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Regional Energy Efficiency Targets

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This document was prepared under the guidance of
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REGIONAL ENERGY EFFICIENCY TARGETS

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PROLOGUE

In 2017, OLADE approved an initiative to enhance energy efficiency in Latin America and the Caribbean, aligned with the Sustainable Development Goals (SDGs). This initiative aims to contribute to increasing the rate of improvement in energy intensity across the region, as well as to establish mechanisms for tracking the progress of member countries.

In recent years, energy efficiency has gained prominence on the international agenda, reflecting a growing interest in this issue and highlighting the urgent need to strengthen the main tools for collecting, monitoring, and analyzing its indicators.

Improving energy efficiency is associated with multiple benefits, such as supporting local economies, reducing strain on energy infrastructure, and creating jobs. However, despite global and regional commitments, progress in this area has been insufficient. The reduction in energy intensity across the region shows uneven results among different countries, underscoring the need to implement more effective and measurable policies to meet the committed goals and tackle the challenges of climate change.

To achieve this, it is crucial to have data and information that enable the integration of disaggregated indicators, which are essential for designing effective actions and programs from an economic, social, and environmental perspective.

In this regard, OLADE's role as a facilitating institution becomes fundamental in supporting the development of dynamic and sustainable action frameworks that prioritize energy efficiency in both planning and decision-making processes.

It is through the creation of synergies that we can help ensure these advancements are translated into more effective policies that allow for their continuity, making it possible to achieve the proposed goals. This positions us as a catalyst for regional actions that drive improvements in national energy efficiency systems and capacities in both the public and private sectors.

Andrés Rebolledo Smitmans
OLADE Executive Secretary

1 INTRODUCTION

1.1 General Context

The energy mix of Latin America and the Caribbean (LAC) is undergoing constant transformation. In recent decades, renewable energies have led advancements in the region, emerging as one of the most dynamic areas in energy transition. However, energy efficiency remains a secondary priority on the energy agenda, despite its strategic potential to reduce greenhouse gas emissions and enhance energy security.

LAC is particularly vulnerable to the impacts of climate change, which underscores the urgency of integrating energy efficiency as a core component of decarbonization efforts. This approach not only offers environmental advantages but also economic and social benefits, such as reducing energy costs for households and businesses, thereby fostering greater social equity.

Despite its many benefits, energy efficiency has not been fully prioritized in the region. This situation is due to a combination of structural, economic, cultural, and institutional factors. Understanding and addressing these challenges is key to unlocking its potential and positioning energy efficiency as a fundamental pillar of the region's energy transition.

1.2 Global Commitments

On the international stage, energy efficiency holds a prominent role as an essential tool for achieving climate and sustainable development goals. The 2030 Agenda for Sustainable Development, through Sustainable Development Goal (SDG) 7, sets a specific target to "double the global rate of improvement in energy intensity" by 2030, requiring an annual improvement rate of 2.6%.

More recently, during COP28, 116 countries, including 17 from LAC, reaffirmed their commitment to energy efficiency through the Global Renewables and Energy Efficiency Pledge. This agreement aims to significantly accelerate the improvement rate from the current 2% to more than 4% annually by 2030, highlighting energy efficiency as the "first fuel" in energy transition efforts.

However, at the regional level, LAC had until recently not defined specific and coordinated targets to align national commitments with global aspirations. The lack of clear objectives limits the development of effective policies and the ability to generate synergies among countries, thereby missing opportunities to exchange best practices and foster cooperation.

1.3 Report Objectives

In 2017, during the XLVI Meeting of OLADE Ministers, Ministerial Decision No. XLVI/D/531 was approved, instructing OLADE's Permanent Secretariat to develop a voluntary regional initiative to promote an increase in the rate of improvement in energy efficiency in the region. This decision sought alignment with the Sustainable Development Goals (SDGs) and established the need to create intra-regional mechanisms to track and monitor the progress of energy efficiency among member countries.

In 2024, OLADE renewed its commitment to this mandate through a series of activities designed to reposition energy efficiency as a priority on its work agenda. Among these the OLADE Energy Efficiency Working Group (GTO) was created as a regional collaboration platform to promote the exchange of experiences, dissemination of best practices, and collective learning among the countries that voluntarily participate. As an initial step and aiming to reach a consensus on a regional energy efficiency target, the group evaluated the current state of member countries in key areas, such as indicator development, target setting, and participation in previous regional initiatives.

The purpose of this report is to emphasize the importance of prioritizing energy efficiency in the energy agenda of Latin America and the Caribbean. This entails establishing clear, measurable targets aligned with international commitments to facilitate the monitoring of regional progress, strengthen cooperation among countries, and maximize the benefits of fully integrating energy efficiency into energy transition strategies.

2 DIAGNOSIS

2.1 Analysis of Energy Intensity

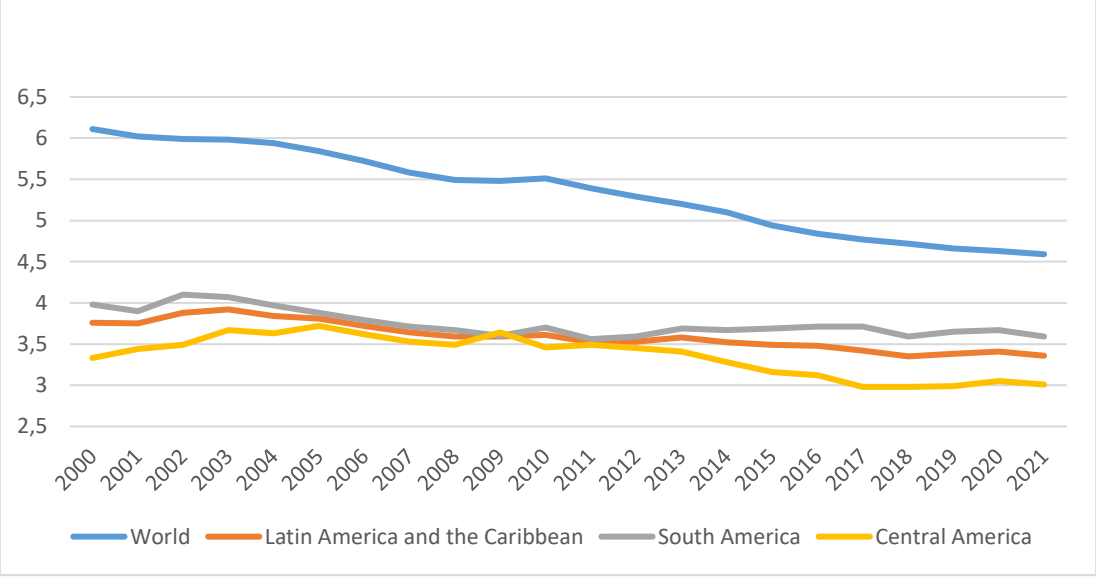
Energy efficiency is a broad and dynamic concept that, while lacking a single definition, is generally understood as using less energy to deliver the same outcome or service. This idea encompasses both reducing energy consumption and optimizing performance in processes and activities, making energy efficiency a key element in the transition toward a sustainable energy system.

A common method for assessing the evolution of energy efficiency is using the energy intensity indicator, which represents the amount of energy required to generate a unit of Gross Domestic Product (GDP). This indicator is popular due to its simplicity and accessibility: only two key data points are needed — total energy consumption and GDP — which most countries collect regularly.

Energy intensity provides a general view of a country's "energy effort" to produce goods and services, making it a useful tool for comparisons over time and between countries. However, its analysis must be contextualized, as factors such as economic structure, climate, and development level can significantly influence its evolution, potentially masking more specific regional or sectoral dynamics.

According to the UN database for monitoring the Sustainable Development Goals (SDGs), between 2010 and 2021, the global rate of improvement in energy efficiency averaged just 1.65% annually (Figure 1).

Figure 1. Evolution of Energy Intensity in Selected Regions, 2000-2021



In contrast, in Latin America and the Caribbean, this figure was significantly lower, reaching only 0.65% (Figure 2).

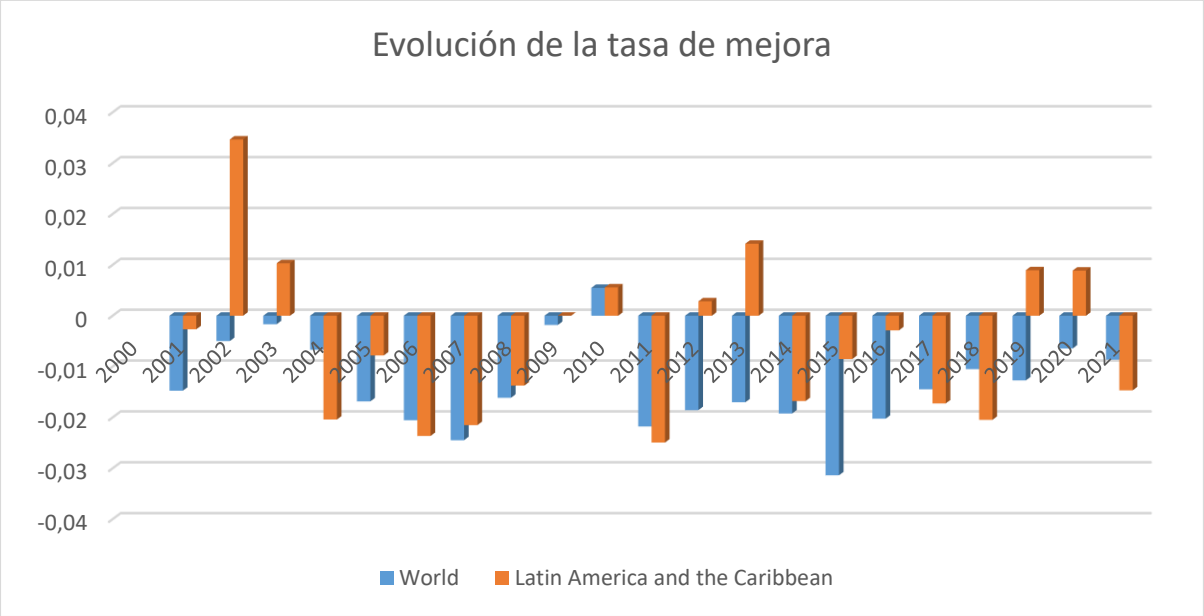
Figure 2 Annual Rates of Improvement in Energy Efficiency Worldwide and in Selected Regions

Regions	Period		
	2000-2021	2000-2010	2010-2021
World	1.35%	1.03%	1.65%
Latin America and the Caribbean	0.53%	0.41%	0.65%
South America	0.49%	0.73%	0.27%
Central America	0.48%	-0.38%	1.26%

Source: UN data. *Global SDG Indicators Data Platform*. https://unstats.un.org/sdgs/dataportal

Year by year, these rates showed significant variations, reflecting short-term effects. Throughout the period, several years can be observed in which no improvements were made in Latin America and the Caribbean (Figure 3).

