It should also be noted that production requirements are constantly growing, and there is no evidence that production might possibly decline at some time. This comes from not taking into consideration the finite nature of gas resources, or their possible substitution in the future for more attractive energy sources, not only from the business perspective but also from the consumer perspective on environmental issues. It is therefore necessary to return to integral energy studies that can provide more realistic forecasting for the sector.

d. Summary: Physical Balance of Scenarios

As observed in Table 10, the prospects are not very promising in the reference scenario. At the end of 2010, remanent reserves will be very low and, to offset production losses between 2010 and 2020, the imports that are required would be equivalent to domestic and foreign requirements. In the resource expansion scenario, the situation would not be as severe, but even then production toward 2020 would not be sufficient to meet requirements.

4. Natural gas supply on the wholesale market

4.1 Domestic sale prices and the shortage of domestic resources

In a system such as Argentina's, where wholesale natural gas trade is governed by market rules, the possible evolution of gas sale prices is of the utmost importance.

First, because the suppliers will not be willing to sell the product at a price that is lower than a profit margin that ensures that their net worth is reasonably compensated.

Second, because the willingness to pay a given price will depend, for the consumers, on the opportunity cost of the substitutes in the different uses.

This game of alternatives is complex and therefore difficult to predict. Nevertheless, an attempt has been made to estimate gas sale prices at the head of the gas pipeline on the basis of the identification of some elements governing the rationale of different producers. For the calculation, the reference that has been used is an estimate of replenishment costs of gas reserves for the Neuquen Basin for the years 1994 to 2015 [Yrigoyen,1994].

The expected evolution of natural gas sale prices at the head of the gas pipeline is explained by a set of complex arguments, involving in some cases the system's flows or stocks, such as yearly production, discoveries, replenishment costs, and remanent reserves, and others such as the rate of return on investments. These data are in turn conditioned by

Table 10. Neuquen Basin: Outlook for 2000-2020

	2000	2010		2020	
		Scenarios			
		Reference	Resource expansion	Reference	Resource expansion
	MMMmc				
Domestic consumption	23.5	33.0		45.0	
Exports	2.3	6.2		6.2	
Country imports (*)	0	0		51.1	42.2
Net production (**)	25.8	39.2		0,1	9.0
Net cumulative production (***)	336.3	670.8		749.8	1018.8
Remanent reserves	353.0	74.6	296.0	0	
Resources to be discovered	60.9	4.8	158.5	0.3	106.5
Ultimate resources	750.2	750.2	1125.3	750.2	1125.3
Reserves/Production (years)	14	2	8	0	

(*) Absence of data from the Neuquen Basin (**) Includes flaring; (***) Since the start-up of production
Source: Own elaboration

relevant parameters such as the level of ultimate resources and the speed of accumulation of discoveries and production that involve the respective business decisions for exploration and production.

In the reference scenario (RS) (Chart 9), the prices will begin to grow rapidly as of the year 2005, as a consequence of the growing scarcity of resources and in order to keep the profit levels required for the companies to continue operating.

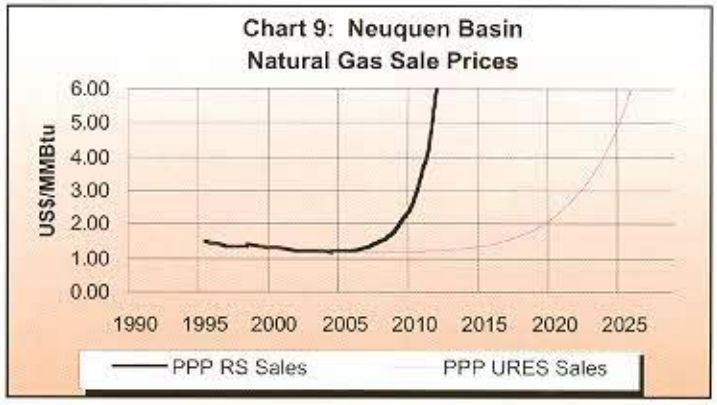
In the ultimate resources expansion scenario (URES) (Chart 9), the prices will grow more moderately as scarcity begins to be felt. This impact occurs later with respect to the reference scenario, because of the higher availability of resources.

Regarding this, the scarcity is reflected by the growing difficulty of discovering reserves. The costs of replenishing reserves will record a growing evolution as the resource becomes scarce, owing to the increasing difficulties in exploring marginal areas at greater depths and in new areas, inland and offshore, with some evidence.

4.2 Buenos Aires city gate prices

If transport costs from the Neuquen Basin (CNQ) to the city of destination are added to the sale prices, the prices at which producers can place natural gas at the city gate will be obtained. In this case, they have been estimated using Buenos Aires as the final destination (Table 11).

In the reference scenario, sale prices would displace basin production, as of 2005, compared to the price of substitutes at city gate (possibly imported gas from Bolivia or LNG and eventually liquid fuels). It can be predicted that scarcity will interrupt supplies to industry and electricity generation and the price effect will lead to lower requirements in certain uses in other sectors. The price of imported gas for 2015 is assumed to be close to that of liquefied natural gas (LNG) coming from Trinidad and Tobago or eventually from Venezuela, which could be between US$3 and US$4/MMBtu (cif) by that date. Nevertheless, domestic transport costs from the site of the regasification plants will be determining the city gate price. In the resource expansion scenario, the impact would be delayed, but it would be felt as of 2020.



5. Conclusions

The analysis that we have done is based on the assumption that natural gas resources will be characterized by limited availability. This prevents us from taking a deliberately unsubstantiated position regarding the reserves that will have to be discovered to meet domestic and foreign requirements. In reality, this expectation of discoveries involves a set of business efforts that are complex to resolve, requiring interaction with energy decision makers. Regarding this, it would be advisable to have more information from the companies on the estimate of resources and expectations of their growth in respect to exploratory activities that they carry out or hope to carry out.

