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ASSOCIATION OF OIL, GAS AND
RENEWABLE ENERGY COMPANIES
OF LATIN AMERICA AND THE CARIBBEAN

EXECUTIVE REPORTS

Decarbonization policies
in Latin America and the Caribbean

July, 2022

Introduction

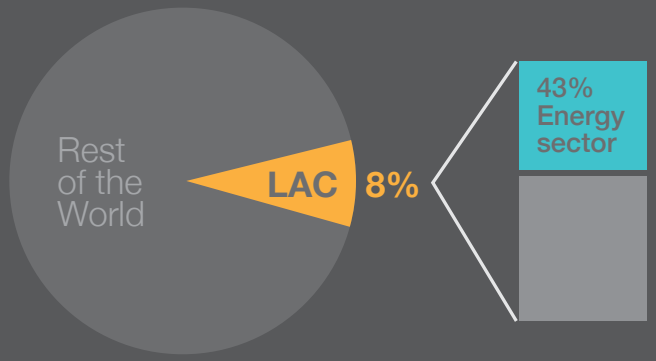
The Paris Agreement signed in 2015 represented a world milestone in the fight against climate change, giving a strong boost to the decarbonization process, essential to achieve the objectives set at that time. The commitments that governments have been assuming to contribute to the fulfillment of these objectives are translated into national decarbonization policies, a strategic "driver" for investment and development decision-making by companies in the sector. In this sense, ARPEL decides to compile and analyze in this report, the current or developing national policies in the countries of the Latin American and Caribbean (LAC) region, regarding the decarbonization of the energy sector.

1

Context

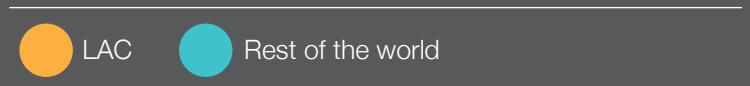
The situation of Latin America and the Caribbean in terms of greenhouse gas emissions from the energy sector, oil production and access to energy is presented below, in relation to the global context.

GHG emissions



GHG emissions per capita (tCO_2eq)

GHG emissions per capita Energy sector (tCO_2eq)

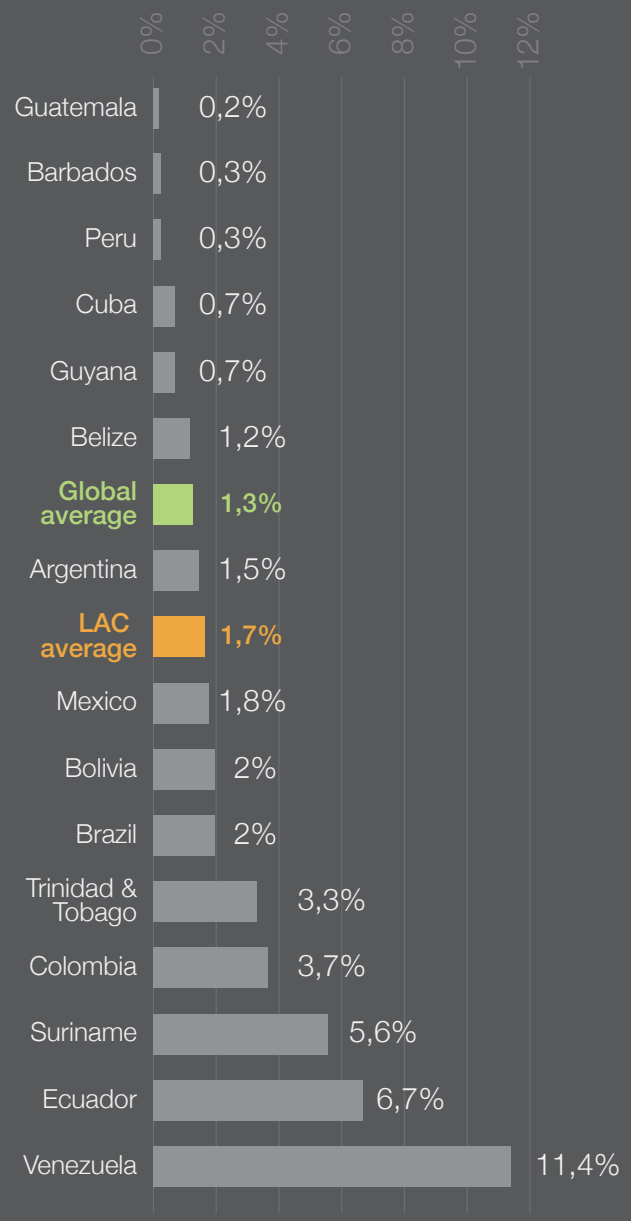


Source: Own elaboration based on data from Climate Watch (CAIT data), 2018

In 2019, approximately 82 million barrels of oil were produced globally per day, 9% of these (approx. 7.5 million) were produced in the region, with Brazil and Mexico being the main producers, accounting for 65% of the mentioned production.

