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Leading Energy Policy Issues in Latin America

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Energy Challenges in the Americas
**LETTER FROM THE EDITOR**  
3

**LETTER FROM THE GUEST EDITORS**  
4

**FEATURES**

- Leading Energy Policy Issues in Latin America  
  *Genaro Arriagada*  
  6

- Energy Conflicts: A Growing Concern in Latin America  
  *Patricia I. Vásquez*  
  12

- Latin America’s Nuclear Future  
  *Jorge Zanelli Iglesias*  
  16

**REPORTS**

- What Climate Change Means for Latin America  
  *Paul Isbell*  
  19

- Central America’s Energy Challenges  
  *Cristina Eguizábal*  
  21

- Why the United States and Cuba Collaborate  
  *Jorge Piñón*  
  24

- Challenges of Designing an Optimal Petroleum Fiscal Model in Latin America  
  *Roger Tissot*  
  26

- Petrobras: The Unique Structure behind Latin America’s Best Performing Oil Company  
  *Genaro Arriagada and Chris Cote*  
  29

**COMMENTARIES**

- Argentina’s Energy Pricing Challenges  
  *Pablo Fernández-Lamela*  
  32

- Energy Consumption: Challenges and Opportunities of Urbanization  
  *Heidi Jane Smith*  
  33

- PetroCaribe: Welcome Relief for an Energy-Poor Region  
  *Chris Cote*  
  34

**SUGGESTED FURTHER READING**  
36
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Cover Image:
Ribeirao das Lajes dike with its forest bordering the reservoir, an example of Light S.A.’s reforestation program. Light, a subsidiary in Brazil of the French company EDF (Électricité de France), distributes electricity to 80% of the State of Rio de Janeiro and implements environmental protection programs. ANTONIO SCORZA/AFP/Getty Images.
Energy is a leading world concern. A fundamental factor in determining the might and weight of nations is the skill with which they handle energy policy. Tensions among states are increasingly linked to the security of energy supplies, prices and transportation. In this context, analyses from the viewpoint of politics and strategic and power considerations among states gain new importance in addressing energy issues.

Compared to other world regions, Latin America's energy mix reveals special circumstances, challenges, problems and policies. The table illustrates the percentage of total consumption by energy source and region.

Latin America is an area rich in oil, hydroelectric power and gas, with enormous reserves and production that exceeds consumption, making it a net energy exporter. By contrast, the share of coal and nuclear energy in the mix is very small.

Since energy policy should be based on the use of all sources rather than a single one, a view of the overall energy mix is fundamental to discussing and formulating long-term policy. Environmental concern about greenhouse gas emissions has given new momentum to once-controversial energy sources, such as dams and nuclear power plants. Such considerations should not obscure economic factors essential to growth, for the cleanest energy sources—wind and solar—are among the most expensive. A purely economic logic favors investment in coal, which is the cheapest source but also the most polluting.

Between now and 2030—assuming that energy consumption rises 60%, the mix remains clean, and the increase in energy costs is minor—Latin America should set the following general energy policy goals: (1) maintain the current share of hydroelectric power; (2) slightly reduce the oil share; (3) maintain the natural gas share; (4) reduce the coal share; (5) reduce the role of traditional biomass, especially if associated with extreme poverty; (6) maintain or, ideally, increase the nuclear energy share; and (7) increase the Non-Conventional Renewable Energy (NCRE) contribution to 10-15% of the mix.

### Analysis of Energy Sources
Having set the general framework, it is important to analyze the different components of the energy grid. These are at varying degrees of development, pose distinct problems and opportunities, and should be addressed through different policies.

**Oil.** Excluding the Middle East, Latin America is the region where oil makes the largest contribution to the fuel pool, even more than in the “oil-addicted” United States. South and Central America, the Caribbean and Mexico together account for 15.8% of proven reserves and 12.8% of world production, which compares favorably to their 8.8% share of consumption.