Likewise, we have introduced the analysis of rationale of the suppliers, which as a rule combines traditional business objectives of market penetration with profitability. Nevertheless, the traditional theory that assumes that investors have similar objectives to maximize profits, have identical information, and interpret this information in the same way does not necessarily hold true [Calabrese, 1997]. This means that each investor has a different appreciation of risk. In fact, investors act on the basis of their own vision of reality, in response to corporate objectives that are

characterized by differentiated management of their own business space, not only in how they have distributed risk but in how they have handled conflicting interests arising from competitiveness.

If the arguments we have set forth are confirmed, it can be expected that:

- There will not be enough natural gas resources in the Neuquen Basin to ensure long-term supply of the domestic market. To ensure durability, a policy aimed at actively promoting exploration activities and legal security will have to be implemented to foster investments aimed at expanding resources or securing alternative supplies of imported origin.
- The possibility of using domestic gas to supply external markets does not seem to be assured beyond 2010.
- The impacts of the durability of resources on the sale prices of natural gas at the head of the gas pipelines will become increasingly important and may well contribute to displacing production of the Neuquen Basin before resources are depleted. All of this may occur because the effects on city gate prices may involve mass substitutions of gas from the Neuquen Basin before the end of the present decade.

The conclusions that have been drawn here are not intended to paint an apocalyptic vision of the financial future of the provinces, which are obtaining from the Neuquen Basin one of their principal sources of earnings to finance their budgets, or of the difficulties of supplying gas to the domestic and foreign market. Rather, this paper is attempting to transmit warning signals about what is to be expected if timely and suitable measures are not taken and also to avoid subsequent explanations of failure, such as the "result of human negligence, arrogance, ambition and lack of effective leadership," to use the critical remarks made by Robert A. Laurie, California Energy Commissioner, on the energy crisis in his State.

Table 11. Average prices and costs of the Neuquen Basin (US$/MMbtu)

	2000	Scenarios						
		Reference			Expansion			
		2005	2010	2015	2005	2010	2015	2020
Sale prices CNQ	1.32	1.23	2.87	Infinite	1.19	1.20	1.39	2.27
Transport costs	0.61	0.61		?	0.61			
City gate prices BUE	1.93	1.84	3.48	?	1.80	1.81	2.00	2.88

Source: Own elaboration

References

Beicip Franlab/OLADE/ARPEL (2001) "Gas Market Integration in South America". October.

Calabrese, J. L. (1997) "Memoria de largo plazo revelada por las series de tiempo" Extract drawn from the complete paper. Buenos Aires.

Figueroa de la Vega, F. (1999) "Interconexiones y Perspectivas para el Comercio de Gas Natural en América Latina" OLADE/ECLAC/GTZ. Presented at the III Inter-Parliamentary Conference on Mining and Energy for Latin America (CIME 99). Buenos Aires, June.

Laurie, R. A. (2001) "The California Deregulation Experience: A Model of Managerial Failure" *Energy Magazine.* OLADE. July-September.

Marshall, A. (1890) "Principios de Economía" Fourth edition 1963. Aguilar, Madrid.

Novara, J. J. (1998) "Las reservas de gas natural ante los crecientes requerimientos de los mercados internos y de exportación" *Rev. Estudios.* Fundación Mediterránea. April-June.

Pinto, H. Q. Jr. (2001) "La Crisis del Sector Eléctrico Brasileño: Causas y Medidas Adoptadas". *Rev. Proyecto Energético.* IEA. Buenos Aires, July-August.

Secretariat of Energy and Mining (2001) "Prospectiva 2000" Energy Under Secretariat. Buenos Aires, April.

Thouin, P. (2001) "Prospects of Natural Gas in South America" *Energy Magazine.* OLADE. October-December.

Yrigoyen, M. R (1994) "Natural Gas Resources in Argentina" *Global Gas Resources Workshop.* Vail, Colorado. September.

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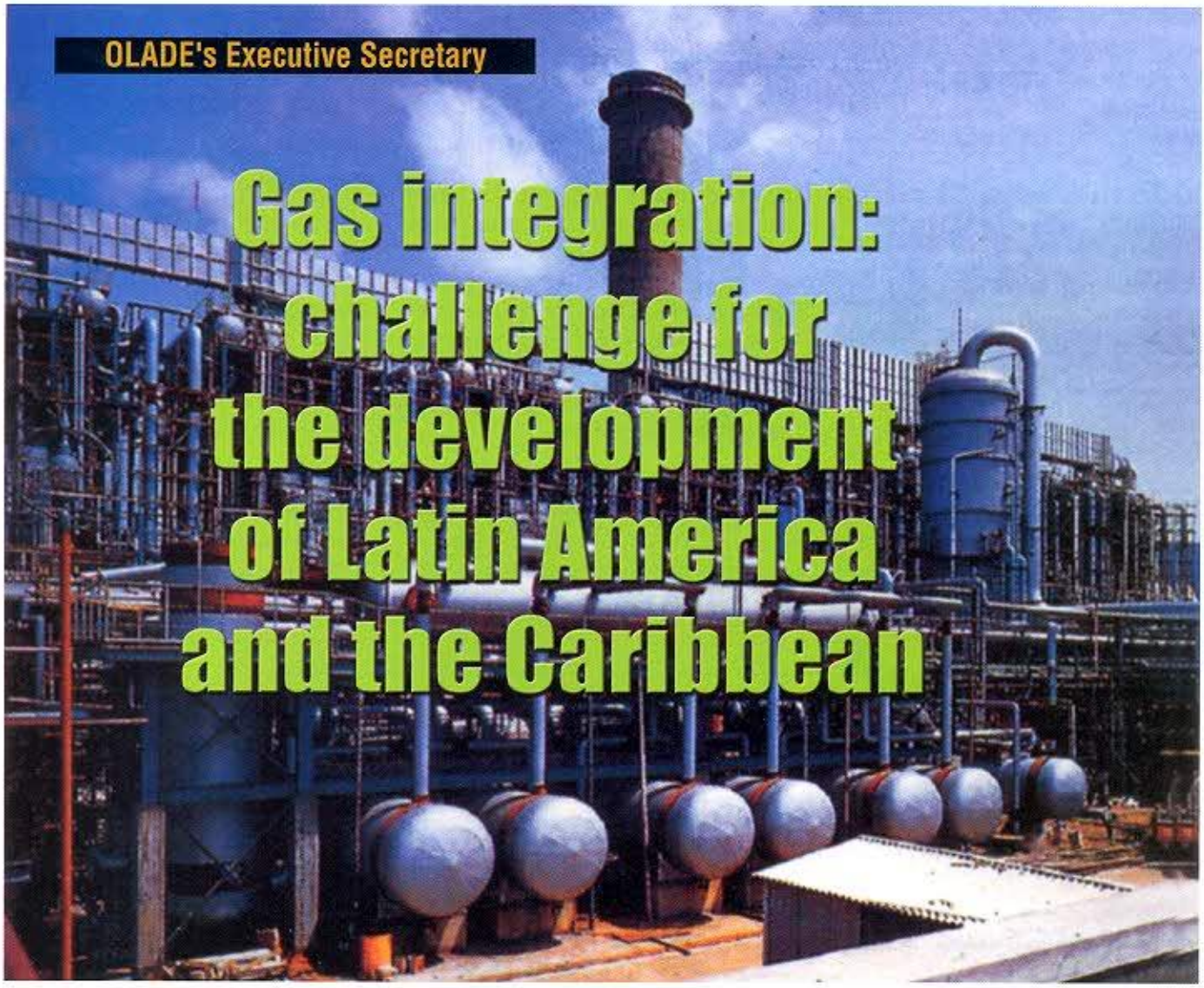

