



# NATURAL RESOURCES AND SMART ENERGY FOR THE AMERICAS

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## KEY STATISTICS

- According to the 2017 Global Tracking Framework Report, **access to electricity in LAC between 1990 and 2016 increased from 86% to 97%**. This increase almost exclusively resulted from the supply of electricity services to rural populations, which climbed from 56% to 89%<sup>1</sup>. These advances will continue and **LAC will reach 99% electricity coverage by the year 2030**<sup>2</sup>.
- LAC represents 8% and 9% of the world's population and GDP, respectively. By comparison, **its countries produce 20% of the world's hydroelectric power, as well as 13% of crude**.
- The oil sector will need an investment of approximately US\$ 550 billion between 2014 and 2030 to maintain current production levels.
- **The energy matrix in LAC boasts the largest participation of the world's renewable energy sources**, which ranges between 60 and 65%. The global average is 25%.

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<sup>1</sup> Idem.

<sup>2</sup> International Energy Outlook, International Energy Agency (2017).

## INTRODUCTION

This document addresses the main challenges of the energy sector in Latin America and the Caribbean (LAC), as well as the role that the private sector must play in the process of overcoming these challenges. The main challenges include:

1. Increasing energy efficiency
2. Providing access to high quality and reliable modern energy at accessible rates in all homes.
3. Diversifying the energy matrix.
4. Strengthening the regional energy integration process.
5. Achieving financial, as well as social and environmental sustainability.

The private sector will play a key role in overcoming the identified challenges by: incorporating and/or training qualified human capital, creating financial products adapted to the realities of the region, identifying and transferring more efficient technologies and designing innovative business models.

## DIAGNOSTIC AND TRENDS

The United Nations General Assembly declared that the period between 2014 and 2024 is the Decade of Sustainable Energy for All and recognized that “sustainable energy is the golden thread connecting economic growth, increased social equity and an environment that allows the world to thrive”<sup>3</sup>.

It is estimated that as a result of the population boom, improvements in human living conditions and enhanced regional economic activity, electricity supply must grow. This implies that LAC will have to increase its installed capacity to generate power by 70% (up to 630 GW) before 2030. **This will require a total investment of approximately US\$ 495 billion**<sup>4</sup>.

The same applies to the oil sector. According to internal Inter-American Development Bank (IDB) estimates, this sector will require an investment of approximately **US \$ 550 billion between 2014 and 2030 to maintain current production levels**<sup>5</sup>.

While LAC represents only 8% of the world’s total population and has 9% of its GDP, its countries produce 20% of the world’s hydroelectric power, as well as 13% of its crude and 7% of its natural gas<sup>6</sup>. The LAC energy matrix boasts

<sup>3</sup>United Nations General Assembly. (2013). Report of the Secretary General, 2014–2024 United Nations Decade of Sustainable Energy for All. New York.

<sup>4</sup>Paredes, J (2017). Network of the Future. <https://publications.iadb.org/handle/11319/8682> Inter-American Development Bank, Washington, D.C.

<sup>5</sup>The numbers calculated by the IDB are based on historical growth rates in the production of crude presented by producing countries, therefore, they represent an adjustment of official statistics. Official country estimates project a 53% growth by the year 2019, foreseeing a heavy acceleration by 2030. According to this data, an additional 1 billion in investments will be required.

<sup>6</sup>World Bank Figures.

the highest participation of renewable energy sources with an annual participation that ranges between 60% and 65%, depending on the availability of water to generate power. **Consequently, the regional electric power matrix is one of the cleanest on the planet**, measured by levels of carbon emissions.

Nonetheless, LAC must address the following challenges:

1. ***Increasing Energy Efficiency.*** The International Energy Agency (IEA) estimates that improvements in energy efficiency can offer benefits that will increase the sector's sustainability, **grow GDP between 0.3 and 1.1% annually**, improve trade balances, enhance industrial productivity and employment, free part of the available family income, reduce local pollution and reduce required investments to supply energy.

