Chapter 2

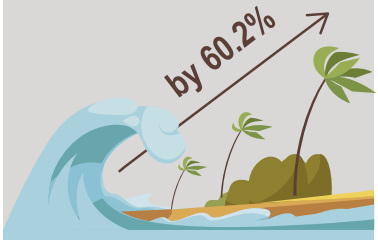
# Harnessing the potential of the green transition to build a more inclusive development model

A green transition that places citizens' well-being at its centre could help Latin America and the Caribbean (LAC) move towards a more inclusive and sustainable development model. First, this chapter maps out where the region stands regarding environmental indicators. Second, it argues why the green transition is an opportunity for the post-COVID-19 recovery in the region. Third, it puts forward a multi-dimensional, systemic approach to advancing a green and just transition and focuses, in particular, on a territorial sustainable development model and policies needed to accelerate the transition towards sustainable transport and urban systems. Last, the chapter highlights main policy messages.

# LAC needs to advance the green transition while fostering sustainable and inclusive development

## LAC is one of the most vulnerable regions to the consequences of climate change

The average number of **extreme climate-related weather events** in LAC increased



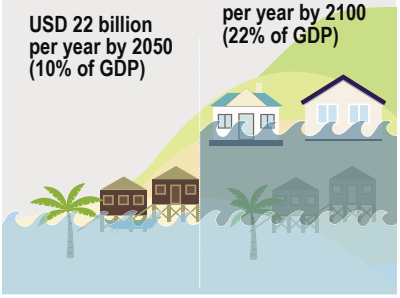

**between 2001 and 2022 compared to the previous two decades**

Climate change is projected to push **5 million more people into poverty** by 2030 in LAC

In the Caribbean, the **annual cost of not dealing with the effects of sea level rise** is estimated to reach

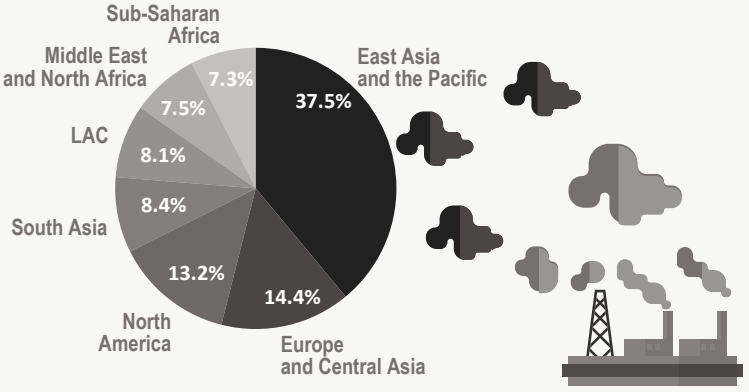
**USD 22 billion per year by 2050 (10% of GDP)**

**and USD 46 billion per year by 2100 (22% of GDP)**



## LAC's total greenhouse gas emissions (GHG) have been steadily rising since 1990, reflecting an unsustainable development model in the region

**Regional shares of total GHG emissions, 2019**




## A systemic approach to the green transition can help implement public policies centred on citizens' well-being

**Instead of focusing on specific problems, a systemic approach designs systems that produce better social, economic and enviromental results**

**Systemic transport policies can:**

Reduce energy consumption | Lower emissions | Yield lower mobility and high accessibility | Offer equitable opportunities | Promote healthier lifestyles

## Introduction

Climate change is an urgent concern that demands local and regional actions that support globally agreed targets. At the current rate of global greenhouse gases (GHG) emissions, the Paris Agreement goal of limiting – by 2030 – global warming to a maximum between 1.5°C and 2°C will be difficult to achieve (IPCC, 2018[1]). Despite the LAC region's contribution to global emissions being around 8.1%, the region has proved to be particularly vulnerable to the effects of climate change. The unequal consequences of climate change are being felt at the environmental, economic and social context. Without immediate implementation of polices for mitigation and adaptation,[1] the effects of global warming are expected to intensify in the coming years and to continue affecting disproportionately the most vulnerable countries and their most exposed socio-economic groups.

The recent crisis generated by the coronavirus (COVID-19) pandemic has led to a significant development setback in LAC. Recovery strategies require rethinking health, social and economic strategies and are also an opportunity to address the environmental and climate emergency (OECD et al., 2021[2]). The region is particularly vulnerable to the consequences of climate change and the cost of inaction is high. Hence, it is imperative to minimise risks by increasing resilience, which requires a better understanding of how the region contributes to and is affected by climate change.

LAC is at a critical juncture that poses an opportunity for action. The post-COVID-19 recovery, a complex global scenario and the pre-existing development traps in the region must be seen as a strategic context to make structural changes that help the region move towards a more sustainable, resilient and inclusive development model. A green and just transition represents a unique opportunity to take this leap forward, by focusing on effectively transforming and decarbonising the systems that underpin the economy and society to improve almost every aspect of the lives of Latin American citizens.