OLADE's Executive Secretary

Gas integration: challenge for the development of Latin America and the Caribbean

"Although it is evident that those countries that have an abundance of gas will be giving impetus to the future of gas trade in Latin America and the Caribbean, one of the main challenges for the region will be to plan its development by expanding consumption markets, especially for electric power generation using gas, and promoting gas exploration and production activities," said OLADE's Executive Secretary, Dr. Julio Herrera, at the presentation he made on January 30, 2002 at the Power Up Latin America Conference held in Miami, Florida, U.S.A.

"As in many other regions of the world, the initial development of electric power generation based on gas will lead to higher consumption of this hydrocarbon for industrial, commercial, and residential use."

"Over the last decade," said Dr. Herrera, "Latin America and the Caribbean has speeded up the gas integration process by installing interconnections from Argentina to Chile, Brazil, and Uruguay, and from Bolivia to Argentina and Brazil. The possibility of integrating Mexico with Central America, as well as Colombia with Panama and Venezuela, has been explored. Trinidad and Tobago has materialized inter-regional LNG trade with the United States and Europe and, at present, with OLADE's coordination, it is working on Caribbean and Central American gas integration involving LNG supplies from Trinidad and Tobago, which might possibly involve Venezuela."

"The complexity of the gas integration process," added OLADE's Exec-

utive Secretary, "as a result of the different characteristics of each one of the countries involved in this process, in terms of gas resource endowment, energy consumption patterns, and gas market maturity, as well as in terms of technical and legal standards, has been confirmed. These characteristics have been determining factors for the greater or lesser progress of gas integration by subregion."

Mercosur is the subregion that has made the most progress in gas integration.

Argentina, which is characterized by a relatively mature domestic market (47% of primary energy consumption), supplies gas to Chile and Uruguay; it will soon be exporting gas to Brazil through the new gas pipeline to Uruguayana. At present, it has 30 trillion cubic feet (TCF) of proven reserves, plus probable reserves. There is uncertainty about the potential of incremental reserves it might have, but new reserves would have to be discovered to meet domestic market needs and to fulfill export commitments beginning in the next decade.

During the first 20 years of the 21st century, Brazil, which has the region's largest economy, will be exerting a major impact on the development of natural gas use and trade in Latin America. There is an ambitious government plan to increase, over the next few years, electric power generation based on gas, for the purpose of reducing dependence on hydropower generation. Considerable growth of gas consumption in all sectors (generation, industry, commerce, residential, and transportation) can be expected. Gas imports from Bolivia will be increasing rapidly, at the same pace that gas consumption infrastructure is built in Brazil.

Paraguay has hydropower production surpluses that are exported to Brazil. There are gas supply projects from Bolivia and Argentina. The possibility of building a gas pipeline between southern Bolivia and Sao Paulo, Brazil, running through Paraguay, is being assessed.

"The complexity of the gas integration process as a result of the different characteristics of each one of the countries involved in this process, in terms of gas resource endowment, energy consumption patterns, and gas market maturity, as well as in terms of technical and legal standards, has been confirmed. These characteristics have been determining factors for the greater or lesser progress of gas integration by subregion"

Uruguay is increasing its gas imports from Argentina as a result of the arrival of this energy source in Montevideo.

Chile has substantially increased its consumption of gas over a short period, and as a result natural gas accounts for an increasingly larger share of its energy matrix. Gas consumption in Chile in 1999 accounted for 11% of primary energy, and considerable growth is expected in all areas.

The Andean Community of Nations has not as yet developed gas interconnections to integrate the subregion. There is interest in promoting this integration, as indicated by analyses and studies conducted by bilateral working groups and in OLADE.

Bolivia, as a member of the Andean Community of Nations, has not been able to develop integration projects with its fellow partners in respect to natural gas, because of geographical and market factors, among others. In contrast, its ties with neighboring Mercosur countries have been viable in this area, because of existing complementation between the availability of its gas reserves and the needs of the consumption markets of Argentina and Brazil.

Bolivia will clearly be the largest supplier of gas to Brazil and possibly to Argentina and Chile. The gas pipeline between Bolivia and Brazil has been operating since 1999, with supply rising to 13 million cubic meters per day. It is expected that, by the end of 2002, Bolivia will be exporting 30 million cubic meters per day to Brazil. The building of another line is being studied, and as a result it is

expected that, within four years, Bolivia will be able to export 90 million cubic meters per day of gas to Brazil.

Colombia has proven, plus probable, gas reserves amounting to 8 trillion cubic feet (TCF), on the basis of which it can meet its domestic market needs. It has undertaken a study to determine the possibility of a binational gas integration with Venezuela.