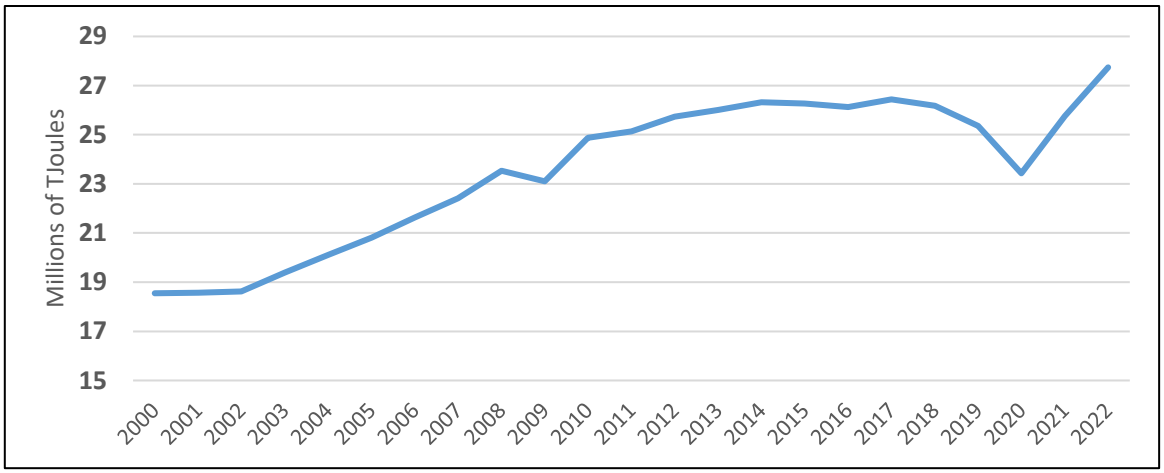
Figure 3 - Evolution of the Rate of Improvement in Energy Efficiency Worldwide and in LAC



Source: OLADE, *Latin American and Caribbean Energy Information System* (SIELAC).

When the two basic components of the energy intensity indicator are analyzed separately for OLADE member countries during the 2000–2022 period, it can be observed that total final energy consumption increased by 50%, rising from 18.5 to 27.7 million Terajoules. However, there was a significant disruption between 2019 and 2021 due to the halt in activities caused by the COVID-19 pandemic (Figure 4).

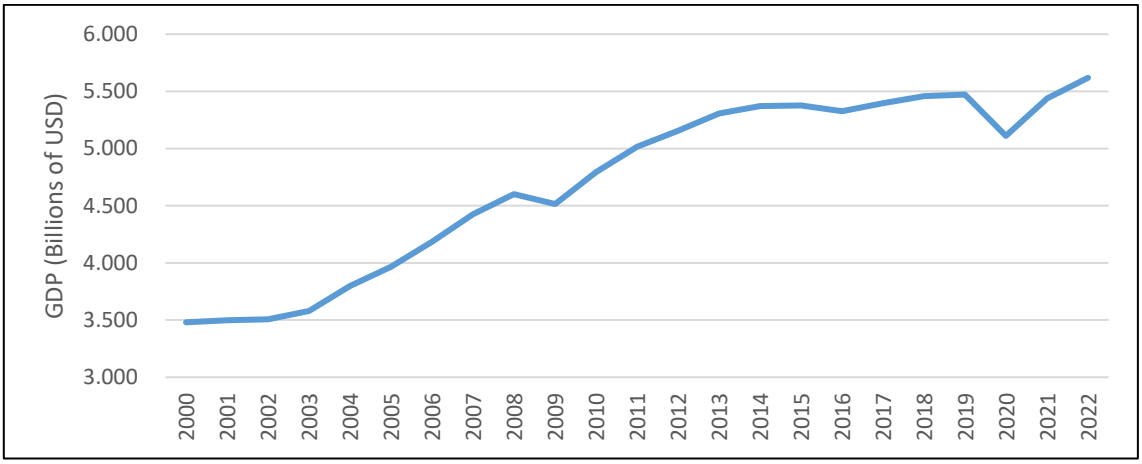
Figure 4 - Final Consumption of OLADE Countries, 2000 to 2022 (Millions of TJoules)



Source: OLADE, SIELAC.

For the same group of countries and the same period, the aggregate GDP grew by 61%, rising from 3,480 to 5,619 billion USD, with a significant disruption between 2019 and 2021 and an 18% rebound between 2020 and 2022 (Figure 5).

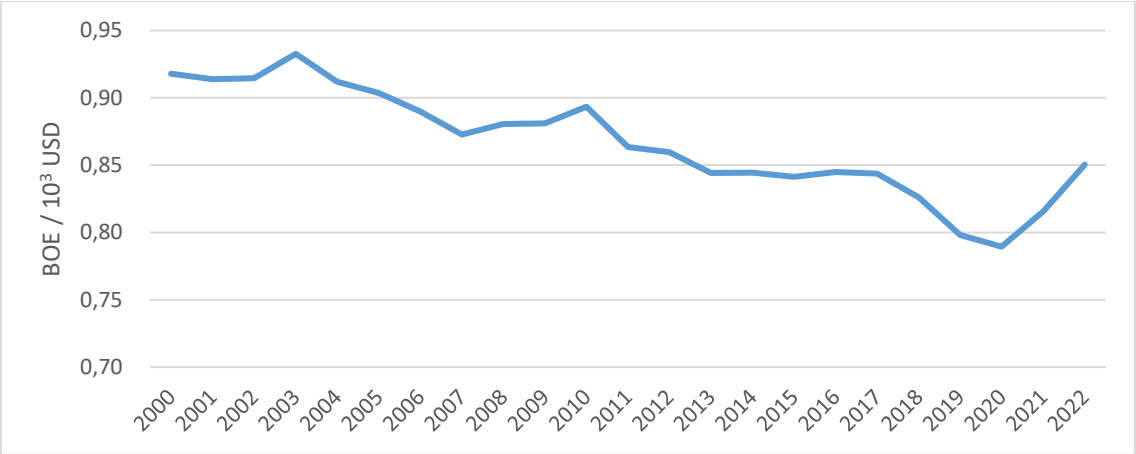
Figure 5 - Nominal GDP by Economic Activity at Constant Prices



Source: OLADE, SIELAC.

These data reveal a trend toward the reduction of energy intensity from 2000 to 2020 in the region, with a radical shift in 2021 and 2022 and a 10% rebound between 2020 and 2022 (Figure 6).

Figure 6 - Evolution of Energy Intensity in the Region

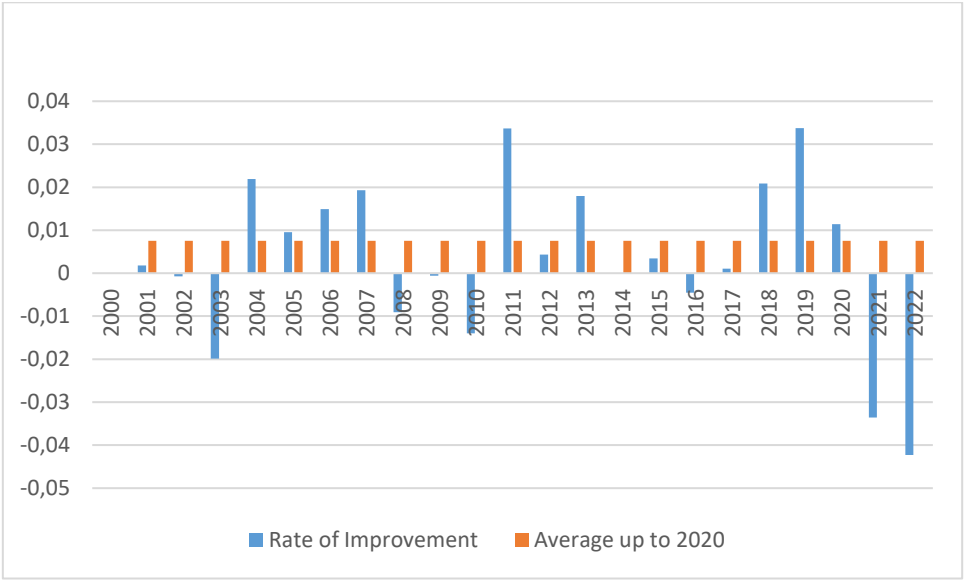


Source: OLADE, SIELAC.

It is relevant to contrast the evolution of the two parameters, which reveals the following: 1) from 2000 to 2022, the region's economy grew more than its energy consumption; and 2) during the pandemic period, energy consumption initially decreased faster than the economy and then behaved oppositely, growing by 18% compared to 10% for GDP.

For this reason, the improvement rate, which was 0.75% annually between 2000 and 2020, became notably and progressively negative for 2021 and 2022 (Figure 7). In other words, the COVID-19 crisis slowed the energy efficiency improvements that had been observed in the region.

Figure7 - Evolution of the Rate of Improvement in Energy Efficiency in the Region



Source: OLADE, SIELAC.

As shown in the graph, progress in improving energy efficiency is far from the targets set in the previous section.

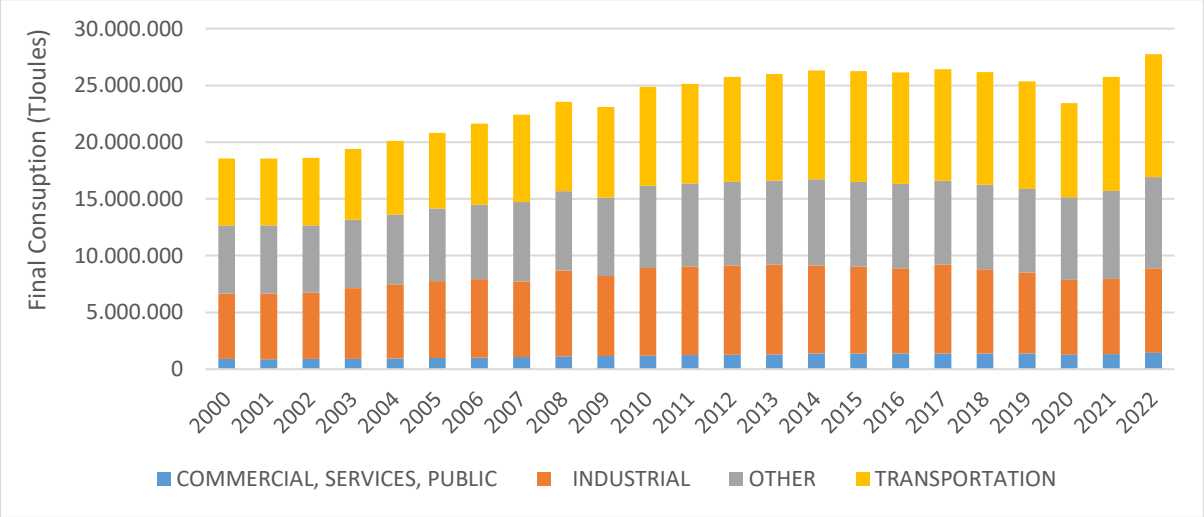
However, it is crucial to highlight that, although energy intensity is a valuable tool, it has its limitations. While it provides an overview of energy consumption, it does not explain the differences between countries or the causes of the observed trends. Factors such as economic structure, geographical characteristics, and climatic conditions significantly influence energy intensity levels.

2.2 Sectoral Analysis

Unlike the aggregate indicator, which relates primary energy supply to a country's total GDP, sectoral indicators are constructed using the final energy consumption of each sector in relation to the value added, expressed in monetary units, that the sector contributes to the national GDP.

When analyzing final energy consumption by sector for the period between 2000 and 2022, it is observed that the transportation sector's share of total energy consumption grew from 32% to 39% during the period; the industrial sector's share decreased from 31% to 27%; the "other" sector (which includes residential, construction, agriculture, fishing, mining, and non-energy consumption) decreased from 32% to 29%; and the commercial, services, and public sector remained constant at 5% throughout the period (Fig. 8).