We conceive the green transition as a means to foster a more sustainable and just development model in LAC. This model should help close the existing social, economic, institutional and environmental development gaps and avoid generating new ones (OECD et al., 2019[3]). A green transition is not only about fighting climate change. A green and just transition aims to advance a greener and more just model of production and consumption that creates new quality green jobs, generates the conditions for workers to acquire new green and digital skills, and supports firms to adopt more sustainable production schemes, including those in brown sectors, which will be more affected throughout the transition and with a special focus on SMEs. Moreover, a green and just transition should contribute to the eradication of poverty and strengthen social inclusion mechanisms, without concentrating only on compensation schemes.

A green and just transition should adopt a systemic approach that produces better socio-economic and sustainable results and should be co-designed by governments and all members of society, across socio-economic groups, territories, generations and genders. Only a strong consensus on what, why and how the green transition is articulated will allow its proper fulfilment. Given the potentially transformational effect of the green transition, mainstreaming climate mitigation and adaptation policies as cross-cutting issues across levels and agencies of government is key. Failure to integrate the social dimension horizontally and vertically, runs the risk of undermining societal acceptance of environmental policy reforms embedded in the green transition. Integrated approaches would allow social development priorities to be taken fully into account in the transition, helping drastically reduce multi-dimensional inequalities (AFD, 2020[4]).

First, this chapter maps out where the region is standing regarding climate change and environmental degradation. Second, it argues that the green transition should be a

priority for LAC and explains how it can respond to structural development challenges. Third, it proposes a systemic approach to guide the policies needed for a green and just transition, giving special relevance to the role of subnational governments. Finally, the chapter provides key policy messages.

## A green transition demands a co-ordinated and systemic response to address climate change effects

At current rates, global warming will reach the 1.5°C threshold between 2030 and 2052 (IPCC, 2022[5]). This is a short horizon, particularly for green policies. Even the commitments for the 2°C scenario already require revisions due to the levels of GHG emissions of the four major emitters (the People's Republic of China [hereafter, "China"], India, the United States and the European Union). At major emitters' current rates, the rest of the world will lose its margin of emissions reduction to comply with the global carbon budget of the 2°C threshold (Bárcena et al., 2020[6]). The actions needed to address climate change are challenging from a global perspective. The time frames of mitigation and adaptation policies are longer, given their complexity and transformational effect, and therefore need to be addressed urgently. In this way, international partnerships are crucial to co-ordinate worldwide efforts to achieve a just distribution of emissions reduction (Chapter 6).

Burning of fossil fuels and deforestation are the main causes of climate change. Human activity and its emissions are increasingly causing changes in atmospheric and ocean temperature, precipitation, and wind patterns which have direct consequences for the planet (IPCC, 2021[7]), and for social well-being. The observed negative impacts over the environment make the current development model based on extractive and natural resource-dependent economies unsustainable and calls for a co-ordinated response.

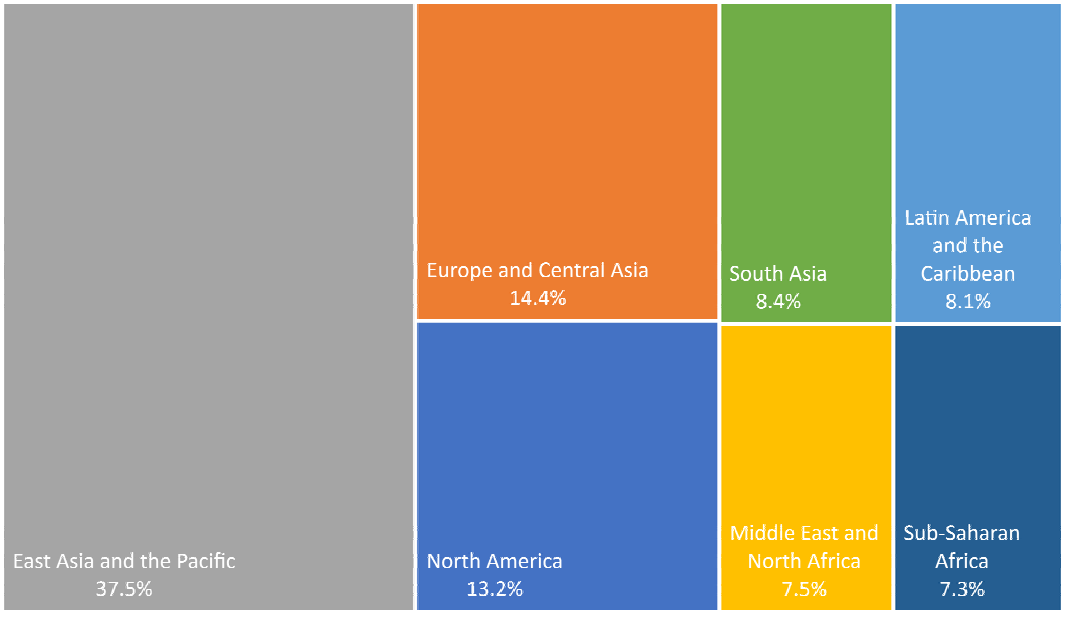
A whole-of-government approach that places environmental issues as a transversal axis of public policy is necessary to mitigate the effects of climate change and develop a more sustainable and inclusive economic model. The post-COVID-19 recovery illustrates the need for such a response. Global carbon dioxide ($CO_2$) emissions rebounded to their highest level in history in 2021, reaching 36.3 Gt. The increase in global $CO_2$ emissions of over 2 Gt was the largest in history in absolute terms, more than offsetting the previous year's pandemic-induced decline. Due to the contraction caused by the pandemic, most of the world's economies recorded a reduction in $CO_2$ emissions of between 5% and 10% in 2020 compared to 2019 (IEA, 2021[8]). The evolution of $CO_2$ emissions from energy combustion and industrial processes reflects the consequences of promoting a recovery concentrated in setting economies "back on track". The progress gained on GHG emissions trends or clean air during previous years was quickly reversed in 2021 due to a recovery defined by a pre-pandemic economic approach. While productivity indicators might have recovered, it is important to align broader policy efforts towards a sustained transition of emissions reduction. Otherwise, the tendency will continue to be the former carbon-intensive growth path.