Ecuador has the La Amistad reservoir, located in the Gulf of Guayaquil. It is a small reservoir whose commercial potential has not as yet been determined. The country has a potential market for LNG from Bolivia or Peru. If the volume for consumption is high enough, an interconnection with Colombia could be justified over the next decade, with the installation of a gas pipeline that would connect Venezuela, Colombia, and Ecuador.

Peru is well-endowed with a non-associated gas reserve of 13.2 TCF in its Camisea field. Development of this reservoir is under way and is aimed at supplying natural gas to thermoelectric plants and meeting the potential demand from the market in Lima.

Venezuela needs to determine its place on the region's gas market. Among its plans, it intends to open up the sector to private investment. This means that Venezuela, which has the seventh largest gas reserves in the world (185 TCF of proven plus probable reserves, including associated gas) will be playing a major role in the region's gas sector and will be expanding its activities considerably over the next decade.

The subregion of Mexico and Central America has not yet been able to develop physical gas interconnections. Over the last few years, three studies have been conducted: "The Regional Mexico-Central American Isthmus Gas Pipeline," as a part of the OLADE-ECLAC-GTZ Project; "Incorporation of Natural Gas in the Energy Matrix of Central America and the Caribbean," conducted by OLADE; and the study on the gas pipeline between Colombia and Panama.

Mexico has recorded fast growth in its gas consumption, and there is concern about domestic supply in the future. Its daily domestic consumption is greater than that of Argentina and Venezuela, and by the year 2000 it amounted to 97 million cubic meters per day, and its proven reserves amount to 30 trillion cubic feet. This has led to the signature of gas integration agreements between Mexico and Central America.

Some countries of the Caribbean, such as Cuba, Haiti, Jamaica, and the Dominican Republic, could be integrated to Trinidad and Tobago, which is an LNG supplier. Trinidad and Tobago is a pioneer in inter-regional LNG transactions, with exports to Boston in the United States and Barcelona in Spain. It is carrying out a project to increase current production from 3 million tons of LNG per year to 10.2 million tons. To do this, it is adding two more gas liquefaction trains for export mainly to Virginia, North Carolina, Louisiana, and Puerto Rico in the United States and to increase exports to Spain and start up exports to the Dominican Republic.

It can be observed that the region of Latin America and the Caribbean have the capacity to promote its development with the expansion and consolidation of its natural gas markets.

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NATIONAL ENERGY INFORMATION SYSTEMS: AN INSTRUMENT FOR DEVELOPMENT

The activities for the National Energy Information Systems (SIEN) project, which is being supported by technical and financial contributions from the European Commission (EC) and will be carried out by OLADE's Permanent Secretariat and its Member States, started with a working meeting held on February 4, 2002 in Quito, which was attended by officers of the EC and OLADE.

As part of its technical contribution, the EC will be supporting the project by providing a group of European experts, for which purpose it has selected the consortium of Spanish companies, Basque Energy Entity (Ente Vasco de Energía—EVE) and IBERESE, and the German company DECON.

As a result of an evaluation by OLADE and its 26 member countries on the situation of activities for bringing together, processing, and disseminating energy statistics for the region, it was determined that there was a need to implement a project aimed at developing, in each country, a National Energy Information System (SIEN) that would provide timely, complete and consistent information to meet the requirements of Energy Ministries, energy and economic sector institutions, OLADE, and the international energy community.

On the basis of this assessment, it was also concluded that, in view of energy sector reforms and administrative changes in public institutions involved in the energy sector, new requirements for information have emerged and the technical difficulties to obtain information with the characteristics needed for studies and research undertaken by different institutions participating in the development of the

region's energy sector have intensified in the countries. As a rule, it was possible to determine that the new requirements and common sources of difficulties in the majority of the countries stemmed from the decentralization of energy resource management, the privatization of public enterprises, the opening up of the sector to new players, downsizing in statistical offices, staff turnover, the lack of training, and the absence of technical tools and suitable methodologies to administer information.

A subsequent analysis determined that the countries had very similar requirements and expectations in respect to an automated information system to directly manage information about the entire sector in an integral fashion.

The needs that were identified and the successful experience of OLADE and its Member States in developing similar projects with the support of the European Commission, such as the Energy-Economic Information System (SIEE), contributed to the formulation of this project, aimed at developing national energy information systems in each member country of OLADE that requests it.

OBJECTIVES

The project has established five general objectives, which will be achieved when a national energy information system has been installed or when solutions have been found to problems that have been identified to ensure their development, implementation, and maintenance:

- Build up energy sector analysis and planning capacity of the member countries of OLADE, providing them with suitable tools for compiling, storing, administering, and evaluating energy sector information.
- Develop in the member countries of OLADE National Energy Information Systems (SIEN), providing energy statistics required for energy sector analysis, monitoring, follow-up, evaluation and planning, as well as economic information, expansion projects and management indicators, environmental impacts and technological development.
- Establish methodologies for the ongoing maintenance of timely and consistent energy sector information, based on information available in the institutions of the sector or other sectors.
- Provide the member countries with suitable instruments to establish energy sector outlooks, using tools that facilitate the presentation of situations or alternative development scenarios.
- Provide the SIEN with modules for the evaluation of energy-economic

Enrique Monasterio, Txetxu S. De Ormijana, and José Alberto Martínez, representatives from European Technical Assistance for the SIEN Project, held a working meeting with OLADE's Executive Secretary, Dr. Julio Herrera, and with the Director of Energy Information of the Organization, Gabriel Hernández, on February 5, 2002, to start up SIEN activities. A consortium comprised of the Spanish companies EVE and IBERESE and the German company DECON was selected by the European Commission for this technical contribution

indicators in order to identify problems and find timely solutions.

ACTIVITIES

Project implementation until it has concluded is expected to take three years, with a preliminary version of the SIEE expected to be ready by the middle of the second year. The activities that have been planned have been broken down into seven major actions.

- *Coordination*

Through this activity, a logical ordering of project activities, follow-up and evaluation of progress and results, and elaboration of reports is ensured. OLADE's Permanent Secretariat and European Technical Assistance (ATE), which constitute the Management Unit (MU), shall participate in its implementation.

