

Energy. Magazine

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**Energy Efficiency in OLADE-GTZ
Cooperation**

**OLADE-Quebec Energy
Cooperation Program for
1998-2000**

**Energy and Sustainable
Development in Latin America
and the Caribbean**

Energy News

Energy Statistics

Calendar of Events

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Latin American Energy Organization

Ave. Antonio José de Sucre N58-63 & Fernández Salvador, OLADE Bldg., San Carlos Sector • P.O. Box 17-11-6413
Quito, Ecuador • Phones: (593-2) 597-995/598-122
Fax: (593-2) 539-684 • E-mail: oladel@olade.org.ec
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Editorial

Cooperation between OLADE and the German Technical Cooperation Agency (GTZ) started in early 1993. At that time, it focused principally on the rational use of energy and the energy sector's contribution to sustainable development.

Among its first efforts, the most noteworthy was a two-year program carried out in six countries of the region selected for their different characteristics to study their resource availability and energy sector structure, on the basis of which projects to enhance energy development were identified. Development of these projects is currently being reviewed by the respective governments.

Likewise, in the framework of OLADE's cooperation with GTZ, the present issue of the *Energy Magazine* is including a summary of the six years of implementation of the Energy and Sustainable Development Project, which also includes the participation of the Economic Commission for Latin America and the Caribbean (ECLAC).

The sustainability parameters and indicators defined by this project have been applied in case studies for Bolivia, Brazil, Colombia, Chile, and El Salvador and have yielded sound results. The first two case studies, conducted in 1995, are currently being assessed again, in order to submit an updated assessment to the

various players involved in the energy development of these countries and, at the same time, to check the effectiveness of the project itself.

Among the case studies, there is also El Salvador, which has decisively taken up the challenge of modernization, achieving highly satisfactory results that have been recognized worldwide. The article focusing on this process included in the present edition underscores the principal aspects of the efforts made by the Salvadoran Government.

Finally, we have dedicated a few pages of the present issue to highlight the preliminary results stemming from the initiative aimed at promoting hydropower projects that OLADE started with the Government of Quebec last year. The results achieved to date, only a few months after starting up the program, promise that it will be exerting a major impact for the benefit of the region.

This program, while furthering an activity that is important to OLADE, namely, promoting business in the energy sector, is finding new ways to tap a resource that is highly abundant in the region and of which only 17% has been tapped.

Luiz A. M. da Fonseca
Executive Secretary

Energy efficiency in OLADE-GTZ cooperation

It is increasingly evident that the countries of Latin America and the Caribbean must tap their own energy resources and resort to a more rational use of oil and electricity. To do this, it is expected that the government, production sectors, and society as a whole will have to perform a leading economic and ecological role.

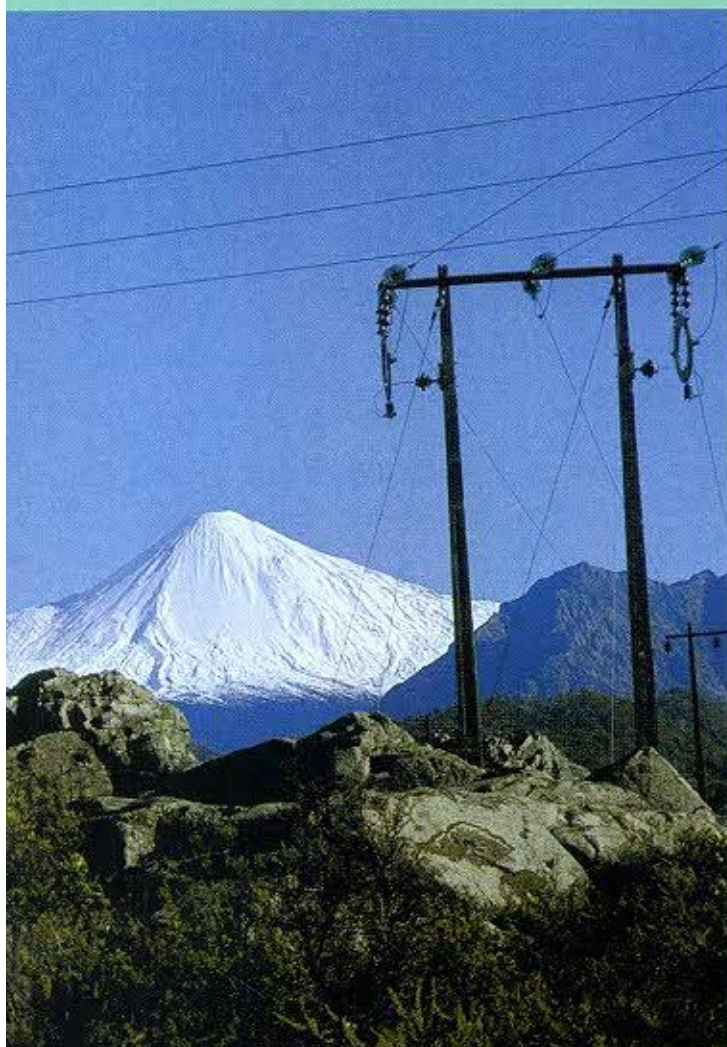
On the basis of this outlook, the Latin America Energy Organization (OLADE) and the German Technical Cooperation Agency (Deutsche Gesellschaft Technische Zusammenarbeit—GTZ) decided to undertake cooperation efforts to support a group of countries from the region in their actions to consolidate the more efficient use of energy.

The objective is to contribute to the establishment or consolidation of the necessary environment for the full development of a market for energy efficiency services and

technology. Indeed, the two institutions recognize that energy efficiency is a valid alternative for improving the competitiveness of a country in an international context.

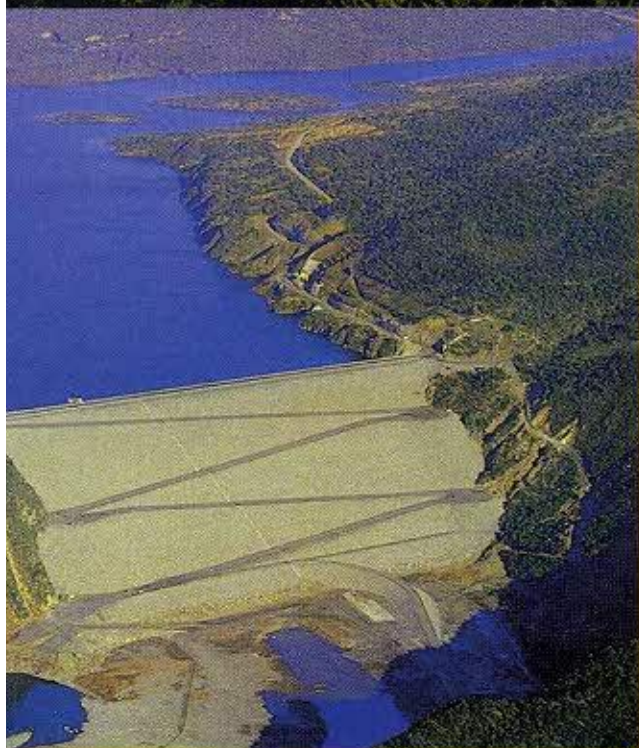
In addition, the progressive deterioration of the environment is leading governments to take actions





aimed at reducing the impacts stemming from human activities and mitigating damages that have already taken place.

Considering that the rational use of energy is offering a potential resource that has been virtually untapped in many countries of Latin America and the Caribbean, the OLADE and GTZ project intends to improve efficiency in energy production and use in the different stages of the energy chain and to reduce the resulting environmental impact.



Both institutions wish to ensure that the sector's situation in each selected country is fully surveyed and that, at the same time, a comprehensive plan of action including the formulation of specific projects be established. Likewise, they envisage support to the entities involved in securing international cooperation from Germany and other sources.

Toward energy efficiency

The notion of efficiency consists of achieving a given result or product at the lowest cost possible.

Indeed, secondary energy (that is, energy apt for end-use) is transformed into energy services, such as lighting, heating or refrigeration, and force, which are aimed at directly meeting human needs or producing other goods for the benefit of society.

Therefore, energy is required by energy services for direct end-use or as an input for other production processes.

Likewise, a given service can be supplied with a lower amount of energy depending on the technology and production process used. And the cost of energy services (investment, raw materials, and maintenance) can be reduced by enhancing efficiency in the production and use of these services.

For example, in Peru, in response to the shortage of installed capacity to meet the demand for electricity, a demand-side management program was implemented in the residential sector of Lima; this program has managed to reduce the system's demand by 70 MW. According to the project, the success in applying energy efficiency measures does not reside exclusively in the technical aspect but also requires the introduction of suitable economic, policy, and legal instruments.

Barriers must be overcome

In order to achieve considerable increases in energy efficiency, various barriers must be overcome. The technical experts of OLADE and GTZ are asking: How much increase in energy efficiency will lead to benefits, expansion of consumption possibilities or economic and/or environmental sustainability

The barriers are apparent in the sectors that are part of the sector service market, among which there are consumers, energy companies, manufacturers and distributors of equipment, financial institutions, advisory structures, civil society organizations, and government institutions.

In principle, these obstacles or barriers are social in nature due to the lack of awareness, information, and know-how of the players involved. They are also organizational due to deficiencies in coordination and management of manufacturing and service companies, energy supply firms, advisory structures, etc. There are financing barriers as a result of the high interest rates required for investments by the consumer sector and scarce financing opportunities, among others.

Therefore, the key factors for the success of these efforts is the appropriate inter-relation between all the following market players: investors and credit suppliers, equipment manufacturers and dealers, political and standard-setting institutions, civil society organizations, and the target group. Meanwhile, the transformation of markets responds to a slow process that can be achieved by means of broad and effective communication.

For OLADE and GTZ, the active promotion of the exchange of information and national and international experiences performs a major role.