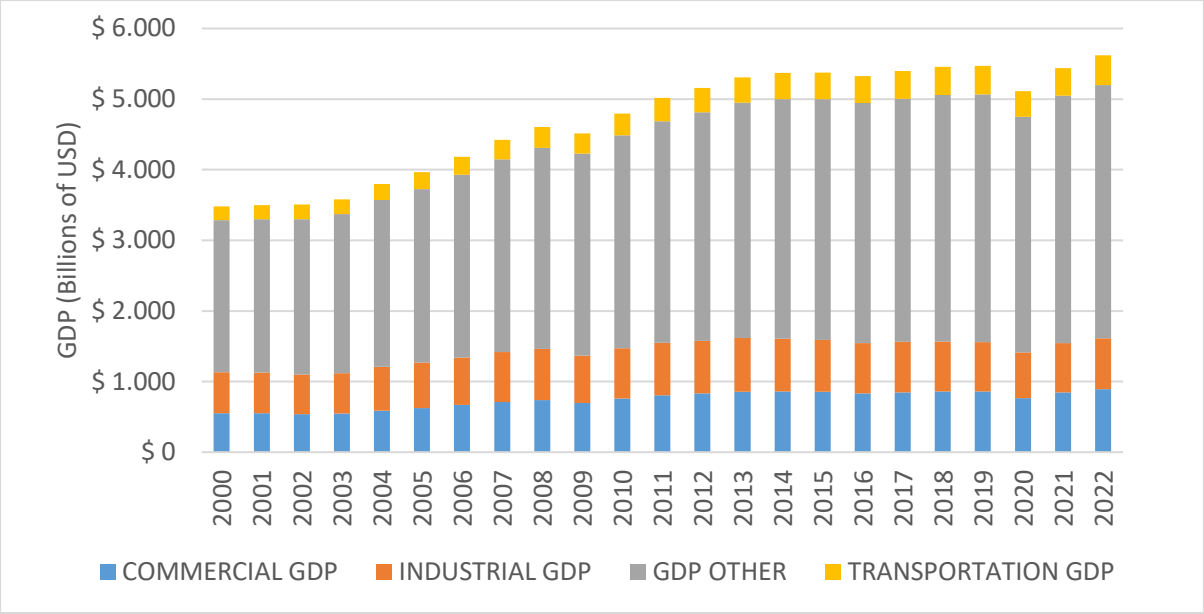
Figure 8 - Final Consumption by Sector



Source: OLADE, SIELAC (Unidades - TJoules)

For the same group of countries and the same period, the aggregate GDP grew by 61%, from 3,480 to 5,619 billion USD, with a significant contribution from the "other" sector, which changed marginally during the period (from 62% to 63%); the industrial sector, which decreased from 16% to 13%; and the Commercial sector, which remained at 16% throughout the period (Figure 9).

Figure 9 - Nominal GDP by Economic Activity at Constant Prices

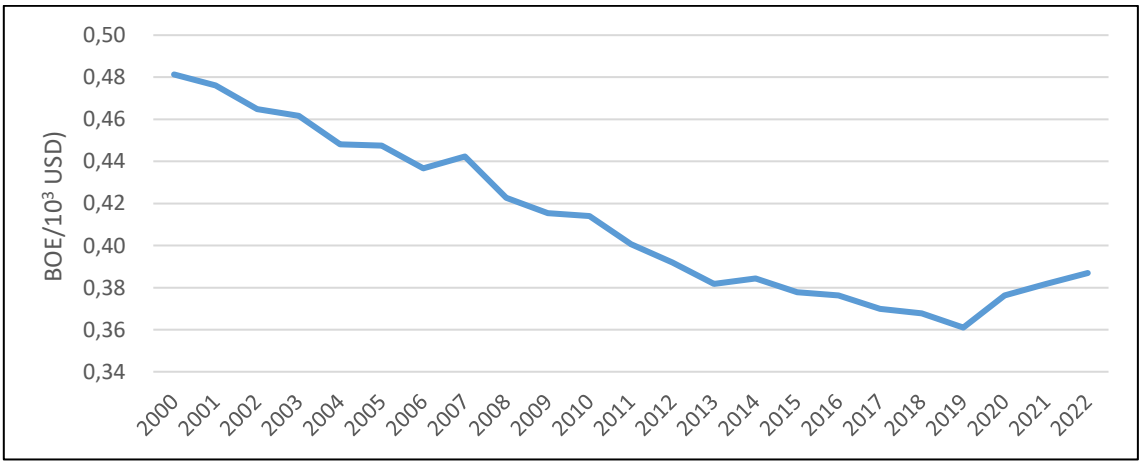


Source: OLADE, SIELAC.

For the period from 2020 to 2022, the GDP rebound by sector ranged from 13% to 17% for the commercial, transportation, and industrial sectors, but only 7.5% for the "other" sector (which represents more than 60% of the region's GDP).

This is reflected in energy intensities with heterogeneous behaviors. The "other" sector showed a significant improvement (from 0.48 to 0.36 BOE/10^3 USD from 2000 to 2019), but a notable setback during the pandemic years (2020 to 2022) (Figure 10).

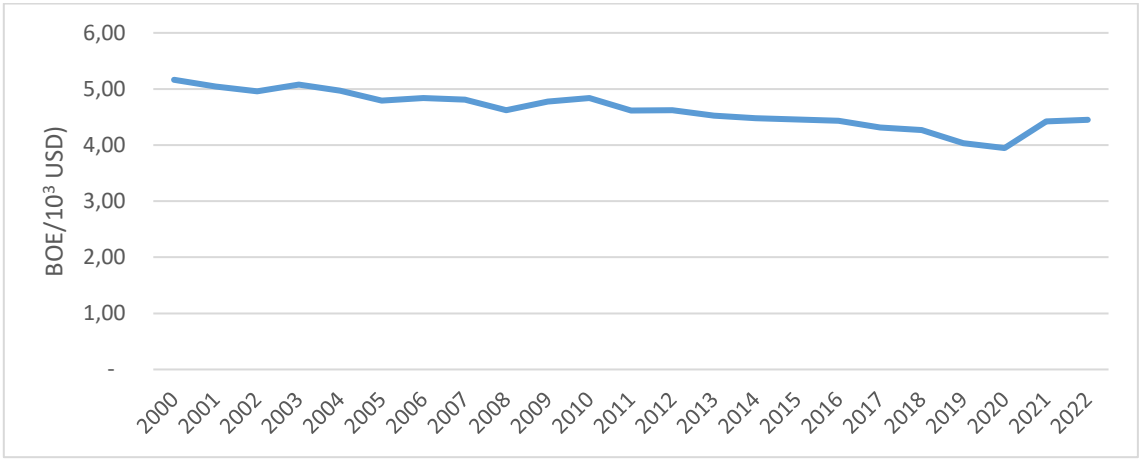
Figure 10 - Energy Intensity of the "other" Sector in OLADE Countries



Source: SIELAC, OLADE.

The transportation sector, which has the highest energy intensity, also shows a significant decrease in that intensity, falling from 5.1 to just over 3.9 BOE/10^3 USD, with a clear rebound of nearly 10% between 2019 and 2022 (Figure 11).

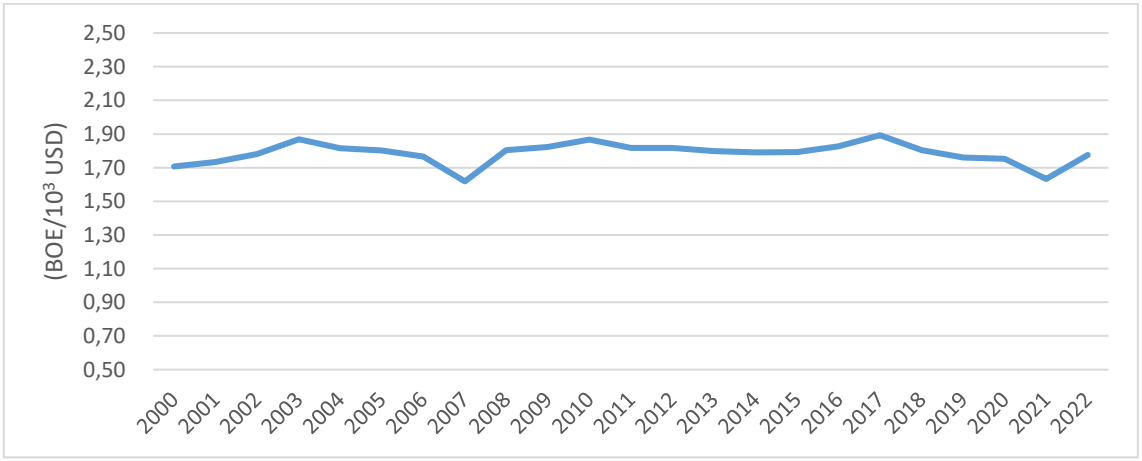
Figure11 - Evolution of Energy Intensity in the Transportation Sector in OLADE Countries



Source: SIELAC, OLADE.

In the industrial sector, energy intensity varied between 1.6 and 1.9 BOE/10^3 USD, with no significant improvements (Figure 12).

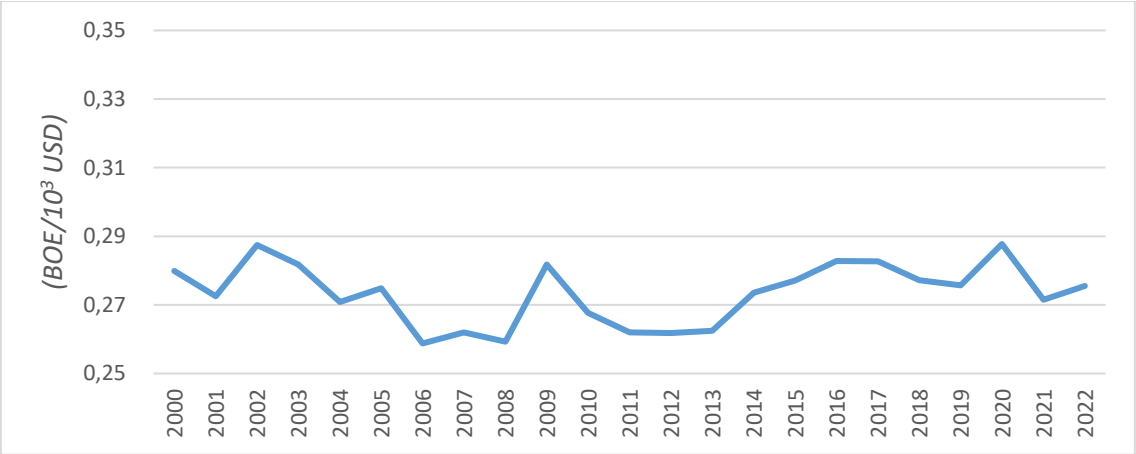
Figure 12 - Evolution of Energy Intensity in the Industrial Sector in OLADE Countries



Source: SIELAC, OLADE.

Finally, in the commercial sector, the variation in energy intensity is similar to that of the industrial sector, ranging between 0.26 and 0.29 BOE/10^3 USD, indicating that there were no significant improvements (Figure 13).

Figure 13 - Evolution of Energy Intensity in the Commercial Sector in OLADE Countries



Source: SIELAC, OLADE.