- *Information assessment*

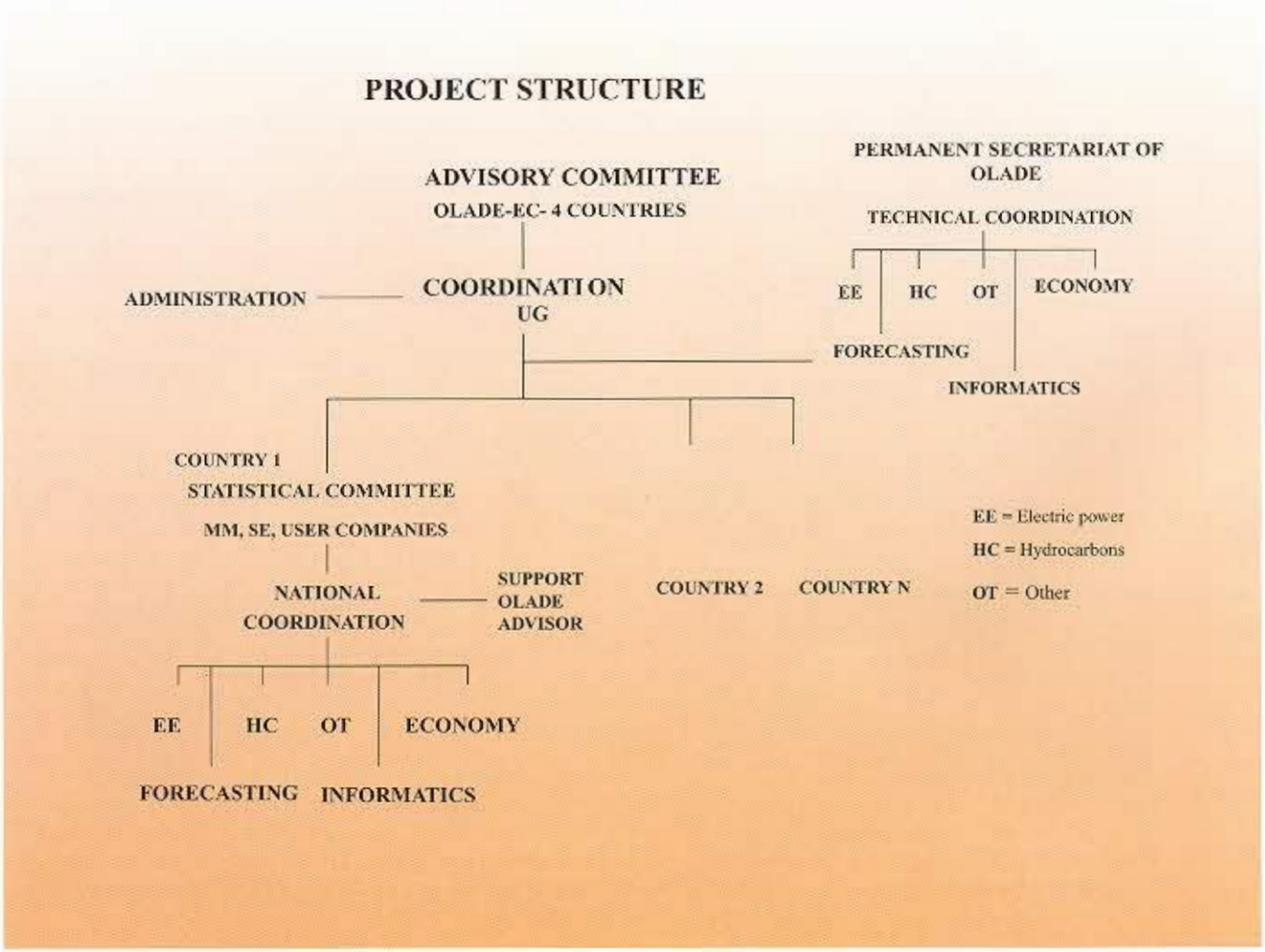
Prior to designing and developing the SIEN, the possible sources of information, characteristics, status, and availability of data or studies have to be identified in each country, as well as the characteristics and status of existing information systems or tools to handle energy statistics that will be integrated either logically or physically into the SIEN.

- *SIEN objectives and strategies*

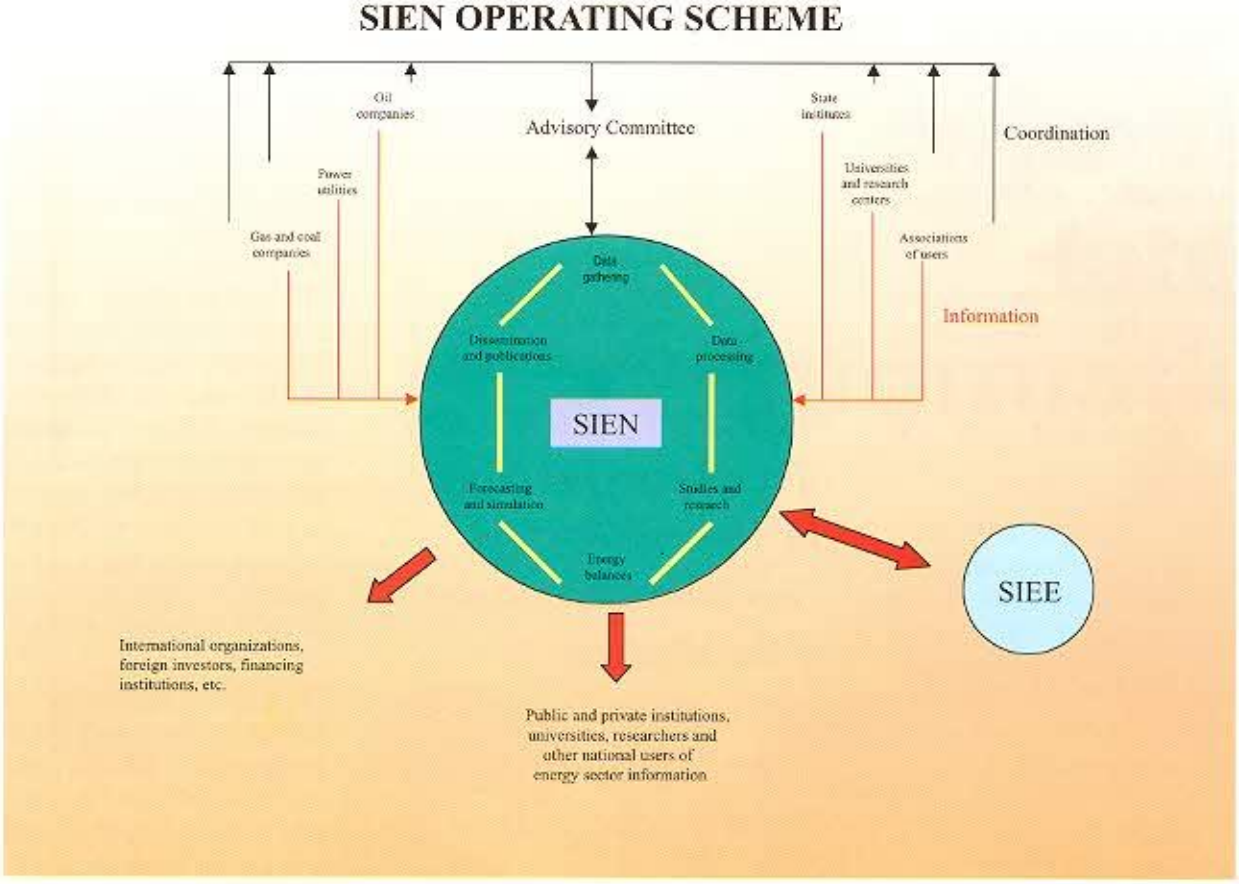
On the basis of the analysis of the assessment of the information in each country, the planning of activities will be revised for each one of them and specific objectives and strategies for the development of the SIEN will be established.

