LATIN AMERICAN AND THE CARIBBEAN ENERGY OUTLOOK

Executive Summary 2023-2024

LATIN AMERICAN ENERGY ORGANIZATION

50 YEARS 1973 - 2023

olade

Energy joins us

ACRONYMS

kWh / Year	Kilowatt hour per year
Mbbl	Millions of American barrels
thousand inhab.	Thousands of inhabitants
CO_2	Carbon dioxide
IROTE	Renewability index of total energy supply
MUSD	Millions of U.S. dollars
Gm^3	Billions of cubic meters
Mt	Millions of metric tons
MW	Megawatt
GW	Gigawatt
TWh	Terawatt hour
MWh / inhab.	Megawatt hour per inhabitant
kWh / inhab.	Kilowatt hour per inhabitant
Mtoe	Million tons of oil equivalent
kbbl	Thousands of American barrels
Mboe	Millions of barrels of oil equivalent
boe / inhab.	Barrels of oil equivalent per inhabitant
Gtoe	Billion tons of oil equivalent
toe / inhab.	Tons of oil equivalent per inhabitant
boe / thousand USD	Tons of oil equivalent
t / thousand USD	Tons per thousand U.S. dollars
t / inhab.	Tons per inhabitant
OLADE	Latin American Energy Organization
sieLAC	Energy Information System of Latin America and the Caribbean
LAC	Latin America and the Caribbean

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FIGURE INDEX

1. INTRODUCTION

Latin American and Caribbean (LAC) countries are engaged in and implementing various energy transition processes.

Both to guarantee supply and to meet the environmental commitments made, as well as to take advantage of available natural resources and improve the competitiveness of their economies, countries carry out comprehensive energy strategies in pursuit of their objectives.

A large part of this agenda is focused on decarbonization processes, which seek to accelerate the implementation of electricity generation from renewable sources (LAC is the region with most of these sources in its electricity matrix); and to electrify consumption in the industrial, commercial, residential, public, transportation and services sectors.

But there are also other indispensable energy resources that must be analyzed.

In turn, crucial measures, such as energy efficiency, need to occupy an important role in the energy public policy agenda in our region.

All this is accompanied by energy carriers such as low-emission hydrogen, which portends a new economy.

What lies ahead is challenging, but at the same time it constitutes an opportunity for development for our peoples.

As in any improvement process, it is necessary to have statistics as up to date as possible to monitor the progress or setbacks that are occurring in relation to the fulfillment of the established goals, so that the respective energy authorities can make timely decisions to maintain, accelerate or, if necessary, correct the course.

In this regard, the Latin American Energy Organization (OLADE) has prepared this report -based on the most updated energy sector information available in its member countries- on the regional energy outlook for the current year (2024).

The current document presents a summary of the most relevant energy statistics for LAC, with figures updated to 2023 and projections for 2024, as well as their historical evolution since 2010, grouped by electricity, hydrocarbons, coal and bioenergy subsectors. It should be noted that detailed information by country will be published soon in the annual edition of the Energy Outlook of Latin America and the Caribbean 2024.

2. SYNOPSIS OF THE LAC ENERGY SECTOR FOR THE YEAR 2024 (PRELIMINARY)

2.1 Comparative data from LAC and the world

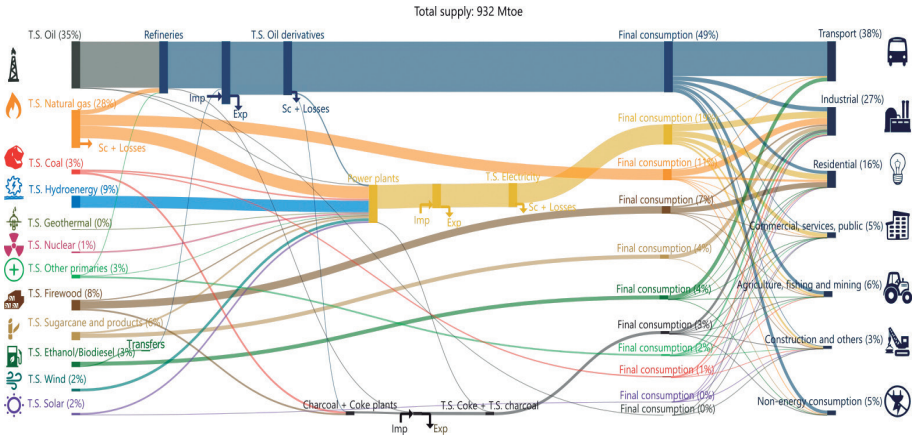
LATIN AMERICA AND THE CARIBBEAN

GENERAL INFORMATION 2024	Unit	LAC	World
Population	thousand inhab.	655.10	8,094.66
Participation of the LAC population with respect to the world	%	8.09%	
GDP USD PPP	MUSD	12,804,030	171,027,440
Share of GDP USD with respect to the world	%	7.49%	
ENERGY SECTOR 2024			
Share of renewables in the primary energy matrix	%	33.08%	14.40%
Share of renewable sources in electricity generation		69%	30%
Hydropower	%	44.74%	14.28%
Solar	%	7.40%	5.53%
Wind	%	11.60%	7.82%
Biomass	%	4.08%	2.30%
Geothermal	%	0.74%	0.30%
Share of non-renewable sources in electricity generation		31%	70%
Natural gas	%	25.02%	22.47%
Coal	%	1.99%	35.51%
Oil and derivatives	%	2.47%	2.67%
Nuclear	%	1.97%	9.11%
LAC's share of total global CO_2e emissions	%	8.2%	
Share of the LAC energy sector in total global CO_2e emissions	%	4.0%	
Final consumption (Demand)	Mtoe	682	15,364
Share of final consumption	%	4.44%	
Per capita electricity consumption	kWh / inhab.	2,345.51	3,748.97
Energy intensity	toe / thousand USD PPP	0.053	0.090
Electrification rate	%	97.37%	91.98%
Population without access to electricity	millons inhab.	17	649
Proven oil reserves	Mbbl	340,074	1,743,008
Share of proven oil reserves respect to the world	%	19.51%	
Proven natural gas reserves	Gm^3	8,195	188,193
Share of proven natural gas reserves respect to the world	%	4.35%	
Proven reserves of coal	Mt	16,065	1,075,273
Share of proven coal reserves respect to the world	%	1.49%	

2.2 Summary energy balance of LAC 2024 (preliminary)

As can be seen in the Sankey diagram showing LAC's energy balance for 2024 (Figure 1), the region's total primary energy supply is highly dependent on hydrocarbons (oil and natural gas), with a total share of 63%, while other sources such as coal, nuclear, biomass, geothermal and direct renewable energies (hydro, wind and solar) have relatively low shares. It can also be seen that the three sectors with the highest final energy consumption are transportation, industrial and residential.