World oil production in 2019 represented an average of 1.3% of **GDP**, while in LAC this value was 1.7%, reaching values well above average in some countries. In turn, according to data from the World Bank, the world average GDP per capita is currently 11,397 USD, while for LAC this value is 8,705 USD.

Oil revenues (% of GDP)



Source: World Bank, 2019 data

1

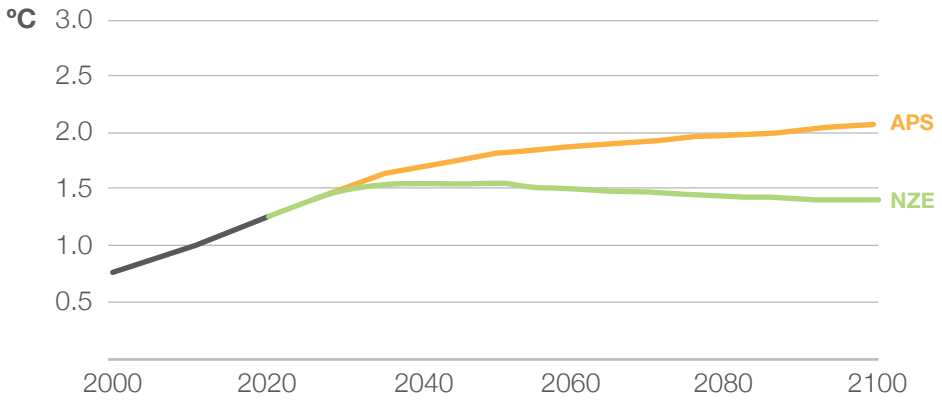
Context

According to OLADE, by 2020 the electricity coverage rate in the region reached 97.4%, however, 17 million people still do not have **access to electricity**. In turn, according to the World Bank, in 2019, 11.5% of the LAC population lacked access to clean energy for cooking.

The Paris Agreement, reached at COP-21(Meeting of the Parties to the United Nations Framework Convention on Climate Change held in 2015), aims to prevent the increase in the average global temperature of the planet in this century from being more than 2°C above pre-industrial levels. Moreover, it promotes additional efforts to ensure that global warming does not exceed 1.5°C.

According to the scenarios built by the International Energy Agency (IEA) in 2021, even if all the commitments assumed so far by governments to face climate change are fully met and on time (Announced Pledges Scenario - APS), the temperature rise will exceed 2°C by the end of the century. Therefore, it is expected that soon governments will consider more ambitious commitments, such as those presented in the Net Zero Scenario (NZE), which establishes that the world energy sector registers net zero CO_2 emissions by 2050.

Global median surface temperature rise over time in the WEO-2021 scenarios



1

Context

73% of the countries in the region, which in turn represent 84% of regional GHG emissions, proposed or made a commitment to achieve carbon neutrality by 2050.

Source: https://zerotracker.net/

Note: The commitment assumed by Uruguay refers exclusively to CO_2 (not to other GHGs).

The foregoing highlights the challenges that arise in the Latin American region to implement decarbonization policies that simultaneously allow for the economic development of countries and improve life quality of their population.

While progress is made towards more diversified energy matrices oriented towards a greater use of renewable sources, fossil hydrocarbons will continue to play a fundamental role in meeting the growing energy demand of the population, being the optimization of the processes linked to the exploitation, production and use of fossil resources, a fundamental component for decarbonization. Progress is being made in the region towards the complementarity of conventional and non-conventional (clean) energy sources.

It is worth noting the bill in Costa Rica that seeks to prohibit exploration and exploitation in the national territory. Along these lines, in a side event at COP 26, Denmark and Costa Rica launched an ambitious alliance to eliminate oil and gas, which includes six other members (France, Greenland, Ireland, Sweden, Wales and the Canadian province of Quebec). They all commit to ending new rounds of licenses for exploration and production. Likewise, Costa Rica will establish dates to cancel the production and exploration of oil and gas, actions aligned with the objectives of the Paris Agreement.