In terms of average energy efficiency improvement rates by period and by sector for OLADE countries, the highest rate is observed in the transportation sector, which was 2.55% between 2000 and 2021 (much higher than the overall sectors and other sectors). In the period from 2010 to 2018, the rate was 4.1% (Figure 14).

|*Figure 14 - Average Energy Efficiency Improvement Rates by Sector and for Different Periods*

Sector	Period			
	2000-2021	2000-2010	2010-2018	2010-2021
TOTAL	0.44%	0.18%	1.30%	0.67%
Industrial	0.07%	-0.96%	1.14%	1.00%
Transportation	2.55%	1.69%	4.10%	3.32%
Commercial	0.30%	0.34%	0.14%	0.25%

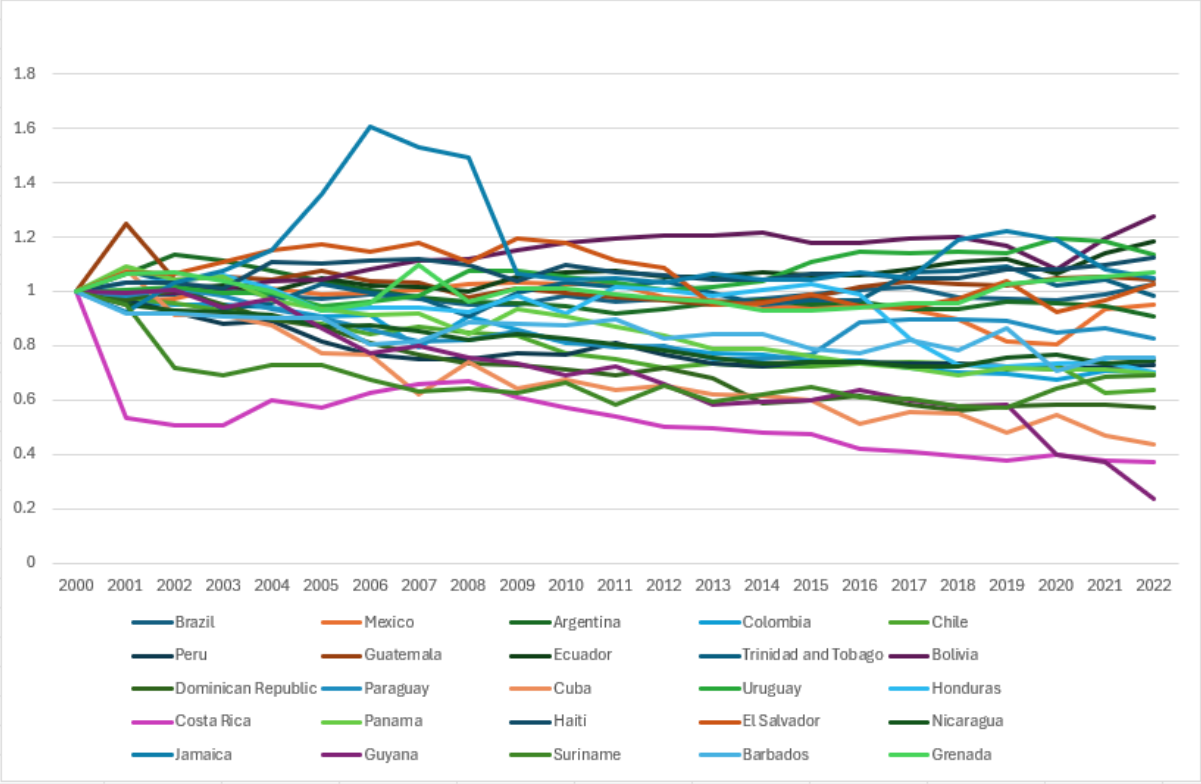
Source: SIELAC, OLADE.

2.3 Country Analysis

To better understand the effect of changes in energy consumption and intensity in the region, it is pertinent to review the trajectories of each country, their most relevant economic processes, and the integration of specific public policies.

The trajectories of energy intensity variation for OLADE countries between 2000 and 2022 were highly variable, and some countries show no improvement in their energy intensity by 2022 compared to 2000 (Figure 15).

Figure 15 - Relative Variation of Energy Intensities in OLADE Countries Between 2000 - 2022[1]



Source: SIELAC, OLADE.

To identify relevant factors influencing the evolution of indicators in the region and, more specifically, in each country a four-element, country-level analysis is presented:

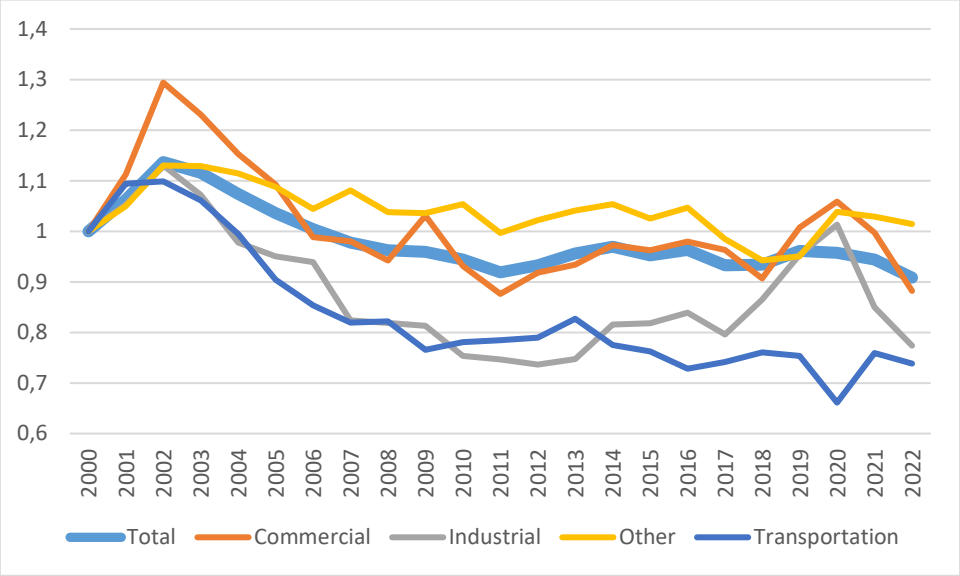
- Energy intensity indicators by sector (based on OLADE data).
- Relative importance of consumer sectors (based on OLADE data).
- Structural aspects for 7 OLADE countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, and Uruguay), based on national energy efficiency monitoring reports coordinated by the Economic Commission for Latin America and the Caribbean (ECLAC).

[1] Belize and Venezuela are not included in this graph as their values fall within ranges significantly higher than those of the other countries.

Argentina

Energy Intensity by Sector: Argentina shows a reduction of nearly 10% in its energy intensity from 2000 to 2022, driven by a significant decrease in the transportation sector's intensity (over 25% during the period) (Figure 16).

Figure16. Relative Variation of Total and Sectoral Energy Intensities in Argentina 2000 - 2022



Source: Prepared in-house, data from SIELAC, OLADE.

Relative Importance of Consumer Sectors: The most relevant variations in the consumption structure during the period are seen in the relative decline of the industrial sector from 27.2% to 21.6% (only growing by 9% from 2000 to 2022) and the increase of the "other" sector to nearly 40% by 2022, both relative to total consumption (Figure 17).

Figure 17 - Percentage of Total Energy Consumption and Growth in Argentina

Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, Services and Public	7.7%	7.7%	7.5%	**38%**	**34%**
Industrial	27.2%	23.6%	21.6%	**21%**	**9%**
Other	35.6%	35.9%	39.7%	**40%**	**53%**
Transportation	29.5%	32.8%	31.2%	**55%**	**45%**

Source: Prepared in-house, data from SIELAC, OLADE.

Structural Aspects. According to the National Energy Efficiency Monitoring Report of Argentina [2], the final energy intensity was reduced in 2010 to 79% of the 2003 value due to the following structural aspects:

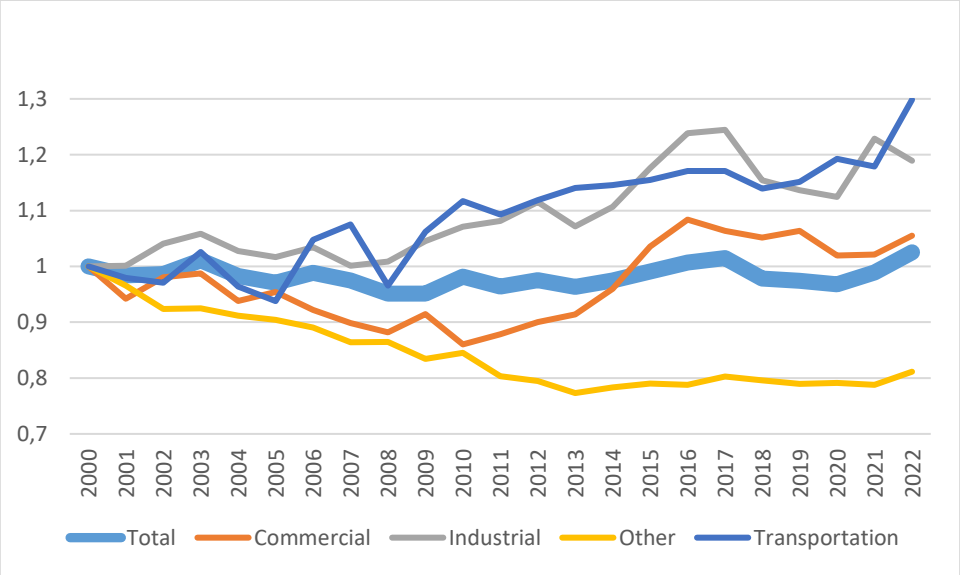
- *Industry:* Industries that are part of a globalized or highly competitive market (metallic and chemical industries) recover their efficiency levels faster and achieve better results compared to sectors that primarily depend on the domestic market (food and non-metallic sectors).
- *Agriculture*: Grain production is one of the main consumers of hydrocarbons in Argentina, not only due to the large volumes of grains and derived products transported, but also because of the increasing incorporation of technology into the agricultural production process.
- *Transportation*: During years of economic growth and higher income levels, the sector steadily increased automotive production, leading to a replacement of the vehicle fleet.
- *Residential*: This sector was affected by the economic crisis and subsequent recovery, in addition to the implementation of active policies starting in 2007 that improved efficiency.

[2] ECLAC, 2015. *Informe nacional de monitoreo de la eficiencia energética de la República Argentina, 2014*. https://www.cepal.org/es/publicaciones/37142-informe-nacional-monitoreo-la-eficiencia-energetica-la-republica-argentina-2014

Brazil

Energy Intensity by Sector: At the end of the 2000-2022 period, Brazil did not achieve a reduction in its total energy intensity, nor in the transportation, industrial, and commercial sectors, although a reduction was achieved in the "other" sector (Figure 18).

Figure 18 - Relative Variation of Total and Sectoral Energy Intensities in Brazil



Source: SIELAC, OLADE.

Relative Importance of Consumer Sectors: The largest variation in the consumption structure is observed in the transportation sector, which saw a growth of 124%, increasing its relative share of total consumption by nearly 10% from 2000 to 2022. Likewise, the industrial and "other" sectors decreased their relative share by about 5% over the same period (Figure 19).

Figure 19 - Percentage of Total Energy Consumption and Sectorial Growth in Brazil

Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, services and public	5.3%	5.7%	5.2%	**60%**	**62%**
Industrial	34.2%	29.9%	29.3%	**31%**	**41%**
Other	32.3%	27.3%	27.0%	**27%**	**37%**
Transportation	28.2%	37.0%	38.5%	**96%**	**124%**

Source: SIELAC, OLADE.

Structural Aspects. According to the National Energy Efficiency Monitoring Report of Brazil, "its energy intensity has increased in recent decades, and energy consumption has also grown at a remarkable pace during the period analyzed in the report. This increase has been accompanied by significant economic growth, as well as improved well-being for families."[3]

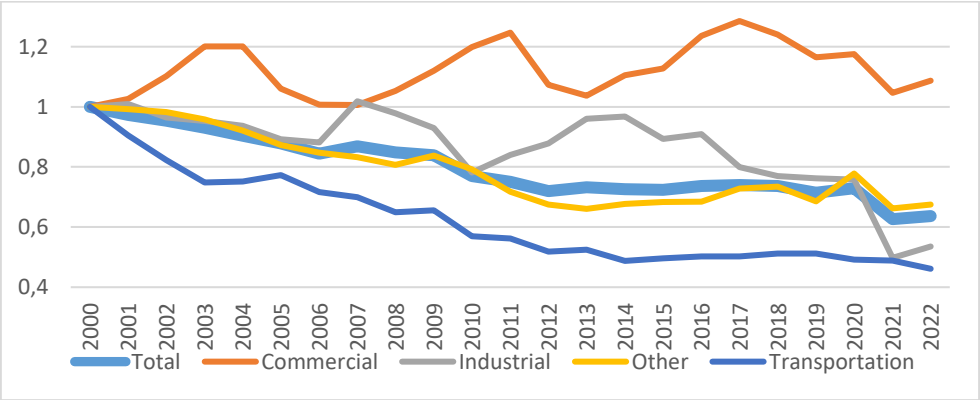
- *Industry:* Changes in the industrial production structure between 2005 and 2015 benefited the energy intensity indicator, largely attributed to the cooling of energy-intensive industries.
- *Residential:* Following the 2001 electricity rationing crisis, more energy-efficient appliances were introduced to the national market. Over time, these modern appliances gradually replaced older ones in households, improving efficiency and reducing electricity consumption.
- *Transportation:* This sector is directly linked to final consumption by households and particularly to the growth observed in the agricultural and industrial sectors. The significant increase in these groups of users over the past decades explains the rise in energy consumption observed in this sector.