Figure 1. Summary energy balance of LAC, year 2024 (preliminary)



Source: sieLAC – OLADE, 2024.

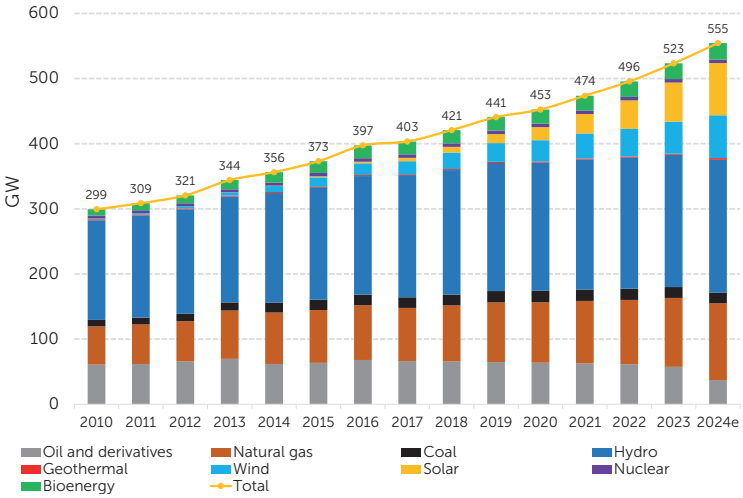
3. LAC'S ELECTRICITY SECTOR OUTLOOK

3.1 Evolution of installed electricity generation capacity by source

With respect to the evolution of the installed capacity of electricity generation in LAC, in recent years there has been a significant expansion of wind, solar photovoltaic and natural gas power plants, and a reduction in thermal power plants that consume oil derivatives.

In 2024, a generation capacity of 17 GW of wind generation, 20 GW of solar photovoltaic, 1 GW of hydroelectric, 1 GW of geothermal, 1 GW of bioenergy plants and 12 GW of natural gas plants will be installed. On the other hand, 20 GW of oil and coal-fired power plants will be withdrawn. In absolute terms, Brazil and Mexico lead in the installation of wind and photovoltaic plants, but in relative terms, the contribution of countries such as Chile with photovoltaic plants, Uruguay and Costa Rica with wind power and Argentina with natural gas plants should be noted. In total, the increase in installed capacity in the region will be 6% in the last year. See Figure 2.

Figure 2. Installed electricity generation capacity by source - LAC

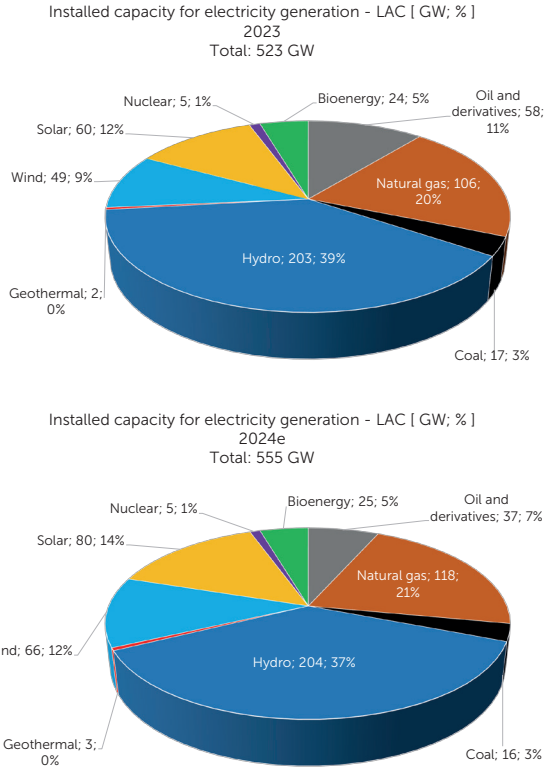


Source: sieLAC – OLADE, 2024.

3.2 Structure of installed electricity generation capacity per source, 2023 and 2024

In structural terms, in 2024, non-conventional renewable energy sources such as wind and solar, as well as natural gas, will increase their share in LAC's generation mix, displacing oil derivatives. See Figure 3.

Figure 3. Structure of installed electricity generation capacity by source, 2023 and 2024

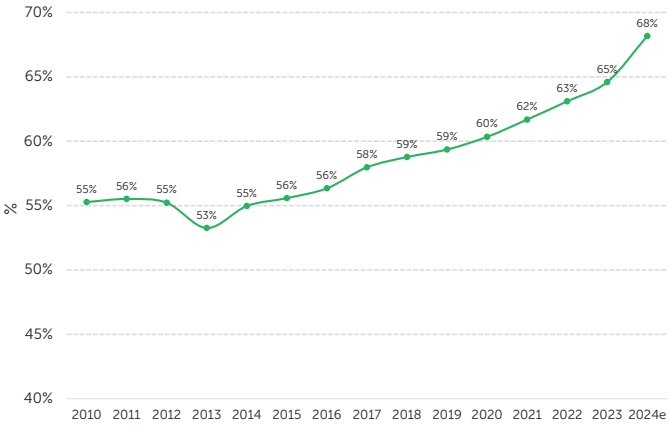


Source: sieLAC – OLADE, 2024.

3.3 Evolution of the renewability index of installed electricity generation capacity

Continuing with the historical trend of recent years, mainly since the signing of the Paris Agreement in 2015 and the increased implementation of energy transition policies in the region, the renewability index of the generation matrix will increase by three percentage points in 2024, as shown in Figure 4. In other words, the year 2024 will end with 68% of renewable energies. See Figure 4.

