

FIER: A Decade promoting integration



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X Regional Energy Integration Forum

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Lennys Rivera

Authors:
Lennys Rivera
Tatiana Castillo
Katherine Segura
David García

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Translators:
Paul Williams
Peter Newton
Gabriela Martínez

Design and Layout:
Alex Romero
Graphic Design Consultant

Contributors:
Paola Carrera
Sofía Lee
Andrea Cevallos

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FIER:
Una
**Década
promoviendo
la integración**

FIER:

A decade promoting integration

During its 10 years of existence, the Regional Energy Integration Forum (FIER from the Spanish) has played a key role by encouraging and supporting energy integration processes and initiatives in Latin America and the Caribbean, as well as promoting cooperation and coordination among OLADE's member countries. Year by year, this ongoing project has clearly contributed to establishing strong, viable links among key energy authorities of Latin America and the Caribbean, international public, private and public-private energy firms, international organizations, the academic and scientific sector, and the civil society.

To mark its tenth anniversary, OLADE decided to publish this special edition, **"Ten Years Building Energy Integration in Latin America and the Caribbean."** In addition to providing information and background on the history of the FIER, three analytical and informational articles illustrate OLADE's energy integration efforts.

The editorial entitled **"Looking Back on the Lima Agreement"** outlines a review of the contents and outcomes of the first Meetings of Experts and Meetings of Ministers from the birth of OLADE until 1984. It critically assesses how the tenets of the **Lima Agreement** were upheld in the initial projects developed by the Permanent Secretariat, with particular emphasis on efforts to create the Latin American Energy Bank and the Regional Energy Market.

The article on **"The Evolution of Energy Integration in Latin America and the Caribbean, 2004-2014: Institutional Frameworks and Production Processes"** reviews the relationship between regional energy integration and the interplay of national production factors in Latin America and the Caribbean, balancing energy sovereignty and energy security with the conditions to ensure energy integration.

Next, **"Toward Comprehensive, Sustainable Energy Planning"** describes energy policy-making and planning activities and projects aimed to supply OLADE's member countries with the tools and resources needed to draw up guidelines and develop criteria to implement long- and medium-range energy plans and programs, forecasts, simulations, and data management systems to meet their national goals for sustainable energy development.

There is also a retrospective study on the key objectives, findings and issues addressed by the FIER since its inception, including statistics on the countries, institutions and participants that were involved.

In sum, this publication is designed to describe and publicize the FIER's contributions to regional energy integration as a means to further negotiations and joint efforts towards bilateral, sub-regional and regional cooperation and interaction. ●

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The FIER and its contribution

to achieving the purpose of the Lima Convention

The Lima Convention, signed in 1973, created and developed OLADE as an organization for cooperation, coordination and consultation, one of whose key purposes would be to promote regional energy integration.

The principles and decisions of this Treaty, which now has 27 member countries in the region, are designed ensure the creation, development and implementation of projects, initiatives, processes, and activities. While strictly adhering to the sovereign right to national self-determination and acknowledging the asymmetries in terms of resources and potential, these countries are creating the requisite conditions to complement their national energy systems in an effort to meet the energy needs of the Latin American and Caribbean people.

The clear intent of the Lima Convention is to further strengthen its member countries as a regional bloc, which is a vital strategy for international insertion to enhance the region's energy industrialization and consequent socioeconomic development.

In keeping with the objectives and duties set forth in Article 3 of the Convention, OLADE created the Regional Energy Integration Forum (FIER) as an opportunity for interaction to encourage its member countries to implement energy projects of common interest, foster direct negotiations among them and with other international financial or technical assistance bodies, and contribute to the development of resources and capabilities in the energy sector.

Over the past decade, the FIER has established itself as a regional energy integration event that provides a platform for policy agreements, a means to publicize outcomes, and a way to link energy needs with cooperation projects, technical assistance and international financing.

May this publication do honor to the FIER, its undertakings and achievements, and to the host countries and institutions that have lent their support and been a testimony to the power of integration as a catalyst for socioeconomic development in our region. ●

Looking Back on the Lima Agreement

Tatiana Castillo

SIEL specialist | Direction of Integration, OLADE

This review came out of a study by the Department of Integration on the contents of the initial Meetings of Experts and Ministerial Meetings of the Latin American Energy Organization (OLADE), from its inception to 1984.

A critical assessment was done of how the tenets of the Lima Agreement were upheld in the initial projects developed by the Permanent Secretariat of OLADE to determine the former regional energy situation, the role of OLADE, and outline its first energy integration projects. It assessed the asymmetries in terms of development, resource availability, energy needs, and other factors vital to the gradual coordination of policies, plans and activities aimed at joining efforts to promote the independent development of the Latin American and Caribbean bloc.

This article emphasizes two comprehensive projects launched by the Permanent Secretariat in the '70s, which were probably ahead of their time and failed to materialize under the existing conditions. They were abandoned as mere hopes, but could very well be taken up again today.



The Lima Agreement

— The idea to create a Latin American organization devoted to energy arose from the first Informal Consultative Meeting of the Latin American Ministers of Energy and Petroleum in Caracas, Venezuela, on August 21-24, 1972.

Subsequently, the 2nd Consultative Meeting of Latin American Ministers of Energy and Petroleum, held in Quito in April 1973, agreed to pursue the proposal through direct recommendations to the governments of the region seeking to gather statements of their political will to sign the agreement that would create OLADE.

Finally, on November 2, 1973, the Lima Agreement was approved and initially signed by government authorities of Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela. Subsequent ratifications of this Agreement completed the 27 countries that comprise OLADE today.

The principles of the Lima Agreement emphasize the sovereign right of all peoples to defend, protect and use their natural resources in their best national interests under international norms. It further highlights the use of energy resources as a factor in regional integration through measures to address economic imbalances caused by trade relations with industrialized countries having market economies.

The preamble to the Agreement states the need for OLADE to coordinate acts of solidarity to support the measures taken by its member states to protect their natural resources from actions, sanctions and coercion against their sovereign rights over those resources, especially their energy resources. It also mentions the importance of joint efforts to develop the region's energy resources through efficient, rational use in order to promote independent socioeconomic development.

OLADE: Beginnings

OLADE was born in a regional context marked by major imbalances between energy consumption patterns and the ability to satisfy them using local resources. This greatly limited the ability to implement national self-sufficiency policies, now known as energy sovereignty.

Oil was the main energy source in 1973, for both electricity generation and fuel production. According to ECLAC, at that time oil met 80% of all energy needs in the region and 60% worldwide.

According to statistics from the Latin American Energy Status Report presented by OLADE's Permanent Secretariat to the 4th Meeting of Experts (1975), of OLADE's 24 existing member countries, only 5 had achieved energy self-sufficiency, another 5 had done so partially, and the remaining 14 used imports to meet all of their oil needs.

Moreover, natural gas production was largely associated with oil production. Refining capacities remained stable and even declined by 3.6% from 1970 to 1973. Although water resources were abundant in much of the region, they were underutilized until rising oil prices incentivized hydro developments. Other sources included coal, which provided no more than 12 million tons per year. Nuclear energy was just emerging, primarily in Argentina, Brazil and Mexico. As for renewable energy, studies showed that there were significant geothermal sources, but few countries had undertaken projects to exploit them.

Ahead of its time, the Lima Agreement had the foresight to recognize the urgent need for integrationist, sustainable development



National Historical Archive Library Cotocollao. November 2, 1973.

Against this backdrop, **integration was an attractive option to meet the energy needs of the region and prevent major trade imbalances for oil-importing countries.** The economic situation of the vast majority of countries in the region did not favor the investments needed to reverse their energy situation.

Integration was an attractive option to meet the energy needs of the region and prevent major trade imbalances for oil-importing countries

Under these circumstances, the Lima Agreement, ahead of his time, proposed a cooperation and assistance organization to promote energy integration based on acts of solidarity for independent development of energy resources. To achieve these ends, the treaty creating OLADE proposed the promotion of effective national policies to ensure rational use of energy resources and to serve as a platform from which to design and implement regional energy policies that would enable its member countries to enter the international scenario as bloc.

Accordingly, the Lima Agreement gave OLADE such goals and tasks as coordinating interstate negotiations to ensure stable, sufficient energy supplies for the integral development of its nations, tending toward industrialization and the subsequent development and complementarity of infrastructure and means of transport.

To support these high aspirations, the treaty creating OLADE laid the foundations for a financial organization that would encourage and support energy project implementation in the region. This would gradually create an enabling environment for the development of a Latin American energy market that would help ensure its member countries a fair share in the benefits to be gained from regional energy development.

Ahead of its time, the Lima Agreement had the foresight to recognize the urgent need for integrationist, sustainable development in harmony with the environment.

Institutional Framework

To ensure that these overriding purposes were achieved, the Organization's founding countries laid solid institutional foundations that would enable energy policy making with strong technical support. Accordingly, they established the Meeting of Energy Ministers as a political body to steer OLADE with its guidelines, formed the Council of Experts as an advisory unit, and created the Permanent Secretariat to implement all efforts proposed by the Council of Experts and endorsed by the Meeting of Ministers. They also left open the possibility of creating other support agencies.

Thus, the Council of Experts emerged as a successor to the so-called "Meeting of Experts" that conceived the need and feasibility to create OLADE. This Council, composed of experts in energy, economics and international relations, was conceived from the beginning as a direct channel between the governments and the Permanent Secretariat. The first delegations were made up of multidisciplinary teams with expertise in energy and related fields, and officials with the political decision-making power and authority needed to take positions at the regular biannual meetings.

The Council of Experts was responsible, in strict compliance with the provisions of the Lima Agreement, for conducting the studies and implementing the activities mandated by the Meeting of Ministers, for submitting agendas, work programs, studies, and projects for the consideration of the Ministerial Meeting, and for advising OLADE's other permanent bodies on an ongoing basis.

As with the Meeting of Ministers, the Council of Experts was established as a permanent body whose activities were not restricted to its formal sessions. The work was organized through task forces formed by the delegations of the member countries. In this way, important initiatives and projects designed to meet the objectives of the Lima Agreement were prepared, presented and discussed.

This approach produced not only studies and policy guidelines on the regional energy situation in terms of hydrocarbons supplies, an inventory of studies and technologies applied to energy production, and a regional energy development plan, but also projects for the creation of OLADE's financial institution, the basis for a Latin American energy market, and other legal, financial and administrative proposals of no less importance, such as setting quotas and drafting the Organization's internal regulations.

Thus, OLADE entered the international community as an entity under international public law and a conglomerate of political wills towards a progressive model of regional energy integration.

Key Projects Undertaken in Observance of the Lima Agreement

Of all the topics, studies and projects prepared and reviewed by the Council of Experts, the creation of a Latin American Energy Bank and a Latin American Energy Market merit special attention, as they are still relevant to the present situation.

The Latin American Energy Bank

The ministerial mandate that instructed OLADE to create a banking entity was fully consistent with the objective set out in paragraph i) of Article 3 of the Lima Agreement, which says, "To promote the creation of a financial institution for energy projects and energy-related projects in the region." This autonomous institution related to OLADE would be empowered to raise financial resources from within and outside of the region, ensuring that they included no commitments or influences that would be harmful to any of the member countries or to the Organization itself. These funds would be used to finance studies, projects and programs for energy resource development in the member countries.

With this in mind, the 5th Meeting of Ministers recommended that studies be conducted on how to achieve these purposes. Following a review of the economic, financial and energy status of the region, with proposals from the member countries, the advice of the Council of Experts and the support of the Permanent Secretariat, studies for the creation of this financial institution were conducted on the necessary amounts of seed capital, the type of organization, its governing bodies, sources of funding, quota systems, voting formulae, and its relation to OLADE. A meeting of financial experts was planned for the presentation of the Permanent Secretariat's report, which included:

- Lending modalities to facilitate hydrocarbons trade in the region, seeking to streamline supply and, insofar as was possible, to substitute sources from outside of the region
- Guidelines for strengthening the direct involvement of governments through state-owned companies, thereby eliminating the intermediary of transnational corporations trading in hydrocarbons
- Ways to use internal financial resources to develop energy storage infrastructure in order to meet the needs of the Member Countries



Convenio de Lima, tratado adelantado a su época que supo identificar las necesidades del sector energético regional y lograr consensos de voluntades políticas para trabajar por la integración y el desarrollo de América Latina y El Caribe

- The means to achieve concrete targets to implement the regional energy program
- The role of OLADE in providing technical assistance and brokering to implement both the existing reciprocal payment and lending agreements, and those to be established in the future
- Establishing an investment priority policy built upon realistic foundations

The methodological proposal examined the background for negotiating it, initial and final drafts, relevant technical, legal and financial studies, an economic assessment, the required structures, its relation to other financial institutions, its duties and regulations, etc.

This project did not materialize, but over time became an account fed by voluntary contributions from member countries and donations from inside or outside the region, to be invested in national energy development projects.