Climate change is a global but heterogeneous and asymmetric phenomenon that entails inequalities (Bárcena et al., 2020[6]). It disproportionately affects the most vulnerable, threatening poverty reduction. It is estimated that globally, by 2030, 68 to 135 million people could be pushed into poverty because of climate change (World Bank, 2020[9]).

## LAC needs to be part of the global fight against climate change

Given its share in total global GHG emissions compared to countries with similar or higher development levels, LAC is usually associated with better environmental performance. The regional shares of total world GHG emissions are disproportionately distributed, as East Asia and the Pacific had the highest emissions in 2019, contributing 37.5%, while Europe and Central Asia represented 14.4%, North America 13.2%, South Asia 8.4% and the LAC region 8.1%, more than the Middle East and North Africa (MENA) (7.5%) and sub-Saharan Africa (7.3%) (Figure 2.1). LAC's share in total GHG emissions is proportional to its share in total world population (8.4%) and slightly higher than its share in total GDP (6.4%) (Ined, 2022[10]; World Bank, 2022[11]), showing that the region sustains the same carbon-intensive development model as the high emitters. In terms of subregions, the Caribbean contributed 0.4% to total global emissions in 2019, Central America 1.7%, and South America had the biggest share with 6.1%.

Figure 2.1. **Regional shares of total GHG emissions, 2019**




*Notes*: Emissions including LUCF reported in Gt of $CO_2e$. Total emissions do not include bunker fuels. The Climate Analysis Indicators Tool (CAIT) was used as the data source. The CAIT dataset is the most comprehensive on Climate Watch and includes all sectors and gases. Climate Watch Historical GHG Emissions data (previously published through CAIT Climate Data Explorer) are derived from several sources. The use of the land use change and forestry (LUCF) or agriculture data is cited as (FAO, 2022[12]). For fuel combustion data, it is cited as (OECD/IEA, 2021[13]).
*Sources*: (Climate Watch, 2022[14]); (FAO, 2022[12]); (OECD/IEA, 2021[13]).

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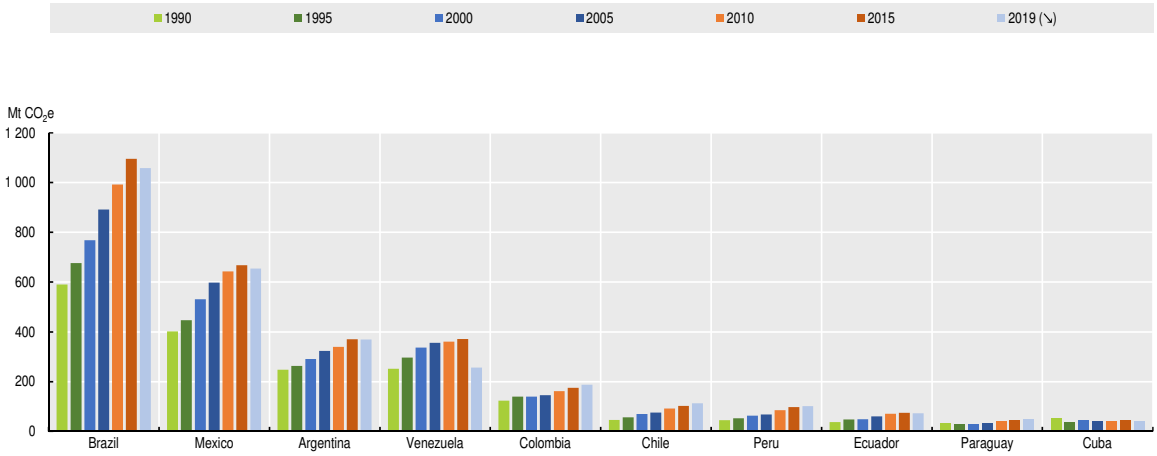
LAC data show a steady increase of total GHG emissions since 1990, reflecting its development model. Between 1990 and 2019, Brazil, Mexico, Argentina, Venezuela and Colombia consistently had higher levels of emissions than other LAC countries (Figure 2.2).[2] This explains the steady increase in South America's emissions, further than the Caribbean and Central America[3] and even OECD countries, which in turn have managed to decrease average total emissions since 2005 (Figure 2.3).[4]

Figure 2.2. **Top 10 countries of total GHG emissions, 1990-2019**




*Note*: Total GHG emissions excluding LUCF. Top 10 countries are the 10 countries that emit the most in the LAC region when analysing total GHG emissions in 2019.
*Sources*: (Climate Watch, 2022[14]); (OECD/IEA, 2021[13]); (FAO, 2022[12]).