[3] ECLAC, 2015. *Informe nacional de monitoreo de la eficiencia energética del Brasil.* https://www.cepal.org/es/publicaciones/38863-informe-nacional-monitoreo-la-eficiencia-energetica-brasil

Chile

Energy Intensity by Sector. Chile experienced a significant reduction in energy intensity during the 2000–2022 period (over 35%). This improvement was driven by substantial reductions in the transportation sector (more than 50%), the industrial sector (almost 50%, albeit with some volatility during the period), and the "other" sector (about to 25%) (Figure 20).

Figure - 20. Relative Variation in Total and Sectoral Energy Intensities in Chile



Source: Prepared in-house, data from SIELAC, OLADE.

Relative Importance of Consumer Sectors. The commercial, services, and public sector experienced a 192% increase in energy consumption from 2000 to 2022, doubling its relative share to approximately 7% during this period. Meanwhile, the industrial sector saw a 15% reduction in consumption from 2000 to 2022, reflecting the decline in industrial production during the pandemic (as of 2019, the sector had grown 17% compared to 2000). The transportation sector increased its relative share by 40% during the period, with virtually no change between 2019 and 2022 (Figure 21).

Figure 21- Percentage of Total Energy Consumption and Sectoral Growth in Chile

Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, services and public	3.3%	6.5%	7.0%	**185%**	**192%**
Industrial	23.4%	19.2%	14.5%	**17%**	**-15%**
Other	39.1%	36.3%	40.2%	**32%**	**41%**
Transportation	34.3%	38.0%	38.3%	**58%**	**52%**

Source: SIELAC, OLADE

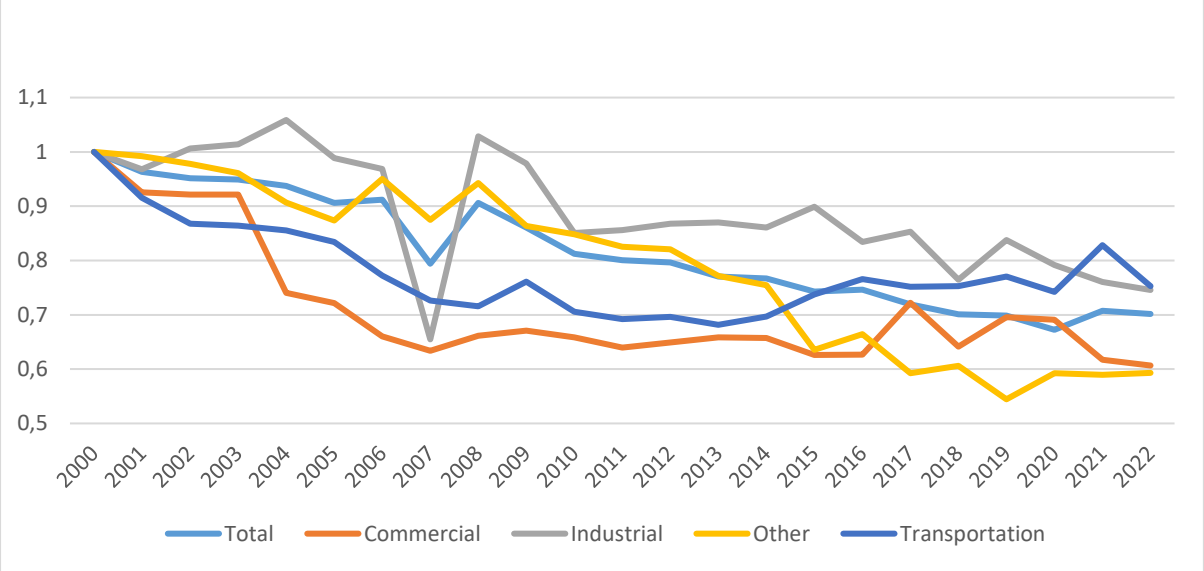
Structural Aspects. According to the National Energy Efficiency Monitoring Report of Chile, the factors driving the improvement in Chile's final energy consumption intensity are a combination of several variables, including changes in the local economic structure, global economic growth (which sets commodity prices that affect the economy), energy and fuel prices, energy efficiency across different consumption sectors, availability of energy sources, and technological developments in the industry, among others[4].

[4] ECLAC, 2014. *Informe nacional de monitoreo de la eficiencia energética de la República de Chile, 2014*. https://www.cepal.org/es/publicaciones/37149-informe-nacional-monitoreo-la-eficiencia-energetica-la-republica-chile-2014

Colombia

Energy Intensity by Sector. Colombia has achieved a significant reduction in its energy intensity between 2000 and 2022 (30%), with all sectors improving by more than 25%. Notably, reductions of up to 40% were observed in the “other” and commerce sectors (Figure 22).

Figure 22 - Relative variation in total and sectoral energy intensities in Colombia



Source: Prepared in-house, data from SIELAC, OLADE.

Relative Importance of Consumer Sectors. A 100% growth in the transportation sector stands out, increasing its relative share by approximately 9% over the period. Similarly, the relative share of the “other” sector decreased by just over 6% (Figure 23).

Figure 23 - Percentage of Total Energy Consumption and Sector Growth in Colombia

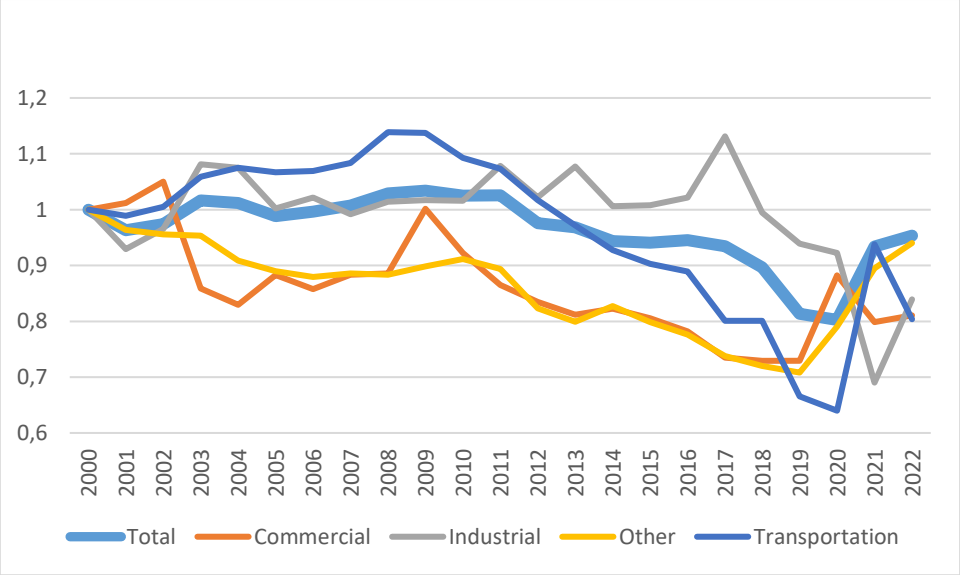
Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, services and public	5.5%	6.0%	5.6%	**54%**	**60%**
Industrial	24.6%	24.1%	22.0%	**40%**	**42%**
Other	36.9%	29.0%	30.7%	**12%**	**32%**
Transportation	32.9%	40.9%	41.7%	**77%**	**100%**

Source: Prepared in-house, data from SIELAC, OLADE.

Mexico

Energy Intensity by Sector. In Mexico, after a 20% reduction in total energy intensity between 2011 and 2019, with even greater reductions of up to 35% in the transportation, "other," and commerce sectors, energy intensity "rebounded" starting in 2020. This rebound was driven by a recovery in activities in 2021 following the COVID-19 pandemic, as well as by the transportation and industrial sectors (Figure 24).

Figure 24 - Relative Variation in Total and Sectoral Energy Intensities in Mexico



Source: Prepared in-house, data from SIELAC, OLADE.

Relative Importance of Consumer Sectors. The consumption structure did not change significantly between 2000 and 2022 for the "other", commercial, services, and public sectors, although in the former (which includes the residential sector), consumption did not grow between 2000 and 2019. However, largely due to the continued effects of the pandemic on energy consumption in these sectors by 2022, the industrial sector experienced the lowest growth during the period and saw its relative share decrease by more than 6% between 2019 and 2022. In contrast, the transportation sector grew by 65% during the period, increasing its relative share by just under 9% by 2022 (Figure 25).

Figure 25 - Percentage of Total Energy Consumption and Sector Growth in Mexico

Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, services and public	3.3%	3.1%	3.1%	**12%**	**30%**
Industrial	32.5%	32.5%	26.0%	**16%**	**8%**
Other	25.8%	22.2%	23.9%	**0%**	**25%**
Transportation	38.4%	42.2%	47.0%	**28%**	**65%**

Source: Prepared in-house, data from SIELAC, OLADE.

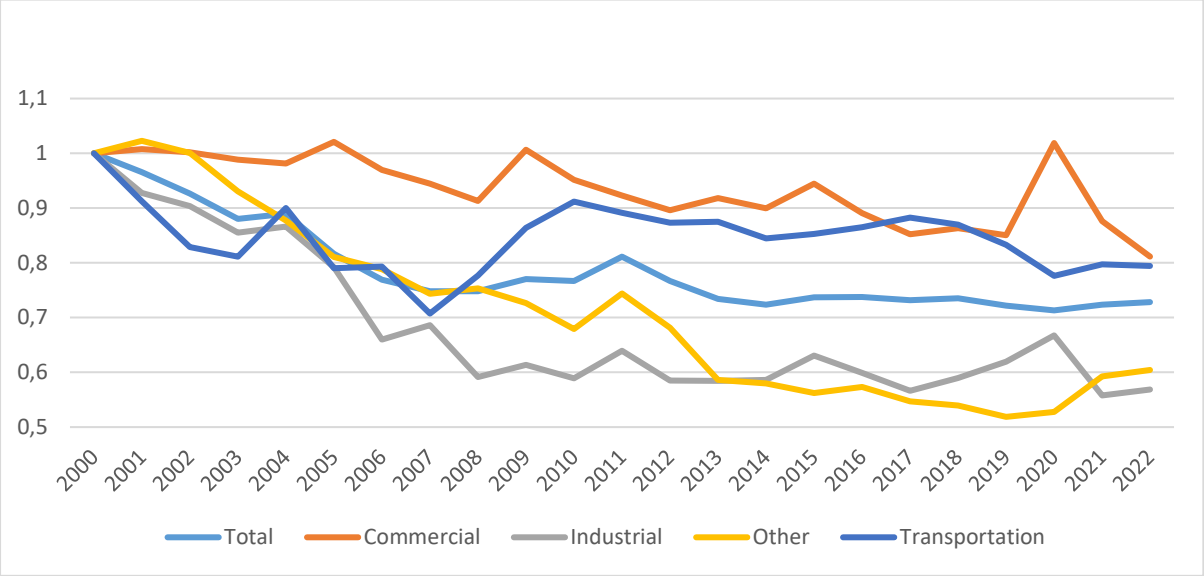
Structural Aspects. According to the National Energy Efficiency Monitoring Report of Mexico, factors contributing to the reduction in energy intensity include the outsourcing of the Mexican economy, fuel substitution, and energy efficiency measures implemented in the industrial sector in response to rising and volatile energy prices. These measures also include energy efficiency standards and replacement programs targeting major energy-consuming technologies in the residential and commercial-services sectors[5].