The Latin American Energy Market

This project was based on the provisions of paragraphs e, l and m of Article 3, Chapter II of the Lima Agreement. It was conceived as an attempt to coordinate policies of supply and production, export and import, transport, payment, and financing for energy products, to facilitate and boost trade among Latin American countries. The market, based on an understanding of the economic situation in participating countries, would seek to ensure a stable supply of hydrocarbons under favorable terms. It centered around promoting the conditions to ensure rational distribution of production in Latin America and, insofar as was possible, to prevent fundamental, persistent economic disturbances. It was anticipated that the only participants in this market mechanism would be governments through their state-owned enterprises or government agencies charged with managing the oil policies of each country.

Implementing this mechanism would ensure a regular supply of hydrocarbons among the countries of the region by streamlining trade among them. Its organization was envisioned to have the following instruments:

- a) An Annual Supply Program
- b) A Specific Financial Program
- c) An Alternative Program
- d) A Negotiated Program

This draft also included the Permanent Secretariat's thoughts on oil and gas transportation and the need to convene a meeting of experts from among the member countries to study measures aimed to develop international transport rates for the Latin American region and to use the existing transport capacity among the countries of the region that had state-controlled companies. There was also a review of the conditions for drawing up agreements among the countries and transportation companies, as a way to strengthen those under state control and foster the creation of multinational public-sector companies in the region.

OLADE proposed gradually creating the conditions to ensure rational distribution of production within the Latin American region, in order to avoid fundamental, persistent economic disturbances as far as possible.

Regarding the organization of this market, it was not based on an intention to be a means for the integration of markets for energy products. Rather, it was designed as a system that, based on a thorough understanding of each Latin American country's needs, current production capacity, exportable surplus, purchase and sales prices, means of transport, etc., would foster negotiations under conditions that, without undermining the economic positions of each country, would provide advantages over suppliers from around the world in all things relating to negotiation with producers in other areas or with transnational trade or carrier corporations. The structural mechanisms of the Latin American Energy Market would function under OLADE's Permanent Secretariat through data collection, studies and the promotion of bilateral or multilateral negotiations.

The momentum that had begun to take shape around this comprehensive initiative under the Lima Agreement dwindled over time, due to the complexity of implementing it in the short and medium term, among other things.



Considerations

This historic overview of the OLADE's key projects during its early years calls us to reflect on whether these initiatives would respond to the challenges currently facing the regional energy sector and the need to grow beyond the institution's present identity and recognize the impressive relevance of the Lima Agreement, a treaty ahead of its time, which identified the needs of the regional energy sector, and reach a consensus of political wills to work for the integration and development of the Latin American and Caribbean region.

To this end, OLADE proposes submitting a ministerial decision to the Meeting of Ministers to conduct a joint study by the Council of Experts and the Permanent Secretariat to review the work of OLADE since its inception and compare the projects developed with the observance of the objectives and tasks set for the Organization in the Lima Agreement.

As a result, this study will outline the groundwork needed to address once again the challenges faced by the Organization from the beginning and focus its efforts on the real reasons it was created, thereby ensuring that efforts are made to promote concrete interstate undertakings that will benefit regional energy integration and the sustainable development of our Latin American and Caribbean peoples, and strengthen the role of energy as a key factor of progress. ●

The Evolution of **Energy Integration** in Latin America and the Caribbean, 2004-2014

David García

Consultant of the Direction of Integration, OLADE

Institutional Frameworks and Energy Integration

The historical evolution of integration processes in Latin America has been described from diverse perspectives. Over time, it has given way to the establishment of multilateral organizations that have contributed to building and consolidating common institutional frameworks. Integration agreements reached in the past two decades have strengthened sub-regional capabilities, policy-centered integration models, and others with a more business approach (Ruchansky, 2013).

The new millennium has brought a change of perspective, and some academics even say that it reoriented the integration paradigm through efforts to strengthen the role of the State in making commercial, policy and economic decisions. The beginning of the 21st Century saw the emergence of institutions such as the South American Community of Nations (CSN) and the Bolivarian Alternative for the Americas (ALBA) in 2004, the latter having members throughout South America, Central America and the Caribbean. In 2007, the South American Community of Nations became the Union of South American Nations (UNASUR). In addition, the

project of the Community of Latin American and Caribbean States (CELAC) became a reality in 2011.

According to Delich & Peixoto (2010), the region has two integration models, which have been reconfigured according to the direction and scope of its business needs. The first is the Pacific model, which brings together Mexico, Chile, Peru and Colombia, the countries that signed FTAs with the USA and have an interest in strengthening trade relations with Asia. The other is the Atlantic model, organized around Brazil and Argentina (Delich & Peixoto, 2010). Although integration agendas and processes have been permeated by externalities, it is noteworthy that the countries have a will to integrate, which poses the need to work together (Gonzalez, 2010).

Institutional frameworks play a significant part when deciding on integration models. Since discussions began regarding the need for integration among the nations of Latin America, it has been a challenge for countries to accept its supra-national nature. Nevertheless, supra-nationality is an essential pillar of true integration, which requires rising above local and national level to build an integrated community with a broader outlook and shared rules that are preferential and mutually enforceable in a timely fashion (KAS 2010).

Having implemented a model of open regionalism and experienced the impacts of economic crises, the countries and blocks of the region have followed their own dynamics and built agreements based on the competitive advantages offered by trade partnerships. The internal heterogeneity and lack of specialization among the countries of the region drove some of them to enter into trade liberalization treaties, which in practice have limited the possibilities of achieving economic and trade integration within the LAC region.

Energy integration has shown to be a necessary, achievable goal in the pursuit of economic growth for the region (Fuser Santos, 2014), and is vital to economic development and complementarity. The concept of energy integration transcends the liberal notion of economic and commercial unification of energy resources between countries. It takes into account the development and coordination of capabilities among states and organizations for the sustainable, efficient development and use of energy resources.

Complementarity is not merely a matter of sharing resources. It is also a process of integrating production capabilities, which tends to enhance the competitiveness that countries need in order to foster their development. Institutional frameworks for integration have followed this view and sought to boost and strengthen the industrialization of energy-related value chains and to foster relationships among state-owned energy companies through partnerships whose features depend on each country, particularly its policies and regulations (CAF, 2013a).

The energy integration paradigm has different connotations in the different sub-regions. The three integration scenarios (Central American, Andean and Southern) show differences in terms of establishing common frameworks. Following various reforms to the integration structures of LAC, the past decade has seen new trends. The presidential summit that provided the framework for the 2002 Guayaquil Consensus on "Integration, Security and Infrastructure for Development" strengthened the process of regional infrastructure integration in South America. The Central American strategy also focuses on boosting the Central American Electrical Interconnection System (SIEPAC). In the Andean region, the foremost interconnection agreements between countries are those of Colombia–Venezuela, Colombia–Ecuador and Ecuador–Peru.

The 2005 Caracas meeting of South American energy ministers showed that some states are interested in renewing and coordinating the negotiating power of energy agreements through strategies designed to enhance their complementarities and the benefits of trade. However, it was not until 2007 and the first energy summit, that the presidents of UNASUR addressed the importance of complementarity and integration in the Southern region.



Despite this expression of will, no concrete political results were forthcoming. In fact, aside from developing the Energy Security Treaty, it was only after 2009, when the impacts of the international economic crises had become evident, that energy issues were addressed for the countries of UNASUR. At subsequent summits, energy discussions centered on the need to encourage investments, especially in renewable energy and energy integration, to make exchanges more efficient through various distribution networks and cross-border trade.

Two significant initiatives have sought to strengthen integration in the past ten years, namely Petrocaribe in 2005 and the Energy Security Treaty (TSE 2007). Other projects, such as the Mesoamerican Energy Integration Project (PIEM), the Central American Electrical Interconnection System (SIEPAC) and the Central American Regional Electricity Market (MER) have enhanced the capacities for exchange among countries from Mexico to Panama and enabled them to interconnect with Colombia.

Despite this progress, institutional barriers are still apparent. The points of reference on which regional integration is based follow two perspectives. The first is functional and centers on institutional frameworks such as community law, among which the CAN stands out with its own regulation-based structures. The second is neo-functional and arose from practical relations among countries seeking an intergovernmental organization to coordinate their wills and needs for integration associated with economic and political restructuring efforts such as UNASUR, ALBA, and others.

The institutional perspective requires understanding that social and organizational approaches include sets of customs that often take the form of legal obligations. In that sense, according to Gehring, integration requires coordinating decision-making and regulations as a result of a process that leads to institutional change (Santos, 2014). Institutional frameworks can be seen as part of integration processes under normative treaties that apply to joint agreements, which include regulations that are autonomous from their party countries. Also involved are non-formal developments that express intentions but are not within the governmental institutional frameworks of the states comprising them.

Cisneros (2009) highlights the importance of institutions to integration efforts, because they guarantee the legal security of energy exchanges (Cisneros, 2009). Accordingly, the integration effort has included numerous attempts to reach multilateral agreements, which historically have been largely unsuccessful, while bilateral integration efforts have prevailed for the most part. However, there have also been discrepancies at the bilateral level, in terms of energy supplies from both hydroelectric plants and natural gas (Ruiz, 2010).

Institutional Developments from a Sub-Regional Integration Standpoint

Over the past ten years, there have been several developments related to the institutional and regulatory aspects of energy agreements. However, it has been difficult to harmonize integration schemes due to domestic regulatory reforms, differences among power supply regimes, loss of trust in agreements due to non-compliance, international price variations, uncertainty of resource availability, lack of funding for infrastructure development, and socio-environmental conflicts.

According to Moreno (2015), regional integration can be expedited and deepened by promoting the energy and infrastructure sectors on a regional scale, despite the instability and uncertain future of the international environment, as long as proper use of the regional energy capacity and its vast natural resources is ensured (Moreno, 2015). Accordingly, an integration strategy must leverage the advantages of local economies through their energy production, based on diversification and the ability to harness the cost-efficiencies of scale.

For example, the experience of some MERCOSUR countries shows that contracts have contingencies related



to supply and demand shocks. Internal energy market imbalances highlight the need to improve the design of contracts governing private sector participation and to enhance public policy coordination (Navajas, 2008). Furthermore, bilateral interconnection agreements are associated with sovereignty over electricity surplus between Paraguay and Brazil, as well as Argentina (the Itaipu and Yacyreta hydroelectric plants).

Within the framework of the Andean Community (CAN), decision 536 of 2002 was passed to regulate electrical interconnections and intra-community trade in electricity. However, conflicts arose between Colombia and Ecuador due to co-management revenue sharing, which in recent years has been allocated to Colombia. As of August 2004, as a result of an inquiry of the Regulatory Bodies, proposed by Ecuador, exports to Ecuador were included as part of the demand served by the Colombian market (CAF, 2009). Recently, temporary suspension of Decision 536 was proposed in order to modify it and study other aspects that had not been adequately regulated, such as emergency supply, since Andean legislation establishes the principle of non-discrimination of markets (Ruiz, 2010).

In the case of the countries of the Central American Electrical Integration System (SICA), integration has centered on the SIEPAC project, which seeks to establish electricity interconnections in a regional power market. This initiative, developed as part of the Mesoamerica Project, formerly Plan Puebla Panama, has made significant progress towards integration. However, despite the progress made in terms of infrastructure, the process has been quite complex institutionally. First of all, SIEPAC operation has had frequent delays due to increased costs, manufacturer defaults and redesigns, which have prevented countries such as Panama and Colombia from interconnecting. Secondly, although the countries of the sub-region have adapted to the institutional framework, which has enabled the MER to introduce power-market mechanisms conducive to competition and cost efficiency, nevertheless other matters like long-term contracts are incompatible with domestic demand.

Central America has a large demand for hydrocarbons, especially natural gas. The 2005 Cancun meeting reaffirmed the commitment to supply its countries through the PIEM using an interconnection strategy. It proposed building a refinery in Central America, at a site to be defined by private investors, and boosting Central American natural gas consumption by building a gas pipeline stretching nearly three thousand kilometers from Mexico to Colombia, including the construction of a regasification plant to create a natural gas distribution system for the region. However, these projects are currently on hold because an offer to supply hydrocarbons from Mexico has not been realized (Ruiz, 2010).

The particular case of the Caribbean islands is different from the rest of the region. Bear in mind that, being a cluster of islands, geographic interconnection represents a challenge to optimal energy integration development. However, cooperation initiatives developed by Venezuela through Petrocaribe have made it possible to improve substantially the energy performance of the islands.

The LAC Energy Status

Latin America and the Caribbean have a heterogeneous distribution of energy resources, whose development depends on the generation capacity of these economies and their ability to produce added value. In principle, this is what makes complementarity possible in the integration process, as it generates comparative advantages for resource exchange. Despite the advantages of resource diversity, production capacity is limited and the economic foundations of most countries support only incipient industry that cannot fully compete and integrate.