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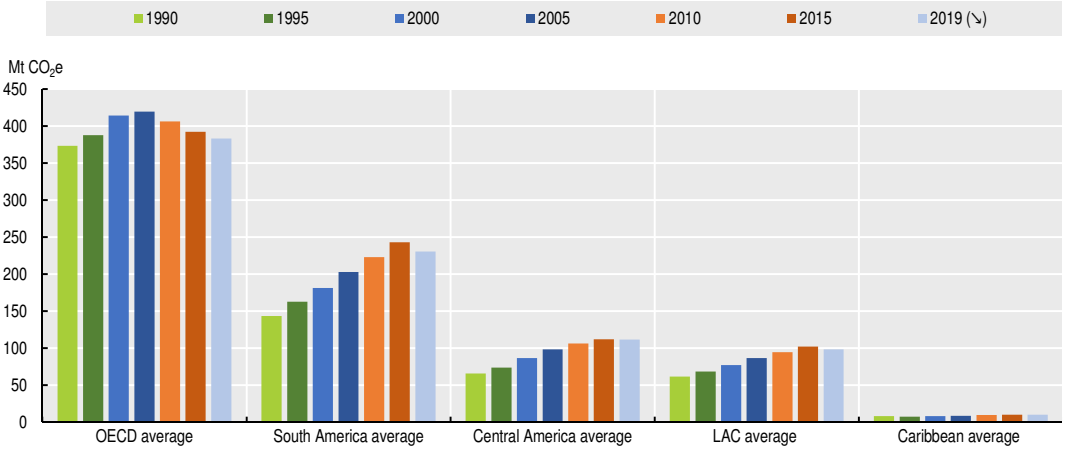
The level of total GHG emissions in LAC has increased by 1 223 Mt $CO_2e$ from 1990 to 2019, representing a 61% increase. On average, emissions in the three subregions have been increasing with a peak in 2015 and a slight decrease in 2019. Total emissions in the Caribbean subregion increased from 125.8 Mt $Co_2e$ in 1990 to 155.4 in 2019. Although this is a small share of total LAC emissions (5%), it represents a 23.5% increase rate for a small region. If LUCF is considered, the amount rises from 125.1 Mt $Co_2e$ in 1990 to 180.4 in 2019, representing an increase rate of 44.2%. Total emissions in Central America increased by 70.5% over the same time period (Figure 2.3). If LUCF is considered, the increase rate rises to 54.4%. Indeed, the pattern of increasing total GHG emissions in LAC shows that the region is no exception and that reversing the trend will require ambitious mitigation and adaptation policies.

Figure 2.3. **Average total GHG emissions by subregions, 1990-2019**



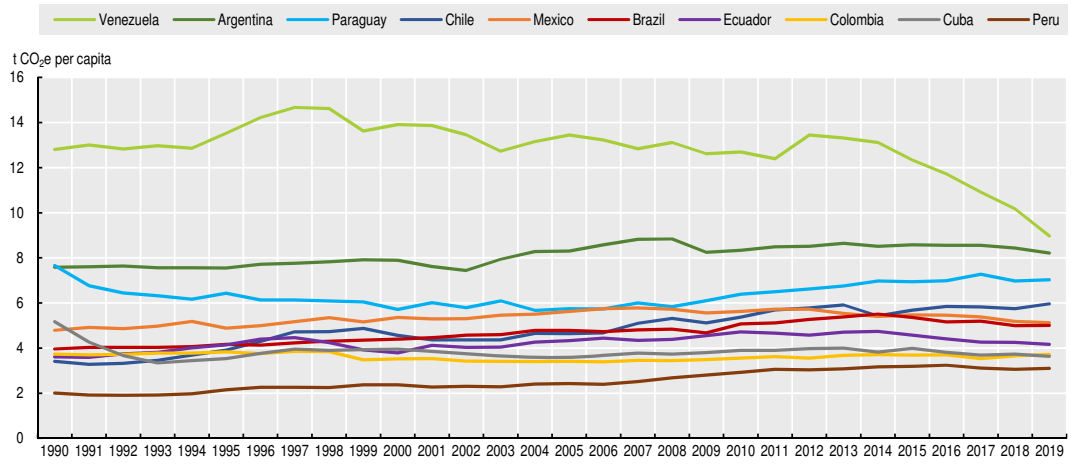

*Note*: Total GHG emissions excluding LUCF. OECD average is a simple average of the largest set of all OECD member countries, as of May 2022, for which data are available.
*Sources*: (Climate Watch, 2022[14]); (OECD/IEA, 2021[13]); (FAO, 2022[12]).