In their opinion, the rise of energy efficiency projects, after the oil shocks, started generating a series of applications to evaluate projects of this kind, in general based on the analysis of incremental costs of alternatives.



In the eighties, methodologies based on end-use studies were developed and widely used for the assessment of electric power projects. These, as well as other, methodologies were used to build software aimed at conducting technical and economic analyses of the above-mentioned projects.

Industrial sector: one of the beneficiaries

The industrial sector is one of the beneficiaries of projects like this one. The benefits are boundless. They usually involve a percentage reduction of total costs, an increase in the company's operating output, that is, sales/assets and earnings/sales, an increase in the return on assets (profits/assets), and financing in terms of interest rates and payment periods.

At the same time, it is evident that a large amount of new business is generated: income; rise in productivity stemming from the training of human resources involved in the project; improvement of the ties with the project's target group; and consolidation of the corporate image.

The benefits reach even further than that: variation in the level of employment, impact on the balance of payments and income distribution, net social benefits, and variation of gross domestic product (GDP).

Six countries being considered

The cooperation is aimed at six countries: Bolivia, Colombia, Guyana, Guatemala, Paraguay, and Venezuela, which have shown interest, need technical and economic assistance, and are likely to be successful in these efforts.

The proposal of the institutions focuses on a comprehensive plan involving actions aimed at the general environment to develop rational use of energy schemes in the country. It also includes political, legal, education, dissemination, equipment and services market, technical assistance, financing, entertainment, and other aspects.

Specifically, it takes into account areas such as the definition of standards, compliance monitoring, equipment and services, energy supply through companies and industrial, commercial, and/or residential consumption sectors.

The case of Bolivia

Bolivia has profoundly restructured its socioeconomic system. The main elements of this process can be found in the Economic and Social Development Plan. The Plan is aimed at implementing changes in the energy sector that are by no means less important and which are aimed at establishing the conditions for competitive markets in different energy subsectors and the broad participation of the private sector.

In energy production, natural gas accounts for 69% and crude oil 17%. They are followed by biomass (9%) and hydroenergy (5%). As for sector consumption, residential-public-commercial accounts for 39%, transportation for 36%, and industry for 24%. Firewood accounts for 40% of the consumption of the residential sector, leading to severe environmental impacts and low levels of efficiency.

In this country, OLADE and GTZ identified the following projects, which will facilitate a change in rational use of energy patterns: demand-side management and institutional capacity building, for

...the industrial sector is benefiting from the decline in total costs, improvements in the operating performance of companies, and better financing conditions in terms of interest rates and terms of payment



The proposal includes political, legal, and educational aspects, equipment and services market, technical assistance, financing, entertainment, and others

which purpose an energy efficiency law and norms must be passed. At the same time, an institutional entity has to be set up to coordinate activities with the private sector.

Professionals, technical experts, the public and private sector will have to be trained and an information system involving surveys, consolidation, statistics, and its own training will have to be implemented.

For the institutions, wider promotion of this subject among private enterprises by means of the initiative "Support to the National Energy Secretariat for a Basic Energy Analysis in the Mining-Metallurgy Sector" is important.

Colombia: attractive prospects

The socioeconomic policy implemented in Colombia to promote market forces, competition, and deregulation has implied major changes in the energy sector. The State has withdrawn from sector production activities, and the sector has been restructured to create competitive markets based on real prices.

Colombia has various factors in its favor, one of which is its self-sufficiency in terms of resources.

Experience in energy efficiency dates back to early 1981 with energy efficiency programs in industry and demand-side management. At present, a very ambitious, multi-sectoral plan is being implemented: PLANURE. In addition to industry, energy efficiency activities have been identified in transportation and the public sector as a whole, as well as cogeneration in the sugar industry in Valle del Cauca.

Open-air burning of farm waste will be forbidden as of the year 2005. This will make its recovery for electric power production more economically attractive, especially in the sugar mills.

It is recommended that the Ministry of the Environment and interested sectors (Ministry of Mines and Energy, chambers of industry, power utilities, suppliers of equipment, etc.) focus on the feasibility and operation of electric power generation plants that use farm waste as feedstock. Nevertheless, the principal barrier for the program is the lack of basic information for these projects.

Guatemala: principal energy sources are oil and firewood

In Guatemala there is a distortion between the energy resource potential and consumption. The country is heavily dependent on oil and firewood, whose consumption accounts for a dramatically high share of 60%.

The State still performs an important role in production and prices do not reflect real production costs, leading to financial problems in various companies.

The experience in energy efficiency dates back to the early eighties, albeit with evident distortion and lack of coordination in the activities.

The principal barriers to energy efficiency are: subsidized prices, limited financial, technological, and human resources for research and development, lack of information and coordination in the public sector and with organizations of civil society.

The country needs to tackle the problem and define a comprehensive strategy to promote the objective that was proposed and address the issue of energy and the environment. It also has to consolidate existing measures and build up institutional capacity in this area.

Guyana: institutional dispersion

In contrast to the other countries, Guyana has developed its energy sector only slightly. Its principal resources are oil, bagasse, and firewood (for the production of thermal energy and/or electricity).

Energy policy is aimed at substituting oil for other sources that are not imported. After economic and energy policy reforms, there is an apparent concern to foster the participation of the private sector, but there is no specific mention of energy efficiency activities.

To deal with issues of energy and the environment, however, the institutions are widely scattered. Experience is limited to a program aimed at reducing the consumption of oil products, a program, which has exerted little impact. There is also a program for energy audits of industry implemented in coop-

eration with the Caribbean Development Bank.

The principal barriers to energy efficiency are lack of information and reliable data, staff training, institutional constraints, and limited human and financial resources.

In any case, the energy policy of Guyana is aimed at ensuring the broader use of renewable energy sources for electric power generation. It is suggested that the National Energy Authority of Guyana and the Association of Rice Growers and for the Development of Rice Exports of Guyana request

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Tel.: +34 - 94 435 56 00
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For further information, please contact:
OLADE

Phones: (593-2) 598-122/597-995

Fax: (593-2) 539-684

E-mail: olade1@olade.org.ec

P.O. Box 17-11-6413

Quito, Ecuador

from GTZ-GATE the documentation that is available on the use of renewable energy technologies for rice dryers (using the husk from the rice). Guyana could use this husk as feedstock for electric power generation.

Paraguay: widespread consumption of firewood

Paraguay suffers from the lack of a clear energy policy in which the strategy for promoting energy efficiency can be inserted. The institutional framework is characterized by the dispersion of functions. Paraguay is a country where the widespread use of firewood has exerted severe environmental impacts and led to low levels of efficiency.

The experience in energy efficiency is limited exclusively to assessment studies without the application of any concrete measures.

The programs for implementation have not gone beyond the study stage. The principal barriers to energy efficiency are: lack of information and trained staff and no coordination with organizations of civil society.

Paraguay needs to set up a national coordination group to identify initiatives that are currently being carried out, to draft a national action program, to establish priorities and requirements for assistance, and


to request international technical cooperation, if necessary. The Synergy Programme of the European Commission would be able to provide suitable support.

The case of Venezuela

The joint OLADE-GTZ mission had the opportunity to review the "Base Document for a National Energy Policy" and the decision of Venezuela's energy authorities to incorporate an indicative energy efficiency plan as part of the guidelines of this Base Document.



The mission and the officials of the Energy Planning Department of the Ministry of Energy and Mines recognized "Preparation and Implementation of a National Energy Efficiency Plan" as one of the possible activities of interest for the major players of Venezuela.

According to the current policy of having civil society participate in decision making, it is recommended that a working group on energy efficiency in charge of designing and planning these activities be established and that it be coordinated by the Ministry.

International support has been secured from the Synergy Programme of the European Commission for the conceptual framework of the activity that was identified. 

OLADE-QUEBEC ENERGY COOPERATION PROGRAM FOR 1998-2000





In June 1997, the Latin American Energy Organization (OLADE) and the Government of Quebec held in Montreal the International Symposium on Hydropower Project Development and Financing, at which time representatives from government agencies and municipal and provincial institutions, as well as entrepreneurs from Quebec and Latin America and the Caribbean, made business contacts and drew up important agreements.

The success obtained at this event impelled both OLADE and the Government of Quebec to take steps aimed at expanding and consolidating this initiative and to enter into an agreement establishing the scope for the implementation of an Energy Cooperation Program to be implemented by the two parties, the first phase of which started on June 15, 1998.

The Program was officially ratified with the signature of an Agreement at the XXIX Meeting of Ministers of OLADE, held in Santo Domingo, the Dominican Republic on November 19-20, 1998.

The first phase of the OLADE-Quebec Cooperation Program will be developing the following two components: promotion of hydro-

power generation and electric power transmission projects in Latin America and the Caribbean (HY-MOTION) and the promotion of demand-side management projects in the region (DS-MOTION).

PROMOTION OF HYDRO-POWER GENERATION AND ELECTRIC POWER TRANSMISSION PROJECTS IN LATIN AMERICA AND THE CARIBBEAN (HY-MOTION)

Electric power is one of the inputs that are indispensable for the economic and social development of the member countries of OLADE. Although these countries have a very high hydropower potential, it is very unlikely that it can be fully tapped without resorting to external financing sources and technical capabilities.

In addition, the companies of Quebec have a wide range of experience in developing hydropower generation and electric power transmission projects and are willing to contribute their technical expertise and financial resources to tap the hydropower resources of Latin America and the Caribbean in association with the region's companies and investors.