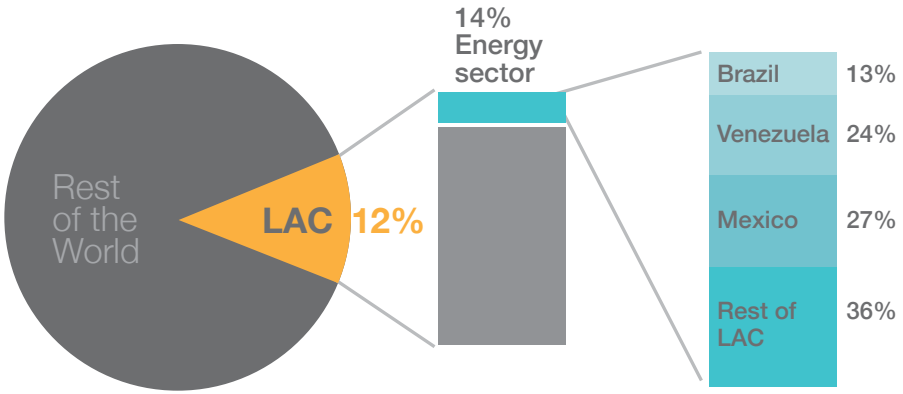
2

Methane

Methane emissions are responsible for about half of the net 1.0°C increase in global average temperature since pre-industrial times. Major sources of emissions of this short-lived greenhouse gas include coal, oil, gas, agriculture, and landfills. In the region, methane emissions represent 27% of GHG emissions. According to the International Energy Agency, around 38% of methane emissions in LAC could be avoided at no net cost. For more information, see the "ARPEL Report for Upper Managers on Climate Change. Methane emissions management".

These methane emissions include those corresponding to gas flaring and others such as fugitive emissions in process facilities. Given the relevance of the issue, seven countries in the region, responsible for 87% of methane emissions, have policies that aim to mitigate these emissions. In turn, nine LAC countries, which account for 80% of the emissions of this gas in the region, are part of the **Global Methane Initiative (GMI)**, a public-private association that provides technical support to its partners to promote the recovery and use of methane as an energy source.

Methane emissions



Source: Own elaboration based on data from Climate Watch (CAIT data), 2018

2. According to the Intergovernmental Panel on Climate Change (IPCC)

2

Methane

On the other hand, through the **Zero Routine Flaring (ZRF)** program that is promoted by the World Bank's Global Gas Flaring Reduction Initiative (GGFR), governments and oil companies commit to putting an end to the routine flaring of gas in the oil production sites by 2030. While participation is voluntary, commitments are monitored. 34 national governments participate in this initiative, including Ecuador, Mexico, and Peru, and 51 companies in the sector (including Ecopetrol, Petroamazonas, Petrobras and Repsol).

During COP26, held in Glasgow in 2021, it was announced that more than one hundred countries representing 70% of the world economy have adhered to the **Global Methane Commitment**, pledging to reduce global methane emissions by at least 30% compared to 2020 levels, by 2030. In parallel, the International Methane Emissions Observatory was launched, which will provide the means to prioritize actions and monitor the commitments made by governments in the Global Methane Commitment. Fulfillment of this commitment is expected to reduce warming by at least 0.2°C by 2050. The European Union and eight other countries have indicated that they will adhere to the Commitment, including Mexico and Argentina.

There are other initiatives that promote the mitigation of methane emissions in the hydrocarbons sector. The Climate and Clean Air Coalition (CCAC) is a voluntary association whose members are committed to improving air quality and protecting the climate through actions to reduce short-lived climate pollutants. Nine countries of the region participate in it: Argentina, Chile, Colombia, Costa Rica, Mexico, Panama, Paraguay, Peru, and Uruguay.

One of the pollutants monitored by the CCAC is methane. Within this framework, in November 2020 the second version of the Oil and Gas Methane Association was launched, with more ambitious objectives, aiming at a reduction in emissions of this gas from 45% by 2025 and 60-75% by 2030.

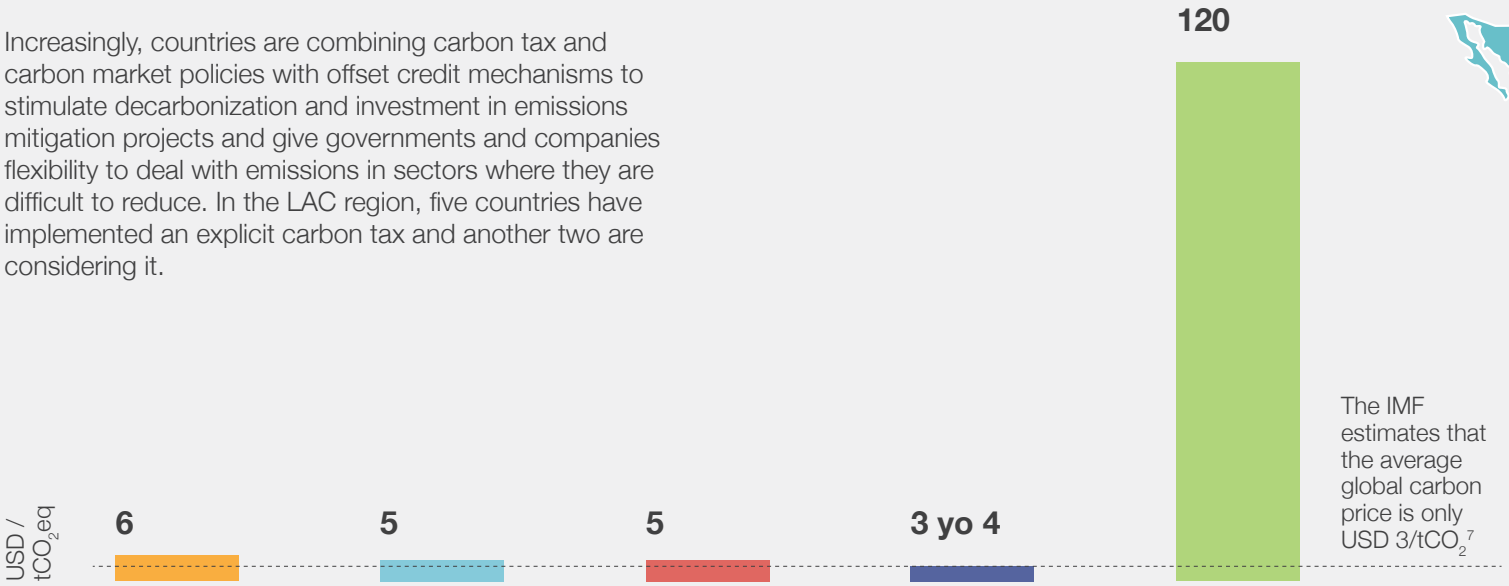
Along the same lines, the Oil and Gas Climate Initiative (OGCI) is an initiative that aims to accelerate the industry's response to climate change and whose members are companies in the sector.