Latin America and the Caribbean account for 4% of primary energy production worldwide. The internal energy mix features primary supplies of 44.3% oil, 22% natural gas, 18% biofuel, and 9.9% hydropower, which is one of the

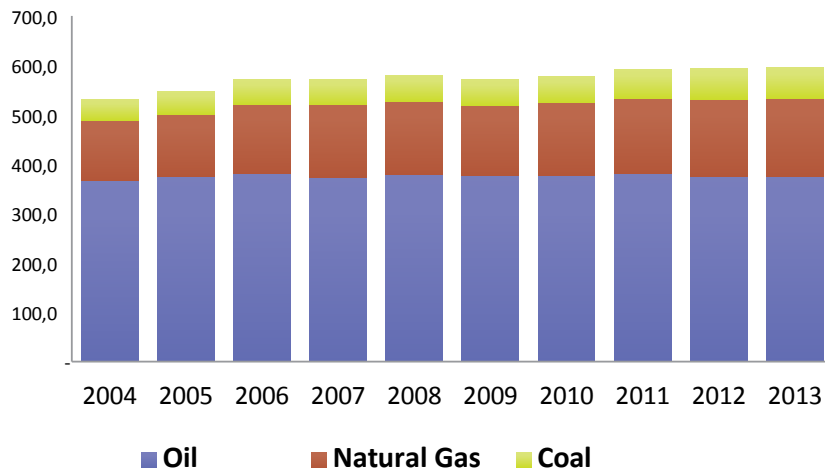


most important sources for electricity transformation and supply. The region's oil reserves account for approximately 20% of global production, with proven reserves of 329.6 mmbbl, more than 90% of which pertain to Venezuela. This gives the region a reserve margin of over one hundred years compared to global reserves, which have an average availability of about 53 years, and those of the Middle East, with a reserve margin of 78 years.

Global natural gas reserves are concentrated in the Middle East, which has a reserve margin of over one hundred years. In LAC, the reserve margin is 43.5 years, with a 4% share of global reserves, which is 185.7 million cubic feet, with a reserve margin of 55 years. Venezuela has the largest natural gas reserves in the region, with a margin of over a hundred years. The largest concentrations of coal reserves are in Europe and Eurasia, with an estimated proven reserve margin of 254 years for different types of coal, followed by the countries of North America, with reserves for 250 years. The LAC region has a proven coal reserve margin of 149 years, and the countries with the largest reserves are Brazil and Colombia.

Primary resource production (gas, oil and coal) in 2013 was 631 million tons, and the average yearly growth rate over the past ten years has been 2.1%. Oil production in the region is 9.1% of the global total, and Venezuela and Brazil are the two largest producers in the region. Natural gas is 5.2% of global production, with Argentina and Trinidad & Tobago being the region's largest producers. Coal is 1.6%, and Colombia has the largest production capacity

Figure 1. Oil, Gas and Coal Production Latin America and the Caribbean

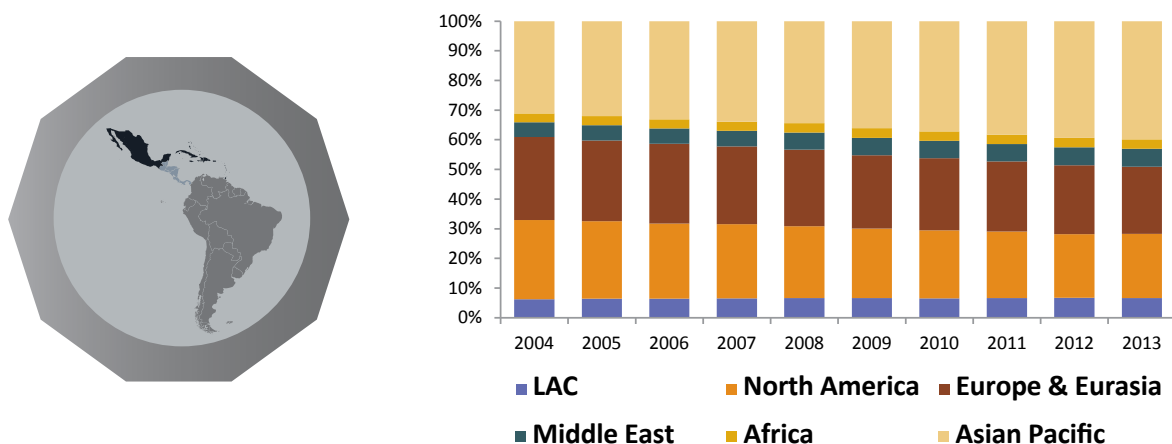


Source: BP Statistical Review of World Energy Natural Gas and Coal in MTOE

On the other hand, Latin America's total installed power capacity is almost 190 GW, excluding Mexico and Venezuela. Of this amount, 120 GW (63%) are hydropower plants, 13 GW (7%) are from non-emitting sources (wind, biomass and small hydropower, geothermal and nuclear power plants), and 57 GW (30%) are from thermoelectric plants burning fossil fuels (natural gas, coal and oil (CIER-CAF, 2012)). Installed power generation capacity has almost doubled over the past two decades, from 157,000 MW in 1990 to 307,131 MW in 2010 (García & Garcés, 2012).

Hydroelectric generation has become more important to energy transformation and exchange among the countries. Accordingly, the capacities of this resource to supply power to the region have been harnessed, and nearly 87% of the population has access to electricity. Another high-percentage resource for power generation is gas, which together with coal accounts for about 20% of the fuel used for generation. The largest electricity producer in the region is Brazil, and the largest exporter is Paraguay.

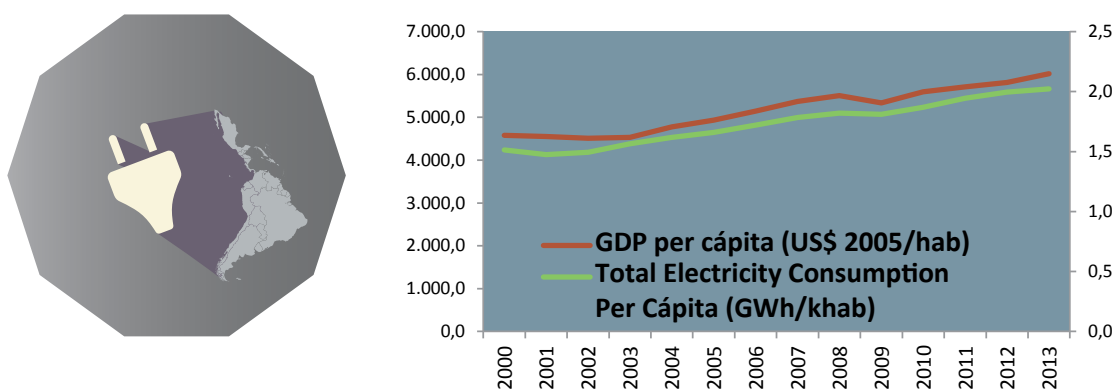
● **Figur2 Primary energy consumption by region (MTOE)**



Fuentes: BP Statistical Review of World Energy.

Total energy consumption worldwide has been growing at a rate of about 2% per year, due to growing energy needs in developing countries, especially China and other Asian countries, which consume 36% of global energy supplies. As a region, LAC consumes about 6% of all primary energy, which in the past ten years has maintained the same levels with no major change. The countries of Europe and Eurasia represent 25% of all energy consumed, although total consumption levels declined from 28% in 2004 to 23% in 2013. North America's consumption trend has also maintained the same levels at approximately 21% of global consumption.

● **Figure 3 GDP and electric power consumption per capita for Latin America and the Caribbean Sea**



Fuente: SIEE OLADE.

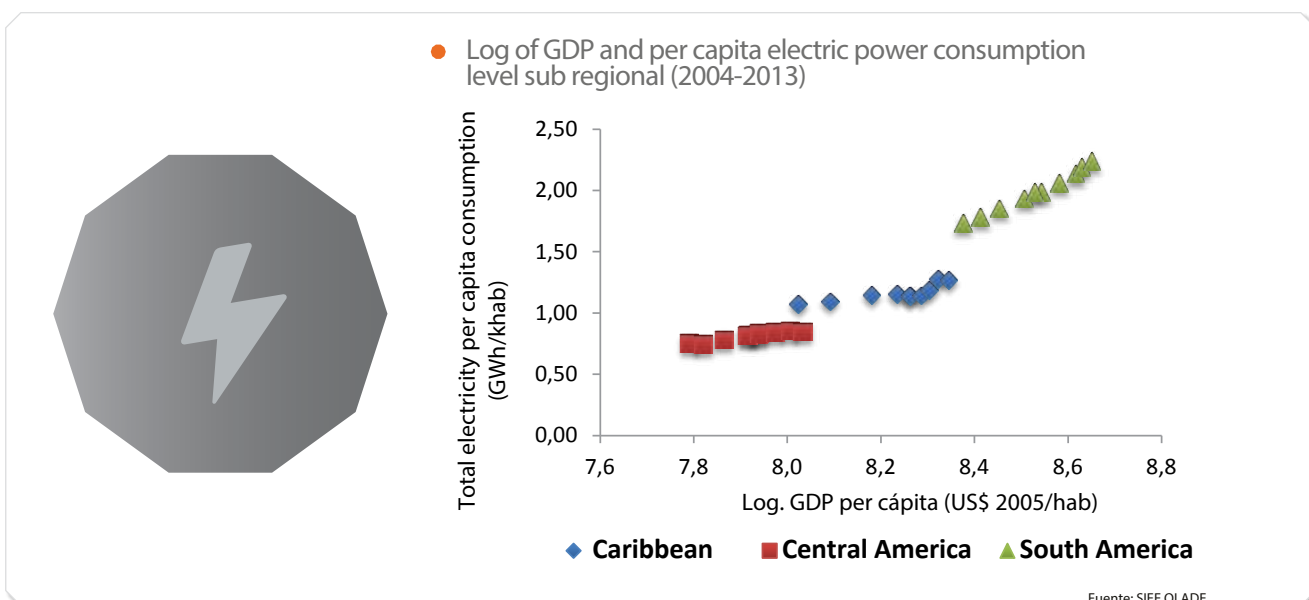
Energy Resources and Production Integration in LAC

Historically, the capacity of the LAC region to adjust to variations in external impacts on the economy is associated with its institutional features, efficient management of economic policies, and growth measures. Citing Altomonte (2008), since the trade liberalization of the early nineties, the region's growing international involvement has led in turn to increased specialization in the energy industries, in which the region has concentrated its comparative advantages. This structural trend, caused by globalization-induced trade liberalization and economic specialization, has sharply increased the industrial sector's overall energy content and subsequent energy intensity since 1990 in several countries of the region (Altomonte, 2008).

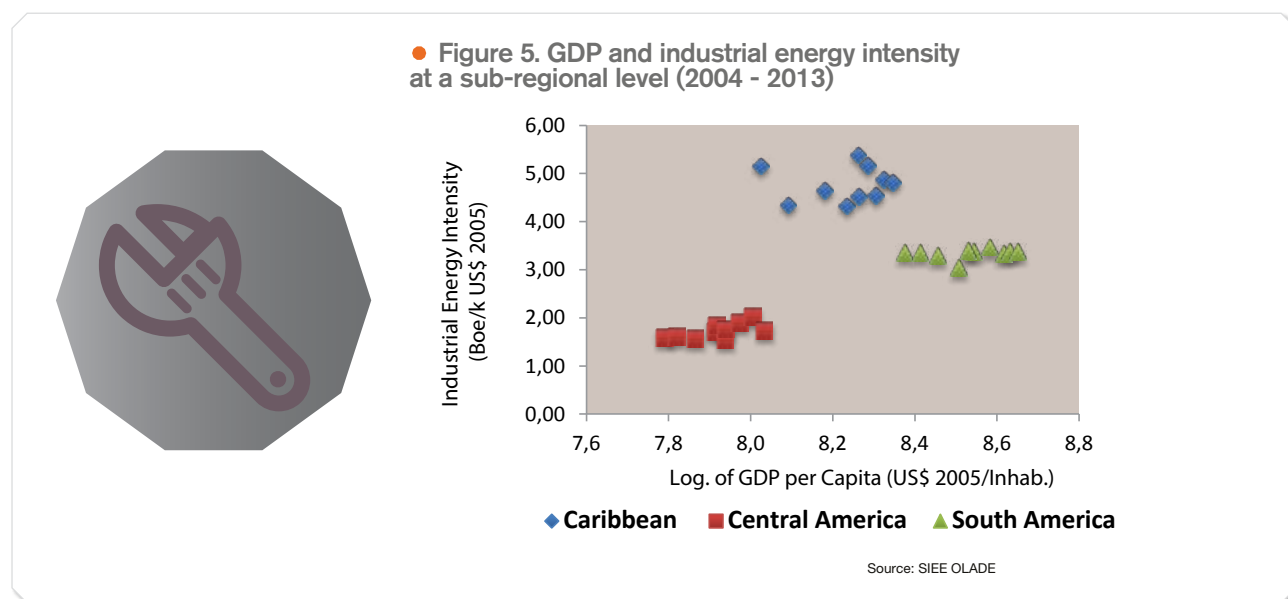
Accordingly, one could ask how productive the economies of LAC are in terms of energy resources. Energy productivity is associated with efficiency and technical progress based on growth in production. Liang & Mei (2005) define productivity as the energy consumption/production ratio. Productivity differs from energy efficiency in that the former relates to the energy units consumed to produce a good or service, while efficiency has to do with using fewer units to produce more goods or services. In terms of production, energy efficiency means lowering production costs, while productivity is only a measure of capacity.