In 2019, LAC's average per-capita GHG emissions level equalled the global average (6.3 t $CO_2e$) and was lower than the OECD average (9.1 t $CO_2e$). When comparing emissions per capita, the Caribbean countries show the highest levels due to a non-proportional relationship between the size of their population and their high levels of emissions (Figure 2.5).

Grenada, Trinidad and Tobago, and Barbados emitted around 20, 21 and 13 t $CO_2$e in 2019, respectively. When analysing the top 10 countries with highest total emissions, Venezuela, Argentina and Paraguay show levels of per capita emissions of 9, 8 and 7 t $CO_2$e, respectively (Figure 2.4). Identifying the origins of these emissions in each country is paramount to help raise awareness of the urgent need to take action in the highest-emitting sectors.

Figure 2.4. **GHG emissions per capita in selected LAC countries**

Top 10 countries of total emissions, 1990-2019




*Note*: GHG emissions excluding LUCF. Selected LAC countries are the 10 countries that emit the most in the LAC region when analysing total GHG emissions in 2019.

*Sources*: (Climate Watch, 2022[14]); (OECD/IEA, 2021[13]); (FAO, 2022[12]).

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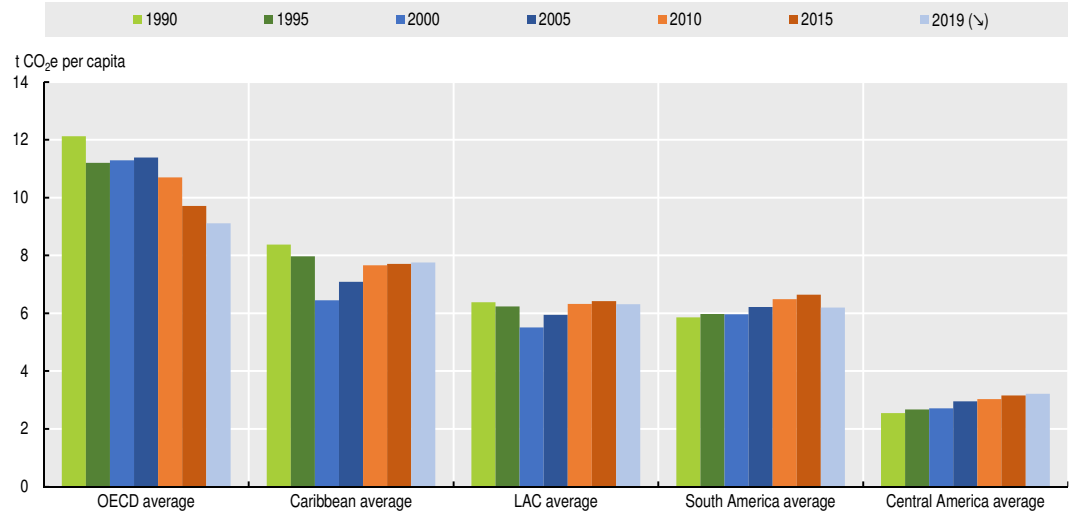
Since 1990, GHG emissions per capita in LAC have remained largely constant (between 5.5 and 6.4 t $CO_2$e without LUCF and between 8.1 and 8.4 including LUCF) while OECD countries have made significant progress in lowering their averages; as such, the gap between the two regions has been closing. The Caribbean subregion has the highest emissions per capita within LAC, and it has managed to slightly decrease them from 8.4 t $CO_2$e in 1990 to 7.7 t $CO_2$e in 2019 without LUCF (Figure 2.5)[7] and from 11.5 to 10.7 including LUCF.

Figure 2.5. **Average GHG emissions per capita by subregions, 1990-2019**




*Note*: GHG emissions excluding LUCF. OECD average is a simple average of the largest set of all OECD member countries, as of May 2022, for which data are available.

*Sources*: (Climate Watch, 2022[14]); (OECD/IEA, 2021[13]); (FAO, 2022[12]).

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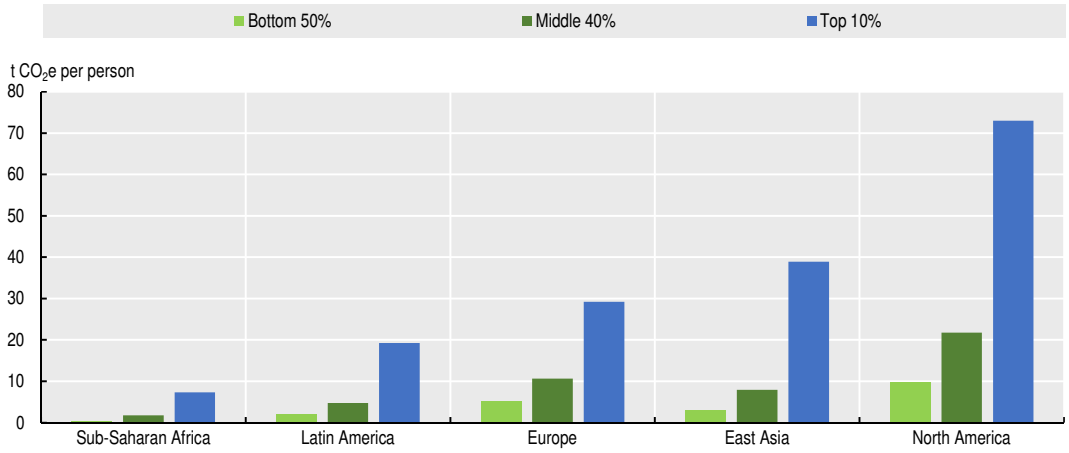
Emission levels also evidence a historic, unjust and disproportionate share of responsibility between rich and poor countries and across their various socio-economic groups (Guivarch, Taconet and Méjean, 2021[15]). The double asymmetry explained earlier is illustrated in Figure 2.6. Regionally, North America stands out, with the top 10% of citizens by income emitting 73 t $CO_2$e per capita. The same quintile shows similar patterns in East Asia and Europe, emitting 30-40 t $CO_2$e per capita. Even in less-developed regions with lower total emissions, such as Latin America or sub-Saharan Africa, this pattern persists but on a lower scale (Figure 2.6) (Guivarch, Taconet and Méjean, 2021[15]).