Recently, however, highly favorable conditions have given way to uncertainty due to stagnating, even declining production in most of...
South America and Mexico. The Mexican state underfunds the oil sector, and oil reforms approved by the Mexican Congress are seen as too limited. In Venezuela, too, the oil situation is deteriorating rapidly. Brazil, in contrast, has emerged as a success story when it comes to oil exploration and production. In 1997 it accounted for two-thirds of South America's crude imports, but by 2009 it was self-sufficient in energy and ready to join the exclusive club of oil-exporting countries. Its results are so favorable that by the end of the decade it will probably overtake Venezuela and Mexico as the hemisphere's leading producer. Outside of Brazil, Latin America's oil future is under threat unless there is an effort to increase sector efficiency, particularly in Mexico, Argentina, Venezuela and Ecuador.

**Natural gas.** The contribution of gas to the regional energy mix is close to the world average: 22.2% compared to a global average of 23.7%. When it comes to reserves and production, however, gas is less satisfactory than oil. Latin America owns 4.1% of proven reserves and production matches consumption, 6.3% of the world total. Venezuela and Bolivia have immense reserves but sector development is lagging. Brazil, Peru and Trinidad & Tobago have more successfully managed their gas sectors.

The South American liquefied natural gas (LNG) market started in 2008 following the announcement of plans to build at least seven regasification plants. This strengthened the overall regional energy situation but weakened integration efforts. A more optimistic way to view the relationship between LNG and integration is to say that classic gas integration—via pipelines—is on the way out, but the door has opened for integration on the basis of LNG, with close cooperation between neighboring countries: Chile and Peru, Brazil and Argentina.

**Coal.** This will continue to be the fastest-growing fuel and its share in the Latin American mix—a low one-seventh of the world average—is likely to increase, driven by low costs and difficulties in developing hydroelectric and nuclear energy. The role of coal is small and limited to Brazil, Chile and Colombia, which account for 85% of regional consumption. At the same time, however, Central and South America represent the world area where coal consumption is growing the fastest. This increase will tend to muddy a comparatively clean energy mix.

**Hydroelectric power.** Latin America, South America in particular, is the world’s richest hydroelectric region, with 22% of the global total for this resource and four times the world average. However, opposition by environmental groups to new dams has led to conflicts in Chile, Brazil, Guatemala, Mexico, Honduras, El Salvador, Peru and other countries. Such confrontations pit environmentalists, native communities and large international NGOs opposed to dams (and nuclear energy or even oil development) against large corporations, governments and multilateral lenders that support development based on such factors as cost and security or clean energy concerns. Proponents argue that nuclear power is a sustainable option for a continent that has decided to halt hydroelectric development and should not rely on coal.

**Nuclear energy.** Nuclear energy comprises 6% of the world energy mix. Itaipu's Brazilian General Director, Jorge Miguel Samek, speaks to journalists about the controversial hydroelectric dam, which is co-owned by Paraguay and Brazil, during a press conference at the São Paulo State Industry Federation (FIESP) headquarters in São Paulo, Brazil, on May 27, 2009. Photo: Maurício Linsal/AFP/Getty Images.
mix, but in Latin America it accounts for less than 1%. Since 2006, governments have espoused the necessity of developing this sector given such factors as climate change, high oil prices, and dwindling reserves and production. Brazil and Argentina have announced new nuclear plants, the debate in Mexico is growing more strident, and Uruguay has set up a bipartisan commission to review the issue. Chile may soon become the fourth Latin American country to integrate nuclear energy into the mix. In Venezuela, the Chávez administration has been flirting with nuclear energy that uses Russian and Iranian technology.

Traditional biomass. The oldest form of energy is traditional biomass for heating, lighting and cooking. Its use is often associated with extreme poverty, and some 100 million Latin Americans rely on traditional biomass to meet their basic energy needs. Firewood, the most characteristic use of biomass, is hard to quantify, but it accounts for a very high share of the mix in the poor nations of Central America and the Caribbean. Yet, firewood could be used rationally in countries with vast forests, the technology to process farm waste, and thoughtful forest management plans. One of the Millennium Development Goals is to give the poor, who otherwise have only traditional biomass, access to modern energy sources.

Non-Conventional Renewable Energy. This includes run-of-river hydroelectric plants, wind, solar, geothermal, and non-traditional biomass such as sugar cane, corn-based and cellulosic ethanol. While they currently contribute only 2% of the Latin American mix, these sources are critical to addressing climate change and will be a focal point of future debate. Clean to varying degrees, some of these sources have non-trivial negative effects. Worldwide use of non-conventional renewable energy has been rising rapidly but its overall contribution remains scant. In general, its development hinges on subsidy policies that poor and even middle-income economies, such as those of Latin America, cannot afford to any significant extent. Still, there have been success stories with some forms of renewable energy in individual countries.