- *Definition of information flow mechanisms*

Once the specific features in terms of information that is available and required, as well as existing information systems, methodologies, and possibilities of commitment of the institutions, have been identified, mechanisms whereby information will



SIEN OPERATING SCHEME



be supplied to the SIEN will be established.

- *SIEN design*

This activity consists of providing a detailed definition of the SIEN's characteristics, in line with the requirements defined by the countries, to establish functional specifications, architecture, information characteristics, calculation processes, data base structure, update procedures, consultation, and administration of the SIEN.

- *Development, installation, and start-up*

On the basis of the design documents, the data base will be built and the information configuration, input, processing, and query programs will be developed. Afterwards, the SIEN will be installed in the Member States of OLADE; data will be entered, operating tests will be conducted, and the system fine-tuned.

- *Technical advisory services and assistance to the countries*

Project consultants and country specialists will be providing advisory services to the working groups of each country to guarantee the development of the SIEN with the expected features.

As part of the horizontal cooperation, training, and exchange of experiences process, four regional workshops will be organized with the participation of all the countries and consultants involved in the project; national workshops will also be organized for the dissemination of the SIEN among the sector's institutions.

ORGANIZATION

The project will be organized on the basis of a scheme proposed for its development. This scheme consists of the shared implementation of all activities, with the direct participation of each country, providing an overview of the status and characteristics of the energy sector's information, clearly defining its information requirements, operating and maintaining the SIEN.

The advisory services of OLADE's Permanent Secretariat will involve developing methodological proposals and procedure guidelines for all the activities that the countries should carry out, the assessment of the information obtained in each country,

the design and development of the SIEN, whereas European technical assistance will consist of contributing experience and advisory services for all activities.

The project's general coordination will be in the hands of the Management Unit, which will be comprised of a Latin American Coordinator and a European Coordinator.

The project's implementation will be in the hands of the Department of Energy Information of OLADE's Permanent Secretariat, from which a Latin American Coordinator will be designated.

An Advisory Committee chaired by OLADE and comprised of representatives from four of the Organization's Member States will be set up. The Committee will benefit from the participation of the European Technical Assistance Coordinator, who will be consulted whenever necessary to obtain about his/her opinions regarding important decisions about the orientation of the project's development. OLADE shall designate the countries that will be members of the Advisory Committee, and will ensure that there is a representative from each one of the following subregions: a) Central America-Mexico, b) the Caribbean, c) the Andean Group, and d) Mercosur, who will be contributing to the project's development by providing their experience in specific areas and knowledge about the situation of the countries of their respective subregion.

In each country, the Ministry or Secretariat of Energy shall designate a National SIEN Coordinator, who will be in charge of local project activities, set up and coordinate the Energy Statistics Committee, be the official contact between OLADE and the country for the organization of the SIEN and decision-making, and be responsible for organizing, and ensuring a follow-up of, SIEN activities in his/her country.

Inside the Statistics Committee of each country, a structure and organization corresponding to the project's activities and areas will be established, ensuring that all energy subsectors are represented.

"The project will be organized on the basis of a scheme proposed for its development. This scheme consists of the shared implementation of all activities, with the direct participation of each country, providing an overview of the status and characteristics of the energy sector's information, clearly defining its information requirements, operating and maintaining the SIEN"

OLADE's Permanent Secretariat will set up a working team consisting of staff and consultants, who are specialists in each one of the areas that will be considered for the development of the SIEN; they will be in permanent contact with their counterparts in the countries and will be in charge of elaborating proposals for methodologies for SIEN information management, design, and development.

Although the project's specific objective is to develop and install the SIEN, the final objective being proposed by OLADE and its Member States is broader. Rather than having the SIEN become static data banks, they should become a dynamic, ongoing process that is constantly being fine-tuned, through which the best information possible is elaborated to support decision-making and energy planning.

The above-mentioned condition can be achieved to the extent that the SIEN are really useful for the governments, sector authorities, investors, private enterprise, researchers and planners, who are the main targets of this effort and who, if they are to benefit from it, will have pledge their support for this work and participate in it by supporting the working groups that are in charge in each country, promoting the establishment or consolidation of mechanisms that guarantee the supply of information for the SIEN and providing feedback with suggestions and results obtained from the use of the information.