Figure 4. Renewability index of installed electricity generation capacity

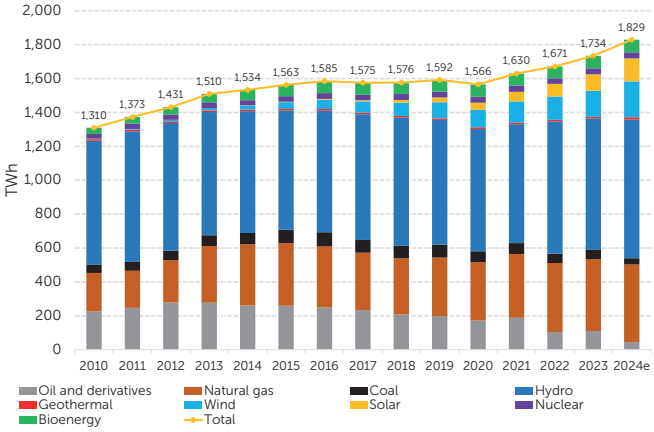


Source: sieLAC – OLADE, 2024

3.4 Evolution of electricity generation by source

Consistent with the evolution of installed electricity generation capacity, electricity production in LAC in recent years has shown a greater participation of non-conventional renewable sources such as wind and solar photovoltaic as well as thermal generation with natural gas, to the detriment of the use of oil-derived fuels, as shown in Figure 5.

Figure 5. Electricity generation by source - LAC

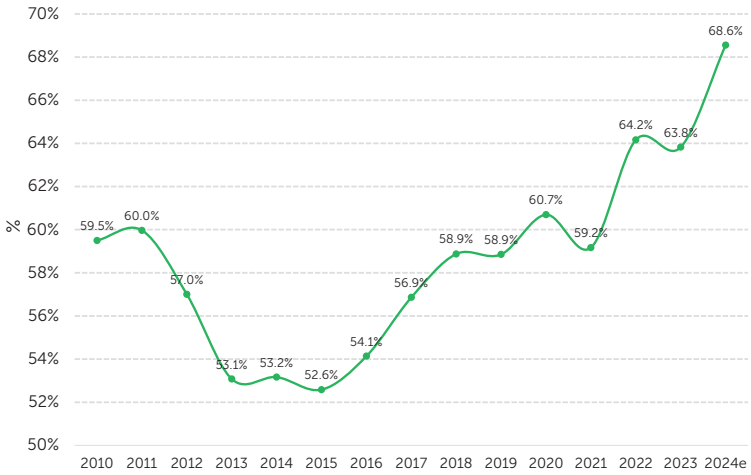


Source: sieLAC – OLADE, 2024.

3.5 Evolution of the renewability index of electricity generation by source

The share of renewable sources in the electricity generation matrix, as well as in the generation facilities, will continue to rise, improving in 2024 by almost five percentage points. This is mainly due to the significant expansion of wind and solar photovoltaic power plants. See Figure 6.

Figure 6. Evolution of the renewability index of electricity generation by source

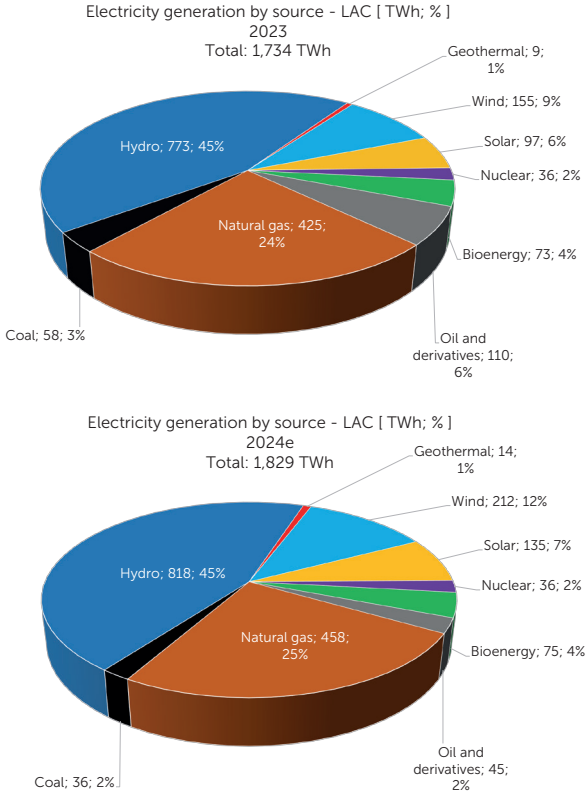


Source: sieLAC – OLADE, 2024.

3.6 Structure of electricity generation by source, 2023 and 2024

In 2024, electricity generation will increase by 5.5%, with a greater share of natural gas generation increasing by one percentage point, wind by three percentage points and solar photovoltaic by one percentage point, as seen in Figure 7, hydropower will maintain its share, while petroleum derivatives will reduce theirs.

Figure 7. Structure of electricity generation by source, 2023 and 2024

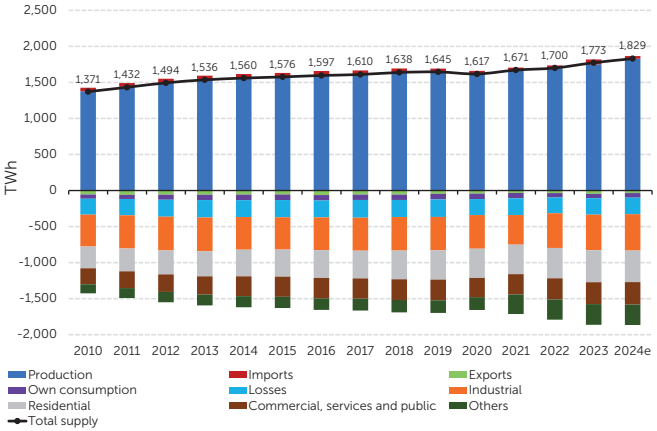


Source: sieLAC – OLADE, 2024.

3.7 Evolution of the electricity balance

The greater electricity coverage and demand for electricity in final consumption sectors will generate an increase of 3.2% in the total supply of this source between in 2024, with the largest increases in consumption in the commercial and services sector (3%), the energy sector (own consumption) with 2.5%, and the industrial sector with 2.3%.

Figure 8. Electricity balance in LAC

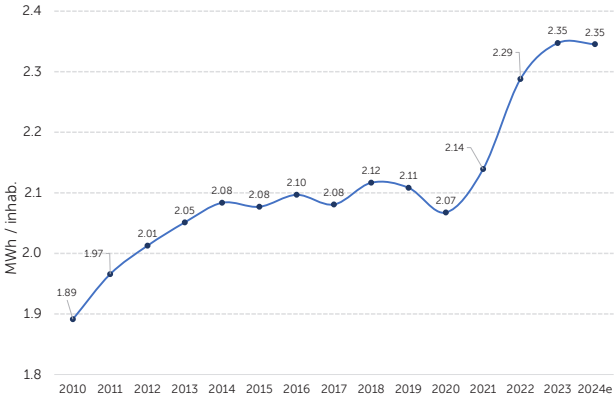


Source: sieLAC – OLADE, 2024.