As a result, the central objective of the component HY-MOTION is to encourage the joint implementation of hydropower and electric power transmission projects between companies and investors of Quebec and those from Latin America and the Caribbean, with the following specific objectives:

- Arouse the interest of the region's governments and investors in hydropower projects, which have been postponed because of the short-term advantages of thermo-electric generation.
- Promote the upgrading and search of new hydropower projects, especially medium-sized and small-scale projects.
- Foster partnerships between entrepreneurs and investors of Quebec, Latin America and the Caribbean involved in hydropower generation and electric power transmission.
- Promote innovative financing schemes for hydropower generation and electric power transmission projects.
- Favor the transfer of hydropower generation and electric power transmission technology between companies of Quebec and Latin America and the Caribbean.

PROMOTING DEMAND-SIDE MANAGEMENT PROJECTS IN LATIN AMERICA AND THE CARIBBEAN (DS-MOTION)

The growth of electric power demand in Latin America and the Caribbean is 50% higher than gross domestic product (GDP) growth. This situation is largely due to the inefficient use of energy. In view of financial and even environmental constraints that will be affecting the development of the region's electric power subsector over the medium and long term, low energy efficiency is a problem that must be tackled.

As part of this scenario, DS-MOTION (DSM) provides an alternative to the postponement of electric power sector investments and, at the same time, reduces environmental pressures stemming from electric power supply, as indicated by various experiences in Canada, the United States, Europe, and Japan.

Although DSM is already being applied in some countries of Latin America and the Caribbean, the full tapping of its potential requires financial and technical resources that are only partially available in the region. It is therefore necessary to find extra-regional partners to ensure the widespread application of DSM.

Thus, the central objective of the DS-MOTION component is to foster the implementation of joint projects

between entrepreneurs and investors of Quebec and those from Latin America and the Caribbean, including the following specific objectives:

- Arouse the interest of governments and investors of the region in DSM projects, which have been traditionally relegated due to preference for energy supply expansion projects.
- Promote the identification and development of new DSM projects in the region.
- Foster partnerships between companies and investors of Quebec, Latin America, and the Caribbean involved in DSM activities.
- Favor the transfer of technology between companies of Quebec, Latin America and the Caribbean in DSM activities.

The two components of the program are being disseminated on an ongoing basis, especially through national and regional events in which the possibilities offered by each one are presented. In addition, there are other promotional channels to foster contacts with companies and promoters interested in the development of specific projects.

Thus, there have been concrete indications of interest that have led to registration in the program, the identification of projects, and the signature of



agreements with Energy Ministries and Secretariats, public institutions involved in the energy sector, and private power utilities and associations from Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Peru, Suriname, Uruguay, and Venezuela.

PROJECTS THAT ARE PART OF THE QUEBEC-OLADE ENERGY COOPERATION PROGRAM

To date the following countries have shown interest in participating in the program with specific projects:

Argentina: From the Energy Secretariat, the program has received the study on the potential of micro hydropower stations in the Province of Neuquen, which will be followed by another similar study for the Province of Santa Cruz.

Barbados: The Ministry of Finance and Economic Affairs, through its Energy Division, has expressed its interest in the program and has requested a wide range of information on the program.

Bolivia: The Vice-Minister of Energy and Hydrocarbons has forwarded a summary of all 1-MW hydropower projects included in the National Development Plan. In addition, the firm Engineering and Integral Services of Cochabamba has presented two

projects for upgrading micro hydropower stations. Likewise, the National Electric Power Utility Association (ANELEC), which brings together electric power distributors, has expressed its wish to become involved in energy efficiency projects and has forwarded information about Bolivia's energy sector.

Brazil: After the program mission that traveled to Brazil in October 1998, Eletrobrás sent four projects for micro hydropower stations. It also sent the National Small Power Plants Program, which includes the mechanisms used by the Brazilian Government to facilitate rural development and a recent study (April 1998) on the potential of energy service companies that are currently operating.

Chile: The Limari Electric Power Cooperative (ELECOOP) intends to submit its hydropower projects that involve between 1 and 50 MW. In addition, the Electric Power Consumption Cooperative of Chillán Ltd. will be submitting its micro power plant, transmission, and energy efficiency projects.

Colombia: The Ministry of Mines and Energy, through its Mining and Energy Planning Unit (UPME), submitted a list of hydropower and energy efficiency projects. The Pacific Power Utility has sent its expansion plan for hydropower projects of up to 100 MW. The CEDENAR utility has forwarded a

summary of its principal transport and distribution projects. The National Energy Financial Corporation (FEN) sent an annotated overview of power generation, transport, and energy efficiency projects that are being planned in Colombia. ISAGEN has presented a list of hydropower projects with their progress status. Finally, the Electric Utility of Caquetá presented a 15-MW hydropower project.

Costa Rica: The Ministry of Energy indicated its interest in participating in the program. The Energy Sector Department sent the study for the La Virgen Hydropower Projects (30 MW) in the country. The Costa Rican Energy Institute has reported that it estimates it has a micro hydropower potential of 1300 MW. The COOPELESCA utility is interested in developing a 17-MW hydropower project.

Cuba: The Ministry of Science, Technology, and the Environment has expressed great interest in energy efficiency projects. It has also received a listing of micro stations that Cuba would like to upgrade.

Ecuador: The Ministry of Energy and Mines has requested support to develop its energy efficiency policy. The National Electrification Council (CONELEC) forwarded the recent Electrification Plan of Ecuador. The Regional Midsouth Power Utility (Empresa Eléctrica Regional Centro





Sur) sent a catalogue of hydropower station projects, as well as the study for the project of the Ocana Station. The company Hidalgo and Hidalgo submitted the 25-MW Sibambe project.

El Salvador: The Lempa River Executive Hydropower Commission intends to send the inventory of the country's potential for hydropower projects.

Guatemala: The Ministry of Energy and Mines sent two hydropower projects of interest for the Electric Power Generation Company (INDE).

Guyana: The country has submitted the description of three hydropower projects that are currently being studied.

Haiti: The Office of Mines and Energy presented the inventory of hydrological sites that can be tapped and development projects that have been prepared by Haiti's Power Utility.

Honduras: The National Electric Power Utility (ENEE) intends to submit a list of hydropower transmission and generation projects.

Jamaica: The Ministry of Mines and Energy presented the results of a pilot energy-efficiency project whose experience can be used in the OLADE-Quebec Program.

Mexico: The National Water Commission has forwarded an inventory of hydropower projects of up to 30 MW. The Trust Fund for Supporting the Energy Saving Program of the Electric Power Sector (FIDE) has requested further informa-

tion on the content of the OLADE-Quebec Program.

Nicaragua: The Nicaraguan Energy Institute (INE) submitted the description of four hydropower projects with different capacities. The Municipal Electric Power Company of Wiwili will submit a hydropower station project that is currently being developed with the United Nations Fund for the Development of Capitalization (UNFDC).

Peru: The Regional Electricity Public Service Company of the Oriente has presented the description of three hydropower projects. The utilities Electro Sur Este S.A. and ETECEN requested further information on the program.

Suriname: The Ministry of Natural Resources has sent the inventory of hydropower projects with their respective assessment.

Uruguay: Usinas y Transmisiones Eléctricas (UTE) and the IMSUR company have shown interest in additional information about the Program.

Venezuela: The Ministry of Energy and Mines submitted an inventory of small, medium-sized, and large hydropower stations. CADAPE (State Electric Power Utility of Venezuela) presented three hydropower station projects rated as priority.

PROJECTS FOR THE HY-MOTION COMPONENT

For the HY-MOTION component, there are at present projects at different stages of implementation:

Projects for more than 50 MW

Ecuador: The Toachi-Pilatón project, involving a 200-MW station financed by a consortium between Hydro-Quebec International, Asea Brown Boveri, Andrade Gutiérrez y Kvaerner, is being built.

Projects between 1 & 50 MW

Ecuador: The Illuchi project being implemented involves upgrading an existing station and the construction of a new one to increase capacity from 9.9 to 18.2 MW. It has financing from Hydro Energi-QUE (CHEC), ELEPCO, and Electro Impianti. The Sibambe project is also being promoted with the construction of a 25-MW station financed by Hidalgo and Hidalgo and a counterpart to be selected.

Guyana: The 18-MW Tumatumari Station Project will be financed by the Corporation Hydro Energi-QUE (CHEC).

1-MW projects and new projects for rural electrification

Brazil: After the mission in October 1998, four projects for small power stations were submitted so that they could be examined by parties that might eventually be interested.

Cuba: After the Program mission in November 1998, several projects to upgrade small stations were submitted by Cuba, and the company CONSEIL S.C.P. of Sherbrooke indicated its interest in obtaining further information.

Ecuador: The studies to promote three projects will be submitted: one for a micro power station tapping tidal



energy in the regional of Esmeraldas using three 1-MW turbines; another to substitute two diesel groups for a 300-kW turbine for the mining company Sultana del Cóndor; and another to add 3 MW to an existing micro power station in the company Textiles Equinoccial.

Venezuela: After a working meeting with technical experts of the Ministry of Energy, a series of projects was identified. The company CONSEIL S.C.P. of Sherbrooke has requested further information on these projects.

PROJECTS REVIEWED FOR DS-MOTION COMPONENT

Bolivia: A seminar on energy efficiency to be funded by the World Bank is being promoted.

Costa Rica: A project to conduct a seminar on the establishment of energy service companies (ESCOs) for the member countries of OLADE has been submitted to the Canadian International Development Agency (CIDA).

Cuba: After the mission to promote the Program, various companies interested in promoting energy efficiency and wishing to become partners for project implementation have been identified. The participation of companies of Quebec in the seminar TECNOURE 99, to be held in Cuba, will help to foster these partnerships and transfer technology.

Ecuador: The company Hydrosoft Energie has developed software to optimize elec-

tric power plant production. It was presented to the National Electric Power Training Center (CENACE), which will use it to optimize the operation of the Paute Hydropower Station.

FUTURE PROMOTION OF THE PROGRAM

At present, new missions are being planned to promote the Quebec-OLADE Energy Cooperation Program. They will be taking place during the implementation of the Program in order to analyze projects that might be of interest to the member countries of OLADE. Thus, the program will be making a major contribution to the region's energy development.