Non-conventional hydrocarbons. The hemisphere holds remarkable possibilities for development of “non-conventional” or “tough” hydrocarbons, including Canada’s tar sands or the ultra heavy oils of Venezuela’s Orinoco Basin, which could total as much as double the reserves of Saudi Arabia. The technical and financial issues in developing these resources are enormous and the environmental impact is also being questioned, particularly with regard to tar sands. Interestingly, high-profile observers note that the distinction between conventional and non-conventional oil is irrelevant since at the end of the day, any oil that markets can integrate in terms of cost and price is conventional. In this sense, the ultra heavy oils of the Orinoco have better prospects than Canada’s tar sands.

Energy Regions in the Hemisphere. Specific local circumstances and issues call for different policies, making it most expedient to view the hemisphere as not one zone but three: Central America and the Caribbean; South America; and North America, including Mexico, the United States and Canada.

Central America and the Caribbean encompass 23 nations with an energy deficit. Only Guatemala and Cuba produce some oil, although not enough to meet domestic demand. Oil accounts for more than 70% of the energy mix in many of these nations. They possess limited refining capacities, compounding dependence. The Central American and Caribbean
zone also has virtually no gas, except for Trinidad and Tobago, home to a significant exportable surplus. Countries in this area possess modest hydroelectric resources and no access to nuclear energy in the foreseeable future.

Energy is one of the bottlenecks to growth in Central America and the Caribbean. Oil becomes an instrument of policy whenever a strong imbalance of power emerges between a country with a surfeit of the resource and another that needs it urgently. A state may prevail over another in such a situation, reinforced by subsidized prices or soft financing terms. Within the hemisphere, this zone is the most likely to experience such relationships.

South America, in contrast, is rich in energy resources. Exportable oil surpluses are significant and proven reserves very high. Venezuela, Bolivia and Peru have vast gas reserves and Brazil has recently reported major discoveries. The hydroelectric potential is enormous.

Major differences underlie this scenario. Chile and Uruguay are weakest, with large energy shortfalls. Paraguay compensates its shortcomings with the enormous flow of electricity from large dams on its borders with Brazil and Argentina. All other countries show positive balances but their prospects differ. Brazil exemplifies successful policy management while Venezuela, Argentina and Ecuador face declining production and deteriorating energy sectors.

Latin America is the leading oil exporter to the United States. The US has a strong energy deficit, in contrast to Mexico and Canada, both with excess production. But in Mexico, too, as we have noted, energy production is on the decline. In fact, North America is the region of the world where the reserves-to-production ratio is lowest.

Because of oil’s fungible nature, its use for political purposes is limited. Exports to one country that are diverted to another will simply be replaced with other exports. The main concern is whether the reduction of one source can limit the global supply.

Natural gas is different, as about 70% of the gas supply does not trade on the open market. Prices and quantities are fixed in long-term contracts between countries joined by a pipeline, creating strict, reciprocal dependence between exporter and importer. The LNG market resembles the oil market with the restriction that it requires consumers to build regasification plants.

Experience shows that higher levels of energy security come not from autarchy but from diversification of the energy mix. Security through diversification and leverage of economic benefits are among the factors that drive integration. The leading forms of energy integration are linkages through gas pipelines and power grids, but development of either in Latin America is nascent at best. In the case of natural gas, progress has been hobbled by political or geopolitical factors.

Nations such as China or India, whose greatest concern is to secure the energy supplies their growth plans require, are increasingly active in Latin America. As a result, the geopolitical energy equation must consider not just large producers, but also and most especially large overseas importers and their investments in the area.

Prospects for energy security would benefit greatly from a regional accord or convention designed to guarantee that energy supplies will not be arbitrarily cut by signatory states. This may not be easy to achieve.

Experience shows that energy security comes from a diversification of the energy mix.

The disparities among these three zones create both challenges and opportunities for energy partnerships.

Security, Integration and Geopolitics

Energy security is an elusive concept. At its most basic it requires an uninterrupted flow of energy at a reasonable price.