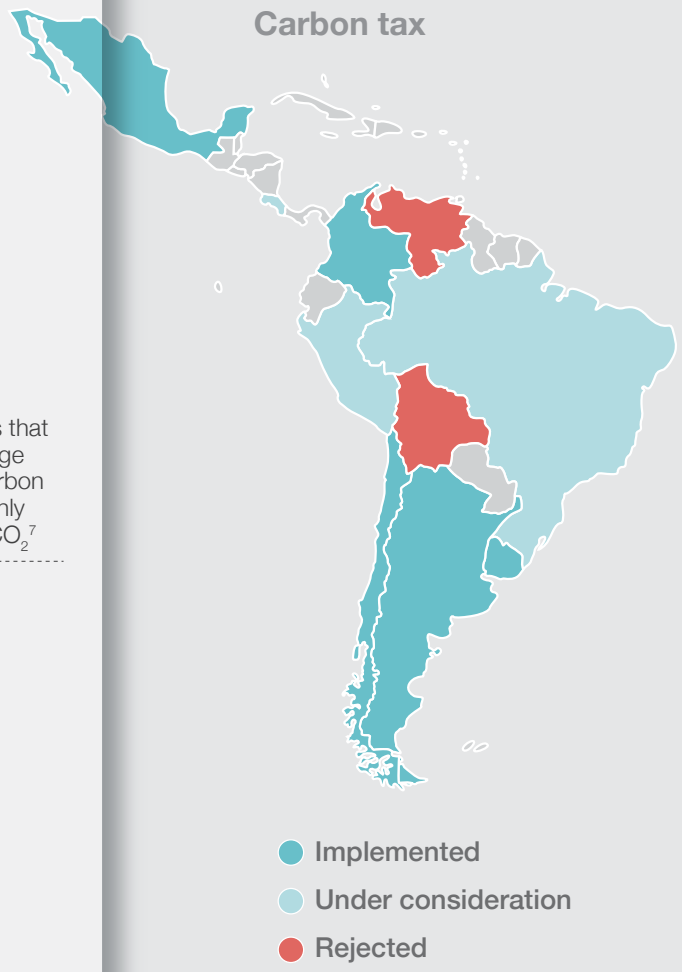
3. Global Gas Flaring Reduction Partnership (GGFR): Global Multi-Donor Trust Fund
4. https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030/endorsers
5. https://www.ccacoalition.org/en/activity/ccac-oil-gas-methane-partnership

3

Carbon taxes and markets

Increasingly, countries are combining carbon tax and carbon market policies with offset credit mechanisms to stimulate decarbonization and investment in emissions mitigation projects and give governments and companies flexibility to deal with emissions in sectors where they are difficult to reduce. In the LAC region, five countries have implemented an explicit carbon tax and another two are considering it.





Carbon pricing status and trends 2020
https://www.imf.org/external/pubs/ft/fandd/2021/09/five-things-to-know-about-carbon-pricing-parry.htm

Carbon taxes and markets

Mexico

Implemented: in 2020, they launched a pilot Emissions Trading System (ETS) with a duration of 3 years, covering the energy and industrial sectors. Entities with annual emissions from direct sources equal to -or greater than- 100 $ktCO_2$ during the 2016-2019 period, or in any year from the launch of the SCE in its pilot phase, will be regulated by this pilot. Sectors that are not directly regulated can participate indirectly in the system through compensation credits.

Cuba

They intend to use cooperative approaches involving the use of internationally transferred mitigation results under that Article. They are working on creating a Measurement, Reporting and Verification system. Art. 75 of the Constitution prohibits the appropriation of natural resources, which limits working in carbon markets.

