Energy is a determining factor for any productive process. It is an essential input and its process to obtaining it is not easily perceived by regions of higher consumption because of its immediacy and availability. However, the production of energy is one of the most complicated tasks of the modern productive apparatus. This work depends on the technical variables of extraction, production and distribution by many actors and also on the institutional and legal arrangements to which the sector is subject. In the international arena, it also depends on market conditions both inside and outside the countries. All these arrangements, for the most part, are known as energy policy, which in turn is defined as the set of goals, measures and economic policy instruments aimed at the energy sector that tend to induce a change or determine a process orientation of general socioeconomic development\(^1\).

Government intervention is central to the development of the energy infrastructure of any country. The depth of their participation depends on the type and level of their economy. In developing nations, where the private sector does not have as much thrust as in the market economies, the government must act as the main axis in the promotion of technology for the extraction, production and distribution of its energy system\(^2\). Likewise, energy systems are destinations for heavy financial investments for generation and distribution projects. In the same way, they are mostly intensive in uses of natural resources and energy itself. Its organization is so complex that it requires multiple actors and forms of coordination and cooperation to function. Energy is a determining factor for any productive process – it is an essential input and its process to obtaining it is not easily perceived by re-

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gions of higher consumption because of its immediacy and availability. However, the production of energy is one of the most complicated tasks of the modern productive apparatus. This work depends on the technical variables of extraction, production and distribution by many factors and also on the institutional and legal arrangements to which the sector is subject\(^3\). In the international arena, it also depends on market conditions both inside and outside the countries. All these arrangements, for the most part, are known as energy policy, which in turn is defined as the set of goals, measures and economic policy instruments aimed at the energy sector that tend to induce a change or determine a process orientation of general socioeconomic development.

The compositions of the energy resources used in a certain region or country to constitute their entire supply or demand are called energy matrices. The energetic matrices are determined during the initial planning of the energetic policy since its composition is the final result of everything that is sought to be addressed in sectoral programs and strategies. Therefore, for the transformation of the systems, it is necessary to undertake a transition in each matrix. These constructions are commonly used as the most approximate representation of the distribution of primary energy sources, including the mechanisms used to provide energy to the productive apparatus at all levels and sectors.

Energy systems around the world are a crucial challenge for human development. Many of the resolution of issues such as poverty, food security, improvement of health, climate change and even peace among nations depends on its transformation. However, what represents a great solution is also commonly a big problem and the dilemma of energy systems is their transformation towards a more sustainable composition. Next, we explain the ways in which an energy system is linked to fundamental development issues through multidirectional guidelines that involve development narratives, action approaches and economic strategies. It is important to note that the tools and challenges presented are the result of important research carried out by more than five hundred researchers from around the world in the area of energy, concentrated in the Global Energy Assessment (2012) of the International Institute of Systems Analysis Applied\(^4\).

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\(^4\) Global Public Policy Institute, *Global Governance 2022 Program*, Energy Governance Outlook, Global Scenarios and Implications, Berlin 2013.
### Priority pathways of energy policy

| Priority trails | The need for a profound change in the current situation of global energy systems originated in the recognition of the impact of human activities on the use of water, soil and energy. Such factors are closely related to each other under the schemes of production and how the ways of modern life significantly alter the natural balance of the planet. However, the global reach of the situation is based on conditions affecting the climate caused by the emission of pollutants into the atmosphere. Therefore, two large premises must be recognized to address this need for change; the first is the urgency of the matter, it is not possible to continue for a long time with the same human patterns and; the second is that in constrains the sense that the availability of energy is one determinant of any type of development.