3.8 Evolution of electricity consumption per capita

Despite the increase in electricity coverage and higher electricity demand in the final consumption sectors, the per capita electricity consumption indicator will stabilize by 2024 at around 2.35 MWh / inhabitant, after an upward trend that was maintained, as shown in Figure 9.

Figure 9. Per capita electricity consumption in LAC

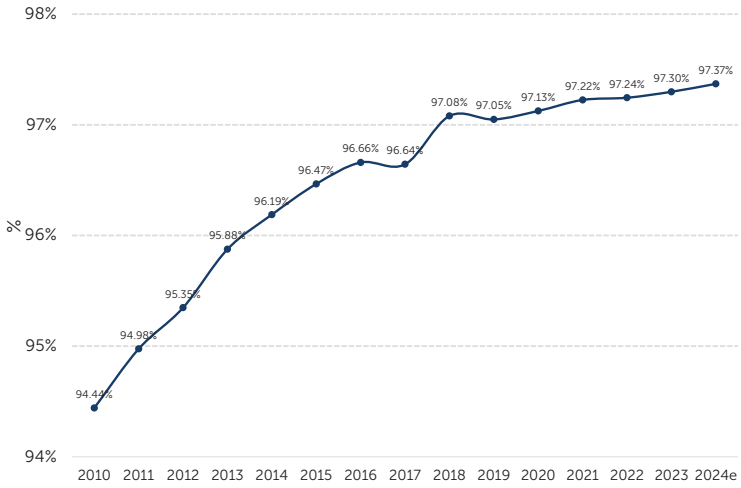


Source: sieLAC – OLADE, 2024.

3.9 Evolution of electricity coverage

Electricity coverage in the LAC region will maintain an upward trajectory in relative terms, reaching 97.37% in 2024. However, in absolute terms and given the growth of the population, by 2024 there will be 17 millon people without access to electricity.

Figure 10. Electricity coverage index



Source: sieLAC – OLADE, 2024.

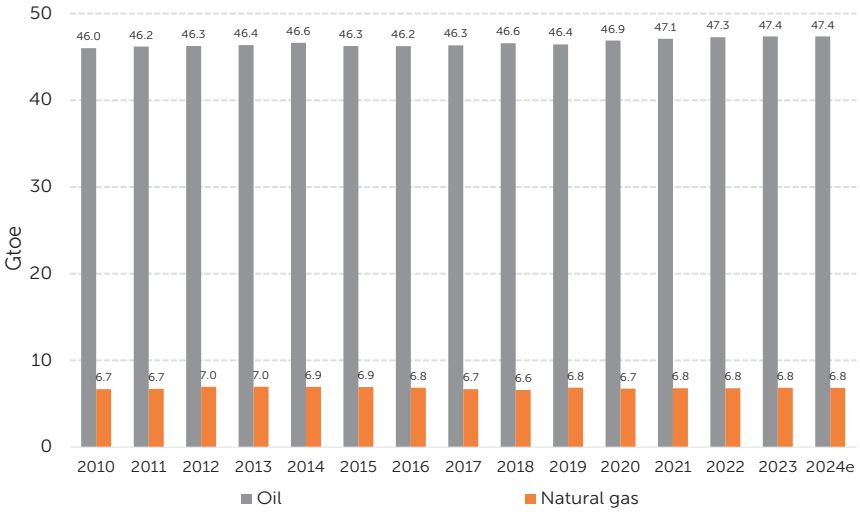
4. LAC'S HYDROCARBON SECTOR OUTLOOK

4.1 Evolution of oil and natural gas reserves

Latin America and the Caribbean stand out for having one of the largest crude oil reserves in the world, a large percentage of which are concentrated in Venezuela (89%), followed by countries such as Brazil (5%), Guyana (3%), Mexico (2%) and Argentina (1%). Proven natural gas reserves are distributed mainly

between Venezuela (66%), Brazil (6%), Argentina (5%), Guyana (4%), Mexico (4%), Trinidad and Tobago (4%) and Bolivia (3%). The remaining 8% is distributed among 7 other countries in the region.

Figure 11. Evolution of oil and natural gas proven reserves in LAC

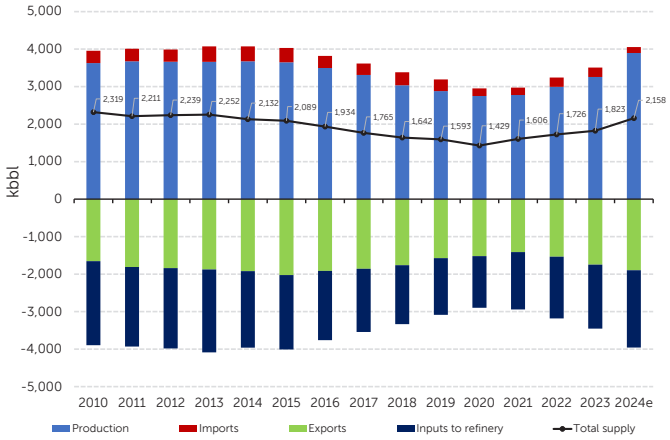


Source: sieLAC – OLADE, 2024.

4.2 Evolution of the oil and natural gas balance

Crude oil production in the region has had a period of decline between 2015 and 2020 due to the reduction in Venezuela's oil production, however, in the last four years a recovery of this item is observed, due to the increase in production in countries such as Argentina, Brazil, Mexico and especially Guyana that started oil exploitation from 2020. As for the total domestic supply of this source, it has followed a similar trend to production, although its growth has been more moderate, because most of the regional production is destined for export. See Figure 12.

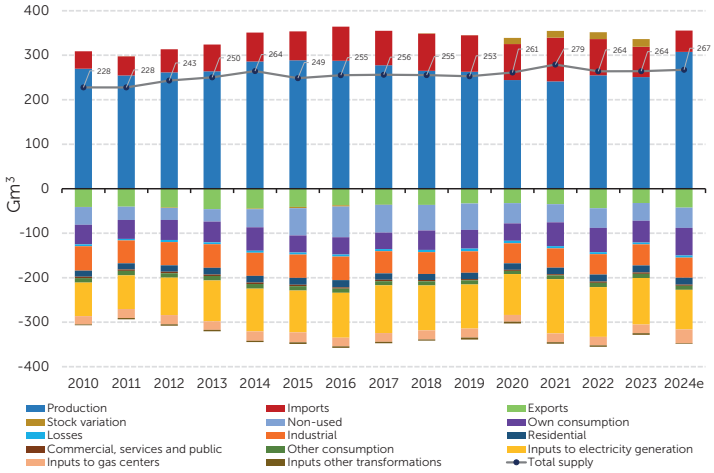
Figure 12. Oil balance in LAC



Source: sieLAC – OLADE, 2024.