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El Salvador



For El Salvador, the year 1989 marks a turning point in its economic evolution. After a decade noteworthy for high inflation and recession, the country, in the very midst of a domestic armed struggle, adopted a course aimed ensuring economic liberties.

In this framework of reference, the Government started putting its finances on a sound footing, applying monetary rehabilitation measures, curtailing inflation, and reducing the government's deficit, which enabled consolidation of the country's macroeconomy over the medium term. Alongside this, other corrective measures were applied, such as the reprivatization of banks and agribusinesses that had been nationalized ten years earlier, legal guarantees to the private sector, liberalization of the oil trade, and the dismantling of government interference in the economy, which was distorting market forces.

The new economic model was promoted by the signature of the Chapultepec Peace Agreements by the government and rebel forces, which not only managed to secure a cease-fire and consolidate democracy but also led to a GDP growth on the order of 6 and 7% between 1992 and 1994.

In 1995, second-generation reforms started being implemented, involving not only modernization of the State but also deregulation of the energy, telecommunications, and retirement fund sectors, which enabled foreign economic players to make investments in the amount of over US\$1.5 billion.

Energy Sector

El Salvador is the smallest country of the Western Hemisphere mainland. It has a territory of about 20,000 square kilometers, 6 million inhabitants, and very little energy resources. Oil is imported from Mexico and Venezuela, and electric

Liberalization and energy development

power production stems principal from the hydroenergy drawn from the Lempa River and geothermal steam from the ground.

lowest prices for oil products over the last ten years.

The regulatory agency for the oil and gas subsector is the

- Application of mandatory Salvadoran norms for imported fuels.
- Monitoring weights and measures for the retail traders of oil products.



Mr. Eric Casamiquela, General Superintendent of Electricity and Telecommunications, has been collaborating in the energy transformation of El Salvador and is the authority representing El Salvador in OLADE.

Oil and Gas Subsector

In 1994, the government implemented an import parity system, liberalizing consumer prices for hydrocarbons: gasoline, diesel, liquefied gas, oils, kerosene/jet fuel, fuel oil, and others. The system uses the U.S. Gulf coast market as a marker, and therefore prices evolve in line with those on the international market for oil and products. The new model has led, during 1998, to the

Department of Energy and Mines of the Ministry of Economy, which has the following duties:

- Approval of peak consumer prices for oil and gas, in keeping with parity system regulations.
- Quality control of oil products processed by the Acajutla Refinery S.A. (RASA), which is a private-sector company.

The RASA is the only refinery operating in the country. It has the capacity to process 6.5 million barrels per day of crude oil and to produce 6.4 million barrels of clean products in order to meet growing demand, which is on the order of 10 million barrels, without including the 1.4 million barrels of liquefied gas imported from the international markets of the Caribbean. The domestic market has aroused the interest of three international firms (two gas and one oil), which are planning to install a new refinery in the short term.

ELECTRIC POWER SUBSECTOR

It can be asserted that El Salvador is one of the region's countries that have been most aggressive in pushing for change in the electric power industry. It implemented legal reforms aimed at deregulating the market and applying a competitive, free-market model where no privileges and exclusive rights are granted. It also successfully reprivatized power distribution utilities. Also noteworthy is the fact that the electric power market is in the hands of a private, independent unit, the Transactions Unit.

Both the wholesale market, the Transactions Unit, the regulatory agency, and the trading agent (broker) are the new players whose activities ensure competitiveness on the market and an effective, efficient, and transparent deregulation of the electric power subsector.

The new development model being applied in the electric power sector responds to economic criteria based on free competition, which has enabled new private-sector operators to enter the market and in which the end-user receives efficient service at real prices. As for prices, they have undergone both quantitative and qualitative changes as of January 1998, ranging from harmonization with production costs to the elimination of cross subsidies.

Legal framework

The legal framework governing the subsector was unanimously approved by Congress at the end of 1996 and has been consolidated by the following laws:

- Law creating the General Electric Power and Telecommunications Superintendence and its regulations.
- The General Electric Power Law and its regulations.

The new legislation grants SIGET its status as regulatory agency and defines its responsibilities. SIGET is more than just a regulatory agency; it is aimed at facilitating market deregulation and ensuring compliance with the legal framework.

Generation

During 1998, the installed capacity of the national generation system has remained the same over the last four years: 946 MW. It is comprised of the following: hydropower 390.5 MW (42%); geothermal energy 105 MW (11%); and thermoelectricity 450 MW (47%). In the latter, the private-sector generator Nejapa Power supplies 144.5 MW, which accounts for a share of 15% of

total. In 1998, gross production of the system amounted to 3,822.2 GWh.

At present, the state utility Lempa River Executive Hydropower Commission (CEL) is the main utility for electric power generation, accounting for 84% of the system's installed capacity. According to the provisions of the General Electric Power Law, last year the CEL underwent major restructuring, and as a result it is transferring various of its assets and activities to transitional state enterprises, which has enhanced, albeit insufficiently, competitiveness on the new market. This has led to the establishment of four corporations organized by type of generation, stemming from the breakup of CEL, with independent shareholding capital and where the State, for the time being, is the only shareholder.

The legal framework of the new model enables private economic players to participate freely in the power generation market. The tapping of water and geothermal resources for electric power generation purposes requires that there be a concession-granting procedure accessible to all investors. In line with the new reality, the government has started the process of selling the corporation set up with the thermoelectric plants owned by CEL, whose transfer has been scheduled for mid-1999. With this economic policy, the model is further consolidating the presence of competition in power generation.

It is estimated that, by the year 2010, the system's installed capacity will have to increase by 800 MW so that it can meet demand. To do this, the State does

not intend, as in the past, to formulate expansion plans but rather will leave the private sector the option to develop them.

The U.S. company ONUCAL has started taking steps to eventually tap the geothermal reservoirs of San Vicente and Chinameca in the eastern part of the country for electric power generation purposes, with an estimated potential of 100 MW in each reservoir.

Likewise, the CEL, with the support of the consortium comprised of Ernest & Young LLP, Deutsche Bank Securities, Inc., and Synex Ingenieros Consultores, is looking for a strategic partnership with a majority shareholder that would purchase 51% of the equity capital of the geothermal generation corporation.

In addition, three private companies with foreign capital are ready to start operating the following thermoelectric plants: Pacific Power Company, S.A. of CV, with a combined cycle plant and a power generation capacity of 112 MW, which is scheduled to start up in May 1998; the Power and Energy Utility of El Salvador, S.A. of C.V., which will be installing a plant with a capacity of 66 MW, with work expected to conclude in October 1999; and Coastal Technology Salvador S.A. of C.V., with a plant that has an installed capacity similar to the previous plant and is scheduled to start up in January 2000.

This gives us a sample of the breakthroughs achieved by the reform of the subsector and the manifest interest of private-sector companies to participate in it.

Transmission

Regarding this, reforms envisage the establishment of an independent company exclusively focusing on transmission. Nevertheless, future expansion remains open to market needs and private-sector capital has the full right to invest and participate in this activity.

Distribution

Deregulation of the subsector has permitted the sale of four distribution utilities stemming from the breakup of CEL in an international public bidding process. Distribución Eléctrica del Sur (DELSUR) was purchased by the consortium comprised of Pennsylvania Power & Light Global Inc. and the EMEL Group of Chile. The Compañía de Alumbrado Eléctrico de San Salvador (CAESS) and the Empresa Eléctrica de Oriente (EOO) were sold to ENERSAL of Central America, comprised of the EDC Corporation of Venezuela and Reliant Energie Inc. In addition, the U.S. company AES purchased the Compañía de Luz Eléctrica de Santa Ana. The sale of assets of the four companies produced a cash inflow to the State on the order of US\$586.1 million.

The shareholding capital of the distribution utilities has been divided as follows: 80% is owned by the foreign strategic partner, 15% belongs to employees, and the remaining 5% will be sold on the Stock Exchange to local investors.

Market liberalization poses a challenge for new private-sector distributors: generating their own energy or contracting bulk supply with local generators or neighboring Guatemala, a country

with which there already are power purchase agreements under strictly commercial conditions.

What is important about the process is not the reprivatization in itself, but rather the competition that has been generated between the distribution utilities, which on the basis of the new legislation can encroach upon the geographical area of another utility and trade energy at better prices and conditions. This situation of competition benefits the user since a better service at attractive prices is provided.

Transactions Unit and Bulk Market

The dispatch and operation of the electric power system are conducted through the Transactions Unit, an entity that is completely separate from the utility that provides transmission service, as well as the regulatory entity. It has been set up as a private-sector

corporation and its shareholders represent the generators, transmitters, distributors, and large end-users.

According to legal provisions currently in force, electricity is traded on the basis of two schemes:

- Contracts between power generation utilities and distributors.
- On the bulk market and on the spot market.

Peak prices appearing in the tariff structures that are annually approved by the regulatory agency use as a reference the price of the System's Regulatory Market (MRS) with which the Bulk Market operated the previous year, regardless of the prices agreed upon for block purchases between generators and distributors.




Regulatory Agency

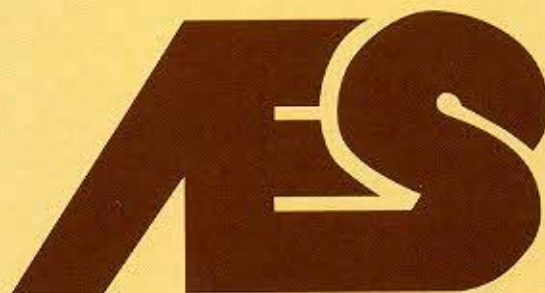
The General Superintendence of Electric Power and Telecommunications (SIGET) is the regulatory entity of the electric power subsector. So that it can exercise this function, the legislation grants it the following attributions:

- Applying the legal framework currently in force, monitoring compliance with this framework, issuing warnings, imposing fines and penalties on lawbreakers.
- Approving maximum tariffs for the presentation of services.
- Issuing technical norms and standards.
- Mediating conflicts between operators.
- Supervising the application of sound market competition standards.
- Granting or taking away concessions, authorizations, and permits to operators.
- Providing legal certainty and security to documents governing relationships between operators.
- Protecting the rights of users.