The law of conservation of energy and thermodynamics principles indicate that you cannot separate energy power generation, i.e., energy is needed to produce energy. For this reason, the main objective of the transformation towards energy sustainability is increasing levels of development, at the same time, to expand the range of energy options on both the supply and the demand side. To address the issue of transformation and its implications at international level can be split between five priority lane coverings from different perspectives. Most of the aspects would be considered in a sustainable energy policy. |
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<tr>
<td>Demographic and economic growth</td>
<td>They are the multiplying factors of global energy consumption. Historically, countries, as they gain wealth, tend to move from agriculture to economic activities of higher energy consumption, similarly require more elaborate supplies for its population from the way of feeding to the search of comfort. Similarly, you should consider the concentration of human settlements generating large cities who today demand enormous amounts of energy. More than half of the world’s population lives in cities with exponential growth and most are the world’s poorest regions.</td>
</tr>
<tr>
<td>Poverty, development, and access to energy</td>
<td>Lack of energy services available to the population is one of the main factors to consider when addressing problems of poverty. The use of primary energy sources, such as wood or coal, represents the point of departure for the prosperity of the quality of life of people in poverty. Access to energy to power night lighting and act as a source of fuel can improve air quality while cooking, growth of crops, and reduce food loss. In urban areas, access to energy helps security, education and mobility.</td>
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### Energy security
The necessary infrastructure for power generation, a way to keep the levels of development, is the main component for achieving a permanent provision of services to the population and the economic processes of a country. The availability of resources keep the system running in a closed cycle to maintain effective stability of energetic services. The Nations of the world are concerned with carry this out according to their abilities. For this reason, and for the oil dependence of energy systems, resource disputes have intensified in recent decades. This path gives the sustainable energy the consensus as a way of peace enforcement.

### Environment
The intensification of the use of energy resources generates a greater use of soil and water. The most evident relationship is our global emission of Greenhouse Gases into the atmosphere which results in climate change. In addition, this generation is depleting resources essential for human survival by using shared natural energy from the sea and land and creating pollution. An example is water-power.

### Health
People in industrialized and urban areas are exposed to air pollution by emissions from energy-intensive machines. On the other hand, in rural areas, the use of wood or other fuels for cooking indoors are exposed directly to families that inhaling toxic gases. In another context, the health of workers in the energy sector who are exposed and at risk of accidents, poisoning, body radiation, and many others requires a serious solution. Energy systems related to health must also take into account the impacts of climate change and the thousands of deaths that occur each year.

A comparative policy exercise for energy integration and cooperation can elucidate deeper approaches that exist particularly in a region. For the tools use for international energy policy, theoretical aspects should focus on the central theme of the research. The purpose of explaining these points is to identify the alignments that this policy has as sustainable energy principles and to explain the implementation schemes that they have.

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Listed below are general objectives that needs focus. Their classification is based on the way in which the transformations are related to energy systems:

<table>
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<tr>
<th>Implementation frameworks for sustainable energy policy</th>
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<tr>
<td><strong>Access to energy</strong></td>
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<td><strong>Urbanization</strong></td>
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<td><strong>Energy efficiency</strong></td>
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<td><strong>Renewable energy</strong></td>
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<td><strong>Alternative fuels</strong></td>
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### Nuclear energy
Oriented towards using nuclear energy as a clean source, in correspondence with the international regulations regarding its use for not war purpose\(^{14}\). For example, the promotion of research in nuclear technology in the field of health.

### Innovation
Oriented towards new technology or infrastructure that modify human behavior or the performance of the production system; Since its incubation up to its massive reproduction. A fundamental part of any energy policy initiative to promote the entry back into sectoral knowledge.

### Financing
Facing the rapid transformation of energy systems in the world, given the urgency of its implementation require huge amounts of capital. Role played by Governments, banks, businesses, etc.