The IEA estimates that by the year 2035 an investment of approximately US\$315 billion in energy efficiency will be required in LAC: US\$ 105 billion for the industrial sector, US\$ 195 billion for the transportation sector and US\$ 69 billion for the construction sector.<sup>7</sup>

2. ***Combining quality and reliability, affordable prices and viable investments.*** A study by the World Bank (WB) estimates that rural electrification costs substantially surpass the benefits. These benefits include: an increase in the number of hours that the population can stay awake, increased study time, access to modern information sources and improvements in productivity in homes and businesses<sup>8</sup>. Another WB report found that countries with deficient energy systems can lose between 1 to 2% of annual GDP growth as a result of power outages, overinvestment in back-up generators, subsidies, losses and/or inefficient energy use.<sup>9</sup>

<sup>7</sup>International Energy Agency (IEA). (2014e). World Energy Investment Outlook. Paris.

<sup>8</sup>World Bank Independent Evaluation Group. (2008). The Welfare Impact of Rural Electrification: a Reassessment of the Costs and Benefits. Washington, D.C.

<sup>9</sup>World Bank. (2009). Africa's infrastructure, a time for transformation. World Bank Africa Infrastructure Country Diagnostic. Washington, D.C.

According to the 2017 Global Tracking Framework Report<sup>10</sup>, access to electricity in LAC between 1990 and 2016 increased from 86% to 97%. This increase was mainly due to the supply of electricity services to the rural population, which increased from 56% to 89%<sup>11</sup>. These trends will continue and LAC will reach 99% electricity coverage by the year 2030<sup>12</sup>.

At the same time, the supply of electricity services in LAC has suffered heavy losses (the difference between the electricity that enters the network and the electricity that is used for final consumption), affecting the financial stability and sustainability of the electrical system.

3. *Diversifying the Energy Matrix.* A diversified energy matrix must combine a variety of energy sources that can adapt to and take advantage of regional and local potentials, technological advances and existing opportunities in international markets.

The majority of Central America and Caribbean countries heavily depend on the import of oil products, especially to generate power. However, a country like Costa Rica has demonstrated in recent years that a diversified matrix, **which is almost 100% renewable**, is possible from a technical and economic standpoint. On the other hand, countries like Brazil, Colombia or Paraguay have a high capacity to generate hydraulic energy, in some years surpassing 70% of each country's electricity production.

The International Renewable Energy Agency (IRENA) estimates that by 2020 all renewable energy technologies that are currently being marketed will be cost-competitive or cost less than electricity generated by fossil fuels.<sup>13</sup>

<sup>10</sup> Global Tracking Framework <http://www.worldbank.org/en/topic/energy/publication/global-tracking-framework-2017> World Bank, Washington DC.

<sup>11</sup> Idem.

<sup>12</sup> International Energy Outlook, International Energy Agency (2017).

<sup>13</sup> <http://irena.org/newsroom/pressreleases/2018/Jan/Onshore-Wind-Power-Now-as-Affordable-as-Any-Other-Source>.

This is especially true for solar and wind energy plants connected to the networks. The cost of solar power supply contracts in Latin American countries that have used the bidding process to increase electric power capacity has decreased by 87% in the past 8 years. The cost of wind power supply contracts have decreased by 44% in the same period<sup>14</sup>.

4. ***Strengthening regional energy integration.*** Energy integration enables countries to correct deficiencies and/or build on comparative strengths through bi-national or regional cooperation mechanisms.

A recent IDB analysis<sup>15</sup> concluded that the net benefit of a regional electrical integration project increases as the level of integration rises, determined by the level of coordination of the planned expansion and the regional operation of the system. In the case of the Electrical Interconnection System of the Central American countries (SIEPAC), the same study found that given the scenario of enhanced integration and regional transmission capacity, **investment savings would reach US\$ 1.4 billion.**

The IDB study Network of the Future<sup>16</sup> found that increased electrical regional integration by 2030 would reduce by 10% contaminating gases, such as sulfur and nitrogen oxides that contribute to air pollution and that carbon emissions could decrease by up to 15%.

5. ***Financial Sustainability.*** The financial sustainability of the energy sectors of the countries of the region depends, among other things, on their capacity to attract investments in more competitive activities, which can achieve higher levels of efficiency in the distribution chain of

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<sup>14</sup> Calculated by the IDB based on public data and biddings in 11 LAC countries.

<sup>15</sup> Echevarría, C., Jesurun-Clements, N., Mercado, J., Trujillo, C. (2017). Central American integrated electric power: Origins, benefits and forecasts of the project SIEPAC: Interconnected Electric Power System of Central America. Inter-American Development Bank, Washington, D.C.

<sup>16</sup> Paredes, J (2017). Network of the Future. <https://publications.iadb.org/handle/11319/8682>. Inter-American Development Bank, Washington, D.C.

energy products, as well as on their ability to maintain and/or establish final price mechanisms that adequately reflect supply chain costs.