Conclusion

The most important aspect of the process of electric power subsector liberalization is that investors have responded to the expectations of the electric power market in El Salvador and it should be assumed that this is due to clear rules presented by the model, the legal security guaranteeing investment, and the trust there is in the regulatory agency as an impartial, honest, and upright authority. 

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Energy and Sustainable Development in Latin America and the Caribbean



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OLADE has been promoting actions for sustainable energy development in the region, as a result of work directly or indirectly involving this topic and with support from the project Energy and Sustainable Development which is being jointly implemented by OLADE, the Economic Commission for Latin America and the Caribbean (ECLAC), and the German Technical Cooperation Agency (GTZ). The present article provides an overview of this issue and references for discussion.

Achievements: The energy system of Latin America and the Caribbean is exerting relatively little pressure on world development

In many parts of the region, an important energy infrastructure involving high supply levels was achieved over the past 30 years. Regarding the sustainability of its development, however, the most important achievement is that the energy system of Latin America and the Caribbean (LAC) is exerting relatively little pressure on the so-called constraints on growth.

The energy supply system of LAC is contributing substantially to enhancing the availability of non-renewable resources and accounts for about 9% of the consumption of oil products, although it holds more than 13% of the world's oil reserves.

In addition, the energy system of LAC contributes very little to the emission of greenhouse gases. According to statistics of the International Energy Agency (IEA), the region's share of total world CO₂ emissions stemming from the energy sector amounts to 5.2%, owing to the sector's structure. LAC has the option of developing its energy resources in keeping with global constraints, if it manages to keep at the present level, or reduce even further, its percentage share of greenhouse gas emissions.

Flaws in sustainability: Unsustainable energy development patterns still prevail in the region

It can be asserted that the energy sector is a mainstay of human development in the region. Nevertheless, there are certain aspects of the sector that could improve considerably.

Access to energy is inequitable and energy supply insufficient in various parts of the region, reflecting prevailing social problems and rural poverty.

In addition, the practice of applying subsidies (cross subsidies or subsidies covered by the State) and the efforts to provide energy to rural sectors in the majority of the countries involve elements ensuring greater social equity. Nevertheless, price discrimination for regulated consumers could become the basis for a new inequality if the relevant measures are not taken now.

Moreover, the lack of suitable mechanisms to insert and coordinate the energy sector's efforts for productive transformation and an economy that is not sufficiently diversified have contributed to the economic vulnerability of several countries.

In the large urban-industrial centers of the region, the environment continues to be unhealthy due to the emission of pollutants into the air and liquid and solid waste.

It should be emphasized that, in some countries, the schemes used for tapping biomass resources along with farming activities do not enable natural resources to be renewed, and this is producing severe social impacts.

Although various countries managed to reduce the energy intensity of their gross domestic product during their progressive economic development, the average energy intensity in the region has not changed substantially over various decades. Of even greater concern are the growth of consumption in transportation and the persistently high energy intensity of industry, although efficiency in the energy

sector has improved considerably in various countries of the region.

Opportunities: Latin America and the Caribbean have a sound energy base to ensure human development

Latin America and the Caribbean are endowed with an extraordinary energy resource base:

In the region, the reserves-production ratio for hydrocarbons and coal indicate high durability. There are abundant fossil resources that have not as yet been discovered.

Although hydropower contributes heavily to energy supply, there are still ample hydro resources that remain untapped.

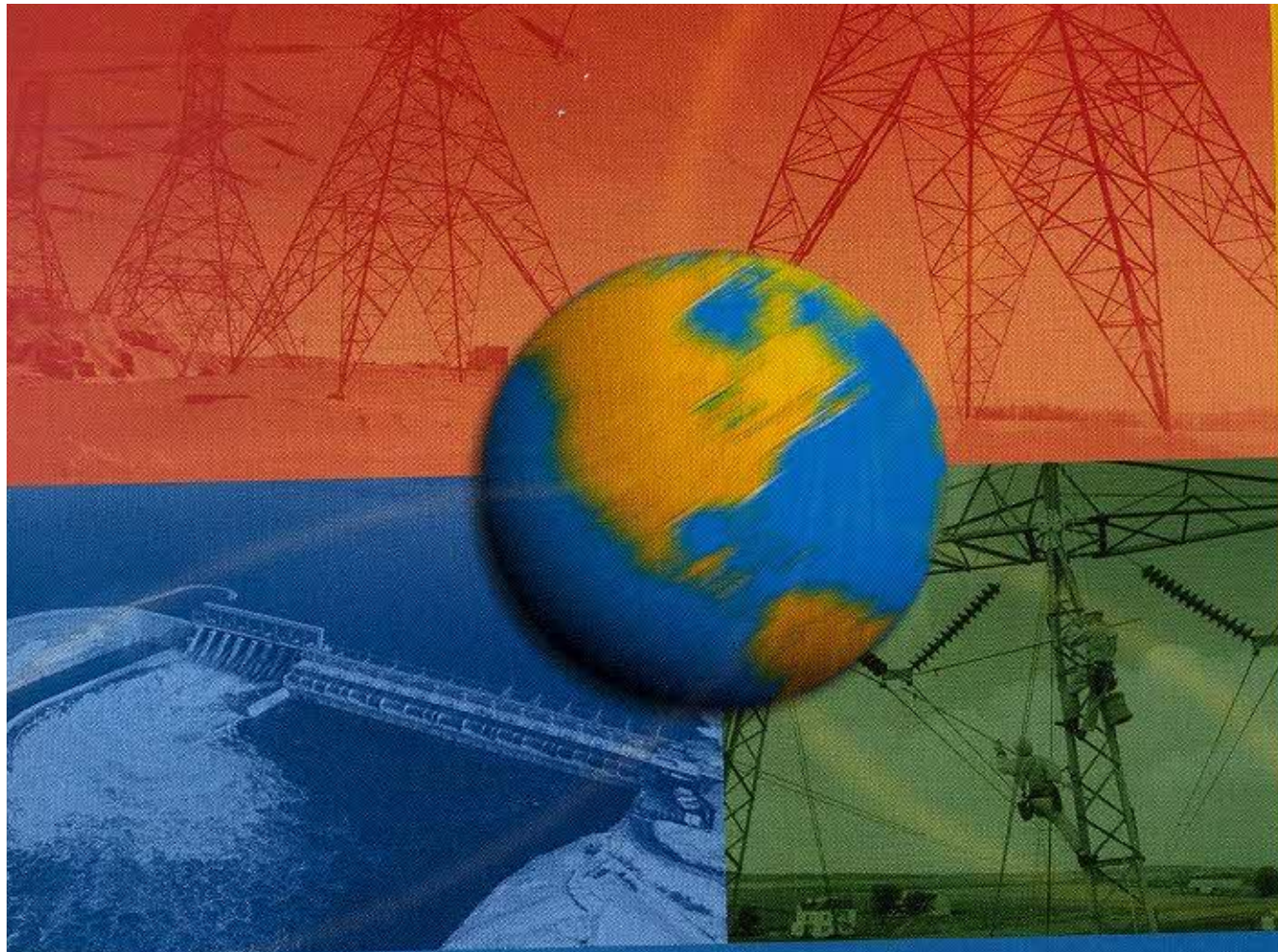
The current way of recovering biomass resources for energy purposes is, without exception, quite ineffective from the energy standpoint.

The solar potential of the region, except for the Southern Cone, is unusually high and well distributed throughout the year, but it has not been well developed either for solar thermal applications or photovoltaic uses.

For the development of other renewable sources of energy, such as geothermal and wind energy, there are more opportunities on the local level.

As for consumption, there is considerable potential for a more efficient use of energy aimed at reducing energy intensity in the industrial, transportation, commercial, and residential sectors, as well as in the energy sector itself.

The energy potential that is available and the rationalization of energy use can, over the medium term, contribute to ensuring much



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greater human development in the region, as a result of a rise in production, the more equitable redistribution of income, and access to social and infrastructure services, without adversely affecting the environment and without over-exploiting natural resources.

In this situation, it would be of the utmost importance to outline an energy system in the region that fosters sustainable human development, based on the following:

- Over the medium term, the substantial rise in energy efficiency and the expansion of natural gas use by means of a regional interconnection.

- The region will thus be gaining time for an inevitable in-depth transformation of the energy system over the long term, one based on renewables and greater efficiency in the production of fossil resources, which will eventually entail implications for the lifestyle of the population.

Shortages: Insufficient non-energy resources and institutional constraints

The high endowment of energy resources referred to above does not come with the other elements that are needed for their effective use for the benefit of human development.

Although there is no doubt that some companies of the region have made considerable progress in terms of technology, most of the state-of-the-art technology for energy transformation and efficient use of energy comes from other parts of the world.

In addition, because of low domestic saving rates, it is indispensable that capital to finance energy development, as well as for other sectors, come from outside the region, although in some countries capital markets have evolved considerably.

It is also evident that, along with foreign direct investment, what is needed is business and financial

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management expertise and technology, which have not evolved sufficiently in all of the region's countries.

There is still a lag in terms of institutional capability, principally in those countries that have not made significant progress in implementing reforms.

Policy: Are we on the right course?