[5] CEPAL, 2028. *Informe nacional de monitoreo de la eficiencia energética de México*, 2018. https://www.cepal.org/es/publicaciones/43612-informe-nacional-monitoreo-la-eficiencia-energetica-mexico-2018

Peru

Energy Intensity by Sector. Peru has shown a steady decrease in its total energy intensity from 2000 to 2008 (up to 25%), which remains relatively stable through 2022. Reductions of up to 45% (compared to 2000) are observed in the "other" and industrial sectors, while the commercial and transportation sectors have reductions close to 20% (Figure 26).

Figure 26 - Relative Variation in Total and Sectoral Energy Intensities in Peru 2000 - 2022



Source: Prepared in-house, data from SIELAC, OLADE.

Relative Importance of Consumer Sectors. The consumption structure shows significant variations in the weight of different sectors, with a 194% growth in the transportation sector (increasing its relative share from 15% in 2000 to 43% in 2022), a 9% reduction in the relative weight of the industrial sector, and a 7% reduction in the "other" sector (Figure 27).

Figure 27 - Percentage of Total Energy Consumption and Sector Growth in Peru

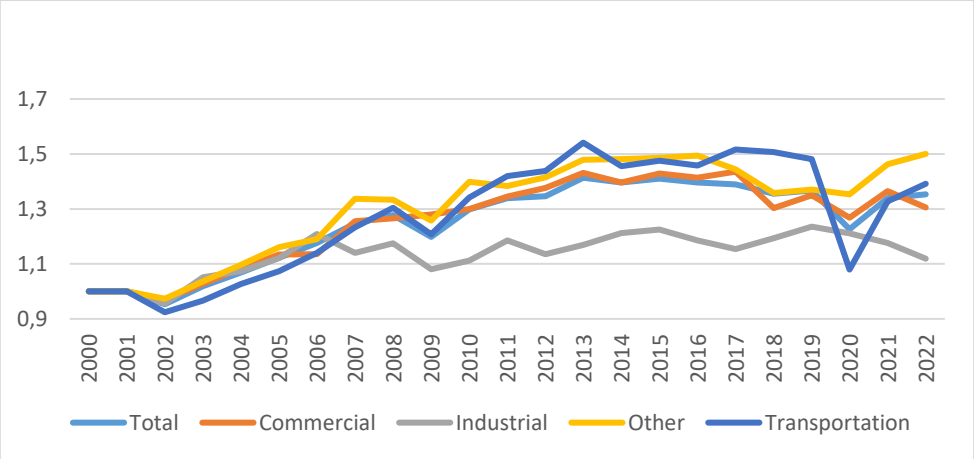
Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, services and public	5.3%	6.5%	6.0%	**119%**	**110%**
Industrial	26.9%	18.9%	17.4%	**25%**	**20%**
Other	40.7%	29.0%	33.7%	**27%**	**54%**
Transportation	27.2%	45.6%	43.0%	**198%**	**194%**

Source: Prepared in-house, data from SIELAC, OLADE.

Uruguay

Energy Intensity by Sector. The relative trajectory of Uruguay's energy intensities shows an upward trend from 2000 to 2011 (exceeding 40%) and a subsequent decline from that year until 2022. However, values remain more than 30% higher than the intensity levels recorded in 2000 (Figure 28).

Figure 28 - Relative Variation in Total and Sectoral Energy Intensities in Uruguay



Source: Prepared in-house, data from SIELAC, OLADE.

Relative Importance of Consumer Sectors. Energy consumption and its relative structure vary significantly over the period, with all sectors experiencing growth of over 115% from 2000 to 2022. Notably, the industrial sector shows a 407% increase, doubling its relative share during this time (Figure 29).

Figure 29 - Percentage of Total Consumption and Sector Growth in Uruguay

Sector	% of Total			Percentage Growth in Energy Consumption from 2000 to	
	2000	2019	2022	2019	2022
Commercial, services and public	7.9%	6.6%	6.9%	**58%**	**171%**
Industrial	19.8%	42.4%	41.2%	**306%**	**407%**
Other	39.4%	23.4%	23.2%	**12%**	**115%**
Transportation	32.9%	27.6%	28.7%	**59%**	**171%**

Source: Prepared in-house, data from SIELAC, OLADE.

Structural Aspects. According to the National Energy Efficiency Monitoring Report of Uruguay[6], the country's economic growth since 2005 has been driven by increased industrial activity. This is reflected in a higher rise in energy consumption relative to economic growth. This shift is primarily linked to the establishment of the first pulp manufacturing plant in Uruguay, which brought about a significant structural change in the sector.

[6] ECLAC, 2015. *Informe nacional de monitoreo de la eficiencia energética de la República Oriental del Uruguay.* https://www.cepal.org/es/publicaciones/38912-informe-nacional-monitoreo-la-eficiencia-energetica-la-republica-oriental

2.4 Summary

In a region as diverse as Latin America and the Caribbean, the evolution of energy intensities by sector and country has shown heterogeneous trends, including the following:

- The sector comprising residential, construction, agriculture, fishing, mining, and non-energy consumption (the "other" sector for explanatory purposes) demonstrated significant improvement, decreasing from 0.48 to 0.36 BOE/103 USD between 2000 and 2019, though it experienced a notable setback during the pandemic years (2020–2022).
- The transportation sector has the highest energy intensity but also showed a significant reduction, from 5.1 to just over 3.9 BOE/10^3 USD, with a clear rebound of about 10% between 2019 and 2022.
- In the industrial sector, energy intensity fluctuated between 1.6 and 1.9 BOE/10^3 USD, with no significant improvements.
- In the commerce sector, energy intensity variations were similar to those in the industrial sector, ranging between 0.26 and 0.29 BOE/10^3 USD, indicating no substantial improvements.

For countries in Latin America and the Caribbean, changes in energy intensity, economic composition, and sectoral energy efficiency indices reveal significant heterogeneity.

- **Argentina** shows a reduction of nearly 10% in its energy intensity from 2000 to 2022, driven by a significant decrease in the transportation sector's intensity (over 25% during the period).
- **Brazil** does not show a reduction in its total energy intensity over the 2000–2022 period, nor in the transportation, industrial, or commerce sectors, although a reduction is achieved in the "other" sector.
- **Chile** shows a notable reduction in energy intensity from 2000 to 2022 (over 35%), driven by significant decreases in the transportation sector (over 50% during the period), as well as in the industrial sector (close to 50%, despite some volatility throughout the period) and the "other" sector (with a reduction of nearly 25%).
- **Colombia** also shows a very notable reduction in energy intensity between 2000 and 2022 (30%), with all sectors improving by over 25%, and reductions reaching up to 40% in the "other" and commerce sectors.
- **Mexico**, after a total energy intensity reduction of 20% between 2011 and 2019 (with even larger reductions of up to 35% in the transportation, "other," and commerce sectors) experienced a "rebound" starting in 2020. This rebound was driven by activity recovery in 2021 post-pandemic and an increase in the transportation and industrial sectors.
- **Peru** shows a steady decline in total energy intensity from 2000 to 2008 (up to 25%), which remained relatively stable until 2022, with reductions of up to 45% (compared to 2000) in the "other" and industrial sectors and around 20% in the commerce and transportation sectors.

- **Uruguay** exhibits a growth trend in relative energy intensities (over 40%) between 2000 and 2011, followed by a decline through 2022. However, intensity levels remain more than 30% higher than those recorded in 2000.

2.5 Analysis of Policies and Regulatory Frameworks

In Latin America and the Caribbean, a wide range of policies and programs have been implemented to improve energy efficiency. However, their impact is not clearly reflected in the indicators presented earlier, varying significantly depending on the sector and country considered.

To compare the progress of countries in implementing energy sector policies and regulatory frameworks, a set of indicators was developed by the Energy Sector Management Assistance Program (ESMAP) of the World Bank.

The *Regulatory Indicators for Sustainable Energy (RISE)* assess the policy and regulatory support provided by countries in each of the four pillars of sustainable energy: access to electricity, access to clean cooking, energy efficiency, and renewable energy.

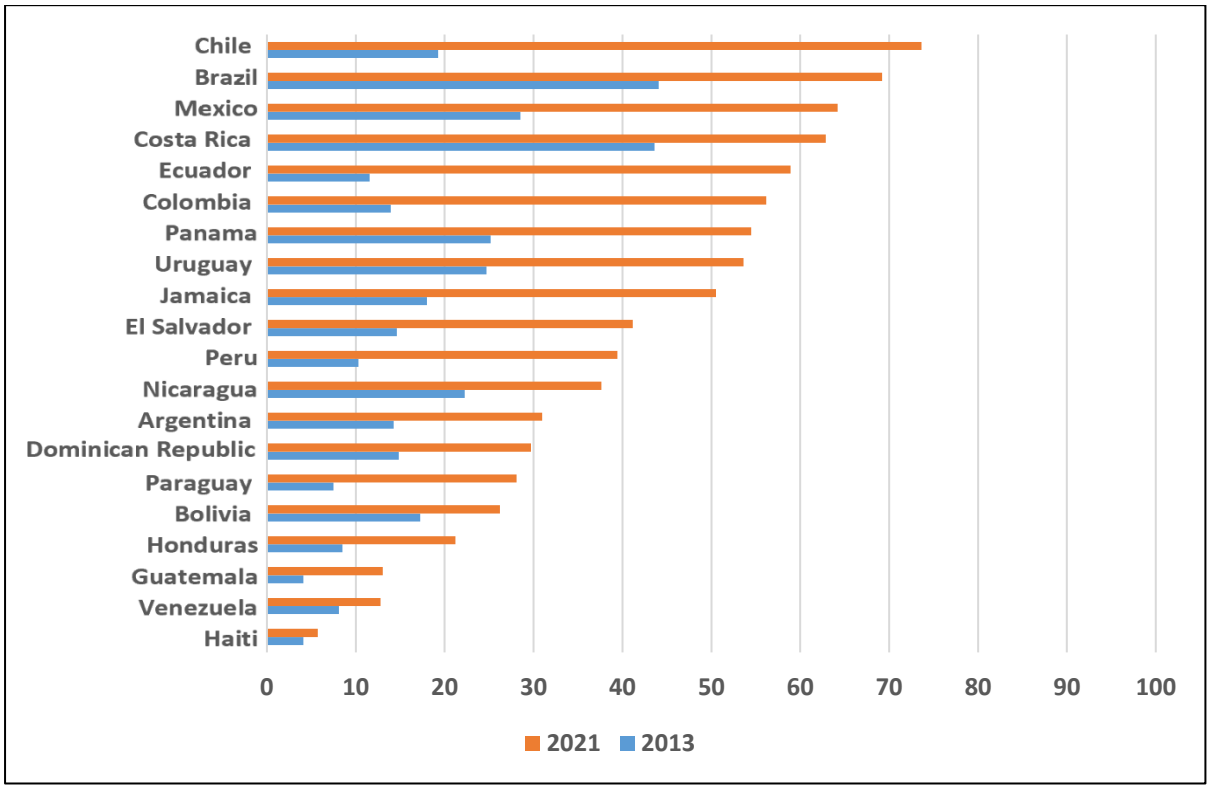
With 31 indicators organized around these four pillars, each indicator is rated on a scale of 0 to 100, based on a weighted set of binary (yes/no) questions focusing on specific aspects of the policies being evaluated.

In terms of energy efficiency, RISE includes 11 thematic indicators, which may, in turn, consist of specific sub-indicators evaluated through the associated questions[7].

For the countries in the region, RISE scores do not exceed 75 points (out of 100). While there have been very significant improvements between 2013 and 2021, the potential for further progress remains considerable (Figure 30).