Chile

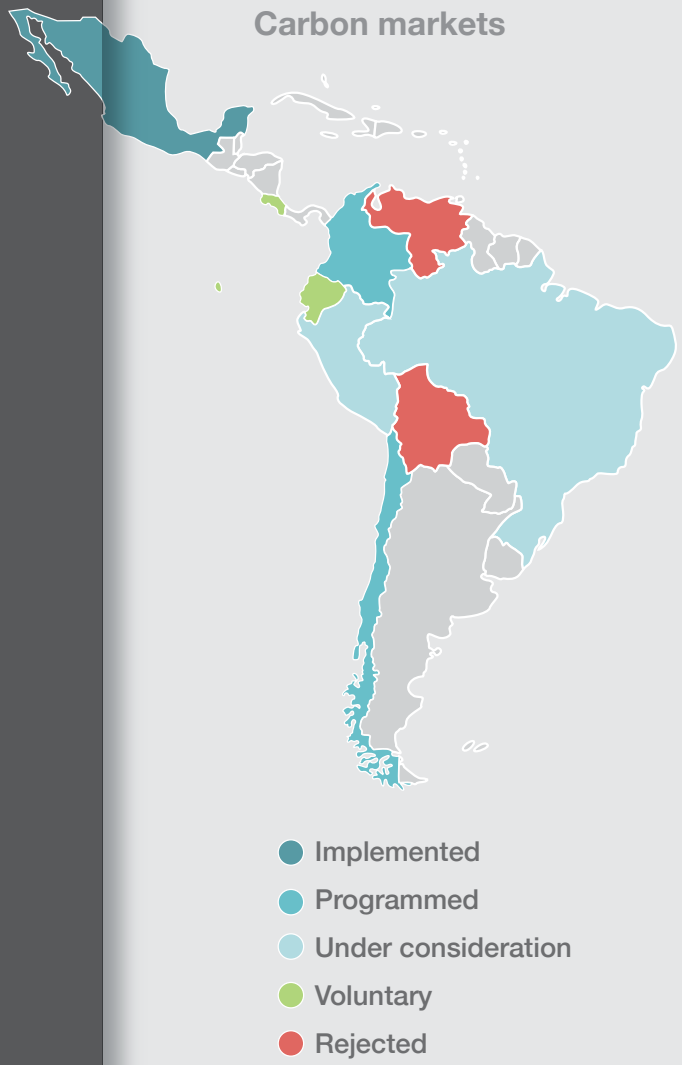
Scheduled: from 2024, an establishment subject to taxes will be able to offset part or all its emissions, through reduction certificates.

Colombia

Scheduled: it is expected that the pilot will begin to be implemented in 2023 - 2024. Emission quotas are established and auctioned, authorizing their holder to emit one ton of CO_2e. They are redeemable after being acquired and supported by the emissions associated to the activity of the quota holder.

Bolivia and Venezuela

They are against carbon markets, since they understand they legitimize the purchase of pollution rights.



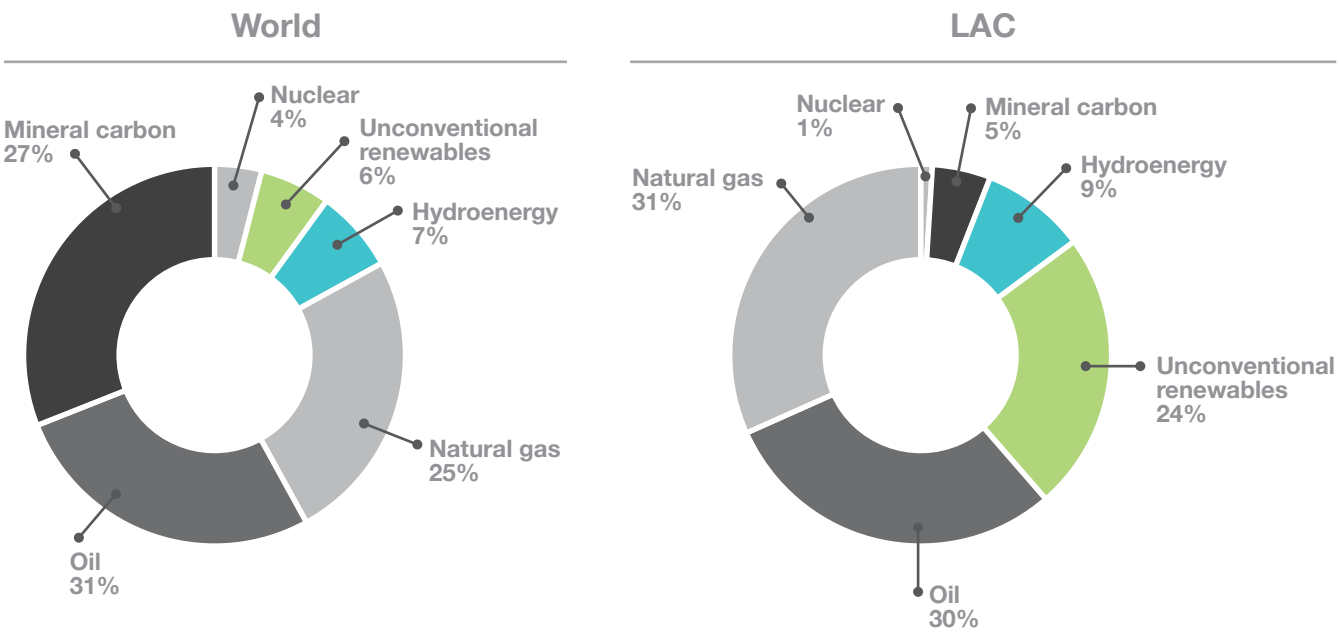
Article 6 of the Paris Agreement deals with cooperative approaches, either market or non-market, and was – until COP26 – the only article for which a consensus regarding its implementation was still pending. During the COP26, the Glasgow Climate Pact was reached through which the countries completed the application rules of the Paris Agreement with regards to market mechanisms and non-commercial approaches, as well as the transparent notification of climate actions and support provided or received, including for loss and damage. In turn, developed countries pledged to transfer $100 billion annually to developing countries and collectively agreed to work to reduce the gap between existing emission reduction plans.