It can be asserted that various energy policy trends are currently pointing in the right direction:

- Energy integration is intensifying as a result of interconnections in some subregions.
- Minimum compatibility of regulatory frameworks is being achieved and enlarged to foster energy integration and trade.
- Subregional wholesale markets are being set up.
- The establishment, over the short term, of minimum common parameters for environmental law frameworks is being promoted.
- The institutional transformation of the energy sector has evolved rapidly in the countries that pushed for sector modernization, and this has facilitated the inflow of capital and technology.
- Subsidies have been curtailed and become more focused, and this has improved substantially the conditions for a more efficient use of energy and for certain renewable energy technologies.
- New imaginative structures for rural electrification and social

development needed for market coordination schemes are being promoted.

- Specific, effective rules fostering renewables in the new regulatory frameworks of the region are being observed.
- Various countries are making progress in the establishment of specific rules for the rational use of energy.
- Decentralization in many countries is providing, in principle, better conditions for sustainability, permitting the participation of players in urban and industrial schemes that are more energy efficient and environmentally friendly and facilitating rural electrification and social development.

What can be done to improve?

In Latin America and the Caribbean, there are several persistent threats to sustainable development owing to current institutional structures in those countries that have not made much progress in terms of modernization and, especially, where modernization has been inconsistent.

It is apparent that regional coordination between the countries regarding certain energy issues, such as investment, production policies, and marketing needs to be consolidated.

Guidelines for an energy policy aimed at ensuring sustainable development

The current situation does not require a change of course for the energy policy of the majority of the region's countries in favor of sustainable development, since the countries already share, and are

committed to, the idea of sustainable development, granting priority to human development. Many of the trends pointing in the right direction should be consolidated and, at the same, existing or emerging risks should be mitigated.

As for integration, subregional efforts should be complemented by a regional approach. Specifically, the northern Andean countries should come together to establish natural gas integration schemes aimed at ensuring the sustainability of medium- and long-term gas development. Likewise, the complementation of electric power supply and demand inside the region has to be developed and electric power integration between the subregions given impetus. Also in the oil sector, there is still much room for better cooperation in the region.

The countries that are on the road to modernization must move ahead decisively and complement their efforts. For those countries that have already made considerable progress in this process, the model must be consolidated by building up the capacity of institutions so that they can become strong and independent.

As a rule, more emphasis has to be laid on institutional development. This includes building up the capacity of Energy Ministries and intermediate institutions, especially the regulatory agencies and anti-trust entities that were created as a result of modernization. The human resource component of these institutions must also be enhanced with training, technical assistance, and horizontal exchanges.

Energy intensity should be substantially reduced over the medium term. It is necessary, in addition, to

increase information, standardization and labeling, incentive, and demand-side management programs and to install efficient markets with specific funds and mechanisms.

Rural electrification and social development should be aimed at ensuring quality energy supply. The competitive situation of renewables must be improved even further.


Companies can also participate in promoting sustainable develop-

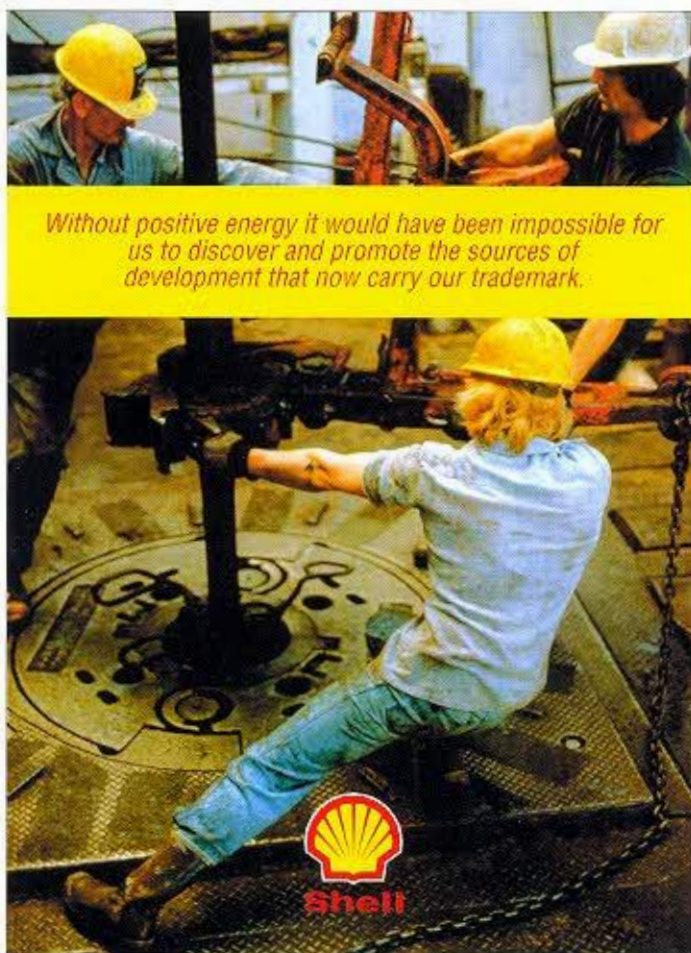
ment. Many of them are prepared to share this responsibility. Specifically, collaboration with innovative companies in the environment, energy efficiency and renewables, and technological development in general must increase.

The resources obtained from energy exports must be used for diversifying and consolidating the economies of the region's countries.

International cooperation should be reformulated so that regional

coordination is consolidated with cooperation from North America and the European Union.

As for climate change processes, it is apparent that the region's countries want responsibility to be shared. 



OLADE and its actions in this issue

OLADE is carrying out, in addition, various actions supporting the elements that are promoting sustainable development in Latin America and the Caribbean, especially in the area of energy efficiency, such as:

Demand-Side Management Project: With funding from the European Commission, this project is being implemented in the Central American Isthmus. A similar project and with funding from the same source, is about to begin for three countries of the Andean subregion. In addition, with the collaboration of the power utility of Quito, Ecuador, a plan is being developed to control and reduce power losses in its distribution system.

Agreement with the Government of Quebec: In cooperation with the Government of Quebec, the DS-Motion Project is being carried out to promote energy efficiency in Latin America and the Caribbean. In association

with two European consulting firms, a study to promote the establishment and operation of energy service companies (ESCOs) throughout the region will soon be launched. Steps are also being taken to implement two projects aimed at household appliance labeling in Mercosur, on the one hand, and the rest of the region, on the other.

Master's Degree Program in Energy and the Environment: OLADE and the University of Calgary, with the support of the Canadian International Development Agency (CIDA), have been conducting this joint program in order to train professionals of the region in disciplines involved in the energy industry and environmental control and protection. At present, the Master's Degree Program is in its third academic year. After 14 months of full-time study, the students will obtain a master of science (M.Sc.) degree in energy and the environment from the University of Calgary.

Program for Environmental Law in the Energy Sector of Latin America and the Caribbean:

This program is also being conducted with the University of Calgary and the sponsorship of CIDA. Its objectives are:

- To undertake a study on the standardization of environmental norms applicable to the energy sector in each member countries of OLADE.
- Draft reference legislative models and formulate recommendations and basic guidelines to ensure suitable legal compatibility and build up the capacity of the region's institutions.
- To promote the incorporation of sustainable environmental practices in energy sector activities, without losing sight of the region's needs.

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Bolivia: New gas reserve certification

The Vice-Minister of Energy and Hydrocarbons of Bolivia informed that intense exploratory activities carried out in Bolivia in 1998, which reported significant gas discoveries, have led to a certification by the firm Golyer & McNaughton, on January 1, 1999, regarding the existence of the following gas reserves in the country:

(in trillion cubic feet – TCF)

Proven (P1)	5.28
Probable (P2)	3.30
TOTAL (P1 + P2)	8.58
Possible (P3)	5.47
TOTAL RESERVES (P1 + P2 + P3)	14.05

It should nevertheless be underscored that this certification has not taken into account all the discoveries reported by the oil companies during 1998, which would entail the addition of 3.1 TFC. This increase in the proven reserves of Bolivia is the result of the sector's transformation, which has involved the transfer of upstream activities to the private sector.



Brazil: Foreign capital gains access to Petrobras shares

The Assembly of Shareholders of Brazil's state oil company Petróleo Brasileiro S.A. (Petrobras) approved the sale of 34% of the state company's shares, which for the first time in its history can be bought by foreign capital.

The Brazilian State will continue to control the company because it will be holding more than 50% of its shares. Petrobras has assets in the amount of US\$13 billion and gross billing in the amount of US\$14 billion. In 1998, it reported earnings of US\$800 million.



Colombia: Gas network grows

In 1998, the program for the mass extension of natural gas for household use recorded a 20.72% increase. The number of household installations rose from 1,340,706 in 1997 to 1,618,531 in 1998, according to ECOPETROL.

If it is estimated that each household has five members, coverage of the programs now encompasses more than 8 million persons.



Ecuador: INECEL has been legally terminated and seven new companies created

On March 31, 1999, The Ecuadorian Electrification Institute (INECEL) came to an end. Pursuant to the provisions of the new Law Governing the Electric Power Sector, seven new companies were established: three for hydropower generation, three for thermoelectric generation, and one for power transmission, as an important step toward privatization of the electric power sector of Ecuador. The same law provides that power supply will continue to be in the hands of the 20 power distribution utilities that already exist.

Of INECEL's 1,115 employees, 767 have been transferred to work in these new utilities.



Nicaragua: IDB interested in promoting geothermal energy

The Nicaraguan Electricity Utility (ENEL) conducted an international bidding process to upgrade the geothermal plant of Momotombo.

Regarding this, it was reported that the Inter-American Development Bank (IDB) will be providing financial support to promote geothermal energy in the country by reactivating the Momotombo project, whose plant produces only 12 of its 70-megawatt capacity. ENEL and IDB have adopted a three-pronged approach to this upgrade: funding for the National Geothermal Plan, private-sector participation in the project, and addressing environmental issues involved in this reactivation.