6. ***Environmental and Social Sustainability.*** It is estimated that two thirds of greenhouse gas emissions are the result of energy sector activities,<sup>17</sup> which are natural resource intensive. Therefore, long-term sustainability of the sector depends in great part on the capacity to harmonize its development with the preservation of the environment.

In LAC the potential to develop large-scale hydroelectric projects has been reduced. Notwithstanding, scenarios presented by different institutions indicate that hydroelectric power will continue to play a key role in the development of the power sector in LAC, which will increase between 2 to 5 GW annually on average<sup>18</sup>.

**Improving transparency in environmental licensing processes and public consultation** to involve affected communities early-on, as well as creating awareness about the benefits of energy projects is equally relevant.

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<sup>17</sup> Inter-governmental Panel on Climate Change (IPCC). (2014a). Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Inter-governmental Panel on Climate Change. Cambridge University Press. Cambridge and New York.

<sup>18</sup> Alarcón, A. (2018) Hydroelectricity in Latin America. Technical paper under development. Inter-American Development Bank, Washington, D.C.

## THE ROLE OF THE PRIVATE SECTOR

### **The maturity levels of the regulatory and institutional frameworks in the energy sector in LAC countries vary.**

The private sector has effectively taken advantage of the opportunities available. There are increasingly more private agents, especially in the electricity sub-sector. For example, private participation in global renewable energy investments in 2016 surpassed 90% of total investments<sup>19</sup>.

**The private sector plays a key role in the mobilization of resources.** The private sector must provide the following inputs to achieve the above-mentioned objectives:

1. Incorporating and/or training qualified human capital
2. Creating financial products adapted to regional realities
3. Identifying and transferring more efficient technologies
4. Exchanging best practices in the development of projects
5. Designing innovative business models (public-private partnerships, for example).

Strengthening the energy integration process in the Caribbean or in Central America, for example, provides an opportunity to create new markets, which can introduce infrastructure for the supply of natural gas.

In Central America, in particular, new projects are being implemented, such as adding a second power line to the SIEPAC, strengthening and consolidating the **Regional Electrical Market** and the **Colombia-Panama Electrical Interconnection**. These will provide important investment opportunities for the energy sector.

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<sup>19</sup> IRENA, 2018. <http://www.irena.org/publications/2018/Jan/Global-Landscape-of-Renewable-Energy-Finance>.

In addition, the **Northern Art Project**, which aims to establish an electrical interconnection among Guyana, Suriname, French Guyana and northern Brazil, will enable the development of large scale power generating projects. These projects will reduce electricity costs and boost competitiveness in those countries. In South America the project SINEA is being advanced, which will connect power transmission lines between Bolivia, Chile, Colombia, Ecuador and Peru. It will also provide important investment opportunities related directly or indirectly to the project.

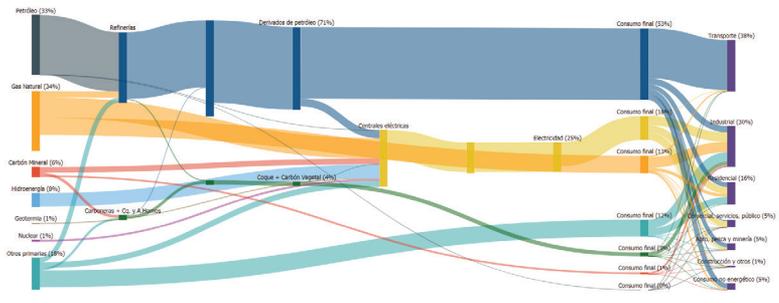
The electrification of households in isolated communities through renewable energy systems will require equipment and specialized technical skills that can be provided by the private sector.

In order to achieve financial stability in the energy sector, the private sector must identify and finance activities that have clear competitive advantages. Investments must also be made to improve the production and supply chains of energy products to reduce inefficiencies.