8. https://unfccc.int/es/process-and-meetings/the-paris-agreement/el-acuerdo-de-paris

4

Renewable energy

The participation of renewable energies in the primary energy matrix is significantly higher in Latin America than in the rest of the world (33% vs. 13%).



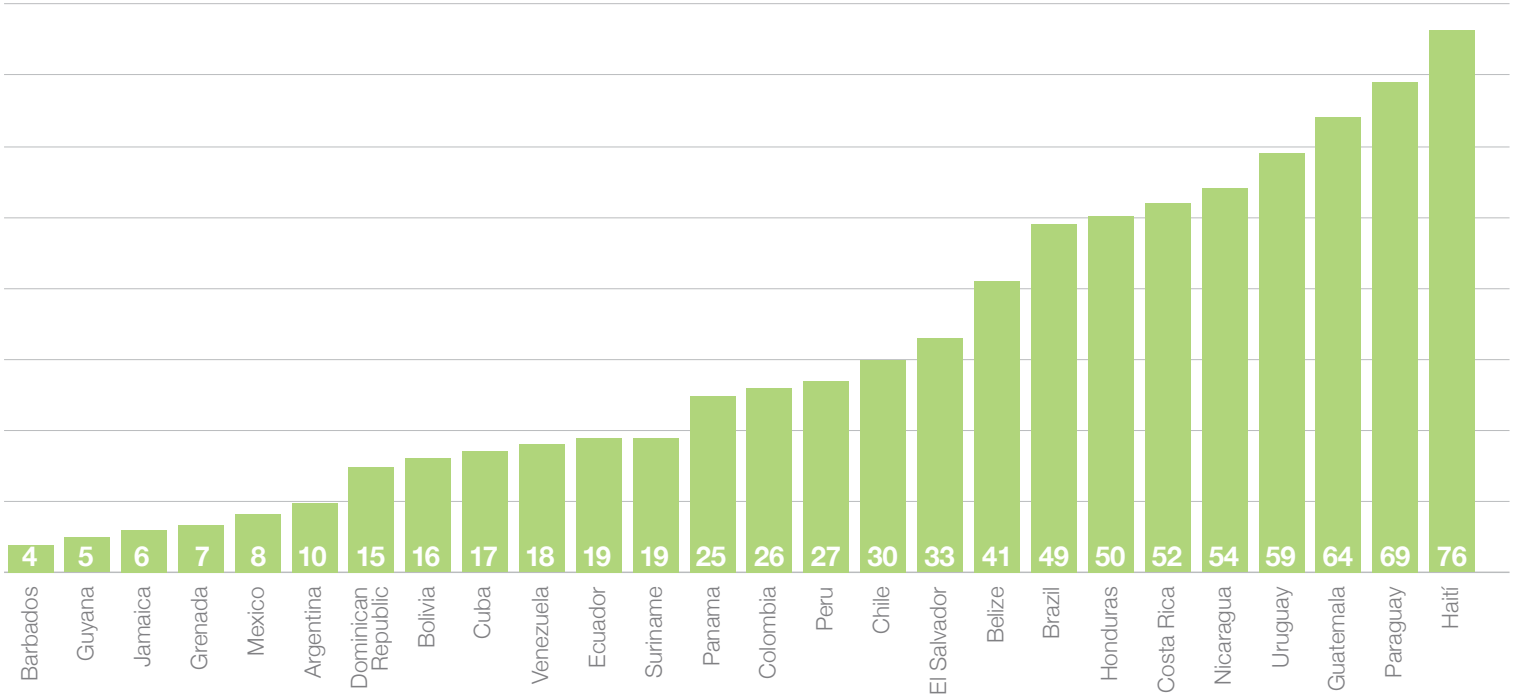
Source: Energy Panorama of Latin America and the Caribbean 2021 – OLADE