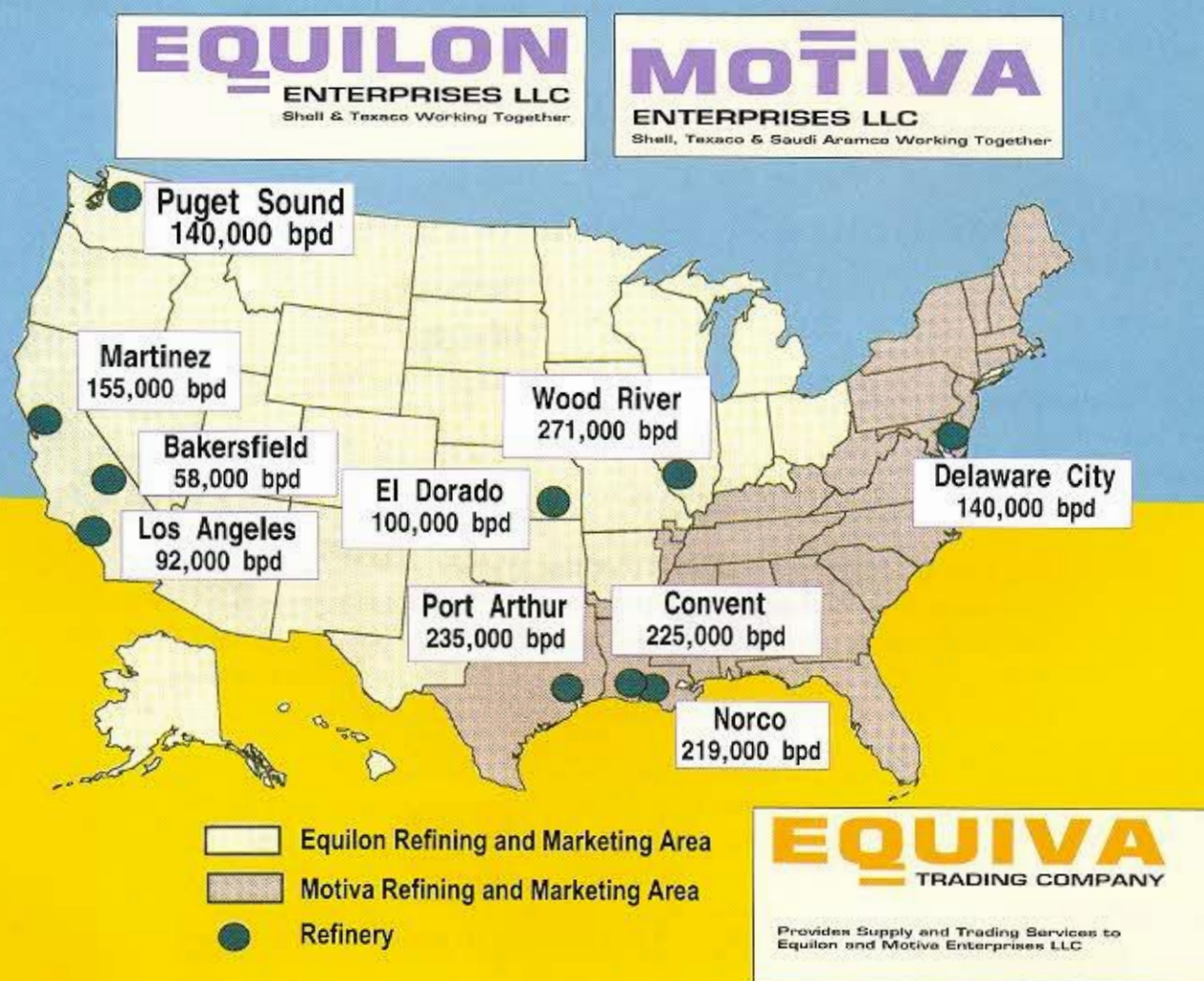


OPEC: Oil cutbacks in order to raise prices

The member countries of the Organization of the Petroleum Exporting Countries (OPEC) agreed to set new and severe limits on crude oil exports, in order to end the market glut that has already lasted a year.

The cutback agreed upon amounts to limiting the amount of crude oil supplied to world markets by OPEC members to 1,716,000,000 barrels per day. To this amount, would be added cutbacks pledged by the independent producers Mexico, Norway, Oman, and Russia. This has led to a hike in the price of West Texas Intermediate oil, which is the marker for the United States, to US\$12.64 by the end of March 1999 and US\$15.51 in futures contracts for May 1999.

The Alliance of Shell, Texaco and Saudi Aramco in the United States: A Force to Reckon with



Equilon Enterprises LLC and Motiva Enterprises LLC, together, are packing quite a punch in the marketplace. The following facts help illustrate how the companies, based in Houston, are poised to succeed in the downstream industry. **Equilon Enterprises LLC** is a joint venture that combines Shell and Texaco's major elements of their western and mid-western U.S. refining and marketing business and their trading, transportation and lubricants businesses. Shell has 56 percent ownership and Texaco holds 44 percent of the company. **Motiva Enterprises LLC** is a joint venture combining Saudi Refining, Texaco and Shell's elements of their eastern and Gulf Coast U.S. refining and marketing business. Shell has 35 percent ownership, and Texaco and Saudi Refining, Inc., a corporate affiliate of Saudi Aramco, each have 32.5 percent ownership of the company.

Motiva Assets

Motiva Refineries (4):

Convent, LA

Capacity: 225,000 barrels per calendar day (bpcd)

Norco, LA

Capacity: 219,000 bpcd

Delaware City, DE

Capacity: 140,000 bpcd

Port Arthur, TX

Capacity: 235,000 bpcd

Total Combined Refinery Capacity:

819,000 bpcd

Motiva Percent of U.S. Capacity:

5.2 percent

Terminals:

47 products terminals (own or have partial interest)

Retail Marketing:

Approximately 13,900 branded outlets in all or parts of 27 states

Motiva Percent of Market Share in Joint Venture Area:

Estimated 15.5 percent

Together, the two Alliance companies....

- Refine and/or market gasoline and other petroleum products under the Shell and/or Texaco brand names in all 50 states;
- Rank No.1 in national market shares for branded gasoline (14.9 percent), refining capacity (10.5 percent) and lubricant sales (13.4 percent);
- Have an estimated annual gross revenue of \$34.9 billion;
- Provide product to 22,900 Texaco and Shell-branded retail outlets;
- Own 10 refineries with total refining capacity of over 1.6 million barrels per day.
- Own or have interest in 114 crude oil and products terminals;
- Have ownership interest in approximately 45,600 miles of pipeline;
- Own eight lubricant plants with capacity of over 53, 500 barrels per day.

Equilon Enterprises and Motiva Enterprises' supply and trading operations are supported by **Equiva Trading Company**, a general partnership in which Equilon and Motiva each have 50 percent ownership.

Equiva Trading Company is now one of the largest petroleum supply and trading organizations in the world buying and selling around 7 million barrels of hydrocarbons per day in the physical markets. Equiva's specific lines of business include: acquisition, sales and trades of domestic and international crude oil and products; lease crude oil acquisition and marketing; marine chartering and risk management support and services.

Equilon Assets

Equilon Refineries (6):

Anacortes (Puget Sound), WA

Capacity: 140,125 barrels per calendar day (bpcd)

Martinez, CA

Capacity: 155,300 bpcd

El Dorado, KS

Capacity: 99,750 bpcd

Wood River, IL

Capacity: 274,500 bpcd

Bakersfield, CA

Capacity: 58,045 bpcd

Total Equilon Refinery Capacity:

817,970 bpcd

Equilon Percent of U.S. Capacity:

5.1 percent

Terminals:

67 crude oil and products terminals (own or have partial interest)

Retail Marketing:

Approximately 9,000 branded outlets in all or parts of 32 states

Equilon Percent of Market Share in Joint of Venture Area:

Estimated 14.3 percent

Pipeline:

Ownership interest in approximately 45,600 miles of pipeline throughout the United States

Lubricants Plants (8):

River Rouge, MI

Capacity: 7,300 barrels per day (bpd)

Deer Park, TX

Capacity: 9,500 bpd (2 trains)

Charleston, SC

Capacity: 8,250 bpd

Martinez, CA

Capacity: 5000 bpd

Houston, TX

Capacity: 8,600 bpd

Wood River, IL

Capacity: 8,300 bpd (2 units)