There is a direct relationship between energy consumption and GDP, both of which have grown in the region over the past ten years. The evolution of energy trends, which relate energy intensity to per capita production, depends on social and productive characteristics and the degree of development achieved. In high-income economies, it is expected that as per capita income grows, structural and technical changes will enable efficient resource use. However, the flattening of the energy efficiency curve is due not only to recent dynamics associated with the issues described above, but also to economic policies and industrial planning, which have failed to encourage higher investment to improve conditions.

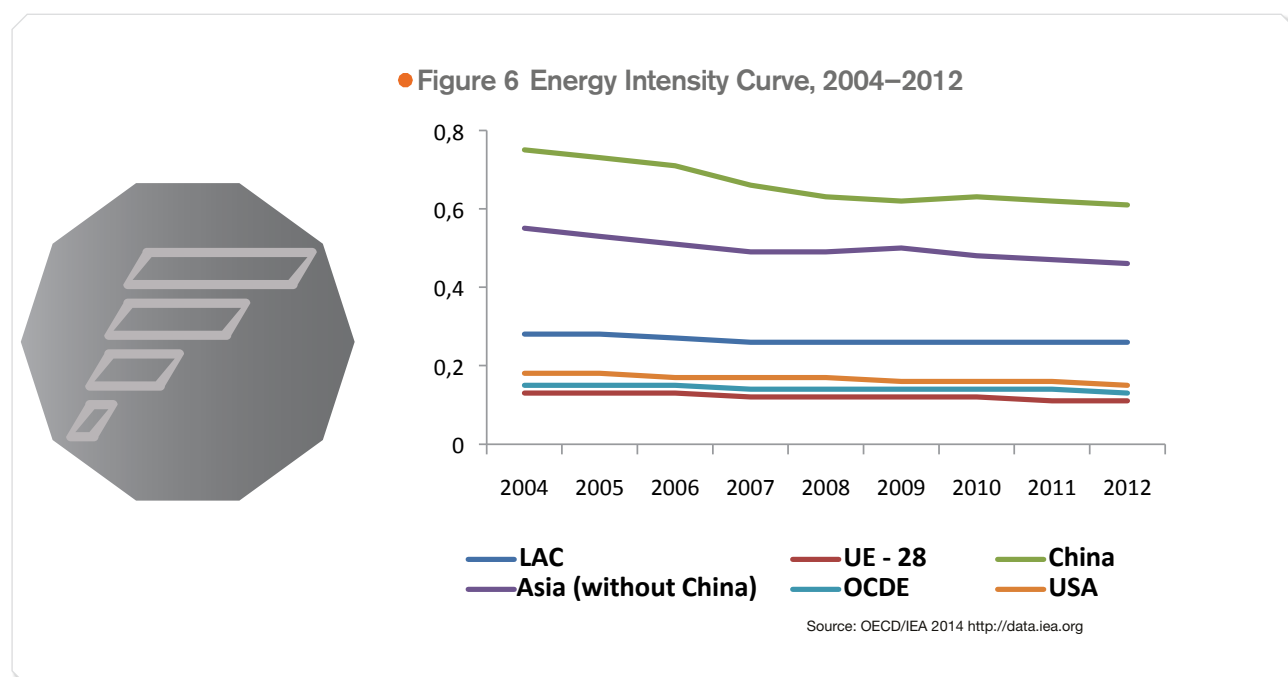
On a sub-regional level, per capita energy consumption is directly proportional to income. It is higher in the countries of South America and much lower in Central America despite having an integrated energy economy, and is consistent with the region's growth performance (Figure 4). One way to understand the economic impacts of resource production and consumption is to analyze energy intensity, which is an efficiency indicator in that it calculates the resource consumption/GDP ratio. Energy intensity relates to how much energy is required to generate one unit of GDP, how much is consumed to move one vehicle, the amount consumed per household or per inhabitant, and the amount per type of service or industry (Baza, 2006).



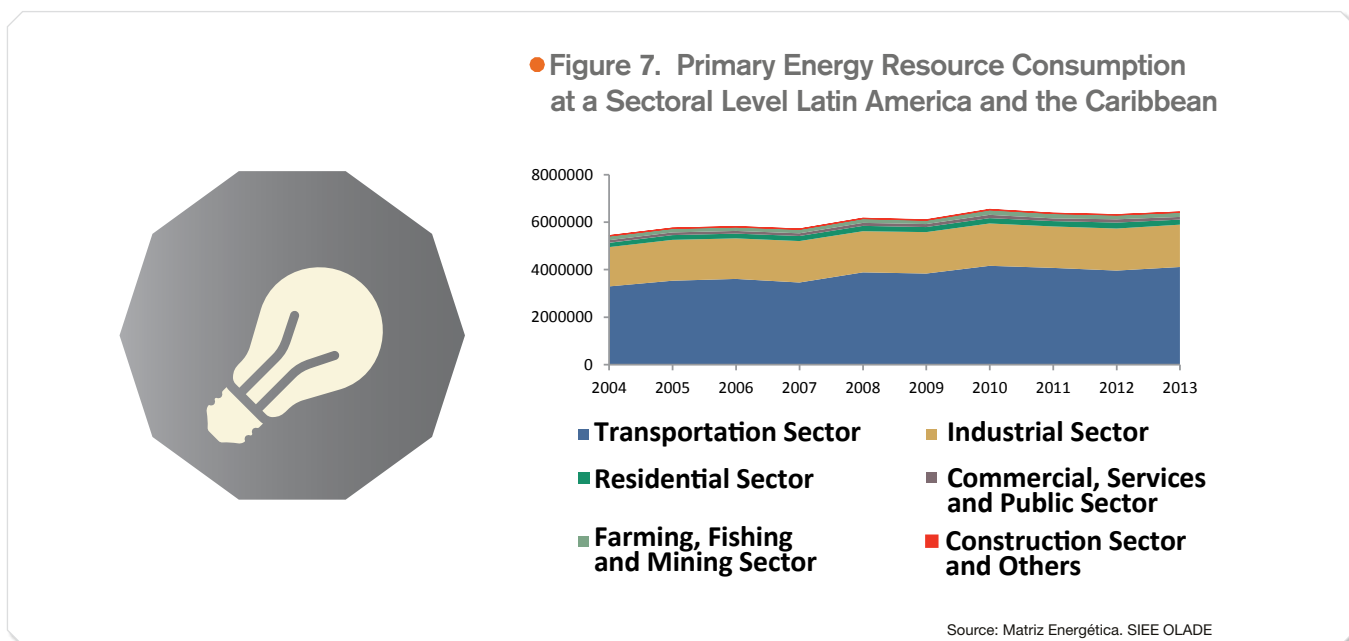
Although power consumption is higher in South American countries, the industrial energy intensity/GDP per capita ratio is higher in the Caribbean sub-region and much lower in the countries of South and Central America (Figure 5). This shows that the industrial sector generates little added value and that sectoral production is poorly integrated. It is due to an economic structure that is concentrated in primary sectors, low economic vitality caused by commodity prices and dependence on exports, lack of investment to increase energy efficiency and, finally, per capita electricity and transport consumption patterns that form as developing countries converge towards higher income levels (Altomonte, 2008).



The energy intensity of LAC is below that of Asia and above that of Europe and the OECD countries. The LAC region currently consumes 1% less than in 2004 to produce one unit of output (Figure 6) due to technological factors that make production more efficient, because economies with more industrial development have higher energy efficiency.



Energy mix structures show that the region's broadest supply variations have been in primary resource exports, primarily oil at around 40%. Although the trade balance for primary resources shows no deficits, import variation has been greater than imports. The industrial sector is the largest primary resource consumer, primarily associated with extraction activities in South American countries. Central America shows higher import levels for primary energy resources. The residential sector comes in second, consuming 17% of all primary production and approximately 5% of total hydrocarbon supplies such as gas and coal (Figure 7).

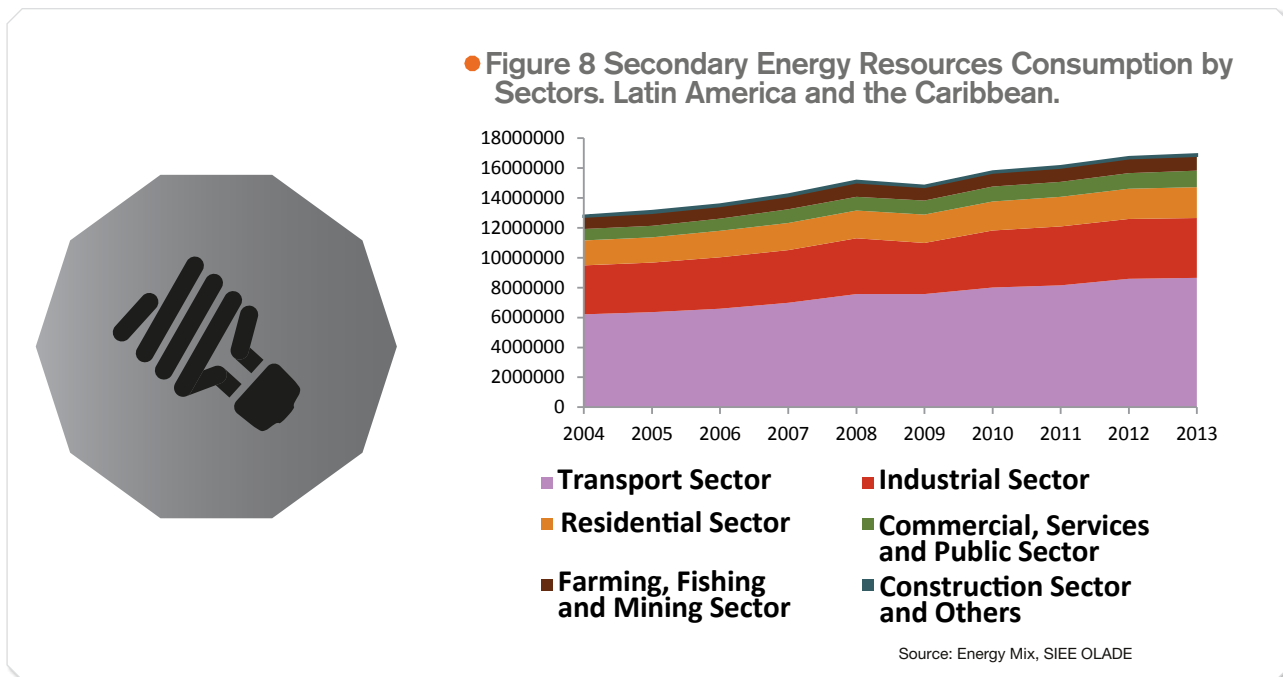


Energy resources from transformed or secondary sources show wider import variations, while production levels remain stable. The largest secondary source is electricity generation, followed by diesel and gasoline. Each source has its own dynamics, especially at the sub-regional level. While electricity production is high in the countries of South America, approximately 4% of all production goes to net exports in the countries of MERCOSUR and the Andean Community, and most fuels are imported due to the region's dearth of refining capacities. The recent economic crises significantly impacted overall production and supply performance for both primary and secondary sources. In 2009, import variations were significant, but commodity prices favored recovery and helped increase productivity.

The sectors with the highest consumption of secondary energy sources were transport, industrial and residential, in that order. Electricity intensity was higher in the LAC industrial sector, while fuel use grew for productive transformation (Figure 8). One industrial performance hypothesis, taking into account the rising commodity prices, fuel prices and costs associated with industrial production, would be to assume that regional production integration declined as the primary sectors grew. This is reflected in patterns of energy-related trade and intra-sectoral complementarity among the countries of the region, which enabled specialization in terms of exploitation and primary resources, and resource transformation from external sectors.

Considerations

In the energy context, integrating production depends on the ability of domestic sectors to interconnect and achieve economies of scale to enhance resource utilization. Cooperation by these sectors with other economies provides a minimally efficient capacity to achieve competitive advantages in terms of resource use and production. In other words,



the region should not only establish resource-sharing complementarities, but also build institutional frameworks to enable greater production interconnections, in order to promote its competitiveness and integration capacity.

The above sections reviewed the relations between energy integration and economic performance among the LAC countries. While future aspects in the region are unclear, there remain many challenges to energy integration and sustainability. Regional resource use has followed an upward curve to ensure higher levels of income, but heavy dependence for commodities, low diversification of production, and lack of internally generated financial capabilities do not favor substantial improvements in production integration and energy sustainability. Production integration is a process that goes hand in hand with enhancing the conditions for competitiveness, and interconnecting production factors. LAC has the physical capital needed to improve these conditions in terms of energy, but needs to review the added value that the sector can generate, starting with human factors, and the possibilities for mobilizing capital on a regional scale.