4

Renewable energy

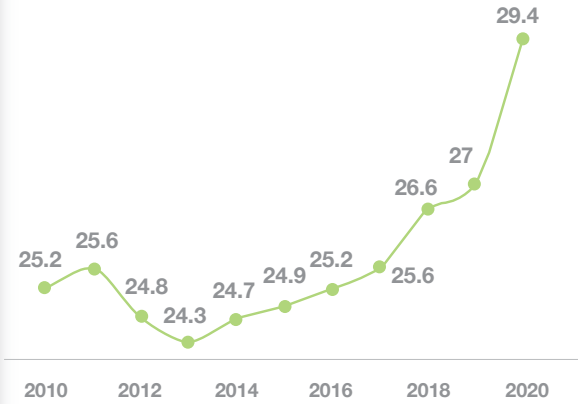
Most of the countries in the region have policies that promote the generation of electricity from renewable sources. Some of them choose to develop policies with quantitative goals in relation to the increase in the participation of renewables, while others, do not specify quantifiable objectives despite promoting these energy sources. In average terms, there is a growing trend in the renewability index of the region's energy matrix and a wide disparity in this index when comparing different countries.

Renewability Index (%)



Source: OLADE 2020

LAC average evolution



4

Renewable energy

On the other hand, globally, in 2019, a milestone was recorded when electricity generation from renewables increased more than electricity demand, while generation from fossil fuels decreased. This coincides with the situation in the region, where in 2020 the installed capacity increased by 16 GW, of which 11 GW correspond to clean energy.

Additionally, 12 countries in the region make up the Renewable Energy Alliance in Latin America and the Caribbean (RELAC), through which participants collaborate to achieve the objective of 70% of installed capacity at the regional level coming from renewable sources by 2030. Members: Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Paraguay, Peru, and Uruguay.

The decision of the different countries to decarbonize their energy matrices is being accompanied by a change in the patterns of energy consumption, with an increase in the use of electricity. At the same time, renewables have become the lowest cost source for producing electricity. Data from the IRENA Renewable Cost Database shows that since 2010, the weighted average cost of electricity generation from renewables is like the cost of generation from fossil fuels, and that this cost continues to decrease rapidly for onshore wind, photovoltaic, and solar concentrators, and is expected to continue to decrease.

5

Hydrogen (H_2)

Thanks to the abundant and competitive resources for power generation from renewable sources in the region, there is great potential to produce green and/or blue hydrogen.

In 2020, this hydrogen represented less than 1% of total world production. In the region, Chile is the only country with a published hydrogen strategy (available since 2020). In addition, Brazil, Colombia, and Uruguay are working on building a similar strategy, while eight other countries are addressing the issue more recently (Argentina, Bolivia, Costa Rica, El Salvador, Panama, Peru, Paraguay, Trinidad and Tobago)

In addition, there are 3 H_2 production pilot projects in the region that are operational (in Argentina, Chile, and Costa Rica) and another 25 projects in the early stages of development, in some of which companies in the sector participate, such as ANCAP. (H_2 U - road transport), Petropar (Petropar pilot project - road and maritime transport), Ecopetrol (Ecopetrol 50 kW Electrolyzer - petroleum refining), Enap (Haru Oni - synthetic fuels), YPF (which is part of the H_2 Ar consortium), Recope (New stage of transport ecosystem - road transport)

The use of hydrogen is gaining increasing momentum in Latin America; however, its deployment depends on technologies that are still in development, and a significant cost reduction will be necessary for it to reduce global emissions.

In turn, most of the hydrogen is currently produced near the point of consumption, so in order to implement the use of this energy on a larger scale, investments will be necessary in new transmission lines, as well as in the development of hydrogen transport and storage infrastructure and port terminals.

The IEA estimates that existing uses of hydrogen will continue to dominate demand in Latin America until 2030, the year in which new uses in industry and transportation will still account for less than 20% of the total potential demand for hydrogen.

In the short term, there could be an opportunity to decarbonize hydrogen production in oil refineries, which is carried out through a steam methane reforming (SMR) process, which releases highly carbon-concentrated streams, which could imply low costs of capturing this GHG.

Green hydrogen is produced without the participation of fossil fuels.

Blue hydrogen is obtained from fuels fossils, but without the release of carbon dioxide (CO_2).

Country with decarbonization policy

Country working in the development of a decarbonization policy

Country addressing the issue from a more incipient position

Has projects related to the topic

5

Hydrogen (H_2)

As the demand for hydrogen for petroleum refining is set to increase over the next decade, projects to build new production capacity based on fossil fuels could include Carbon Capture, Use and Storage (CCUS) systems from design or consider the application of emerging technologies, depending on their degree of development. Although experience and training in CCUS are limited in the region, significant progress has been made:

Mexico

With the support of the World Bank, it has undertaken feasibility studies for pilot projects that apply CCUS techniques to the generation of electricity from gas. Carries out hydrocarbon production activities through the injection of natural gas.