Los Angeles, CA

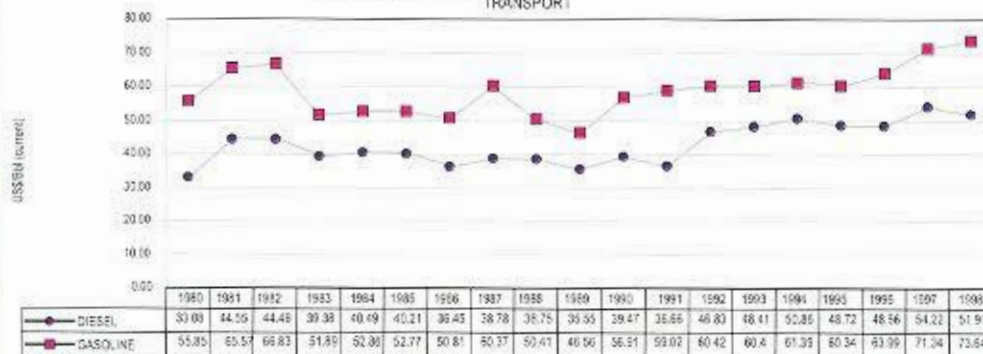
Capacity: 5,500 bpd

Seattle, WA

Capacity: 1,100 bpd

Energy Statistics

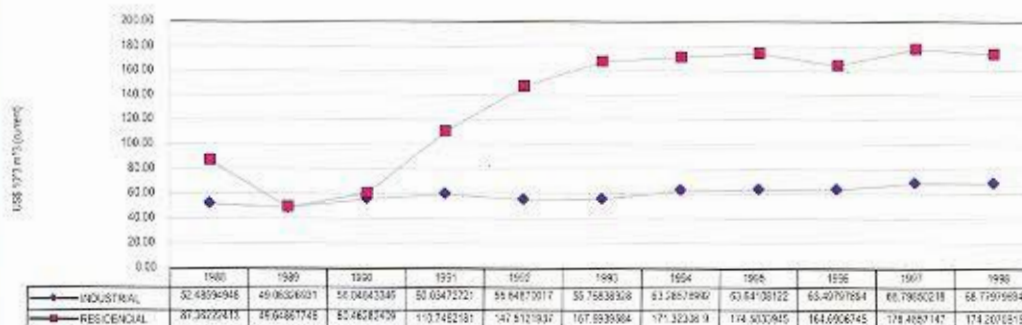
AVERAGE PRICES FOR DIESEL AND GASOLINE IN LA&C
TRANSPORT



AVERAGE PRICES FOR ELECTRICITY IN LA&C

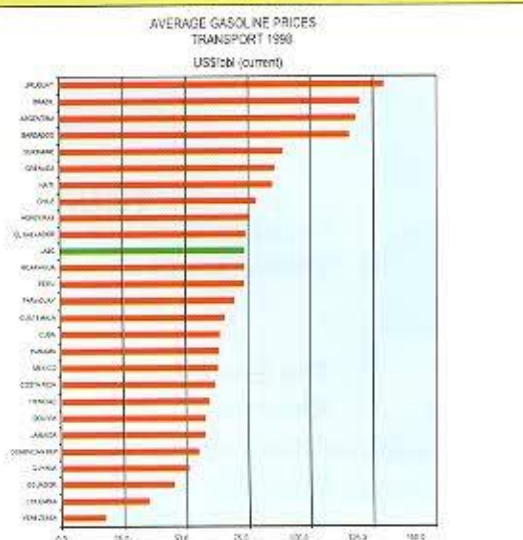


AVERAGE PRICES FOR NATURAL GAS IN LA&C

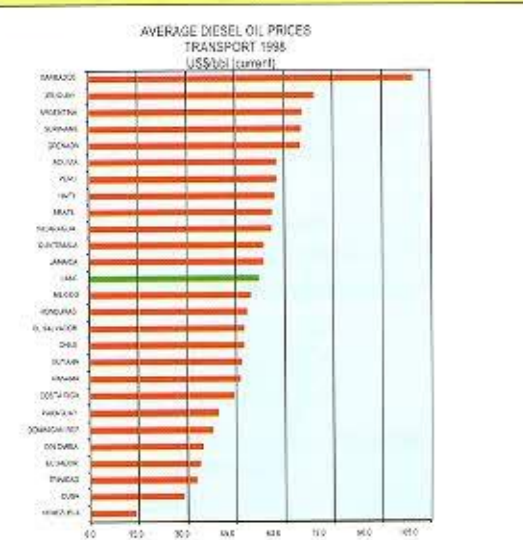


SOURCE: SEEQ

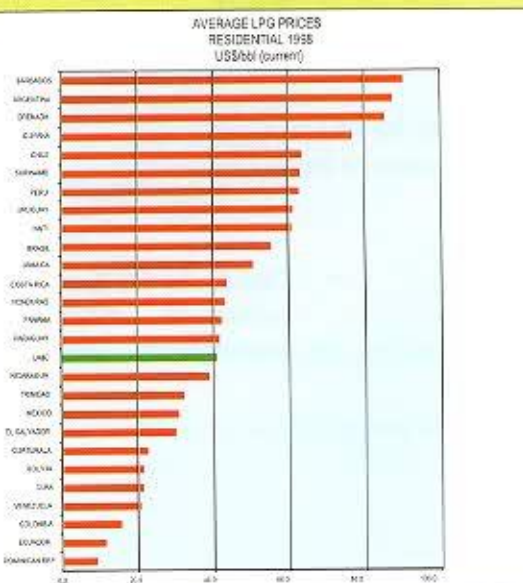
YEAR	1980	1990	1998
VENEZUELA	5.96	9.25	17.38
COLOMBIA	29.79	24.12	34.62
ECUADOR	7.93	18.05	44.76
GUYANA		50.67	50.66
DOMINICAN REP.	82.82	50.30	54.85
JAMAICA	90.85	51.45	57.31
BOLIVIA	29.54	50.37	57.56
TRINIDAD	11.86	56.11	59.18
COSTA RICA	114.86	50.40	61.53
MEXICO	48.49	56.33	62.63
PANAMA	85.68	70.14	63.29
CUBA		42.93	63.59
GUATEMALA	80.14	46.19	65.52
PARAGUAY	151.42	93.06	69.38
PERU	34.02	60.19	73.03
NICARAGUA	18.04	82.95	73.39
LASC	55.85	56.91	73.64
EL SALVADOR	52.65	65.96	73.82
HONDURAS	74.65	131.25	75.26
CHILE	70.96	57.87	78.07
HAITI		139.39	84.38
GRENADA	65.28	89.06	85.24
SURINAME		89.55	88.56
BARBADOS	83.79	98.18	115.72
ARGENTINA	66.67	77.13	117.81
BRAZIL	101.91	91.71	118.89
URUGUAY	148.91	115.41	129.13



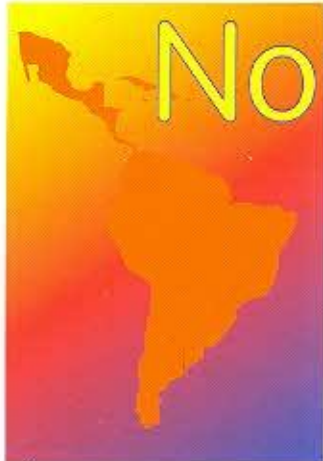
YEAR	1980	1990	1998
VENEZUELA	3.66	3.58	13.90
CUBA		10.43	28.54
TRINIDAD	12.82	33.67	32.38
ECUADOR	5.86	16.95	33.66
COLOMBIA	21.76	23.13	34.62
DOMINICAN REP.	37.60	27.65	37.60
PARAGUAY	73.18	82.05	39.51
COSTA RICA	46.39	46.60	44.00
PANAMA	52.92	69.98	46.15
GUYANA		50.59	46.64
CHILE	84.91	53.77	47.26
EL SALVADOR	53.09	35.44	47.33
HONDURAS	46.88	90.25	49.16
MEXICO	6.93	31.94	49.38
LASC	33.05	39.47	51.31
JAMAICA	55.02	55.81	53.21
GUATEMALA	42.21	28.41	53.55
NICARAGUA	50.78	47.29	55.87
BRAZIL	43.99	44.88	56.03
HAITI		100.34	56.67
PERU	18.25	29.39	57.42
BOLIVIA	20.11	41.91	57.56
GRENADA	85.80	72.18	64.76
SURINAME		85.01	65.01
ARGENTINA	46.54	50.27	65.20
URUGUAY	69.72	66.79	69.12
BARBADOS	61.95	79.37	99.40



YEAR	1980	1990	1998
DOMINICAN REP.	33.48	12.55	8.84
ECUADOR	22.74	5.69	11.19
COLOMBIA	19.05	14.44	15.28
VENEZUELA	8.13	7.63	20.51
CUBA		21.39	21.20
BOLIVIA	7.28	22.17	21.37
GUATEMALA	38.22	19.57	22.57
EL SALVADOR	29.40	30.18	29.87
MEXICO	9.53	13.21	30.66
TRINIDAD		39.10	31.95
NICARAGUA	38.99	27.36	38.64
LASC	17.98	19.30	40.70
PARAGUAY	61.51	36.12	41.34
PANAMA	45.50	16.38	42.10
HONDURAS		92.96	42.88
COSTA RICA	37.38	25.45	43.47
JAMAICA	53.05	40.53	50.45
BRAZIL	23.12	22.09	55.14
HAITI		92.72	60.80
URUGUAY	78.63	58.55	61.07
PERU	7.97	17.83	62.70
SURINAME		62.33	62.95
CHILE	43.67	47.73	63.41
GUYANA		52.60	76.63
GRENADA	72.83	88.60	85.39
ARGENTINA	19.99	38.95	87.44
BARBADOS	65.45	84.70	90.26



SOURCE: SIEES



TECHNICAL ASSISTANCE AGREEMENT BETWEEN OLADE AND CEAC

The Electrification Council of Central America (CEAC) and the Latin American Energy Organization (OLADE) signed a technical assistance agreement, providing for the participation of OLADE in the Regional Electric Power Project of the Central American Isthmus (PREEICA) and use of the regional electric power planning system, the SUPER/OLADE-BID®, by power utilities of Central America.

Implementation of the Agreement signed on March 5, 1999 will be supported and funded by the Canadian International Development Agency (CIDA) for two years. It encompasses the following actions:

- Delivering licenses to CEAC to use the latest version of the SUPER/OLADE-BID® Model for 21 installations, without any date of expiry. This version will include the improvements made to the planning under uncertainty module during the studies of the project Electric Power Interconnection System for Central America (SIEPAC).
- Distribution of a user's manual and reference manual for each installation.

- Support for converting the data bases of the electric power systems of Central America to the latest version of the SUPER/OLADE-BID® Model.
- Technical assistance to the users for the 21 installations acquired by CEAC in using the Model and forwarding all upgrades and improvements for two years.
- Technical assistance in installing the latest version of the model.
- Training events, organized by CEAC, OLADE, and the PREEICA Consortium, in electric power planning, as well as methodology and use of the SUPER/OLADE-BID®.

The Agreement will no doubt contribute considerably to energy sector development of the countries of Central America, a subregion that, over the last few years, has been intensely promoting cooperation and integration, especially in the electric power subsector.