[7] https://rise.esmap.org/scoring-system

Figure 30 - RISE Scores for Energy Efficiency Policies in LAC



Source: RISE (*Regulatory Indicators for Sustainable Energy*)

3 WORKING AREAS

3.1 Data Collection

The diagnosis presented in the previous chapter was made possible through access to data provided by the Economic and Energy Information System of Latin America and the Caribbean (SIELAC). This repository, developed by the Latin American Energy Organization (OLADE), is one of the primary energy information sources for the countries in the region. It centralizes data on production, consumption, commerce, energy prices, and other relevant indicators.

SIELAC plays a crucial role by offering systematic and consolidated access to information that facilitates energy analysis and supports the design of informed public policies. Its structure allows countries in Latin America and the Caribbean to have a common database, which promotes the harmonization of methodologies, international comparability, and the construction of historical series for key indicators.

However, the highest current level of disaggregation reached by SIELAC is limited to energy intensity indicators at the sectoral level. This restricts its ability to more accurately assess progress in energy efficiency. For this system to become an effective tool for measuring progress toward regional energy efficiency goals and strengthening decision-making, it is essential that it evolves to integrate more disaggregated indicators. This could include, for example, specific data on end uses of energy, processes, and equipment, as detailed in the section below.

Advancing toward greater disaggregation would not only facilitate a better identification of improvement opportunities in each sector but would also enable more effective monitoring of the impact of implemented policies, thereby strengthening regional efforts to achieve greater energy sustainability.

3.2 Disaggregated Indicators

Energy efficiency in an economy is achieved through the aggregation of millions of actions that occur in a highly disaggregated manner across sectors and specific end uses, in systems, processes, and equipment that provide specific energy services located in the final energy demand.

Similarly, the equipment and energy consumption of systems, processes, and equipment in an economy depend on a variety of factors such as the country's economic structure, its agriculture, industry, and commerce, its own energy sources, energy prices, climate, availability of energy-efficient technology, and the policies and institutions that influence energy use, among other factors.

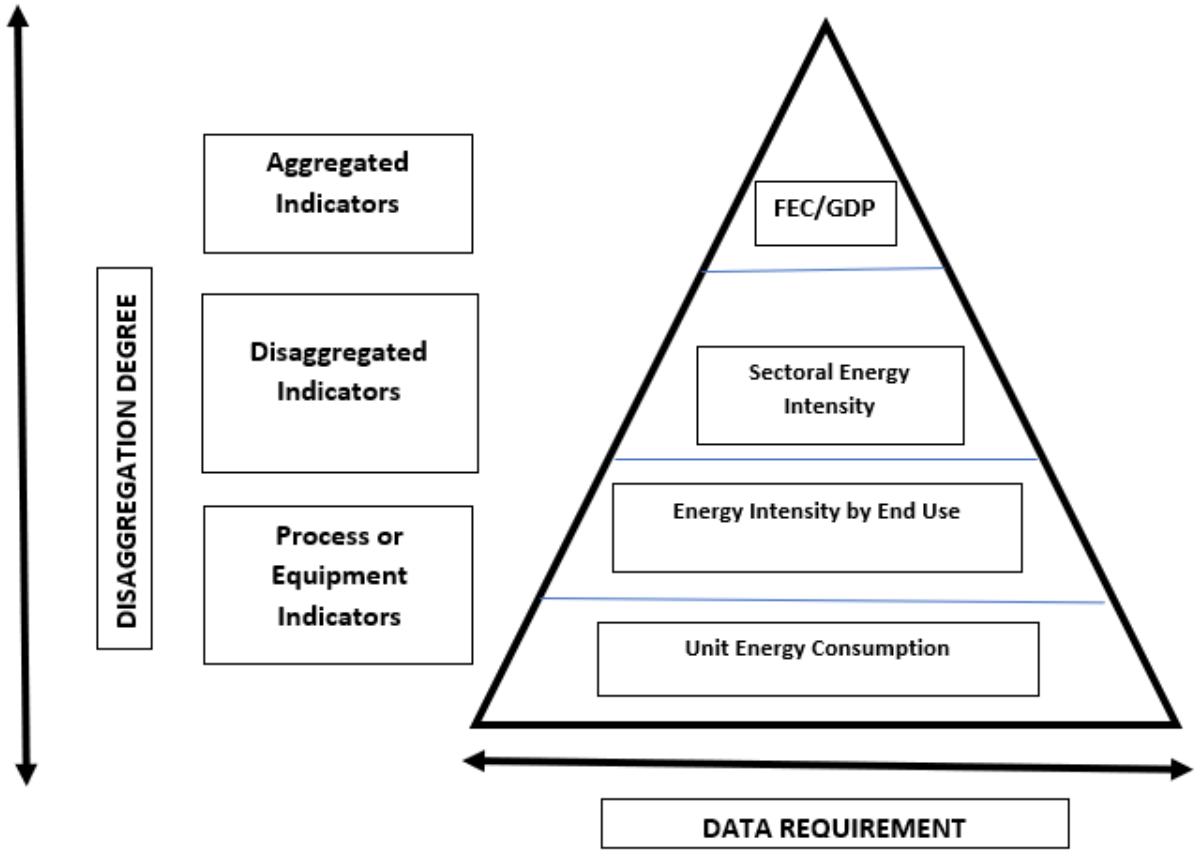
Having disaggregated energy efficiency indicators allows for a more precise identification of improvement opportunities and priority areas for intervention in each sector, end use, system, or process. These indicators facilitate the design of more specific and effective policies and programs by reflecting the particularities of equipment and energy consumption in different economic, geographical, and technological contexts. Furthermore, they enable more detailed monitoring of the impact of implemented initiatives, adjusting strategies based on the results obtained. This is especially valuable in economies with diversified structures, as granular

analysis can uncover hidden dynamics in aggregated data, maximizing energy savings potential and carbon emission reductions.

At the international level, various indicators have been developed to support national efforts to improve energy efficiency.

The International Energy Agency (IEA) proposes a pyramid scheme that organizes indicators by aggregation levels. At the top, it places the relationship between Final Energy Consumption (FEC) and Gross Domestic Product (GDP)[8], or alternatively, the relationship between energy consumption and another macroeconomic variable such as population, which are key drivers of energy consumption (Figure 31).

Figure 31 - Disaggregation by sectors, subsectors, and end uses



Source: Energy Efficiency Indicators: Essentials for Policy Making, International Energy Agency (IEA).

At the second level, there are energy intensity indicators disaggregated by main sector, defined as energy consumption per unit of activity, using physical units (e.g., tons or volumes,

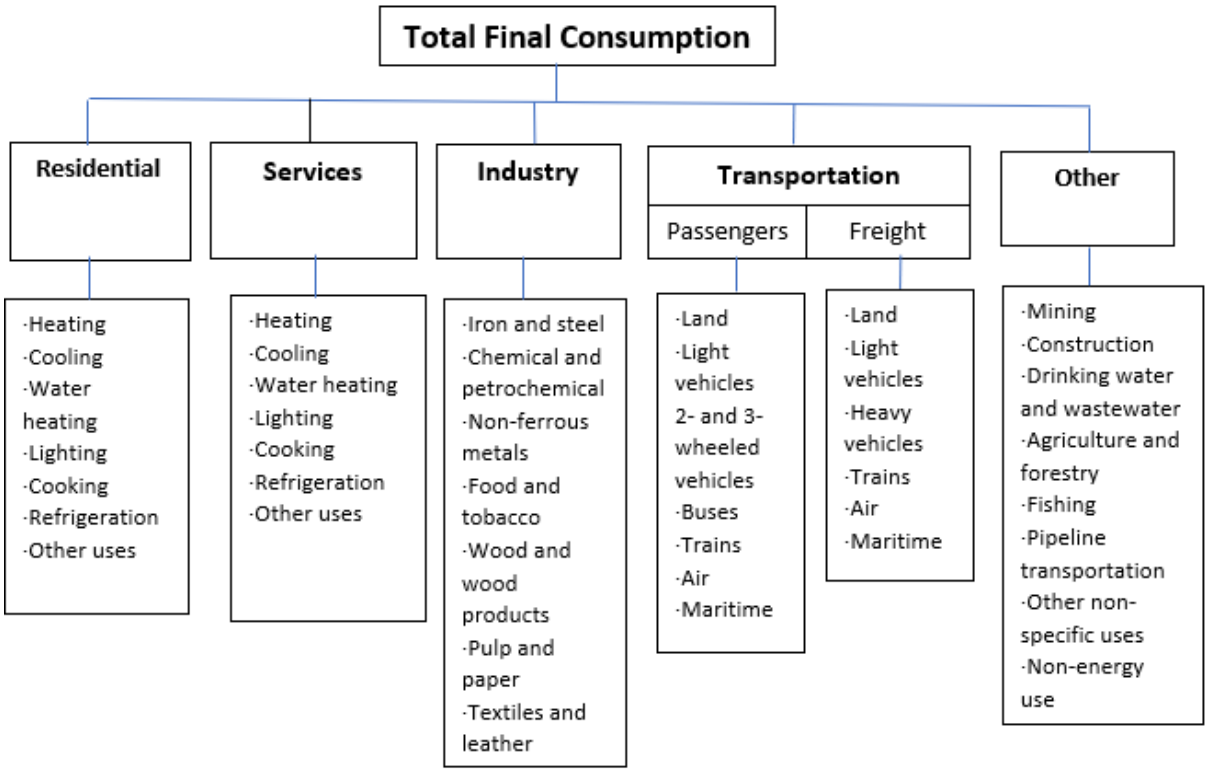
[8] IEA, 2014. Energy Efficiency Indicators: Essentials for Policy Making. https://iea.blob.core.windows.net/assets/c41341f3-2149-4f59-a2e4-81c48bbc49be/IEA_EnergyEfficiencyIndicators_EssentialsforPolicyMaking.pdf

occupied area, number of households or population, number of employees) and monetary units, depending on the key drivers of the sector.

The most disaggregated level corresponds to indicators that represent subsectors and end uses, characterizing energy services, physical processes, or end-use devices. These indicators identify the elements with the greatest weight in energy demand, either by their total consumption or, in the case of electrical equipment, by their impact on hourly and instantaneous demand in electrical systems.

For example, the IEA develops detailed indicators for more than 20 end uses covering sectors such as residential, services, industrial, and transportation (Figure 32)[9].

Figure 32 - Disaggregation by Sectors, Subsectors, and End Uses



Source: Demand-side data and energy efficiency indicators. A guide to designing a national roadmap, IEA.

The development of energy efficiency indicators at a disaggregated level and with national scope requires collaboration from a wide range of stakeholders, as the necessary data (especially those related to processes, systems, and equipment) are often collected by various institutions.

The primary source of information in all countries is the ministries or secretariats responsible for the energy sector. However, to obtain more detailed indicators, it is essential to incorporate

[9] IEA, 2023. Demand-side data and energy efficiency indicators A guide to designing a national roadmap. https://iea.blob.core.windows.net/assets/bcc21d9c-47df-4d5b-8e20-f9688d9f9279/Demand-sidedataandenergyefficiencyindicators.pdf

data from a variety of public and private entities. These institutions provide the information needed to construct a more comprehensive and accurate picture of energy efficiency across different sectors.

The main institutions acting as sources of information include:

- Ministries or secretariats of energy
- Central banks
- Commissions or agencies working on energy efficiency
- Energy companies (electricity, gas, and fuels)
- Energy sector regulators (electricity and gas)
- Regulators of land, air, and maritime transportation
- National institutes of economic and social statistics
- Energy research centers
- Private associations and chambers in the industrial, commercial, agricultural, and transportation sectors
- International agencies, such as OLADE, IEA, the World Bank, and the Inter-American Development Bank
- Ministries of economy, labor, housing, land planning, communications, and transportation
- Meteorological services
- Customs organizations

The diversity of these sources highlights the importance of inter-institutional coordination to ensure that the data collected are complete, consistent, and useful for the formulation of effective energy efficiency policies.