### Capacity development
Required to generate Adaptive flexibility to energy systems with essential feedback from experiences. Role played by all agencies for research and international cooperation in the world. Globalization is the greatest factor of impact on public policies of strategic character, this is reason that the global market increasingly has more interference in the public events that affect economic sectors\(^{15}\). The relationship between globalization and knowledge, is a fruitful reflection “field” on technology policy. However, while the implementation of policies in the transition to sustainable energy systems can be a task even within the reach of every citizen, the adoption of measures for the interaction between decision makers is borne by levels of each country’s Government. Then will be more thoroughly the consequences of globalization and the influence of markets on the adoption of sustainable energy systems, specifically in the region of Latin America, to refine the approach to transverse elements in analysis of the policies to be implemented. The following analysis aims to determine the existence of economic barriers in the course of the implementation of projects according to the global trend in countries developing; also, given an approximation to the institutional synergies as part of the strategy of adoption of regional markets.

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**Cooperation and energy regionalism in Latin America and the Caribbean**

Due to its antecedents, the region has the experience and institutionality in energy matters that reflect the remarkable efforts to produce improvements in the productive and social conditions of several countries as a whole.


This presents, over the last six decades, short-term achievements that produced a remarkable effect on the challenges of governance. However, the diversity of experiences, the multiplicity of actors and the differentials in the effects of the implemented policies make difficult, but not impossible, the structural analysis of the same experiences and institutions. This happens because the region is characterized by the scarcity of energy resources in one country and its abundance in others. This results in an exercise of complementarity through agreements that can lead to international cooperation and/ or foreign trade\textsuperscript{16}. First, the composition of energy agreements and projects under way between countries in the region is almost as varied as regional economic integration strategies. Second, the practice of energy cooperation in the region has generated a “spaghetti”\textsuperscript{17} of bilateral and multilateral relations with effective results for energy development in most cases. Finally, initiatives in the energy sector have been conducted through integration agreements and/ or international cooperation arrangements. For example, the outcome of the bilateral agreements between Mexico and Belize, as well as their commercial relationship in the matter of energy, determine to a large extent the results of the energy cooperation of both countries. However, when talking about the relationship that both countries have with ECLAC, the IDB or OLAD, or triangular cooperation financed by a third country is taken into account, or the processes are adapted to the priorities generally addressed by the Caribbean Community; the results of cooperation will undoubtedly have different results than the bilateral relationship\textsuperscript{18}.

There are three categories of regions that originate from energy cooperation, this classification depends on the degree of institutionality on which initiatives in the sector depend for cross-border projects, as well as the discrepancies in the regulation of the energy market in each country. The first classification covers those regions that comply with the policy objectives of their most powerful neighbors by not having the resources to have their own institutions. The second classification covers regions whose institutions determine their own rules of interdependence. The third classification is the region that creates energy communities with lasting institutions. It should be noted that these categories are based on European cases of strategic integration that, despite the fact that there are points of agreement, incorporate


\textsuperscript{17} Term used for the first time in 1995 by Jagdish Bhagwati referring to the relations between countries that by different rules of origin generate a system of cross-references that if they were schematized would appear multiple lines that cross from one side to another as in a dish of spaghetti.

the factor of political conflict with implications for national security. Latin American energy regionalism differs from others in the rest of the world by the early adoption of an energy agenda aimed at the sustainability of its systems. While it is true that economic complementarity is the main motivation for establishing implementation frameworks towards sustainable energy systems, it is also clear that political will, the influence of other regions and the participation of multilateral organizations influence and determine market vectors and priority paths for each initiative.

Therefore, the barriers to cooperation often originate in its institutionality, political will or the availability of infrastructure\textsuperscript{19}, that is why it is more viable to verify the cooperation projects that occur in conditions of low barriers to integration. For this reason, cases of multilateral relationship are selected because they are the projects in which the cooperation, in addition to being centralized, is based on the participation of broad organizations that in turn coordinate the advances in other strategic areas\textsuperscript{20}. Therefore, in Latin America and the Caribbean, energy regionalism should be understood as a consequence of the application of policies towards the complementarity of energy systems. It is not about understanding the region as a conceptual construction occupied to define the events that characterize a regime but to limit the meaning of international cooperation actions to their final result. In this way, according to the premises of the implementation frameworks, at least three versions of energy regionalism with multilateral origin in the region must be differentiated.