While cuts in supply are the foremost threat to security, responsibility for them varies. Many cuts occur for reasons beyond the fault or control of states or companies, although cutting or threatening to cut the energy supply may be used as an instrument of political pressure. Security can also be threatened when a relatively more powerful country sets an unfair price—either too high (if it is a supplier) or too low (if it is a consumer), thus affecting a weaker nation. Cartels may distort prices and, more seriously, put conditions on supply.
Geopolitically, the presence of extra-continental powers in the region as well as tensions between countries in the hemisphere should be watched. Examples include: (1) any vacuum created by the suspension or reduction of projects or promises made to countries and governments by Venezuela, whose oil slump may make fulfillment impossible; (2) how the United States will address eventual export declines by Mexico and Venezuela; and (3) tension between Brazil and Bolivia over natural gas, not only as related to Brazilian investments in Bolivia, but also to those arising from Brazil’s shift from deficit to self-sufficiency and even to exporting.

**Savings, Prices and Public Corporations**

Any energy policy must consider three fundamental elements: efficiency, public corporations and energy prices.

Energy efficiency is a priority objective of a consistent policy. Nearly all Latin American countries have the ability to reduce consumption at a reasonable cost using measures within reach of institutions and individuals. Energy efficiency can yield a remarkably high economic return and makes efficiency an attractive option, even if supported by subsidies. This forces a discussion within a broad perspective about the advisability of investing in non-conventional renewable energy without impacting global economic growth or diverting funds from other areas, especially social needs.

The largest players in the Latin American energy arena, especially as pertains to oil and gas, are National Oil Companies (NOCs). Many types of NOCs exist, varying by corporate governance systems and relations with the state, the private sector and society. These models are differentiated by the way NOCs address rent take (production sharing or concession-based contracts); whether private participation exists (in exploration and production, or in company ownership); how and by whom the company is governed; and the sector’s price policy. Brazil’s Petrobras and Venezuela’s PDVSA are examples of NOCs that address these issues in divergent ways. NOCs are likely to continue to dominate the oil industry, especially in Mexico and South America, and the quality of their performance is a central energy policy issue in Latin America.

The study of pricing and subsidy policies is an issue of special concern, as in Latin America these can be an obstacle to consistent energy policies. They interfere with efficiency, discourage investment, distort demand, do not always favor the poorest and are a disincentive to integration.

Subsidies, first cousins of pricing, tend to be high in Latin America. Venezuela, for instance, has some of the world’s lowest gasoline prices at enormous public cost. Subsidies in Venezuela and Ecuador represent 8.3% and 6.7% of GDP, respectively. In some cases, subsidies are high and lack transparency. Their cost and financing are unclear and they sometimes benefit the affluent sectors of society. At the same time, many non-conventional renewable energy sources are costly and can only be developed if supported by subsidies. This forces a discussion within a broad perspective about the advisability of investing in non-conventional renewable energy without impacting global economic growth or diverting funds from other areas, especially social needs.

**Latin America and Climate Change**

Energy’s golden era of fossil fuels is coming to an end. Humankind has agreed that such a system is unsustainable and must be stopped due to high levels of carbon dioxide emissions and their contribution to climate change. Latin America is not a large contributor to greenhouse gas emissions. The region adds a mere 6% to the world total, thanks to low levels of industrial output and public transportation emissions and the weight of hydroelectric power in the energy mix. The region’s greatest potential contribution to climate change is deforestation.

Regional energy policies have already begun to address the climate change challenge. Important initiatives include hydroelectric power and increased energy efficiency. Nuclear energy too cannot be ignored. The controversies over its development, mostly political (nuclear weapon proliferation) and safety-related (risk of accident) cannot obscure the fact that it is a clean source of energy in terms of greenhouse gas emissions.

To the above policies—whether any or all are adopted—one must add the fundamental role to be played by non-conventional renewable energy for its contribution to reducing carbon dioxide emissions and fossil fuel dependence. In general, non-conventional renewable energy is expensive and hard to develop without subsidy support. Production costs have declined significantly in recent years, however, and there is active discussion about international financing tools that could make it accessible to countries with lower relative development. Latin American countries should continue their efforts to invest in non-conventional renewable energy and develop new, more accessible technologies. They should do so with caution, however, ensuring that development does not create a heavy subsidy burden or pronounced energy price increases.

Genaro Arriagada is a non-resident senior fellow at the Inter-American Dialogue.