3.3 Previous Experiences: BIEE

The **Base Indicators for Energy Efficiency (BIEE)** program, launched in 2011 by the Economic Commission for Latin America and the Caribbean (ECLAC), was a key project for the formulation of energy efficiency indicators in Latin America and the Caribbean. With financial support from the German Agency for International Cooperation (GIZ), technical support from the French Agency for Environment and Energy Management (ADEME), and collaboration with the international consultancy ENERDATA, this program established the methodological foundations for the development and analysis of indicators in the region.

The main objective of the program was to create a robust set of indicators that would enable the measurement of the progress of national energy efficiency programs, analyze their results over time, and support more informed and effective public policy decisions.

The project involved 16 countries in the region: Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, and Uruguay. As part of its activities, the program conducted energy statistics collection and harmonization, technical workshops to train national teams in the methodology, and the preparation of national reports that strengthened the institutional capacity of participating countries.

The BIEE developed two fundamental databases:

- **SDG7 Indicators:** Contains information on the performance of energy efficiency, renewable energy, and energy access by sector (energy, transportation, industrial, residential, services, and agriculture.)[10]
- **Energy Policies:** Compiles measures applied by sector in energy efficiency, renewable energy, and energy access[11].

Both databases are integrated into an interactive format that allows for data mapping, policy visualization, and impact monitoring. The system identified 293 policies and measures applied between 1985 and 2023, providing details such as policy name, status, type, implementation period, and a semi-quantitative impact analysis.

As for the indicators, the BIEE compiled over 60 indicators for all participating countries, including:

- **Aggregated indicators**: Primary and final energy intensity adjusted by exchange rate and purchasing power parity.
- **Sectoral indicators**: Energy intensities disaggregated by major sector, with more specific data available for some countries, such as:
    - **Industry**: Specific consumption in sectors like steel, cement, and paper.
    - **Transportation**: Unit consumption for road transportation, car efficiency, and average consumption per vehicle.
    - **Households:** Total and electricity consumption per household, as well as consumption by end use (heating and cooking).

Despite its progress, the system lacks information on specific equipment characteristics and data on energy savings derived from policies.

One of the program's most significant achievements was the preparation of national reports that identified the main challenges in integrating the necessary information to build indicators. These reports laid the groundwork for tracking energy efficiency actions and strengthened national capacities to monitor progress toward greater energy sustainability.

However, the lack of funding led to the discontinuation of the project. This issue illustrates how the disruption of international technical assistance programs and grants is a significant barrier to progress in energy efficiency in the region. These aspects will be addressed in more detail in the following section.

[10] https://biee-cepal.enerdata.net/datamapper/
[11] https://biee-cepal.enerdata.net/measures/

4 CHALLENGES AND OPPORTUNITIES

4.1 Challenges

The region faces multiple barriers to achieving higher levels of energy efficiency. Among the most common are low energy prices, limited exposure to energy supply shocks, the prevalence of inherited assets operating beyond their useful life, and obstacles related to the adoption of new technologies.

More specifically, the document *Realizing the Potential of Energy Efficiency in Latin America and the Caribbean* by the World Bank identifies other key challenges[12]:

- Lack of coordination and prioritization of policy measures across all sectors.
- Political instability and lack of capacity to implement and monitor public policies.
- Discontinuity in international grant and technical assistance programs, which, although they often include capacity-building components, do not always achieve continuity or scalability by local governments.
- Disruption of financial incentives, making it difficult to develop sustainable projects over time.
- Barriers to technology transfer, such as trade restrictions with certain countries or financial limitations that affect both the public and private sectors in investing in modern technologies.

These barriers are compounded by inherent characteristics in the design and management of public energy efficiency policies:

- They are complex policies to approve and implement and require long periods of time to show tangible results.
- Their success depends on the convergence of multiple decisions from parties with diverse and sometimes contradictory interests. Additionally, they require medium- and long-term continuity and flexibility to adapt to constantly changing technological, environmental, and economic factors.
- Due to their cross-cutting nature, these policies have a multisectoral reach and present regional variations. This means that their implementation requires coordinated participation from actors in sectors such as energy, industry, housing, transportation, and finance, as well as from subnational and local representatives.

4.2 Opportunities

Despite the challenges, Latin America and the Caribbean (LAC) have multiple opportunities to unlock the potential of energy efficiency. The implementation of effective strategies requires a comprehensive approach that combines institutional, regulatory, economic, and information dissemination policies. Each type of policy offers distinct advantages in terms of relevance, energy-saving potential, ease of implementation, and execution timelines, allowing them to be adapted to the specific needs of each country.

[12] World Bank, 2022. Op cit.

The International Energy Agency (IEA) has developed a set of recommendations based on international best practices, designed to fit the cultural, political, and economic contexts of developing countries. These recommendations not only focus on highly developed countries but also address the particularities of the region's economies. They are organized according to their typology, application sector, impact on energy savings, ease of implementation, and required time horizon.

In this context, **Figure 33** provides a summary of these strategic opportunities, offering a practical guide for LAC countries to identify and implement the most suitable policies for their reality. Among the recommendations, initiatives such as the establishment of capacities for energy data collection, the design of national energy efficiency plans, the promotion of private investments, and the development of specific regulations for key sectors like transportation, industry, and buildings stand out.

Figure 33 - Regional Energy Efficiency Policy Recommendations (REEPR)

Recommendation	Policy Type	Sector	Relevance	Savings	Ease of implementation	Implementation time (years)
Highly recommended as they provide a solid foundation for the national energy efficiency strategy						
Establish energy data collection capacity	Institutional	All	High	ND	Minor difficulty	1 to 2
Develop national energy efficiency (EE) plans						
Recommended for immediate adoption by all governments in the region						
Mandatory technical regulations for appliances	Regulatory	Appliances	High	Very large	Minor difficulty	1 to 2
Require adherence to energy management protocols		Industry				
Highly recommended for consideration by all governments in the region and immediate adoption in most countries						
Facilitate private investment	Economic	All	High	Large	Can be challenging	2 to 3
Appoint leading institutions for EE	Institutional					
Require and enforce energy-efficient building codes	Regulatory	Buildings			Challenging to enforce	
Monitor, verify, and enforce technical regulations	Institutional	Appliances			Can be challenging	
Gradual phase-out of inefficient lighting	Regulatory			Very large		
Promote vehicle fleet renewal	Economic	Transportation		Large		
Recommended but requires special attention and additional consideration prior to adoption.						
Gradually phase out energy price subsidies	Economic	All	Very high	Very large	Very difficult	3 to 5
Require fuel efficiency regulations for vehicles	Regulatory	Transportation				
Recommended for consideration and adoption						
Promote EE in building renovations	Economic	Buildings	High	Significant	Minor difficulty	1 to 2
Encourage the use of high EE construction components			Significant			
Implement high EE in public lighting		Equipment		Large		
Promote cost-effective driving practices	Information	Transportation		Significant		
Support the development of public transportation	Economic		High	Very large	Difficult	5 to 10

Enforce energy performance standards for equipment	Regulatory	Industry	High	Large		2 to 3
Promote EE for small and medium-sized enterprises	Information			Significant	Minor difficulty	1 to 2
Establish complementary EE policies for the industrial sector	Economic and information					2 to 3

Source: IEA

Among this range of policies, the creation of capacities for energy data collection stands out as a priority, classified as of “high relevance,” with “lower implementation difficulty,” and essential for building a solid foundation for national energy efficiency strategies. This recommendation aligns directly with the analysis presented, as having reliable and disaggregated data is a fundamental pillar for measuring progress and strengthening decision-making.

In this regard, OLADE plays a central role as the coordinator of regional efforts in energy data collection and disaggregation. Its experience in managing platforms such as SIELAC, combined with its ability to facilitate cooperation among countries, positions it as a key entity to lead initiatives that promote the harmonization of methodologies and the generation of disaggregated indicators.

5 CONCLUSIONS

The countries of Latin America and the Caribbean have made key commitments within the framework of the United Nations (UN) 2030 Agenda, which establishes the Sustainable Development Goals (SDGs) as a roadmap for the region's economic, social, and environmental development. Among these, Goal 7 stands out, which aims to ensure access to affordable, reliable, sustainable, and modern energy for all. In this context, a global target was set to "double the rate of improvement in energy intensity worldwide, compared to the average rate observed between 1990 and 2010". This implies achieving an annual improvement of 2.6% in energy efficiency between 2010 and 2030. At the international level, the Global Commitment on Renewable Energy and Energy Efficiency, ratified at COP28, sets the goal for countries to work together to increase the average annual rate of improvement in energy efficiency from 2% to more than 4% by 2030. This global goal aims not only to improve energy efficiency but also to contribute to the reduction of greenhouse gas emissions and the transition to a more sustainable economy.

However, the analysis of energy intensity evolution in the region and in key countries shows that the proposed targets are far from being met. According to SDGs data provided by the United Nations, the global improvement rate between 2010 and 2021 was lower than committed, with an average of only 1.65% worldwide. In the case of Latin America and the Caribbean, the improvement rate was even lower, reaching only 0.65% during the same period. Additionally, the evolution of energy intensity in the region has shown irregular behavior between 2000 and 2019, highlighting the urgent need to adopt more effective policies and measures to accelerate progress in energy efficiency.

Furthermore, the assessment conducted by the Regulatory Indicators for Sustainable Energy (RISE) reveals that the countries in the region have significant opportunities to design and implement better policies and programs in energy efficiency. For these opportunities to materialize, it is crucial to improve the countries' capacity to collect, process, and analyze data with a high level of disaggregation. This will allow the identification of energy-saving opportunities and the efficient use of energy, facilitating the formulation of policies better adapted to the local reality and the implementation of more targeted action measures.

In this context, it is essential to strengthen the capacity of countries to integrate, process, and analyze information with high levels of disaggregation, which would enable the identification of cost-effective opportunities for energy savings and efficient use. These capacities, in turn, would facilitate the design of more effective policies and programs, as well as the continuous monitoring of their progress at both the national and regional levels.

Building on the mandate of Ministerial Decision No. XLVI/D/531 of 2017, OLADE aimed to continue, improve, and expand the initiatives carried out to date, positioning itself as a catalyst for regional actions that drive improvements in national energy efficiency systems and capacities. In line with this goal, OLADE conducted a survey of existing regional initiatives to define targets that are consistent with the reality of the countries and aligned with the commitments made at COP28. In consultation with the OLADE Energy Efficiency Working Group (GTO) countries, a regional target was proposed for energy efficiency improvement at 1.3% annually between 2022 and 2030, based on the average rate achieved

by the region between 2010 and 2021.

As a result, 21 Energy Ministers from OLADE Member States signed the joint declaration "Energy Efficiency Target" in Asunción, Paraguay, on October 31, 2024, committing to working together to achieve a 1.3% annual improvement in regional energy efficiency by 2030. They also reaffirmed their commitment to establishing national goals aligned with global objectives and emphasized the need for adequate financial resources to implement energy efficiency programs, strengthen infrastructure, promote sustainable technologies, and build local capacities.

In this context, OLADE will play a key role as the technical secretariat to support the implementation of the regional target, providing assistance in identifying, analyzing, and disseminating best practices in energy efficiency. The organization will also promote the creation of effective mechanisms for data collection and monitoring progress toward the targets, in close collaboration with Member States. OLADE's work will be essential to ensuring that regional efforts are well-coordinated and aligned, thus facilitating progress monitoring and informed decision-making for improving energy efficiency in Latin America and the Caribbean.

In conclusion, achieving the proposed goals not only represents a technical and political challenge but also a unique opportunity to transform energy efficiency into a driver of sustainable development for Latin America and the Caribbean. With a coordinated regional approach, robust national efforts, and the backing of international commitments, the region has the potential to move toward a more sustainable, equitable, and resilient energy future. This is a path that requires the commitment of all stakeholders, both public and private, and a collective effort to ensure that energy efficiency is a fundamental pillar of regional development.

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