1. Cases of regional energy interconnection. They are indispensable for the complementarity of systems and greatly reduce the risk of market or credit depending on the origin of the project. Emphasis is given to projects whose main source is the regional planning promoted from regional and international financial institutions whose participation is embedded in all phases of the project cycle. The most egregious cases are those of regional electrical interconnection, which is itself a result of energy cooperation. However, in many cases represents the first step in the creation of regional or sub regional energy systems that complement. This type of regionalism energy operates with its own level of institutionality that in some cases it is supranational entities that share a common governance through mechanisms of multilateral cooperation structure.

2. Strategies that encompass one or several implementation frameworks promoted by regional organizations. The activities that are commonly

\textsuperscript{19} R. I. A. Castillo, Apuntes sobre la Integración Eléctrica Regional y Propuestas para Avanzar, Organización Latinoamericana de Energía (OLADE), Quito 2013.

carried out and that generate effective results for the achievement of objectives towards the transformation of systems are analyzed. These strategies reflect certain regions that share implementation frameworks, from the institutional as well as the functional perspective, countries apply the same strategies derived from either global, local or regional initiatives with the support of cooperation agencies or international financial institutions. In this version, countries propose common objectives through an international organization, but with a regional institutionality, in this way they are forced to implement certain policies in favor of meeting the goals set.

Global initiatives that promote one or more implementation frameworks. They sometimes have a direct impact on the formulation of local energy policies in the region. This type of intervention has to do with broader processes of promotion of agendas on priority paths such as the environment or energy security, thus explaining the way in which multilateral organizations implement projects derived from cooperation. Global agendas such as the United Nations Sustainable Development Goals or the Paris Agreement derived from COP21 formalize the link with the domestic policies of each country, so that, in the short and medium terms, they translate into common commitments that tend to form a regionalism immersed in the global dynamics of cooperation. Next, the elements that make up the categories to be explained are explained in more detail, detailing the factors that ultimately determine the outcome of the cooperation.

Conclusion

Implementation frameworks that must integrate a sustainable energy policy are present in various measures in the region of Latin America and the Caribbean. In sum, regional projects and strategies facilitate and accelerate the achievement of objectives towards the transformation of the systems of energy of each of the countries of the region. Therefore, the following is a path to consider for the creation of sub regional systems that allow you to take advantage of resources consistent with sustainable forms. From a systemic perspective, recover multiple factors that constitute macro variables in turn reflecting a complexity of schemes of cooperation and integration mechanisms that, without a doubt, new models of regionalism mark. This thesis covers the most important aspects of multilateral governance in global energy cooperation. Taking into account this aspect, the main theme is focused on the development of sustainable energy systems in the region of Latin America and the Caribbean.

It involves measuring the process through implementation frameworks around the transformation of existing systems and the focus of current
opportunities through projects that involve factors of continuous integration and economic complementarity. The region’s responsibility to complement efforts to diversify the global energy matrix does not only imply a transition to other sources of energy generation. The work of states, organizations and financial institutions should consider transforming the paradigm if we want an integral solution for the energy task of the 21st century. From a systemic perspective, discovering multiple factors that constitute macro variables that in turn reflect a complexity of cooperation schemes and integration mechanisms will undoubtedly create new models to follow. In the implementation of energy projects, international cooperation adopts all its facets in a special range that proves that energy cooperation is a concept used to refer to cooperative actions that were not previously in broader ranges such as economic cooperation.