The total domestic supply of natural gas has remained very stable over the last decade, with a slight increase expected in 2024, due to the expansion of natural gas-fired power plants and the increase in production in countries such as Argentina, Brazil and Mexico.

Figure 13. Natural gas balance in LAC

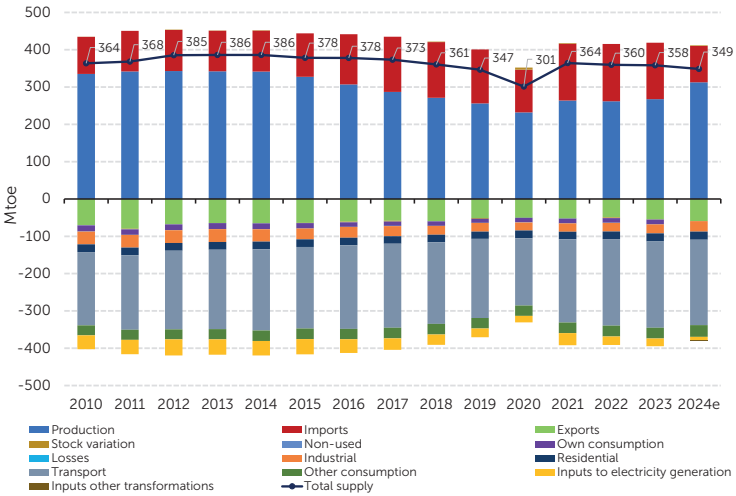


Source: sieLAC – OLADE, 2024.

4.3 Evolution of the oil derivatives balance

Between 2010 and 2017, the supply and demand of oil derivatives in the region remained at almost constant values. After a reduction due to the effects of the pandemic in 2020, it recovered in 2021 and thereafter shows a slight downward trend that will continue until 2024. However, between 2010 and 2024 there will be a net reduction in the total supply of oil derivatives in the region. This trend will continue in the future, due to the greater presence of renewable sources and natural gas. See Figure 14.

Figure 14. Oil derivatives balance in LAC

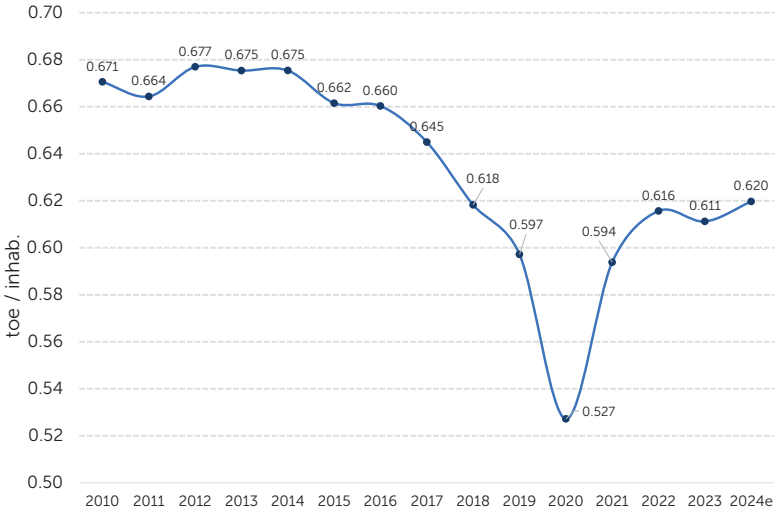


Source: sieLAC – OLADE, 2024.

4.4 Evolution of per capita hydrocarbon consumption

After the decline due to the effects of the pandemic in 2020, per capita consumption of hydrocarbons has remained practically constant and with very slight variations in the last three years, but with values lower than those reported until 2016, as shown in Figure 15.

Figure 15. Per capita hydrocarbon consumption in LAC



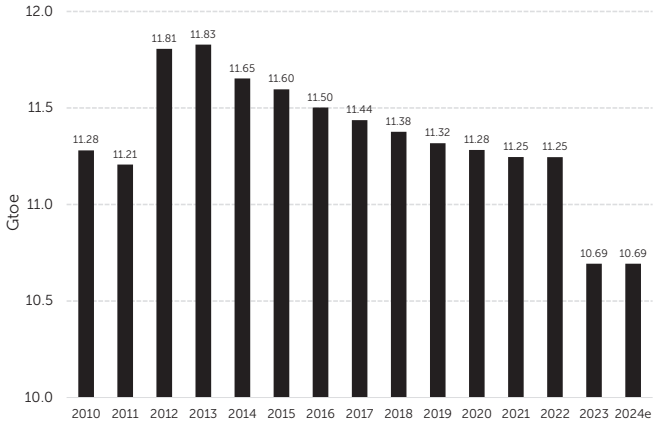
Source: sieLAC – OLADE, 2024.

5. LAC'S COAL OUTLOOK

5.1 Evolution of coal reserves

Proven coal reserves in LAC are mainly concentrated in Brazil (43%), Colombia (33%), Venezuela (10%) and Mexico (8%). The remaining 6% is distributed in 6 other countries in the region. The decrease in the last two years is mainly due to the review of its proven reserves carried out by Colombia. See Figure 16.

Figure 16. Coal reserves in LAC

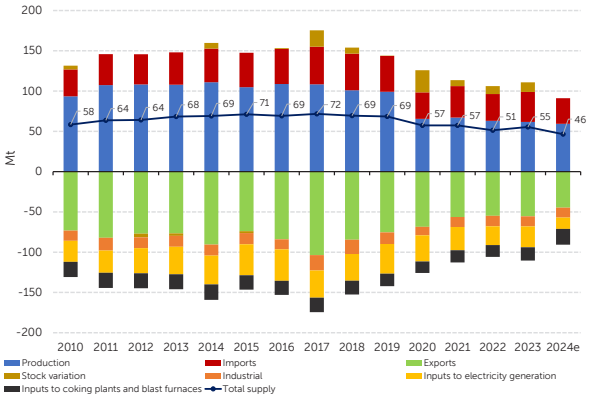


Source: sieLAC – OLADE, 2024.