Guaranteeing energy sovereignty and security requires strengthening regional integration, from the policy level to the economic level. Since 2004, conditions have been stable for integration, but institutional challenges remain due to the persistence of mutual conflicts that hamper full implementation of bilateral and multilateral agreements for development and physical integration. ●

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FIER: Ten years building energy integration in Latin America and the Caribbean

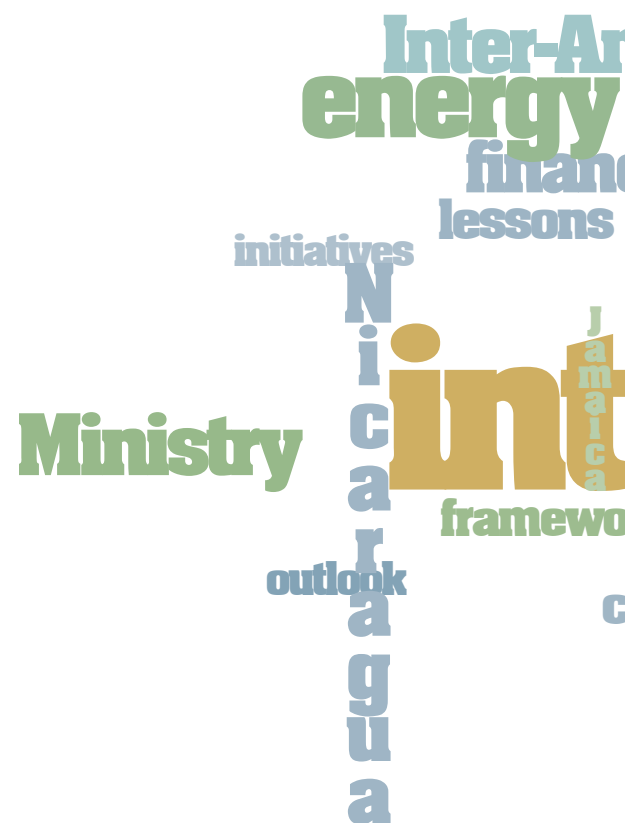
Lennys Rivera

Director of Integration, OLADE

Below is a brief summary of the Regional Energy Integration Forums (FIERs) held from 2006 to 2014, highlighting the key themes and conclusions that OLADE would bring to the attention of its member countries.

The FIER is celebrating its tenth year as a place to meet and exchange energy integration experiences among energy authorities and experts in Latin America and the Caribbean.

Through this summary, OLADE acknowledges the host countries of these gatherings and all the institutions that share and support the vision of an increasingly integrated Latin American and Caribbean region.





Target Population

Authorities of energy ministries, regulatory agencies, planning institutes, electric utilities, and oil and gas companies in the member countries; experts from international organizations; private sector representatives, investors and project developers; and university representatives and energy integration experts of international renown.

Background on the creation of the Regional Energy Integration Forum - FIER

Interview by Marcelo Ayala

EX Executive Secretary Alvaro Rios

What was the purpose for creating the Regional Energy Integration Forum in 2006? What motivated its establishment?

To generate a dialogue in which the Ministers of Energy would be the drivers of integration processes, but also with the engagement of the private sector.

Can you tell us an anecdote or peculiar experience regarding the FIER events in which you have participated?

I never thought we could bring together 17 Ministers at the first FIER in Mexico. It was exhausting, but also exciting to achieve that.

Did you ever think that the FIER would continue until today?

No, because institutional arrangements are extremely variable in Latin America.

What goals should the Organization set for the FIER?

I still maintain that energy flows among countries require supranational legal frameworks and stable integration platforms.

Why is energy integration important for the countries of Latin America and the Caribbean?

The synergies among our countries' demand and supply systems bring efficiencies to the energy economy, and we should utilize them for the benefit of the region.

Do you think these 10 years of FIERs have produced consensus among the countries of Latin America and the Caribbean that have laid the groundwork for regional energy integration?

I would say not. What we have in the region are bilateral relations, not regional integration, but we should not give up; we need to keep trying.

Interview with the ex Executive Secretary of OLADE, Mr. Alvaro Rios Roca (2006-2007) ●

Specific Objectives

- To present the lessons learned and challenges of Latin America's experience with regional integration
- To publicize the role of key stakeholders, both public and private, in regional energy integration
- To study regulatory, institutional and commercial factors as the pillars of energy integration in the region
- To showcase the role of new technologies and human talent in developing energy integration projects
- To put forth proposals for strengthening energy integration from a vantage point of sustainable development and international cooperation



AGENDA

- Plenary session: Integration as a driving mechanism of investment
 - Panel 1: Infrastructure projects in natural gas
 - Panel 2: Electricity infrastructure projects
 - Plenary session: Point of view of public and private gas and electricity companies
 - Plenary session: Integration experiences in Europe
 - Plenary session: Point of view of regional organizations on the integration of Latin America and the Caribbean
 - Plenary session: Complementarity, cooperation and partnership among energy utilities
- Panel 3: Importance of legal frameworks for energy integration
- Panel 4: Determination of gas prices in a context of regional integration
- Panel 5: Settlement and conflicts resolutions mechanisms between countries
- Panel 6: Social, environmental responsibilities and poitin of view of the States and civil society on energy integration
- Plenary session: Presentation of findings of the Forum
- Plenary session: Ministerial presentations (Argentina, Barbados, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay and Venezuela)

CONCLUSIONS

- There is a need to continue fostering the standardization of rules and promotion of regional treaties or agreements on energy.
- The governments' role is a key aspect in the development of regulatory frameworks to encourage public and private investment.
- Regional experiences confirm that energy integration is a condition for sustainable development in Latin America and the Caribbean, and it must be addressed with supply security objectives at regional level.
- Integration should consider clear rules that provide legal security, a prerequisite to attract required investment for the development of energy markets; both in trade surplus as in bi-national interconnections, which are only the first steps toward real energy integration.
- If investments are the basis of economic development of the region, the regulatory framework is, therefore, a priority for the States.
- The existence of a dispute resolution Center between the States must be considered where regional and subregional integration organizations can participate through a countries' mandate that so manifest.
- The entry of LNG to the different sub-regions will set a new stage of rather international than regional prices.





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II FIER

From Planning to Action: Regional and Subregional Energy Integration

AGENDA

- Plenary 1: Progress in the implementation and operation of legal frameworks on natural gas and electricity and integration agreements by sub-regions
 - Plenary 2: Initiatives and proposals of sub-regional integration
 - Panel 1: Hydrocarbons Binational Projects
 - Panel 2: Electricity bilateral projects
 - Plenary 3: Strategic partnerships between public and private companies and their role in integration
 - Plenary 4: Energy planning, experiences and its importance in integration
 - Panel 3: State-owned enterprises transformation, regulatory framework and business management
 - Panel 4: State-owned oil companies or electric power companies, management and use of renewable energy
- Plenary 5: The private sector and climate change
- Plenary 6: Biofuels and social development
- Roundtable of Energy Ministers on Integration and Energy Supply



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AGENDA

- Opening Plenary Session 1: Global and Regional Energy Outlook
 - Panel 1: Regional and Subregional Energy Integration Initiative • Panel 2: Integration of Energy Markets: Role and Public - Private complementarities
 - Panel 3: Legal and Financial Mechanisms: Its importance in the regional and subregional integration
 - Panel 4: Public - private infrastructure projects and its contribution to regional energy integration
 - Panel 5: Peaceful Uses of Nuclear Energy in Latin America and the Caribbean
 - Panel 6: Development of New Energy Technologies and Sustainability
- Closing Plenary Session 2: Path to Power Integration



CONCLUSIONS

- Panel 1. Presentation of integration initiatives and proposals: Mechanisms, agreements, programs and projects, the progress of integration experienced by the Caribbean Community and its 2008 energy development Comprehensive Plan.
- Panel 2. Presentation of regional and subregional experiences in integration of energy markets in Mesoamerica, the Caribbean, the Andean region, the Southern Cone, Argentina's energy ministry and experience in Oil and natural gas from Trinidad and Tobago.
- Panel 3. Presentation of an overview on legal, regulatory, financial mechanisms and tools from the perspective of the World Bank, IDB, CAF and the FIDE of Mexico for training and availability of funds.
- Panel 4. Presentation of the development of new investments and projects in the energy sector, interconnection progress between Central America, Mexico and Colombia and binational experiences in Hydropower between Brazil and Argentina.
- Panel 5. Presentation of current state of infrastructure, research and innovation from the point of view of the IAEA and the current state of development of atomic energy in Brazil, Argentina and Mexico and future prospects.
- Panel 6. Presentation of the progress of new technologies, investments and infrastructure projects and their environmental implications for sustainable energy.
- Closing Plenary Session 2. Presentation of the path to energy integration with the various institutional activities related to this topic, such as CIER, ECLAC, ARPEL and OLADE with emphasis on strengthening institutional cooperation.



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IV FIER

Development of energy efficiency projects as elements of regional integration

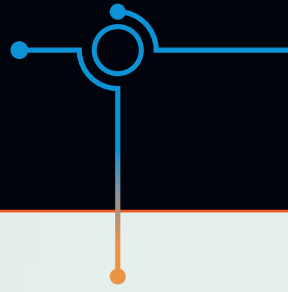
AGENDA

- Opening Plenary Session: Global and Regional Energy Outlook
 - Panel 1: Energy Efficiency in today's world and particularly in Latin America and the Caribbean
 - Panel 2: Presentation of Regional and Subregional Mapping on Energy Integration in Latin America and the Caribbean
 - Panel 3: Successful Experiences in Developing Energy Efficiency Projects as Integration Elements
 - Panel 4: Policy and Essential Regulatory Frameworks to Enhance Energy Efficiency
 - Panel 5: Strategic Alliance for Sustainable Energy Development in Latin America and the Caribbean, a roadmap common proposal
- Field visits FIER IV
- Closing Plenary Session: Executive Summary

CONCLUSIONS

- The Energy integration is a long-term process that requires shared vision, joint planning, consensus range, alliances, agreements, resources availability and approval of rules to go from national and subregional markets to regional energy markets.
- It is essential to have strategies, policies and clear guidelines for joint energy management, to prioritize energy issues according to the regional context; they must also reflect the needs and requirements for the development of a common regional energy agenda for Sustainable Energy Development in Latin America and the Caribbean with a long term approach.
- Energy integration in Latin America and the Caribbean should be used by the countries as an important tool for promoting social, economic and environmental development and contribution to poverty reduction. In this sense, it is necessary to reiterate the commitment to universal access to energy as a civil right in Latin America and the Caribbean.
- It is necessary to take action in order to strengthen the relations between the member countries of OLADE and other initiatives of regional and subregional integration, based on the sustainable use of energy resources and energy potential, taking advantage of economic complementarities and partnerships to reduce asymmetries in the region and move toward hemispheric, regional and sub-regional unit.





La Habana

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AGENDA

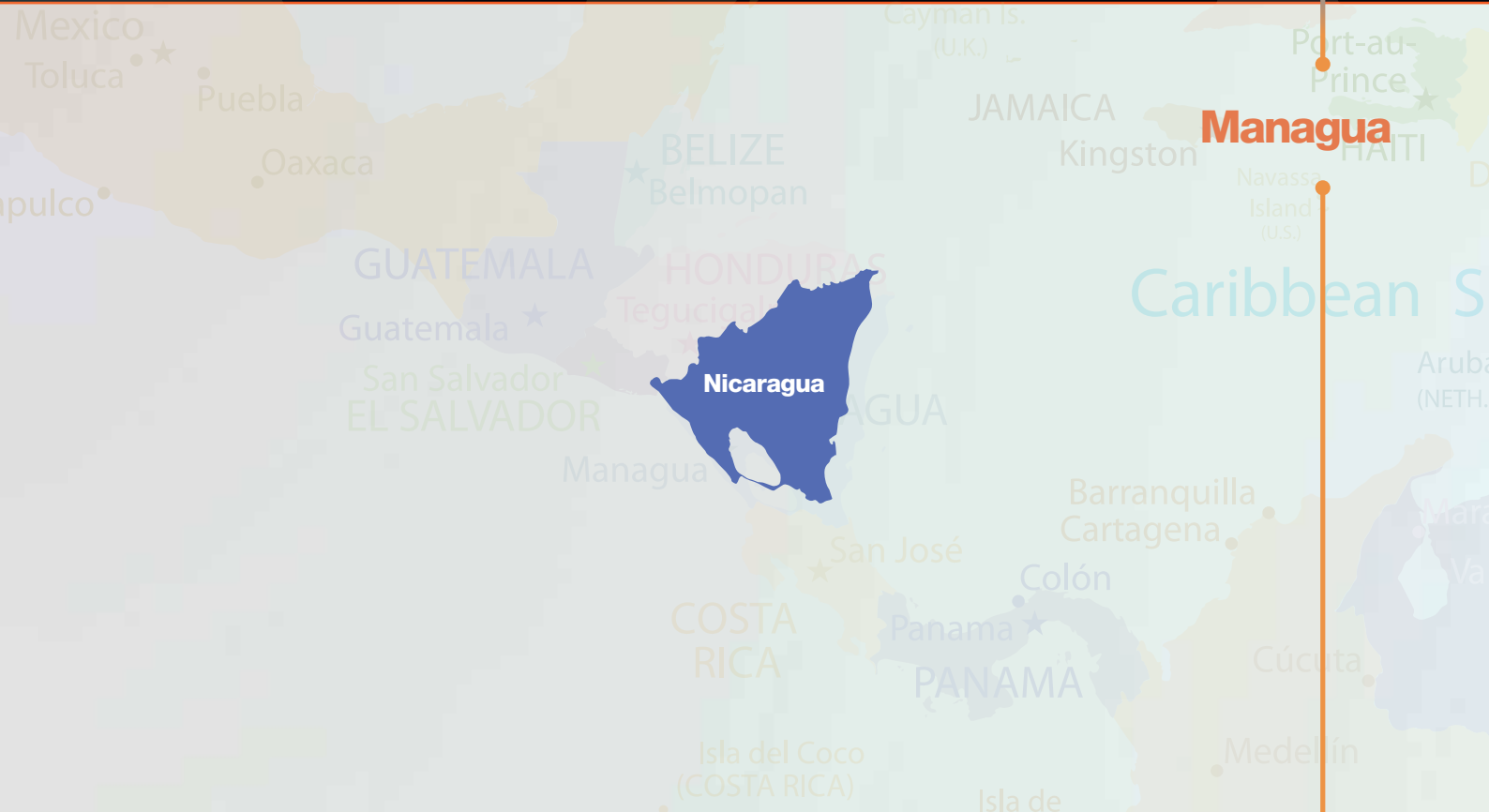
- Session 1: Panel: Benefits of energy integration in Latin America and the Caribbean • Session 1: Benefits of Energy Integration - Comments to the presentations
- Session 2: Outlook for Energy Integration - Electricity
- Session 3: Outlook for Energy Integration - Natural Gas
- Session 4: Cooperation as a factor of integration in Energy and Sustainable Development
- Session 5: Roundtable on Energy Integration in Latin America and the Caribbean