Figure 2.6. **GHG emissions by income group and region, 2019**




*Note*: Latin America refers to Argentina, Brazil, Chile, Colombia and Mexico, due to data availability.
*Source*: (WIR, 2022[16]).

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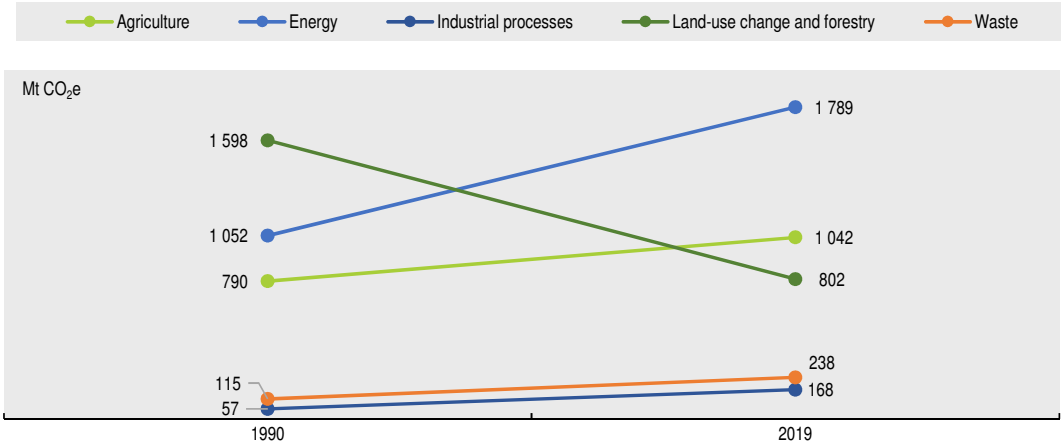
Since 1990, emissions from almost all sectors have grown continuously in LAC, with the greatest increase in the energy sector; 738 Mt $CO_2$e from 1990 to 2019 (Figure 2.7).[8] In the agricultural sector, GHG emissions increased 100% between 1961 and 2010 (Tubiello et al., 2014[17]), primarily due to the rise in extensive grazing systems in South and Central America. In a smaller, more recent time frame (1990 to 2019) emissions from agriculture increased around 32%. Direct GHG emissions from agriculture are expected to continue rising by 1.1% annually between 2022 and 2031, but the rate of output growth is only around 0.01%, suggesting a persistent carbon intense production (OECD/FAO, 2022[18]). While the industrial and waste sectors produce emissions at a lower scale, their growth rates have been significant (193% and 108%, respectively). To address this constant growth in emissions from almost all sectors, targeted responses are needed in LAC. Programmes and policies should include digitalised and tailored solutions for each sector, from subsistence agriculture to renewable energy and technological intensification for competitiveness and further global integration.

Figure 2.7. **GHG emissions by sector for LAC, 1990-2019**




*Notes*: LAC includes 33 countries with available data. The energy sector includes building, electricity and heat, fugitive emissions, manufacturing and construction, other fuel combustion and transport.
*Sources*: (Climate Watch, 2022[14]); (FAO, 2022[12]); (OECD/IEA, 2021[13]).