5.2 Evolution of coal balance

The largest producers of coal in LAC are Colombia, Mexico, Brazil and Venezuela, with Colombia being the largest exporter at the regional level. Since 2017, production and supply have suffered a contraction caused by the fall in exports and the reduction in the share of coal-fired power plants in the electricity generation matrix. See Figure 17.

Figure 17. Coal balance in LAC



Source: sieLAC – OLADE, 2024.

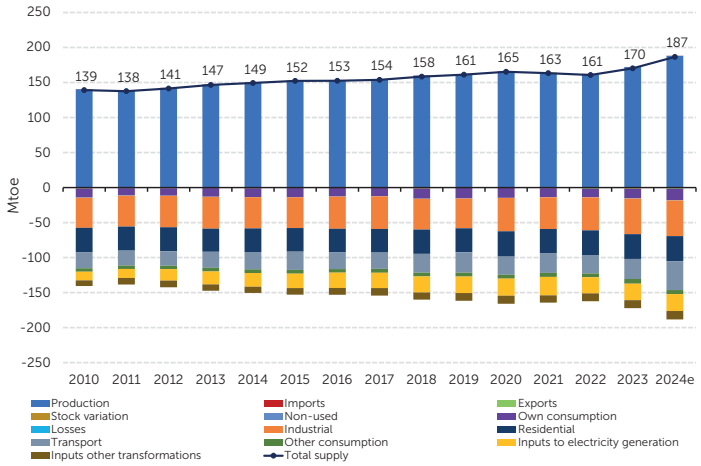
6. LAC'S BIOENERGY OUTLOOK

6.1 Evolution of the bioenergy balance

LAC has a high rate of bioenergy production and consumption, which includes firewood, sugarcane bagasse, biogas, charcoal, liquid biofuels and organic waste. Among these sources, firewood stands out due to its high consumption in some countries of the region. With regards to liquid biofuels such as ethanol and biodiesel, their production and consumption is mainly concentrated in Brazil, Argentina and Colombia, and their consumption is mainly in the transportation sector, generally in blends with oil derivatives such as gasoline and diesel, although Brazil does record consumption of pure fuel ethanol in this sector.

By 2024, a significant 10% increase in demand and supply of bioenergy is expected, which mainly corresponds to modern biofuels such as ethanol and biodiesel.

Figure 18. Bioenergy balance in LAC

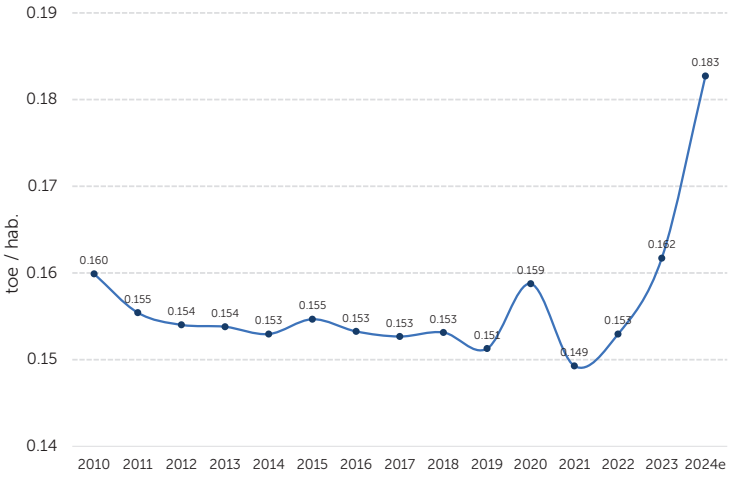


Source: sieLAC – OLADE, 2024.

6.2 Evolution of per capita bioenergy consumption

Due mainly to the high growth in demand for liquid biofuels in Brazil and in relation to population growth, per capita bioenergy consumption in LAC has been growing steadily over the last 3 years. See Figure 19.

Figure 19. Per capita bioenergy consumption in LAC



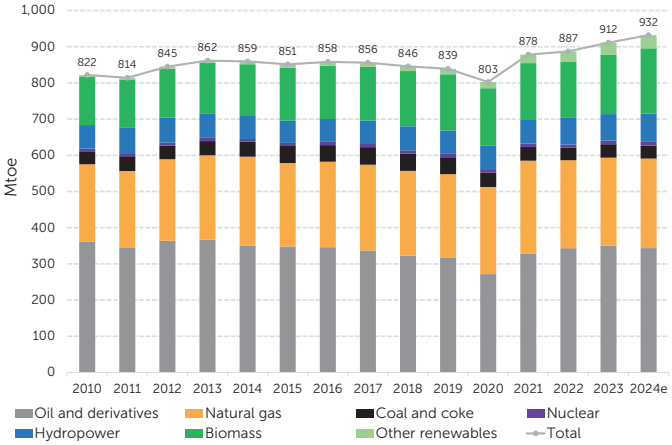
Source: sieLAC – OLADE, 2024.

7. EVOLUTION OF TOTAL ENERGY SUPPLY IN LAC

7.1 Evolution of total supply by source

In the evolution of the total energy supply in LAC during the last decade, the increase for natural gas and renewable energy sources and, on the other hand, the reduction in the supply of oil and its derivatives stand out. In 2024, LAC's total energy supply will experience a growth of 2.2%. See Figure 20.

Figure 20. Total energy supply in LAC by source

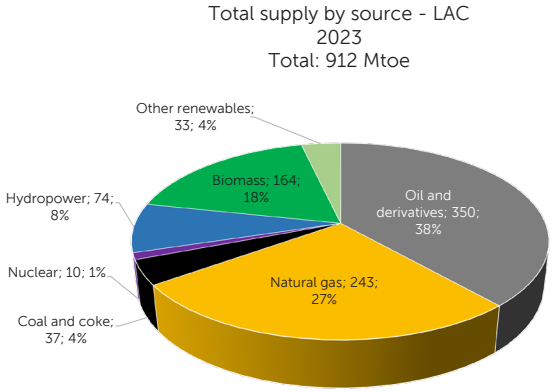


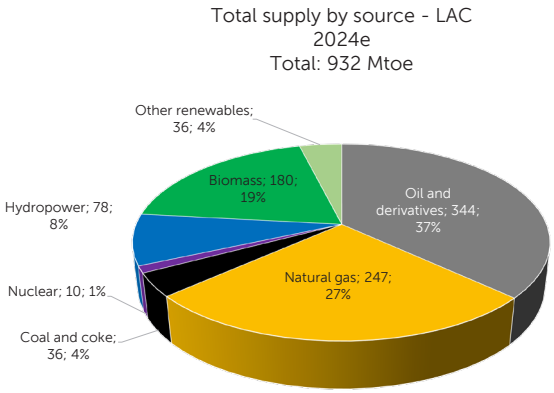
Source: sieLAC – OLADE, 2024.