CONCLUSIONS

1. Feasibility of energy integration in the region. Technological and economic complementarity, solidarity and mutual assistance are vital for consolidation.
2. The integration makes possible the realization of ambitious projects that countries, in a isolated manner, could not implement; so it is necessary to advance on methodologies to approach the communities.
3. "Win-win" strategies should be developed; business is possible when all stakeholders are benefited.
4. Society requires increasing demands of cheaper energy resources that are also committed to the environment, so it is necessary to take advantage of the significant potential of renewable and non-renewable energies in an environmentally and socially responsible manner.
5. Hydropower, biomass, geothermal, wind power, natural gas, and other energy sources have sufficient potential for energy supply in the region. To avail of this resources it is necessary the development of energy policies to promote regional and subregional integration.
6. Highlighting the importance of the lessons learned in sustainable development projects and results as tools of cooperation in the region.
7. Successful experiences must be evaluated in terms of electrical integration in Latin America, as in the case of Mexico - Central America Electric Interconnection which became real through the Mexico-Guatemala power interconnection.
8. Regulatory asymmetries exist in the region that require uniformity to promote integration.
9. It is key to the integration processes that governments regain investor confidence and resume its role of power sector planning.
10. International cooperation and technical assistance of the specialized agencies can contribute significantly to the consolidation of regional energy integration.

ISLAS
REVILLAGIGEDO
(MEXICO)





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AGENDA

Sesión 1: Keynote Speech: The Regional Point of view of Integration as Energy Security factor

- Comments on the lectures
- Session 2: Panel 1- The Regional Point of view of Integration as Energy Security factor: Outlook of Integration Organizations, Cooperation and Financial Institutions •
- Session 3:
 - Panel 2- Strategic Outlook of Regional Energy Systems
- Session 4: Conference- Role of Enterprises in the Energy Integration Initiatives

• Session 5: Conference- International Cooperation and Integration Tool

- Session 6: Round Table -Progress in Regional Energy Integration
- Session 7: Launching of the Integration Observatory



CONCLUSIONS

1. The economy of Latin America and the Caribbean has presented growth indicators. However, it has been shown that the benefits of economic development should be distributed more equitably to all segments of society, which is consistent with the development policies of member countries in the last decade: development productive sectors, the welfare and social and economic inclusion of the most vulnerable segments. Energy plays a key and strategic role in meeting these objectives.
2. Meet the growing demand for energy requires efforts on the implementation and development of mechanisms that facilitate the availability and access to energy in quantity, quality and low prices, considering the use and potential for complementarity of abundant non-renewable and renewable resources of the Countries in the region.
3. Energy integration allows several benefits for the region, such as better use of resources and complementarities between energy systems that enable better allocation of investments in the energy industry facilities; it can also reduce asymmetries. The projects and studies show that energy integration is a relevant factor for regional energy security.
4. To make progress on energy integration is crucial to have a regional or coordinated energy policy that seeks socio-economic development with solidarity, sustainability and equity. With it, you can have a portfolio of viable projects, defining a mechanism for benefit sharing, respecting the sovereignty of countries. It is also essential to have an institutional framework to facilitate energy integration in line with regional policy vision. To this, it must be taken into account regional integration processes under way, such as UNASUR, SICA, CARICOM, among others.
5. There are successful experiences in the region focused on bilateral projects, however it is shown that the benefits could be greater if the regional approach prevailed.
6. With energy security in mind, countries must develop both renewable and non-renewable resources seeking efficiency in the entire chain of the energy industry.
7. The promotion and exchange of information on experiences is a valuable tool to promote regional cooperation and integration.
8. Latin America and the Caribbean has significant energy resources and the possibility of accessing to financial resources, which can generate great opportunities for sustainable energy supply in the region.

24-25 October 2011

Caribbean Sea



Ciudad de Panamá

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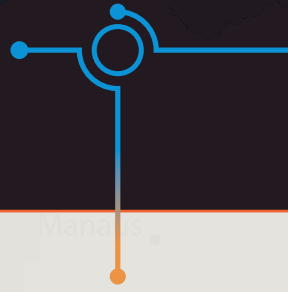
AGENDA

- Keynote Speech: The regional point of view on Policies, Regulatory Frameworks and Initiatives for the Advancement of Energy Integration in Latin America and the Caribbean • Session 1: Policy and Regulatory Frameworks in Latin America and the Caribbean
 - Session 2: Analysis from the Viewpoint of the Power Sector - Electricity production and electricity interconnections
 - Session 3: GN Transport options to diversify energy sources in Latin America and the Caribbean
- Presentation: IFT ENERGY 2013
- Session 4: Panel 1. Regional Strategic Approach: Sustainable energy development and social inclusion • Session 5: Panel 2: Opportunities for Regional Cooperation
- Session 6: Panel 3: Mechanisms for Strengthening Regional Integration
- Round table: Guests from the Member Countries Brazil, Cuba, Ecuador and Guatemala

CONCLUSIONS

- "Energy security to guarantee domestic energy supply, sustainable energy development and respect for the environment and society, the availability of energy at reduced costs and social inclusion are elements in the political agenda of Latin America and the Caribbean.
- Specialized studies indicate the existence of very large reserves of unconventional natural gas and additional reserves of oil, which strengthens the strategic regional position on energy resources, despite the heterogeneous distribution in geography.
- To ensure the use of the large reserves and potential energy resources and ensure energy supply in the region is important to make progress in the realization of infrastructure projects for energy integration that will benefit everyone.
- To make progress on energy integration is recommended to deepen the process of building regional and subregional policy and from thereon, strengthen and implement strategic agreements and transparent regulatory frameworks that promote concepts such as cooperation, gradualism and reciprocity, trying to minimize impacts on the national technical and legal systems and respecting sovereignty of countries.
- Progress was made in defining policies or stability and adjustment of the regulatory framework in the integration processes in Central America, the Andean region and in the field of UNASUR Energy Council. The importance of supporting and strengthening integration and cooperation processes in the Caribbean is highlighted
- The importance of regional policy and planning with long-term vision to ensure sustainability of supply in a context of strong growth in demand and to support the advancement of integration is identified





Lima

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VIII FIER

OLADE 40 years: Contribution to the History of Energy Integration in Latin America and the Caribbean. Lessons Learned, Progress and Challenges

AGENDA

- Keynote Speech: The historic regional approach on the development of energy integration in Latin America and the Caribbean and future challenges
 - Panel 1: Evolution of the Integration Process from the Perspective of Financial Organizations
 - Panel 2: Lessons Learned and Challenges - Experiences of integration in the area of hydrocarbons in Latin America and the Caribbean
 - Panel 3: Renewable Energy Technologies Integration Projects in Latin America and the Caribbean
 - Panel 4: Lessons learned in legal, Regulatory and Commercial Energy Integration in the Region
- Part I: Electricity interconnections
- Part II: Hydrocarbons in Latin America and the Caribbean
- Panel 5: A Look Ahead: Proposals on Energy Integration

CONCLUSIONS

- Latin America presents real examples of projects that allow remarkable advances in energy integration, this has been possible thanks to the political will of the countries and clear and stable legal framework.
- Energy integration should be based on trust between the parties and should serve the development and security; the investment market and the physical market must be released.
- By 2030, the projected electricity demand in the region may double. There is concern about the shortage of supply in the short and medium term, so one of the options to address this situation is to increase the share of renewable energies, improving energy efficiency and strengthening energy integration.
- There are still challenges to be addressed in order to advance the energy integration such as legal and institutional issues as well as funding for regional projects and the social and environmental aspects.
- Financial institutions and banks have been instrumental actors in financing energy projects, but they should consider additional resources to continue supporting these energy projects beyond just infrastructure.
- Mechanisms that allow equitable and fair and socialization of integration and in particular infrastructure should be promoted.
- There is a substantial supply of natural gas from Bolivia and Trinidad and Tobago to the LAC countries and the world; it is highlighted the supply from Bolivia to Brazil and LNG from Trinidad and Tobago to several countries.
- NG reserve in several countries in the region is significant and they will increase significantly with the new technologies available to harness resources such as shale gas (unconventional gas), among others.
- Investments in renewable energy are growing significantly in LAC as shown in the study by the IDB / MIF Climatescope 2013.
- Shared hydroelectric resources continue to be displayed as axes of development of important areas of South America, with implications for social, economic, social and environmental development of the countries.
- There are platforms of knowledge in the region with available data on policies, regulatory framework, projects, investments and training in renewable energy, with free access for the countries concerned, such as the Renewable Energy Observatory.
- The technology available and the studies that have been conducted shows the current feasibility of the electricity sub-regional integration.





Caribbean Sea

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IX FIER

Strengthening Subregional Energy Agendas

AGENDA

- Opening • Keynote
- Signing of the Cooperation Agreement OLADE-SICA
 - Session 1: Evolution of the integration process from the sub-regional perspective
 - Session 2: Challenges in the energy integration processes: plans and investment needs
 - Session 3: Opportunities for strengthening energy integration processes: financial instruments and policy
 - Session 4: Legal, regulatory and commercial aspects of sub-regional energy integration
 - Session 5: Proposals and strategies of development cooperation and sustainable access to energy
 - Dissemination of the South - South Cooperation Mechanism in the energy sector in Latin America and the Caribbean
 - Round table: Production integration: joint cooperation spheres as generators of added value and socioeconomic growth poles

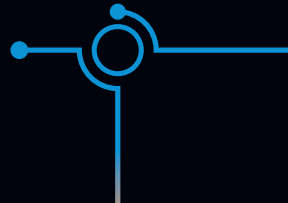


CONCLUSIONS

- It was confirmed the importance of SIEPAC integrating electrical system for the 6 Central American countries and the need to incorporate Belize into the system.
- Efforts are being developed to include Mexico and Colombia through SIEPAC network, by increasing coverage of regional electricity market, through the Mesoamerica project.
- The the natural gas' value to increase electricity generation through projects under study in El Salvador (Pacific Area) and Honduras (Atlantic Area) was recognized.
- There were disseminated important initiatives to supply electricity to the Caribbean Islands through potential energy power lines through submarine cables integrating continental countries and island.
- Important binational integration experiences were analyzed such as Salto Grande hydroelectric plant between Argentina and Uruguay that offers significant benefits to the population of these countries.
- It was highlighted the advancement of electrical integration in the Andean countries through SINEA initiative that considers various stages in its implementation, where regulatory framework and infrastructure planning are being implemented.
- The potential of the CELAC Regional Integration initiative and the importance of collaboration among several cooperation agencies to consolidate this joint work strategy approach for the countries. The huge potential of hydropower resources in the region, much of which is untapped.
- The white energy (geothermal) available in LAC through the experience gained in countries like El Salvador that has major projects and technical capacity to support other countries.
- Importance of liquefied natural gas in countries that do not have hydrocarbon resources; There is consolidated experience in the region in promoting the use of clean energy.
- New electricity interconnection projects based on water and gas resources in the region.
- Renewable energy and its potential to complement the power generation in LAC with important experiences in several countries, especially the exploitation of wind, geothermal, biomass and solar photovoltaics.
- Existing barriers were analyzed to strengthen electricity interconnection projects such as: engineering techniques, funding in case of major projects; policies due to the need for agreements between countries, formation of multinational consortia and search of political will.
- It was presented the experience of Bolivia, Ecuador, Paraguay and Peru in the construction and diversification of energy matrices, highlighting the experience of Bolivia on gas industrialization and Ecuador in productive energy matrix, as elements to be considered in the analysis of productive integration and creation of traslatin companies.