However, the proposed approach is so complex that empirical support must be given to the foregoing to verify that in the evolution of international instruments, energy cooperation is in different forms with respect to the terms of international cooperation. At least in Latin America and the Caribbean, the conceptualization of energy cooperation has not been studied in depth as a primordial element that has given rise to cooperation schemes used in other sectors. In other words, in this sector they have been carried out before defining international cooperation, methods, schemes and instruments that today have a wide recognition of studies. This is without saying that energy cooperation can be a form of international cooperation. The truth is that, by their background and performance it should be placed in the middle of a discussion that seeks to find the relevance of energy cooperation projects to check if it is consistent to its multiple categorization within areas such as infrastructure, technology and capacity building, etc. What has been studied previously is the distinction of the energy narratives of the Latin American and Caribbean region with those of other regions of the world due to their outstanding coordination in sectoral policies and the acknowledged progress in their socio-economic complementarity. Even so, it has been necessary to make distinctions that energy has to do with the factors of development accepted worldwide. This is why it has been necessary to identify prominent roles in the implementation frameworks in accordance with their timeliness and effectiveness in the region for the integration of energy systems. Although economic integration is generally measured on the basis of international trade, this same measurement cannot be applied to energy integration by its great complexity. Energy trade is only part of the framework of a system of energy and more even when the systems complement each other. Some components are not as easy to quantify as innovation and institutional changes are explained only in terms of technical cooperation. In addition, the complementarity of structural and strategic issues, such as
energy, is measured differently in the mechanics of multilateral coordination or bilateral integration: cooperation is continuous. The foregoing shows that the measurement of energy complementarity must include other terms that become more important than the monetary one.

Beyond the political leadership that might of had decades ago regional integration intentions in Latin America and the Caribbean, action strategies based on the structural performance of regional economies requires viable cooperation models for the implementation of deep transformations such as power systems in the region. When considering the interaction of systems in the political framework, cooperation initiatives that have measurable and verifiable effects at the level of certain common objectives can be translated into results. In addition to implementing frameworks addressed by cooperation initiatives, in which some were analyzed in the case studies, other secondary or emerging present damages can be found to direct the evolution of the systems towards a more sustainable operation. Meanwhile, international organizations are obstacles to introducing implementation frameworks for political dialogue in the absence of an appropriate instrument to link the strategy with national policies. This effect, in Latin America and the Caribbean, involves almost for obvious reasons the participation of regional actors due to their political relevance, their experience in the region and their close links with the government, which means that the global institutions or programs do not act only in the region. If it has new and relative information showing technical capacities, the political and financial interventions of international organizations or initiatives become relevant.

This is because some types of studies in the energy sector of each of the countries they have already been carried out previously by OLADE, ECLAC or the IDB itself. For example, in the year 2016, the International Renewable Energy Agency identified convergence in energy policies of some countries in Latin America. In the report about policies for the promotion of renewable energy sources, the focus is on the importance in the institutional synergies for the achievement of objectives in this regard\(^\text{21}\). The study emphasises national policies, tax incentives, access to energy, instruments regulatory, financial and other relevant factors such as the consideration of the nexus between food and biofuels. The regulatory and energy policy framework places the region as a pioneer in the design and implementation of alternative sources of energy. However, the path towards systems sustainability is not only through the means of renewable. In other implementation frameworks, the region has made significant progress that complement the actions undertaken from different approaches.