7.2 Structure of the total energy supply, 2023 and 2024

In 2024, despite its increase in absolute values, natural gas, hydropower and other renewables (wind, solar and geothermal), will maintain their percentage share in the total energy supply matrix, while biomass will register a slight increase of one percentage point and oil and derivatives a reduction. See Figure 21.

Figure 21. Structure of total energy supply in LAC by source



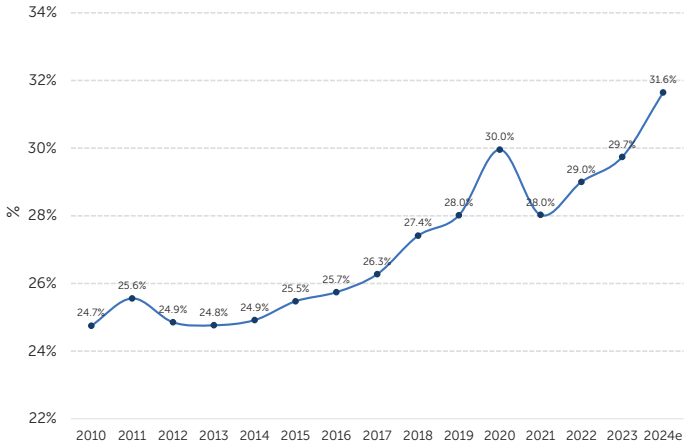


Source: sieLAC – OLADE, 2024.

7.3 Evolution of the renewability index of the total energy supply (IROTE)

As shown in Figure 22, the renewability index of the total energy supply has maintained an upward trend during the last decade, mainly due to the increase in the share of renewable energy sources in the electricity generation matrix. This indicator shows the relationship between the supply of renewable energy sources and the total energy supply.

Figure 22. Renewability index of total energy supply (IROTE)



Source: sieLAC – OLADE, 2024.

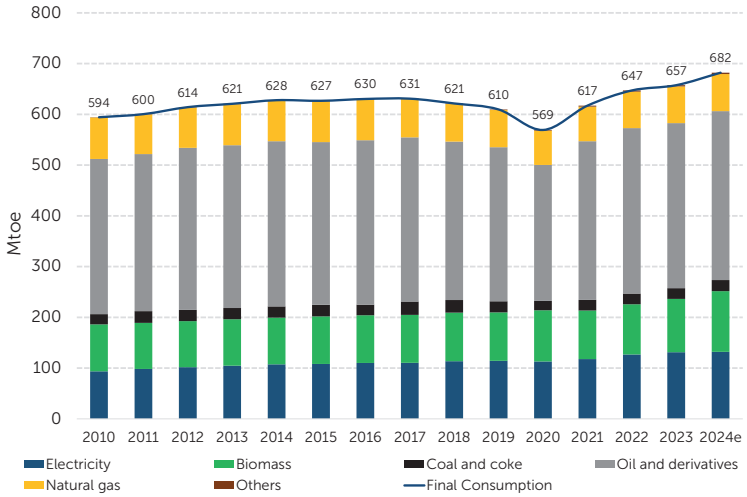
8. EVOLUTION OF FINAL CONSUMPTION BY SOURCE IN LAC

8.1 Evolution of final energy consumption by source

Since the contraction of 2020, caused by the COVID 19 pandemic, final energy consumption in LAC has been experiencing continuous growth thanks to the economic recovery of the countries, with an expected increase of 3.8% in 2024.

In the final energy consumption matrix, hydrocarbons (natural gas and petroleum derivatives) represent more than 60% of the total, a condition that has remained almost invariant over the last decade. It is followed in importance by electricity with a 19% share and biomass with a share of around 14%. Biomass is mainly represented by firewood, cane bagasse and liquid biofuels.

Figure 23. Final energy consumption by source

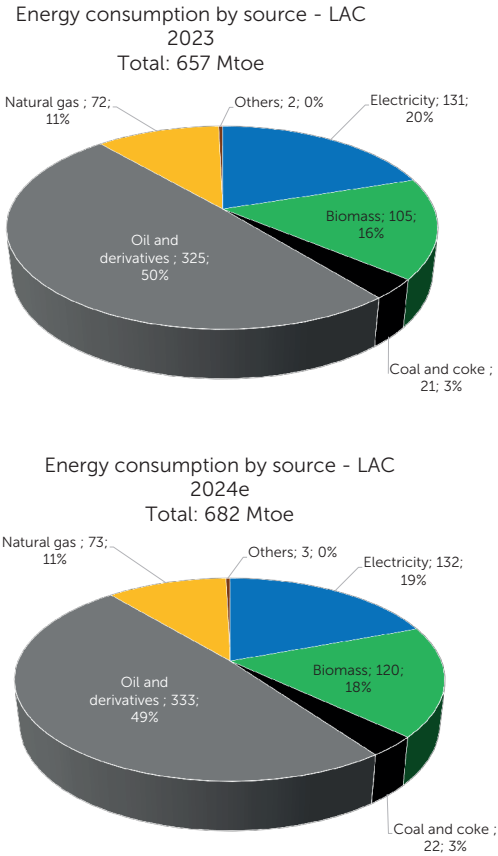


Source: sieLAC – OLADE, 2024.

8.2 Structure of final energy consumption, 2023 and 2024

In 2024, the final energy consumption matrix will not undergo significant changes in its structure, highlighting the increase in biomass by 2 percentage points due to the higher consumption of liquid biofuels. See Figure 24.

Figure 24. Structure of final energy consumption 2023 and 2024



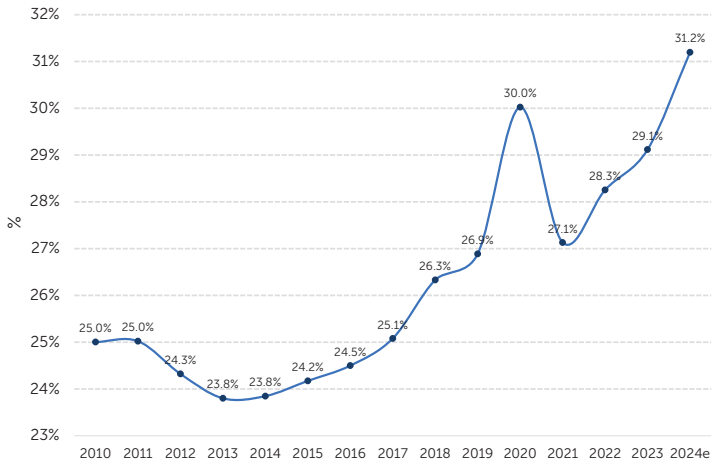
Source: sieLAC – OLADE, 2024.