3-4 November
2014

Belmopan



San Salvador



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X FIER


X Foro de Integración Energética Regional

X Regional Energy Integration Forum



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Tarija
Bolivia

28-29
OCTUBRE



Tarija

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Financiamiento para el Desarrollo Energético Sostenible

Financing Sustainable Energy Development

Ministerio de
HIDROCARBUROS
& ENERGÍA

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Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia



Integration as a driving mechanism of investment: cooperation and partnership between public and private companies

Regional Energy Integration for of supply security and sustainable development and its relationship with Energy Efficiency and the Environment

Benefits and prospects for energy integration in Latin America and the Caribbean

I FIER
Mexico D.F.
Mexico
6-8
september
2006

II FIER
Medellin
Colombia
28-20
november
2007

III FIER
Buenos Aires
Argentina
12-13
november
2008

IV FIER
La Habana
Cuba
28-29
october
2009

V FIER
Managua
Nicaragua
26-27
october
2010

From Planning to Action:
Regional and Sub-regional
Energy Integration

Development of energy efficiency
projects as elements of regional
integration.

More than 30 initiatives, programs and energy integration projects presented:

- Electrical Interconnection System of The Central American Countries, SIEPAC
- MEIP-Mesoamerican Energy Integration Program,
- PETROAMERICA -PETROSUR-PETROANDINA and PETROCARIBE
- Agreement of energy complementation in MERCOSUR
- Energy and Environment Partnership for Central America, AEA
- Andean Electric Interconnection System,SINEA
- Regional Electric Interconnection Commission (CRIE)
- Central American Court of Justice
- Electrification Council of Central America
- Eurosolar program
- Gas interconnection in the binational are Peru-Ecuador
- Gas integration in the Southern Cone
- 1LNG imports
- Northeast Argentine Pipeline -GNA
- Expansion and consolidation of the SIEPAC
- Interconnection Mexico-Central America-Colombia
- European integration - Power Network of Spain
- Single energy market in the European Union
- Energy Integration between PDVSA and PETROBRAS
- Colombia-Venezuela gas interconnection
- Garabí Binational Power plant Brazil-Argentina
- Colombia-Panama Electrical interconnection project
- Bolivia-Paraguay Energy integration
- Guatemala-Mexico electrical interconnection
- Energy integration of the Andean Countries
- Energy Market Integration in the Caribbean, Trinidad and Tobago
- Special Program for the Development of Renewable Energies in Mexico and cooperation with other countries
- Transbolivian pipeline SA
- Salto Grande Binational Hydroelectric Plant
- Andean Electric Interconnection System (SINEA)
- Renewable Energy and Energy Efficiency Program with Central America 4E/ GIZ

Policies, Regulatory Frameworks and Initiatives for the Advancement of Energy Integration in Latin America and the Caribbean

Strengthening Sub-regional Energy Agendas

VI FIER
Panama City
Panama
24-25
october
2011

VII FIER
Lima
Perú
12-13
november
2012

VIII FIER
Punta Cana
Dominican
Republic
25-26
november
2013

IX FIER
San Salvador,
El Salvador
3-4
noviembre
2014

X FIER
Tarija
Bolivia
28 y 29
october
2015

The Regional Point of view of Integration as Energy Security factor: Outlook of Integration Organizations, Cooperation and Financial Institutions

OLADE 40 years: Contribution to the History of Energy Integration in Latin America and the Caribbean. Lessons Learned, Progress and Challenges

Funding for Sustainable Energy Development

1267

decision-makers and specialists in the field of energy integration.

Total number of participants

29

countries in the region and outside the region

Participating countries



Ministries, Departments of Energy, superintendents and regulatory bodies

- Ministerio de Planificación Federal, Argentina
- Secretaría de Energía de Argentina
- Comisión Nacional de Energía Atómica, CNEA, Argentina
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- Ministerio de Hidrocarburos y Energía, Bolivia
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- Comisión Nacional de Energía, Chile
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- Ente Nacional de Gas, ENAGAS, Venezuela

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Towards an integrated and sustainable energy planning

Katherine Segura

Analyst SIEE Department of Integration, OLADE

The Latin American Energy Organization, OLADE (in Spanish) aware of the importance that energy planning has at the world and regional levels as a tool for the evaluation and monitoring of policies that will contribute to energy security, sustainable development and regional integration, has focused its efforts to strengthen this area, through the implementation of actions and the development of tools that foster the simulation, management and administration of energy information and the transfer of knowledge among our member countries.

Taking into consideration this mission, we next present the principal elements of the background that has brought about the development of the actions for planning from OLADE; the difference between the concept of policy and that of planning; the systematic approach to the planning process, the evolution of this concept and its relation to sustainable development. Likewise, there is a description of the tools that from OLADE are being used for planning, concluding with some considerations derived from the experience and activities that the Organization has carried forth within this scope, and which through these means are made available for providing service and knowledge in the region.

Background

— Energy planning in Latin America and the Caribbean has been somewhat limited due to frequent changes that have taken place in the last twenty years, generated by structural variations in the energy sector and global events associated with economic recessions, which affected investments in the regional energy sector. As a result of this, at the national level, units for energy planning were organized and dismantled several times, losing the continuity of strategic energy planning and the capacity for adaptation to the variations in the energy sector. It must be highlighted that this activity suffered the impacts of the precepts of the Minimum State that dominated the decade of 1980, and with greater emphasis during the decade of 1990, that brought about the existence in several countries of serious difficulties that hindered the timely design and effective application of public policies.

However, since the end of the decade of 1990, the application of policies better directed towards the preservation of natural resources and energy security with a regional focus, have permitted an increase in the levels of integration, cooperation and development in energy matters, thus strengthening a unanimous and equitable economic growth among countries, achieving a greater degree of state participation in the tasks of regulation, control and planning in the energy sector.

Likewise, OLADE in compliance with its institutional objectives, associated with promoting an energy policy among its Member States, has undertaken important technical contributions directed to satisfying in a timely manner, the needs of the Ministries of Energy of Latin America and the Caribbean. Worthy of mention, as background information, the document “Energy and sustainable development in Latin America and the Caribbean – A Guide for the formulation of Energy Policies” jointly prepared between OLADE, GTZ and ECLAC at the end of the decade of 1990, that corresponded within a global context to the establishment of the criteria of sustainability in energy development, is in line with the agreements reached at the Earth Summit of Rio 92. At the world scale, these agreements determined different degrees and scope of the demands for countries. Even though the countries of the Region were not directly included in the commitments linked to the Framework Convention for Climate Change, the Access to different mechanisms for international cooperation and loans by multilateral organizations was affected by rules of an environmental nature. Additionally, several countries ratified other

Energy and sustainable development in
Latin America and the Caribbean – A Guide
for the formulation of Energy Policies



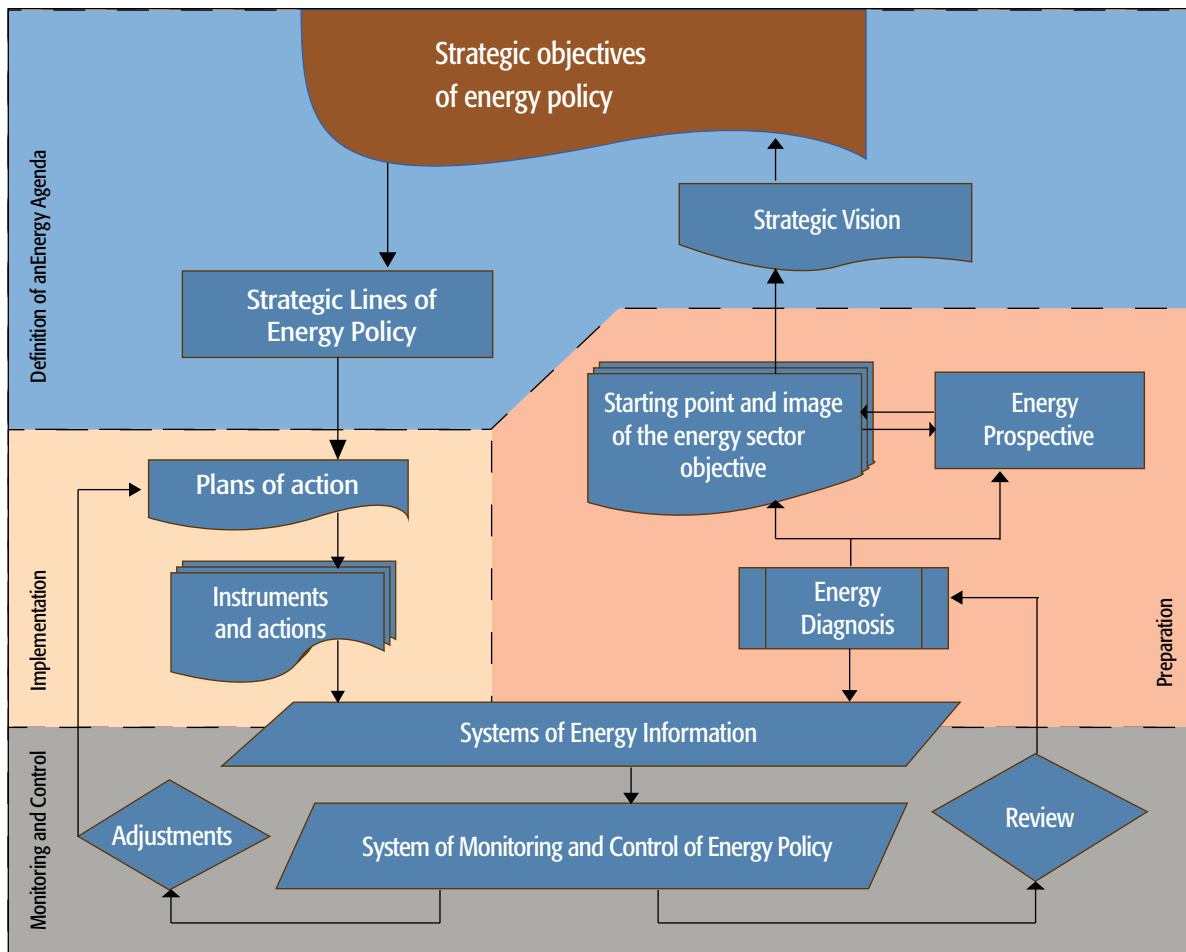
environmental Conventions of world scope that also were related to the energy sector. This generated the need of having available a guide for the formulation of energy policies that incorporated the focus of sustainable development. This matter was addressed in the above-mentioned document.

Energy Planning: Conceptualization

Planning is a strategic tool for sustainable development, regional integration and the formulation of stable energy policies, thus constituting a key instrument within energy policy and in turn it is a method and a practical discipline. As any other method, planning is a continuous process that deepens the institutional organization, to establish systematic procedures, by means of which it strengthens compatibility with regulatory issues, of investment and taxes between States, facilitating the sustainable exchange of energy resources.

The definition of the underlying objectives of an energy policy is one of the essential elements that must be present to be able to reach the sustainable development of a State. However, these objectives run the risk of not being reached without the support of a proper planning that guides resources, strategies and actions. From this perspective, we must not confuse planning

- General scheme of the process for the formulation of policies with the sections that must be included in an energy policy



Source: Practical Guide for Energy Policy, OLADE, preliminary version, September 2015.

with energy policy since the latter constitutes the framework within which the activities of energy planning must be placed. In this sense it is possible to characterize planning as a tool of energy policy.

In this context, energy planning is a continuous process, dynamic and adaptable to the evolution of uncertain variables within the social system in which it operates (that changes under economic variables, technological progress, political changes, etc.). Energy planning is carried forth with a systematic and analytical methodology that conveniently processes the information of the demand, transformation and supply of energy, and based on these elements it generates plans of action. Thus, finally planning within the scope of the definition of strategies is what permits the achievement of the objectives that have been determined in energy policy. Both planning as well as energy policy must be established through a systematic approach, considering the group of productive energy chains and all endogenous as well as exogenous interactions, both in the upstream, in the centers of transformation and at the level of final consumption, providing special attention to the disputability between nodes of intermediate and final consumption. In function of this, planning must focus on a general and integrated plane of the energy sector, specifying its acts at the sub-sectorial sector, observing the strategic guidelines determined in policies (this implies taking into consideration general and specific objectives, goals and strategic lines defined in relation to each specific objective, as well as the instruments set forth in order to provide an operative sense to such strategies)

Therefore the role of planning is to make concrete determinations and provide operability in a coherent manner to the guidelines established within energy policy. The analysis of an energy system that is required for planning has to be of a much wider scope and in great detail, both at the global level as well as the sub-sectorial level for its consolidation in national plans that start with the preparation of an energy diagnosis, an analysis of the energy policy of each country, the design of an Energy Agenda, prepared on the basis of the national social, economic and energy objectives, and which sets forth the strategic lines that must be implemented for their execution. Once this stage has been concluded, we then start with the development of the Energy Prospective, as a tool that provides assistance to the energy policy, by means of the construction of the social/economic and energy scenarios, using specific models and tools. Prior to the execution of the stages mentioned, it is important to form a professional team, the profiles and the creation of the capacities that must be developed, for which it is necessary to have a clearly defined objective as well as the scope of such training.

Tools for Energy Planning

Energy planning requires tools that provide support to the actions taken by the managers of energy in the sense of satisfying the objectives of the present and future supply of energy systems. Therefore, it is necessary to have tools that are capable of replicating the complexity of the energy system in an organized manner. In this context, the use of a energy planning requires the strategic definition of the objectives set forth in the implementation phase. That is to say that the authority responsible for formulating energy policies must have incorporated all of the capacities of energy modeling to thus clearly define the goals for the use of each instrument.