In turn, OLADE, specifically the Energy-Economic Information System (SIEE), will benefit highly from the results obtained from the project, as it will enable the Organization to enhance the quality of the information it disseminates through the SIEE, which is the data base that is used by OLADE's Permanent Secretariat to conduct its studies and research.

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BOLIVIA – BRAZIL

Building a new gas pipeline

The President of Petróleo Brasileiro S.A. (PETROBRAS), Francisco Gros, announced that Brazil's state oil company will be financing the construction of a new gas pipeline in Bolivia to increase the Bolivia's capacity to export natural gas to Brazil and other nations.

The gas pipeline will require an investment amounting to US$400 million and will be stretching over 430 kilometers to connect the Bolivian towns of Yacuiba and Rio Grande. It is expected that this project, which will be carrying 23 million cubic meters of gas per day, will be finished in 2003.

BOLIVIA – PERU

Alliance to export gas

The possibility of forging a strategic alliance to export jointly the gas reserves of the countries to external markets was proposed by the President of Peru, Alejandro Toledo, to the President of Bolivia, Jorge Quiroga. "It's not necessary to build separate liquefaction plants... The time has come to give added value to our production," said the Peruvian Head of State, while emphasizing the advisability of having both countries make efforts to industrialize their gas so as not to sell it as a crude product.

BRAZIL

Building a hydropower station

The Grupo Rede of Brazil and the Empresa Electricidade of Portugal will be building a hydropower station in the Amazon state of Tocantis, for an estimated investment of US$370 million.

The new plant, called Peixe Angelical, will have an installed capacity of 452 megawatts. Operation is expected to start up in 2005.

Bidding processes for 11 hydropower projects

In July 2002, the National Electric Power Agency of Brazil, ANEEL, will start up bidding processes for 11 hydropower projects, including concessions to build and operate for a 35-year period.

The investments needed for these projects amount to US$1.37 billion, and they are expected to add a generation capacity of 2,200 MW.

COSTA RICA

Building hydropower projects

The Costa Rican Electricity Institute (ICE) is planning to build three new hydropower projects over the next four years. The projects, which are essential for the development of the sector in Costa Rica, are as follows: Cariblanco, with a capacity of 70 MW; Pirris, 130 MW; and Peñas Blancas, 37 MW:

Building the Cariblanco and Pirris projects will require an estimated investment of US$34 million for equipment and machinery. The ICE will shortly be announcing an international bidding process to carry out the three hydropower projects.

ECUADOR

Investments for the development of a mega oil field

Ecuador's oil reserves increased by 13% as a result of the successful drilling of the Ishpingo-4 well, confirming the presence of a large structural train or mega-field.

To develop this structure, an investment amounting to US$2.5 billion will be required to drill a total of 142 vertical wells and 57 horizontal wells. The Special Bidding Committee of the state oil company Petroecuador will be announcing a bidding process aimed at finding a strategic partner with which to join efforts to operate this mega-field.

GUATEMALA – MEXICO

Plan for electric power interconnection

Authorities from Mexico and Guatemala agreed upon a plan to interconnect their electric power systems by building a 80-km, 500-kV line that would connect the substation of Tapachula in Mexico and Los Brillantes in Guatemala, at an estimated cost of US$30 million. The project is part of the Puebla-Panama energy integration initiative, in the framework of the Electric Power Interconnection System for Central America (SIEPAC).

PARAGUAY – URUGUAY

Sale of electrical energy

The Minister of Public Works and Communications of Paraguay, Mr. Alcides Jiménez, announced the possibility of drawing up an agreement with Uruguay to sell electric power surpluses generated by the Itaipú hydropower project. He indicated that the government of the Republic of Uruguay has expressed its interest in drawing up this contract. Paraguay has the option of selling energy generated not only in Itaipú but also in Yacyretá; in both cases, it will have to secure the acceptance of the partners of these projects, Brazil and Argentina, respectively.

Opinion and debate

La Paz, March 5, 2002

Dr. Julio Herrera
Executive Secretary of OLADE
Quito, Ecuador

Dr. Herrera:

I have read with much interest the October-December 2001 quarterly edition of OLADE's Energy Magazine, especially the speech delivered by the President of my country, Bolivia, to the last General Assembly of the United Nations.

I would like to highlight the well justified optimism of President Jorge Quiroga's speech, indicating that the projects that are being studied and negotiated to promote Bolivian gas will be transforming our country's production structure, multiplying growth rates, and consolidating our role as the hub of the continent, enhancing our presence in the Pacific Rim.

I am an engineer, starting my professional career in the metal-mechanical industry, and the statement of President Quiroga has inspired much confidence that the projects I am starting to work on will be successful, thanks to the current drive of Bolivia's economy.

Thank you for disseminating these messages in your journal. I know it is widely read in many South American countries, where Bolivia's new possibilities can be disseminated.

I would like to say that, as a reader of the Energy Magazine, which periodically reaches the institution where a friend and fellow university graduate of mine works, I hope that upcoming editions preferentially include topics focusing on the possibility of developing wind energy in the Americas.

Cordially,

Antonio Galarza-Rosas
La Paz, Bolivia

APEC/EUROSTAT/IEA-OECD/OLADE/OPEC/UN

The Joint Oil-Data Transparency Initiative

A Concrete Manifestation of the Producer-Consumer Dialogue

The late 1990s saw extremely volatile oil markets, which some observers ascribed partly to inadequate and opaque statistics. The criticism, whether justified or not, has inspired a new look at the availability and reliability of oil data.

Responding to the call from the Seventh International Energy Forum, six major international organisations agreed in June 2001 to launch a six-month data reporting exercise. The Joint Oil-Data Exercise – under the auspices of APEC, Eurostat, IEA/OECD, OLADE, OPEC and the UN – aimed to assess the quantity, quality and timeliness of basic monthly oil data.

A very simple questionnaire was circulated to a large number of countries, asking for month-old and two-month-old information (M-1 and M-2).

Results were reviewed at a meeting in Riyadh in November 2001. Sponsors of the exercise discussed issues including methodologies and reporting units used, the availability of M-1 data, confidentiality and stocks. Some 55 countries completed the questionnaire, although data quality varied widely by country. Respondents represented about 70 % of world oil production and 83 % of world demand.