Trinidad & Tobago

It has experience in CO_2 injection for Enhanced Oil Recovery (EOR).

Chile

Intends to combine CO_2 from direct air capture and electrolytic hydrogen to produce synthetic methanol and gasoline.

Source: https://www.worldenergy.org/assets/downloads/Working_Paper_-_National_Hydrogen_Strategies_-_September_2021.pdf Global Hydrogen Review 2021, IEA https://h2lac.org/
https://h2lac.org/

6

Transportation

Transportation is the main, and fastest growing, source of GHG emissions in Latin America and the Caribbean, accounting for approximately **one third of the energy sector emissions and 15% of total GHG emissions.** The use of energy for transportation in the region is dominated by petroleum derivatives, which represented more than 85% of the final energy demand of this sector in 2018.

Clean electrification favors decarbonization through electric transport, and in turn increases the efficiency of the sector, since electric vehicles consume an average of 70% less energy per km traveled than their counterpart that consumes fossil fuel.

27 of the 33 countries in the region

have prioritized the transport sector and/or are working on it as a central element to achieve their emissions reduction goals in accordance with the current Nationally Determined Contributions. Half of them mention electric mobility specifically within their international commitments, although the majority do not establish quantifiable goals.

In turn, many of them have legislation that encourages the entry and/or use of electric vehicles at the national level, with stimuli such as extensions of tariff quotas, and reduction or elimination of taxes. Almost half of the countries in the region have national electromobility policies or are working on them. Chile, Colombia, Costa Rica, Panama and the Dominican Republic have published national policies on electromobility. Likewise, Mexico, Guatemala, Honduras, Paraguay, Nicaragua, El Salvador, Ecuador and Argentina are in the process of developing their plans or strategies. In Peru, there are proposals for the creation of a national strategy, promoted by civil associations. However, it is important to highlight that there are countries, such as Uruguay, with great progress in terms of incentives for electric mobility, which do not have a single document that directs the policy.

Countries that prioritize the transport sector to reduce emissions

9. Source: Zero Carbon Latin America and the Caribbean – UNEP & https://www.climatewatchdata.org

10. Hydrogen in Latin America: From short-term opportunities to large-scale deployment. IEA – 2021

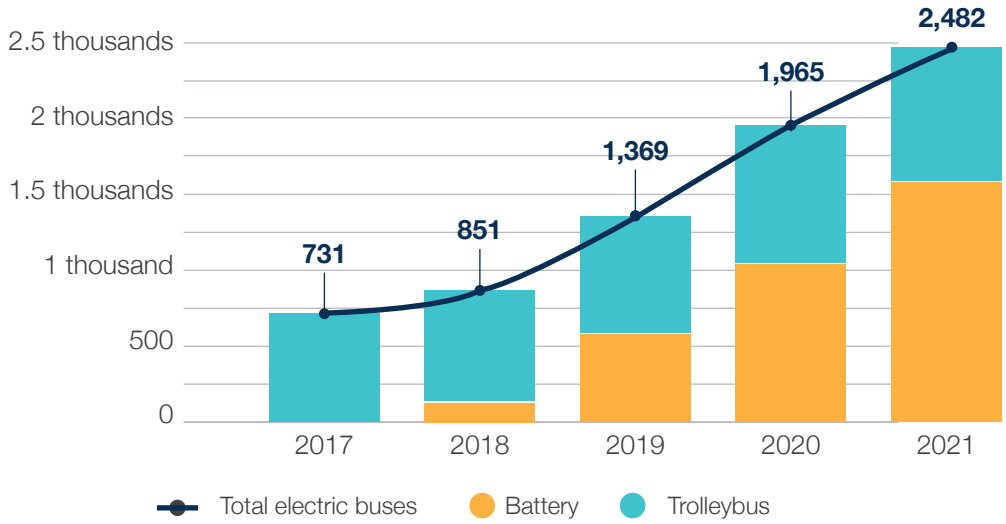
6

Transportation

The progress of electromobility policies is partly reflected in the evolution of **the electric bus fleet.**

At the level of **river and maritime transport, electrification** is still in its infancy, above all because it requires large amounts of energy to propel the vessels (and, therefore, large energy storage capacity) and high investments to implement it. However, there are projects in the design and piloting phases in Peru and Chile, with vessels of different characteristics for the transfer of people.

Total electric buses



11. https://www.ebusradar.org/es/

Abbreviations used in this report

LAC: Latin America and Caribbean

GHG: Greenhouse Gases

equivalent ton of carbon dioxide

GDP: Gross Domestic Product

COP: Conference of the Parties

OLADE: Latin American Energy Organization

IEA: International Energy Agency

Reviewer: Irene Alfaro (ARPEL Managing Director) and Javier Bocanegra, (ARPEL Regional Coordinator)

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