**In conclusion, the private sector will play a key role in overcoming the current challenges faced by the energy sector in LAC since it will provide the necessary inputs to stimulate modernization and guarantee that each country in the region makes the best use of its comparative advantages.**

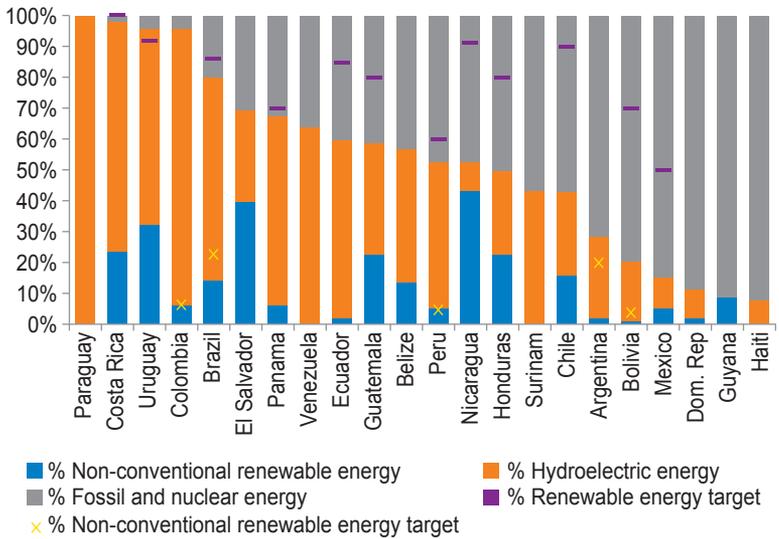
## ATTACHMENTS

### Energy Balance in Latin America and the Caribbean Year 2016



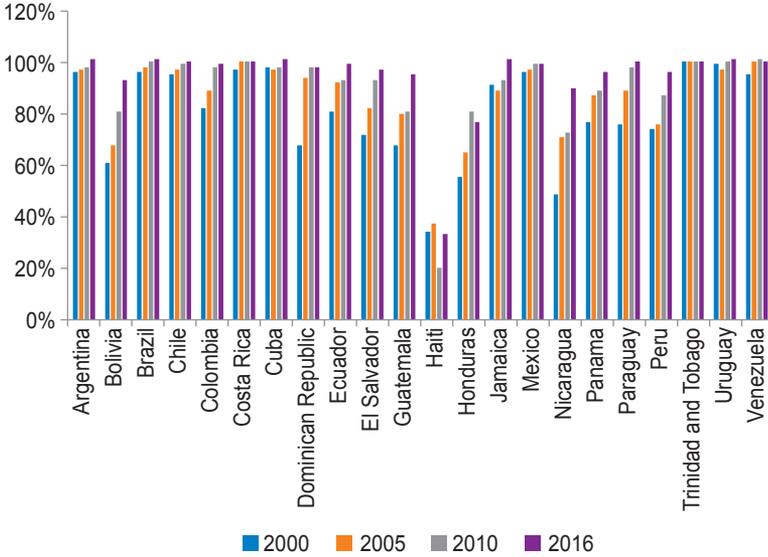
Fuente: sieLAC – OLADE.

### Electricity Matrices in Latin America and the Caribbean Year 2017



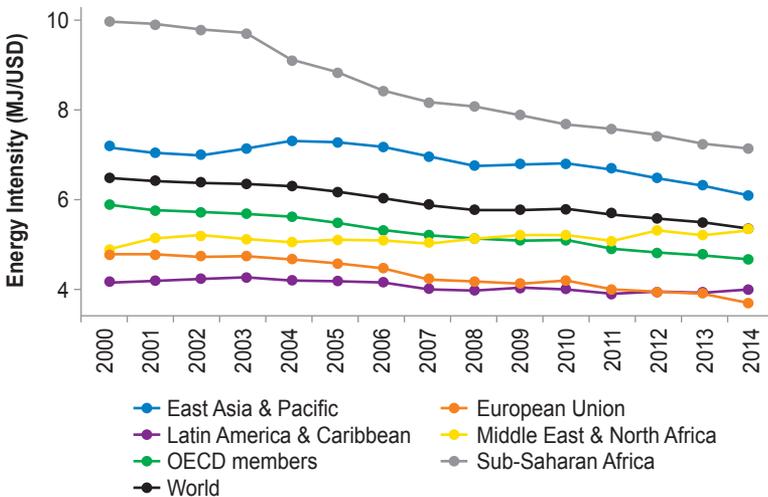
Source: Prepared by the IDB.

### Access to Electricity in LAC



Source: Energy Sector Framework IDB (2018) using IEA Access Outlook data (2017) and OLADE database.

### Energy Intensity, by Region, 2000–2014 (MJ/USD)



Source: Development Indicators of the World Bank.