Participants decided at Riyadh to extend the exercise till September 2002 and to report results at the Eighth International Energy Forum, to be held at Osaka the same month. Osaka will serve as a prestigious platform for presenting the initiative's results. If serious oil-data problems remain, the high-level participants at Osaka could appeal for further efforts to resolve them.

In May 2002, Mexico is scheduled to host a third international meeting on the initiative. Representatives of international organisations, countries and industry will consider progress to date on the initiative. They will also consider the key question of the dissemination of data to oil-market players: how much information? from what sources? and how should it be communicated?

The six sponsoring organisations call on all their member countries and the oil industry to participate actively in the exercise. Full transparency will come only when all countries are involved and when all their data are timely, complete and reliable.

SIXTH MASTER'S DEGREE PROGRAM IN ENERGY AND ENVIRONMENT STARTS UP AT OLADE'S HEADQUARTERS

On March 25, 2002, the activities of the Sixth Master's Degree Program in Energy and Environment, which is being conducted jointly by OLADE and University of Calgary, Canada, with support from the Canadian International Development Agency (CIDA), started up. On this occasion, there are 15 professionals, from Colombia, Ecuador, Honduras, Peru, Venezuela, Canada, Japan, and the United States, registered for the Program, which is being delivered at OLADE Permanent Secretariat headquarters in Quito, Ecuador.

The Master's Degree Program in Energy and Environment is being offered since 1996. Each program requires full-time attendance for 14 months and includes courses and seminars offered by professors from the University of Calgary and reputable Latin American universities and by OLADE consultants and experts aimed at providing specialized training to professionals who will be able to lead working teams of energy-environmental projects.

After obtaining the respective academic credits and participating in field tours in both Ecuador and other countries of Latin America and the Caribbean, the students have to complete two research projects, an individual project and a group one, as a prerequisite for earning the master of science degree (M.Sc.) in energy and the environment from the University of Calgary.

The Fifth Program, which started in 2001, will be ending its cycle of activities on June 29, 2002.

Students of the Sixth Master's Degree Program in Energy and the Environment, who started their specialization studies on March 25, 2002, at OLADE headquarters

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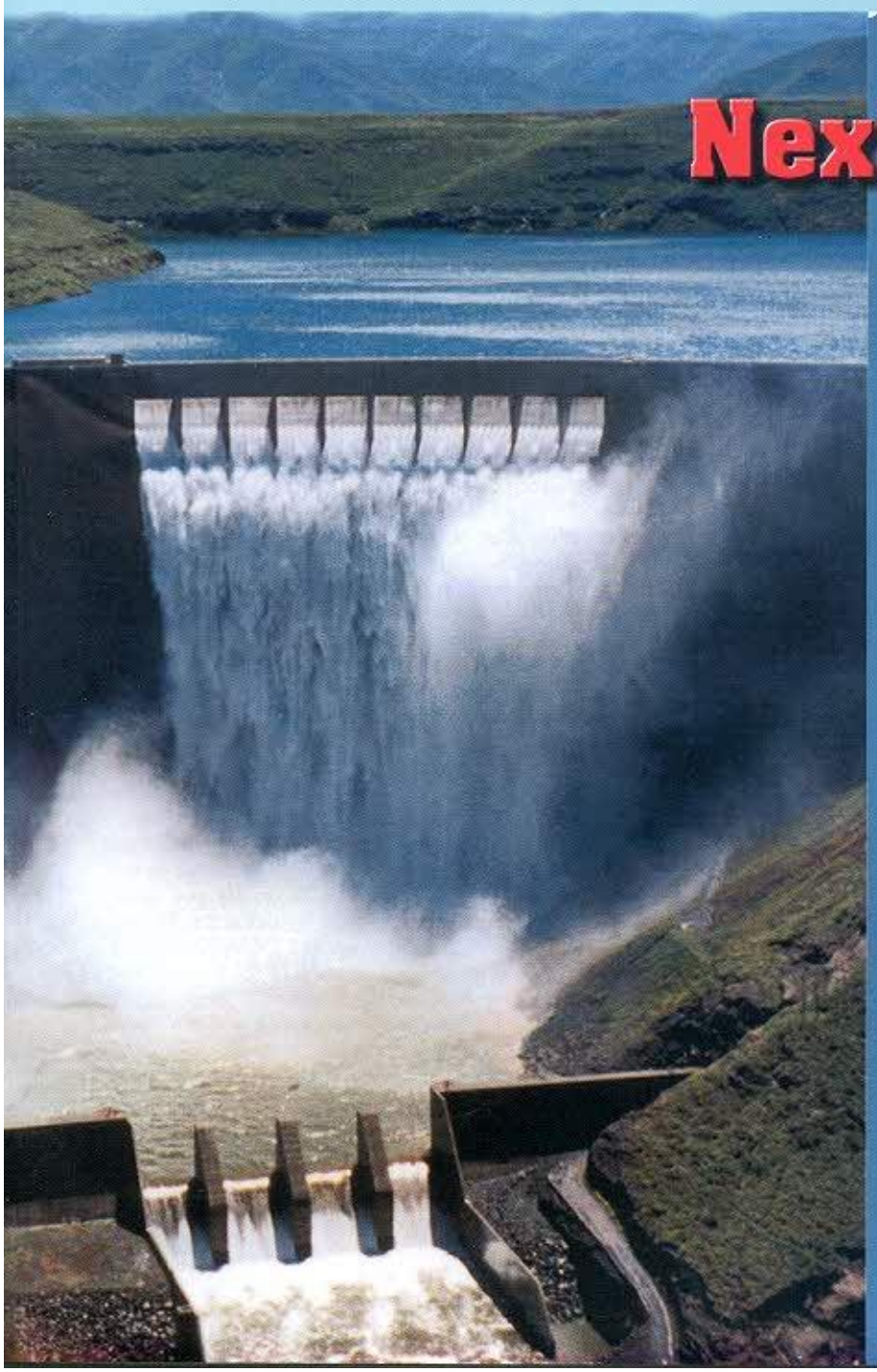

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