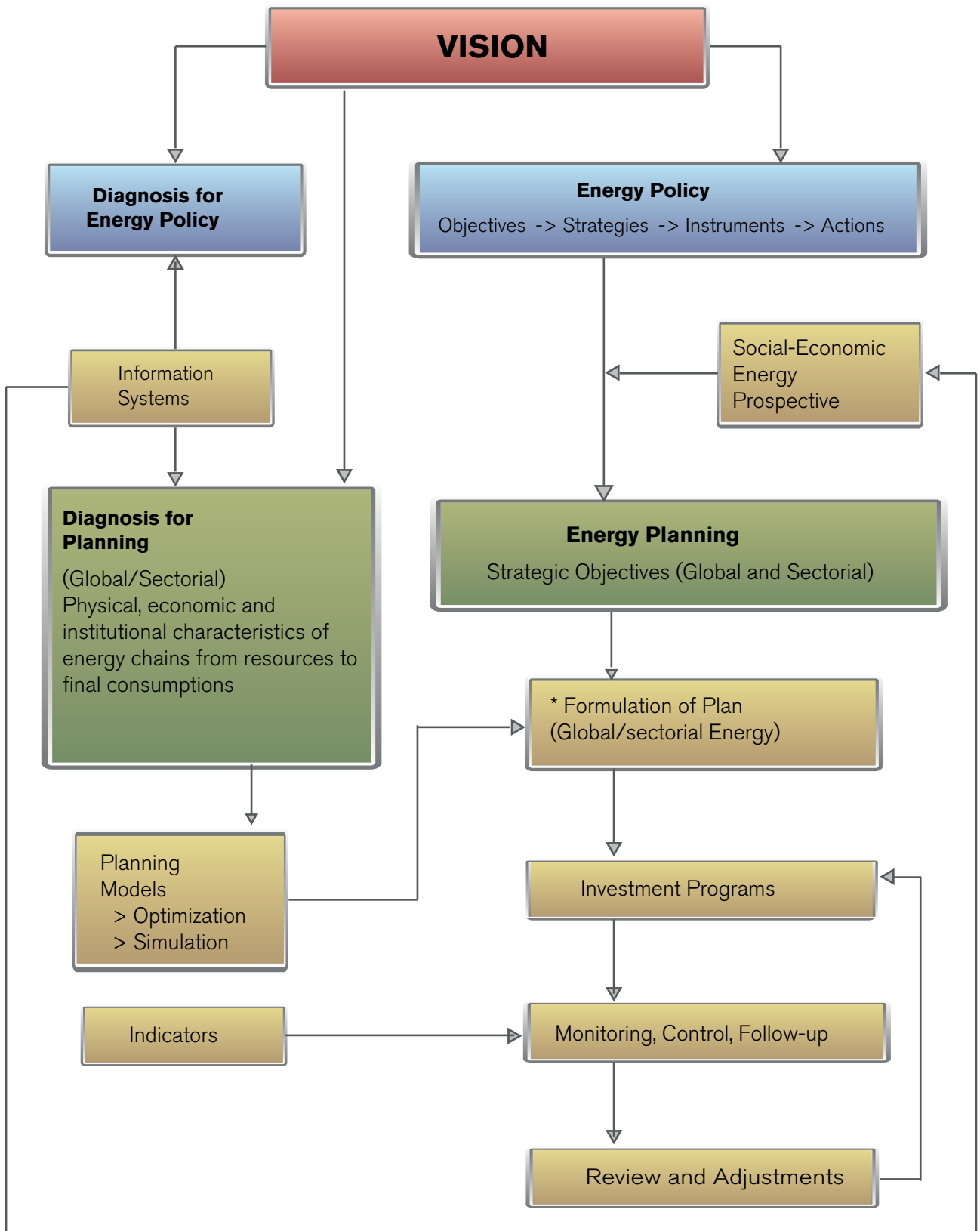
Among the tools for energy planning we can highlight the following:

- a) Energy information systems
- b) Models for the construction of prospective energy scenarios
- c) Models for evaluation and multiple criteria decisions

Relative to the management and administration of the statistical energy information that is required for planning, we must highlight that OLADE has more than 40 years of experience in this field, and has available related tools, within which stand out the System of Economic-Energy Information (SIEE, in Spanish), The Legal Energy Information System (SIEL, in Spanish) and its Regional Energy Information Platform (SIER, in Spanish). Several specialized tools have also been developed for Energy Planning and Prospective such as the Regional Electric Unified Planning System (SUPER, in Spanish) and the System for Simulation and Analysis of the Energy Matrix (SAME, in Spanish); as well as manuals and guides relative to the matter of energy planning and its inherent processes.

¹ Ndaye B. (2009). Energy Planning in Developing Countries. Doctoral Thesis, Universidad Politécnica de Valencia. Spain.

● Figure 2: Stages of energy planning and their link to the tools for energy modeling



Source: Energy Planning Manual, OLADE, 2014

Manual for Energy Planning and Practical Guide for Energy Policy

During the last 4 decades, OLADE has been working jointly with other organizations in initiatives and programs that contribute to the strengthening of energy planning both at the level of energy matters as well as the issue of resources. In this sense, since 2012 with the support of the Government of Canada in the Project “Development of Capacities in Energy Planning”, by means of the execution of the phases described in Fig. 2 (with the exception of investment programs), it has been possible to obtain tools for the analysis and conformation or re-establishment of energy planning units in the member countries, as a result of which the Manual for Energy Planning was produced, which constitutes a unique guide in the region and will be an instrument for decision makers. This guide was prepared by prestigious specialists of the region and its first version was revised by the “Group of Advisors on Energy Planning and Prospective of Latin America and the Caribbean” at the Workshop that took place on March 26 to 28 of 2014, which had the participation of: Argentina, Bolivia, Brazil, Colombia, Ecuador, Nicaragua, Panama, Paraguay, Peru and the Dominican Republic.

The Manual for Energy Planning is comprised by 8 chapters, that describe the activities that any Institution must consider in order to carry out Energy Planning with the goal of establishing National Energy Plans.

In a parallel manner and derived from the specific assistance in energy planning being provided by OLADE, the countries have expressed their strategic need of strengthening the capacities in the institutions that are responsible for the energy sector in the areas of analysis and formulation of public policies. In this sense, the “Practical Guide for Energy policy” has been developed, in which are indicated the steps and essential procedures that must be followed for the formulation of energy policies, respecting the autonomy and sovereignty that the States have to select the most adequate manner and most appropriate guidelines to establish their policies. This guide constitutes a complementary document to the Manual for Energy Planning and has the intention of serving as a reference regarding the procedures and tools that may be useful to carry forwards the processes for the formulation of policies.

Implementation of the Manual for Energy Planning

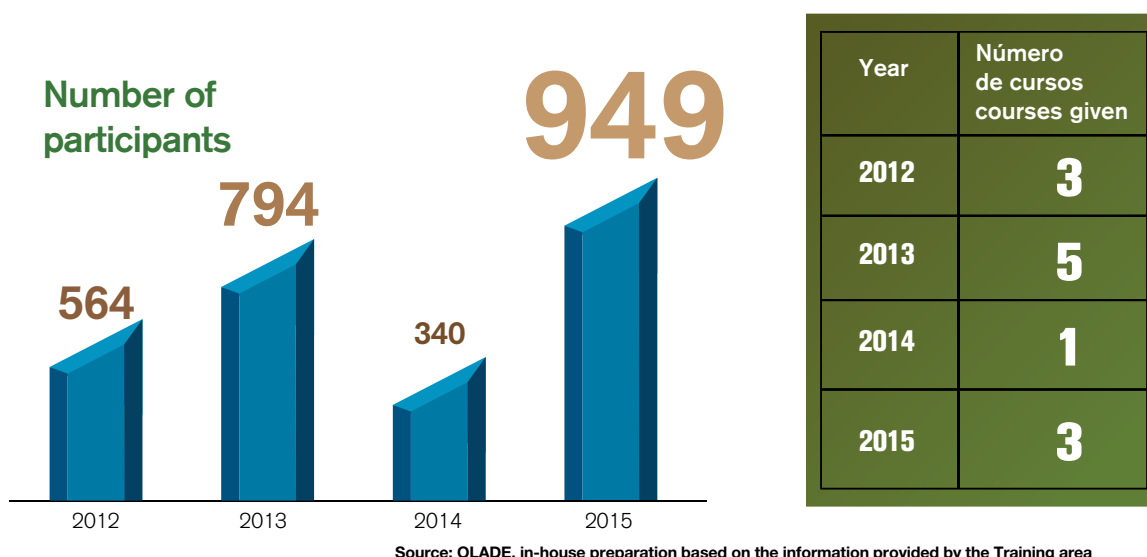
With the purpose of verifying the applicability of the Manual for Energy Planning developed by OLADE, its implementation is being carried out in phases; the first was executed in Bolivia and Honduras and a second one in Nicaragua. It is estimated that during 2016, the implementation continues in two additional countries of the region. The implementation of the Manual constitutes a practical exercise and its applicability represents a reference at the regional level. The countries in which the Manual is being applied exhibit different structures, both at the energy level as well as the scope of legislation y regulation, presenting different degrees of progress and difficulty that constitute valuable inputs that could lead to preparing a manual that will take care of needs and sets forth procedures that can be adjusted. Once the first stage concludes, there will be available a set of observations that will permit the preparation of the final Manual for Planning, to be disseminated among the entities of the sector, universities and energy research institutes so that it may constitute a contribution in the area of energy planning.

In the framework of these implementations, a series of workshops have been carried out as well as visits to the pilot countries and it has been possible to obtain important products, highlighting among theses the transfer of knowledge and the determination of lines to be considered for the development of national energy plans. In the case of Honduras, the execution of each one of the stages of planning started in September of 2014 and in Bolivia in November of 2014 and it is estimated that these will conclude in October and November of 2015. Figure 3 offers a schematic representation of the principal products and activities executed during its implementation.

Training tools

—One of the fundamental components in energy planning is the human resource. Therefore the importance of forming integrated teams with the ideal profiles. Acting under this premise, OLADE has been the pioneer in the creation of spaces that permit the exchange of knowledge and experiences, achieving an important positioning both at the national as well as regional levels through in-presence and virtual Training Programs and Networks of Experts among others. Worthy of mention is the fact that during the last years 12 courses and four Executive Development Programs in Energy Planning have been offered, directed to officials from the Caribbean, Central America and Mexico and South America; during the period 2012-2015, in the matter of training for planning, assistance has been provided to a total of 2.647 officials; Figure 4 presents the annual evolution of the participation in such training courses:

● Figure 4: Evolution of the participation of specialists of the region in virtual and in-presence courses provided by OLADE in Energy Planning.



Considerations: Medium and long term Vision for regional energy planning

OLADE is an organism for integration, cooperation, coordination and advisory functions in energy for Latin America and the Caribbean. Among its work axes are the promotion of an energy planning that will promote regional integration among energy policies, leading to sustainable development and regional integration, in accordance with that established in the Lima Agreement (1973), in the articles next mentioned:

“Article 2.- The Organization is an entity for cooperation, coordination and advisory services, with its own legal standing, that has as its fundamental purpose the integration, protection, conservation, rational use and marketing and defense of the energy resource of the Region”.

“Article 3.- Objectives and functions: Promote the formation and development of common energy policies as a factor for regional integration”.

Based on this premise and on the experience and results that have been obtained during these last few years, OLADE works on the medium term basis to become consolidated as the Latin American and Caribbean Center for Energy Planning at the service of its member countries, to provide technical advice in the different stages of planning, to promote the exchange of experiences and to contribute to the strengthening of the units for planning as a fundamental axis of energy policy.



PHOTOGRAPH: PARTICIPANTS PROGRAM FOR THE DEVELOPMENT OF EXECUTIVES IN ENERGY PLANNING FOR CENTRAL AMERICA, HELD ON AUGUST 25 TO 29 OF 2014 IN TEGUCIGALPA, HONDURAS.

This center provides space for the participation of prestigious specialists of the member countries of OLADE and it will strengthen the technical team of the Organization. This will contribute to the development of long term plans that reflect the situation of each one of the countries, the analysis of which and proposals guided by those responsible for making decisions, will contribute to a greater energy security both at the national as well as regional levels. Likewise, it will continue to generate synergies for the definition of methodologies and information models with the purpose of providing tools that offer a greater degree of reliability, theoretical coherence and robustness, thus decreasing the uncertainty in the modeling of energy systems within a long term horizon where most of the input variables are uncertain.

Finally, under this mission it will contribute to the professionalization of officials and to the strengthening of a culture of energy planning, through properly structured programs for training, guaranteeing the continuity of planning in the countries of the region. ●

Related documents:


- [1] OLADE, Manual for Energy Planning, first edition, July 2014.
- [2] OLADE, Practical Guide for Energy Policy, preliminary version, September 2015.
- [3] OLADE, Models for Energy Planning for Latin America and the Caribbean, 2014
- [4] OLADE, CEPAL and GTZ, Energy and Sustainable Development in Latin America and the Caribbean– Guide for the Formulation of Energy Policies –, 1990


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