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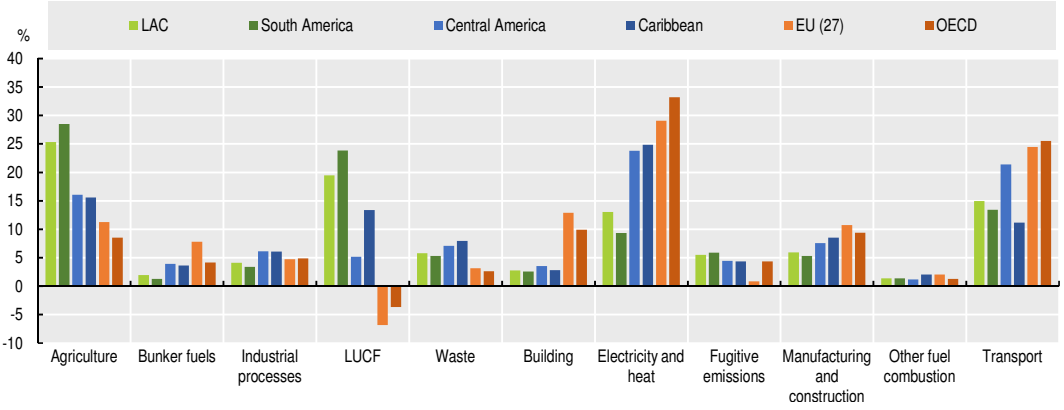
The structure of emissions in LAC differs from that of the EU and OECD countries. Whereas the energy sector (which includes building, electricity and heat, transport, fugitive emissions, manufacturing and construction, and other fuel combustion) accounts for 83.5% of OECD countries' total emissions and 80% for EU, three sectors represent 88.3% of total emissions in LAC, comprising energy (43.5%), agriculture (25.3%, more than double the OECD) and LUCF (19.5%) (Figure 2.8).[9] Although the energy sector remains the most emission-intensive for all three subregions, each one has its particularities. South America's high emitting sectors are agriculture (28.5%), LUCF (23.8%), and transport (13.4%). The Caribbean differs slightly, with electricity and heat (24.8%) followed by agriculture (15.6%) and LUCF (13.4%, very similar to transport at 11.1%). In Central America, electricity and heat accounts for 23.8% of emissions, while transport accounts for 21.4%, followed by agriculture with 16%. A deeper understanding of the structure of emissions would contribute to a cleaner productive strategy that protects the land and avoids long-term consequences in terms of food security and vulnerability to external shocks (Chapter 3).

Figure 2.8. **LAC's sector shares of total GHG emissions by subregion compared to the European Union and OECD countries, 2019**




*Note*: LAC includes data for 33 available countries. The energy sector includes building, electricity and heat, fugitive emissions, manufacturing and construction, other fuel combustion and transport.
*Sources*: (Climate Watch, 2022[14]); (FAO, 2022[12]); (OECD/IEA, 2021[13]).

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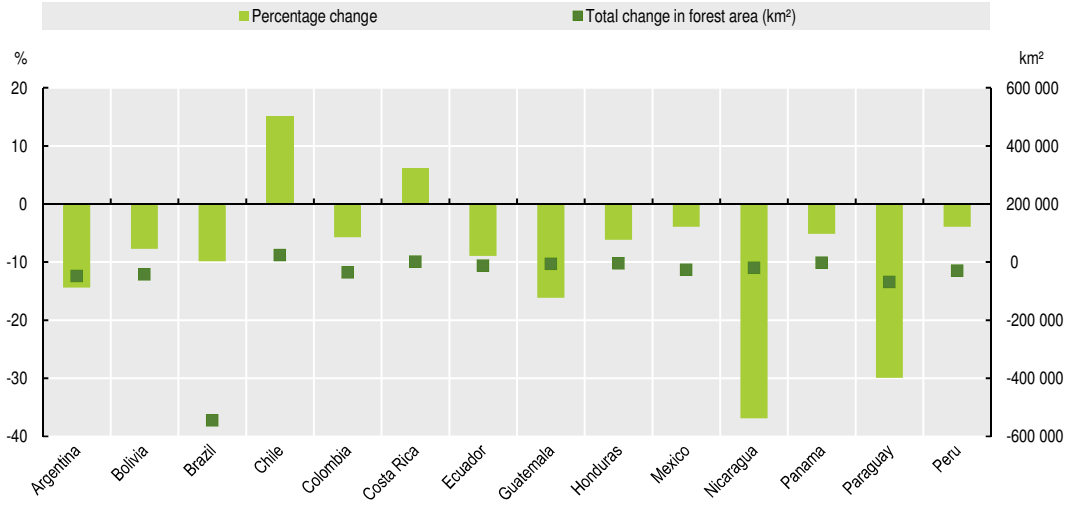
The growth of transport sector emissions contributes the most to the increase of energy-related GHG emissions in LAC (Bárcena et al., 2020[6]), followed by electricity and heat production (where oil is the main source of emissions, followed by natural gas and coal). While figures for all three generators rose between 1990 and 2014, there has since been some progress: GHG emissions from oil, natural gas and coal have either decreased or remained constant, showing that the region has potential for a net-zero transition (IEA, 2021[19]).

Forest loss is a prevailing trend in the region (Figure 2.9), explained by new uses of land for agriculture, forestry, and stockbreeding, and to a lesser extent by the expansion of cities and highway building (ECLAC, 2021[20]). In the last 20 years, Brazil shows the highest total forest area lost (544 690 km²), at a loss rate of around 10%. Deforestation by logging in Brazil has accelerated since 2012, and particularly in recent years with 11 088 km² deforested in 2020. Although the forest areas involved are smaller, Nicaragua and Paraguay also stand out with the highest loss rates in the last 20 years. Costa Rica and Chile stand out as they managed to increase forest cover. Strong government capacity to enforce law in general, and land tenure in particular, can secure property rights and help fight illegal deforestation and unsustainable agricultural and livestock practices.