8.3 Evolution of the renewability index of final energy consumption

The renewability index of final energy consumption refers to the ratio of the consumption of renewable energy sources (mainly biomass) plus the share of electricity considered renewable to total energy consumption. The renewable portion of electricity is calculated by multiplying total electricity consumption by the renewability index of the electricity generation matrix.

This indicator has shown an upward trend over the last decade due to the increased share of electricity (from renewable sources) and modern biofuels in the final energy consumption matrix.

Figure 25. Renewability index of final energy consumption



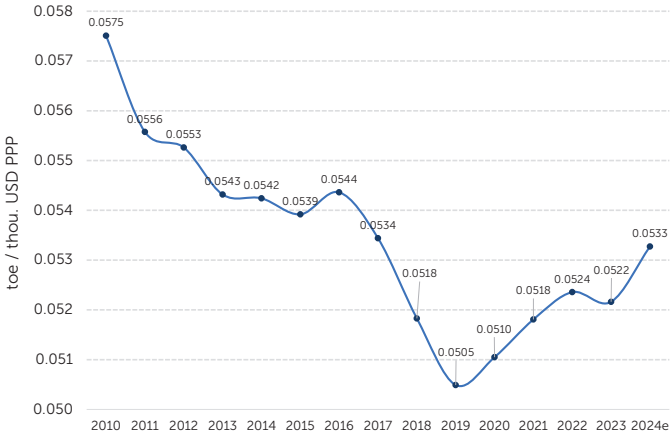
Source: sieLAC – OLADE, 2024.

9. OTHER INDICATORS IN LAC

9.1 Evolution of energy intensity

The energy intensity of the region (final energy consumption / PPP GDP) shows a clear downward trend between 2010 and 2020. Between 2020 and 2022 it grows due to the post-pandemic economic recovery and from there it decreases again to show a slight increase in the last year. Despite this intermittency of the data, between 2010 and 2024 there is a net decrease in the indicator, which can be interpreted as an improvement in energy efficiency in the final consumption sectors caused by the higher electrification rate of final uses and the different programs for rational and efficient energy use that have been implemented in the region. See Figure 26.

Figure 26. Energy intensity in LAC

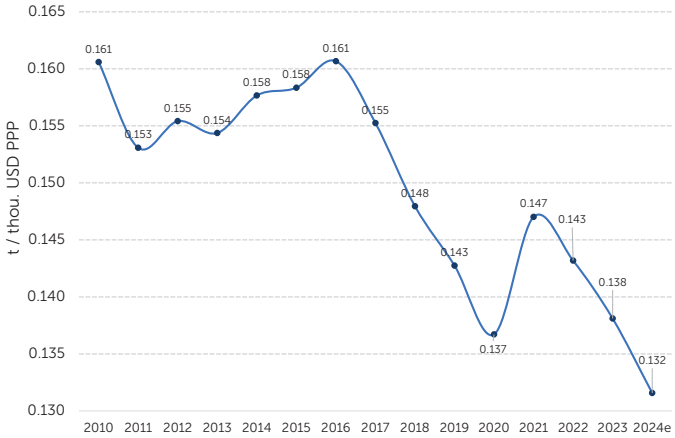


Source: sieLAC – OLADE, 2024.

9.2 Evolution of CO_2 emissions intensity

In line with the improvement in the renewability index of the total energy supply that has occurred in the last decade, the intensity of CO_2 emissions in LAC shows a decreasing trend during this period.

Figure 27. LAC CO_2 emissions Intensity

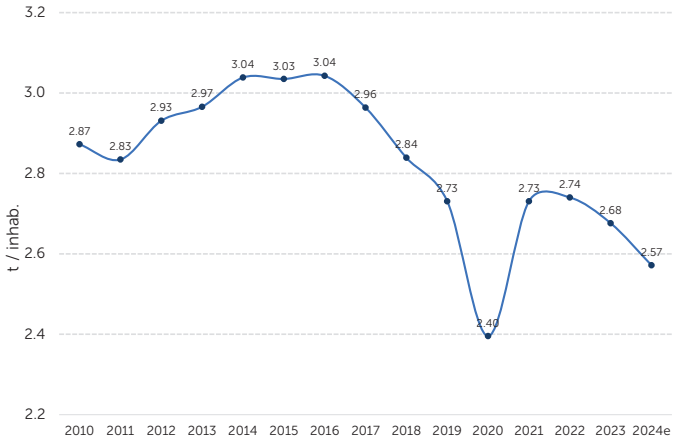


Source: sieLAC – OLADE, 2024.

9.3 Evolution of CO_2 emissions per capita

For the same reasons that justify the trend of the previous indicator, LAC's per capita CO_2 emissions show a downward trend in the last decade.

Figure 28. LAC CO_2 emissions per capita



Source: sieLAC – OLADE, 2024.

This document was prepared under the direction of:

Latin American Energy Organization (OLADE)

Andrés Rebolledo Smitmans
Executive Secretary

Fitzgerald Cantero Piali
Director of Studies, Projects and Information

This document was made by:
Fabio García Lucero
Targelia Rivadeneira Merino
Katherine Segura González
Marco Yujato Toasa

Collaborators:
Karla Flores Moreno
Fabricio Ramos Sarango

Design and Layout

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Contact
OLADE
Mariscal Antonio José de Sucre N58-63 y Fernández Salvador
OLADE Building, San Carlos Sector
Quito-Ecuador
Phone: (593-2) 2598-122 / 2531-674
sielac@olade.org

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olade LATIN AMERICAN ENERGY ORGANIZATION
Energy joins us

Avenue Mariscal Antonio José de Sucre
N58-63 and Fernández Salvador
OLADE Building, San Carlos Sector
Quito - Ecuador

Phone:
(593 2) 2598 122 / 2598 280

olade@olade.org
www.olade.org

OLADE - Organización Latinoamericana de Energía
olade.org
@OLADEORG
@oladealc
Organización Latinoamericana de Energía OLADE
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