\(^{21}\) OLADE, Acceso a la Energía Sostenible en América Latina y el Caribe, Organización Latinoamericana de Energía, Quito 2014.
For these reasons, it can be said that in Latin America there is a coordination of agendas that put certain institutional objectives to public bodies of government much before the global initiatives. As a result, energy efficiency and renewable energies are the frames that have generated the greatest impact in transforming Latin American into a sustainable energy system. However, other frameworks such as access to energy, financing and urbanization are frameworks that additionally provoke positive effect and require energy cooperation to mitigate risks towards the construction of market vectors. The latter has caused a revolution in political and financial systems of the region, giving positive results not only toward their own mobile but also using the legal frameworks that have bilateral and multilateral treaties and agreements. Faced with this situation, regional financial and political bodies, have built-in strategies that seem to unify common regional agendas for all its member states. In functional terms, there is proof that participation in discussions on international energy issues has had a significant response like no other issue and without generating regimes or regional orders as it was assumed in past decades. In other words, global initiatives such as SE4ALL have become real mechanisms of impact adopted by multilateral bodies to justify international cooperation projects. More and more countries intertwine together an energy agenda that involves transitions regardless of its commercial, financial or social opening to international issues\(^2\). This can only be seen as “momentum” generated by a spark of opportunity before the convergence of policies in the region or a periodic interest in taking advantage of opportunities arising in the valley of the economic cycle. Despite this, none of the above factors, individually or as a whole, clearly explain certain results of networks of actors or the mobilization of enough resources for the energy sector. However, consistent with the outcome, it is also viable to identify market vectors that have strictly unified economic operators in terms of their change initiatives\(^3\). Institutional change, the path of investment and technological innovation, become priorities for the private sector which can enter the stage of the regional energy market. This has occurred based on structural reforms that several countries undertook in the last decade that is also complemented by projects that promote international networks and encourage the financial institutions for the creation of new energy markets. Although, not all actors promote a sustainable transformation of systems. Those that do incorporate the same frameworks implemented by governments and international organizations, thus generating results that have an impact on the indicators that monitor their progress. Thus, it is through the

\(^2\) SE4ALL 2014, Energy Efficiency Committee Report to the Advisory Board, Vienna, Austria, Sustainable Energy for all, Global Facilitation Team.

market vectors which joined efforts to achieve objectives for sustainable energy development.24

Thus, it is through sub-regional comparison that progress should be measured in terms of transformation of energy systems. The latter, given that the achievement of agendas for regional energy revolves around a political network that for some subregions is indispensable to be considered a priority in their development strategies. This thesis presents a methodology, subject to improvements in terms of the quality and usefulness of the information that it sheds, but with ample possibilities of objectively monitoring the degree of sustainability of regional projects originating in the energy cooperation.

In terms of multilateral cooperation, coordination plans rely heavily on the central role of organizations in terms of the wide range of options that states have to consider. Therefore, the results of this analytical factor suggest an important utility to the development of cooperative activities among agencies for the promotion of sustainable projects in search of a better use of energy resources. The Governments of developing countries, as it is the case of all the nations of a region, must engage more thoroughly with the implementation of programs from energy cooperation to the predictability of the behavior of the energy demand in the future. In reality, this intervention academic program serves as a complement to the projections for growth, emissions and demographics of the coming decades to demonstrate that the narratives for energy development can coexist under similar parameters of cooperation. Even more in America Latin America and the Caribbean, more and better information analysis is needed to reach standards and common units of measurement adapted to the shared needs. This involves a joint effort to recover the results of the first exercises of cooperation in the region since the mid-twentieth century. This requires a joint effort to recover the results of the first cooperation exercises in the region that occurred since the middle of the 20th century. It is necessary to concentrate efforts on the recovery of the advances in sustainable energy present in the region before the seventh sustainable development objective. These efforts must come from the same multilateral bodies without waiting for an approval of global initiatives.

Multilateral organizations in the region have the technical, legal and financial capacities to complement domestic efforts and provide tools for global initiatives in order to generate mechanisms adapted to the realities they face. Provide specific knowledge and promote key projects that can support the responsibility that these institutions have with the governments of each country and therefore with the peoples of the region.

**Literature**


**Summary**

**Key words:** Integration, sustainable energy, Latin America, infrastructure, policy, cooperation, globalization, regional, legal arrangements.

Multilateral cooperation and sustainable energy are two topics linked through regional policies which, in turn, have been related to the interdependence of secondary resources and self-sufficiency of primary resources. Therefore, the focus of research, energy cooperation, must conceptualize from both approaches that give sustenance to a regional transformation process framed in a global transition. This concept is retrieved from history of international cooperation as this sector since the beginning of regional multilateralism. This research is of interest to know in depth the implications that entails the coordinated implementation of the seventh goal for sustainable development for Latin America and the Caribbean: ensure access to affordable, secure energy, sustainable and modern for all.