Figure 2.9. **Change in LAC forest area, 2000-20**




*Notes*: Forest area is land under natural or planted stands of trees of at least five meters in situ, whether productive or not, and excludes tree stands in agricultural production systems (for example, in fruit plantations and agroforestry systems) and trees in urban parks and gardens (World Bank, 2021[21]). The primary axis shows the percentage change of forest land regarding the year 2000; the secondary axis shows the total change of forest in km² between 2000 and 2020.

*Source*: Authors' elaboration based on (World Bank, 2021[21]).

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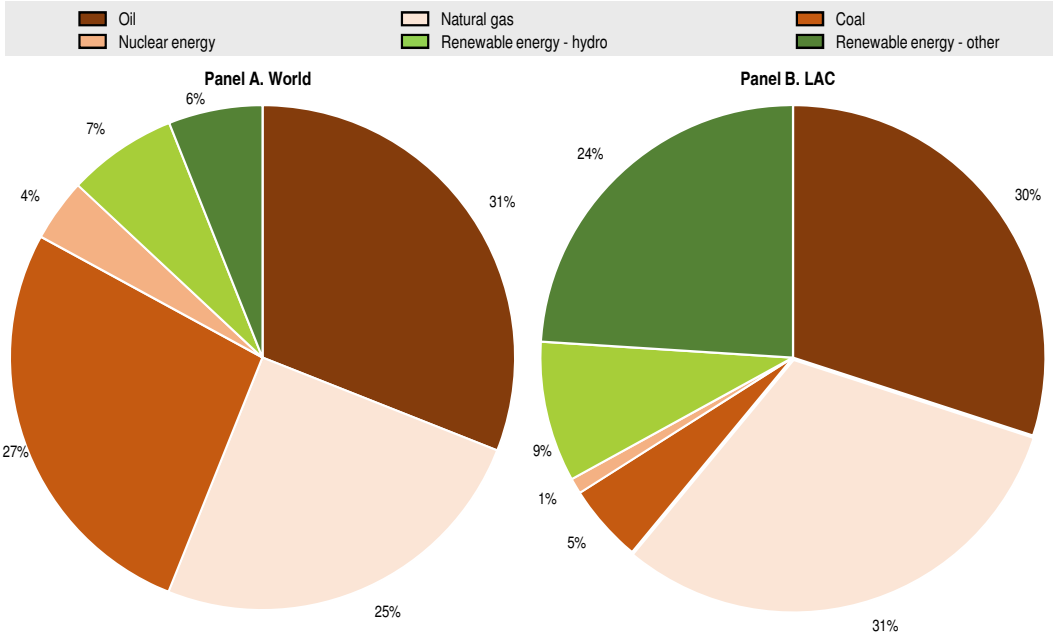
## Fossil fuels still dominate energy supply in LAC

The region's primary energy supply remains predominantly fossil-based at 66% by 2020, making the region vulnerable to global fuel shocks. Nevertheless, the total energy supply in the region is much cleaner than that of the world, where 33% is renewable compared with 13% at the global level (Figure 2.10). The primary supply of renewables in LAC includes hydroelectric power (9%), biofuels such as firewood and bagasse (18.8%), solar and wind (5.1%) and geothermal (0.9%). The second greatest supply of energy is natural gas (31%), which slightly surpassed the oil share (30%), possibly because of the effects of COVID-19 pandemic, followed by coal (5%), and nuclear energy (1%) (Figure 2.10). The trend

in the region is one of absolute and proportional growth of renewable energy sources, mainly hydropower and increasingly solar and wind, followed by biofuels. Between 1970 and 2020, the primary energy supply grew 2.44 times, while the renewable portion grew faster, from 25% in 1971 to 33.6% in 2020, although the decrease in economic activity (-6.8% GDP in 2020) and in the regional energy supply due to the pandemic must be taken into account (Chapter 3).

Figure 2.10. **World and Latin America and the Caribbean total energy supply matrix, 2020**




*Notes*: Total energy supply consists of production + imports – exports – international marine bunkers – international aviation bunkers +/- stock changes. Renewable energy – other includes biofuels, solar, wind, and geothermal energy.
*Source*: Authors' elaboration based on (Sistema de Informacion energetica de Latinoamerica y el Caribe (SieLAC), 2020[22]).

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LAC countries have been implementing policies designed to reduce their dependence on fossil fuels. However, emissions generated by oil and gas represent the primary source of pollution across the region, reaching 90% or above of $CO_2e$ in countries such as Costa Rica, El Salvador, Paraguay and Uruguay. Although energy produced by coal has been decreasing across the region, some LAC countries remain highly dependent (e.g. Chile, Colombia, the Dominican Republic and Guatemala) with associated consequences in pollution levels (Tambutti and Gómez, 2020[23]). Nonetheless, in 2019, Chile approved a Coal Phase-Out Plan, aiming to close all coal-fired power plants by 2040 and already 5 of 28 existing plants have been closed (Gobierno de Chile, 2021[24]). The Caribbean is highly dependent on imported fossil energy. Only Trinidad and Tobago, Suriname and recently Guyana have significant domestic energy resources (ECLAC, 2021[25]).

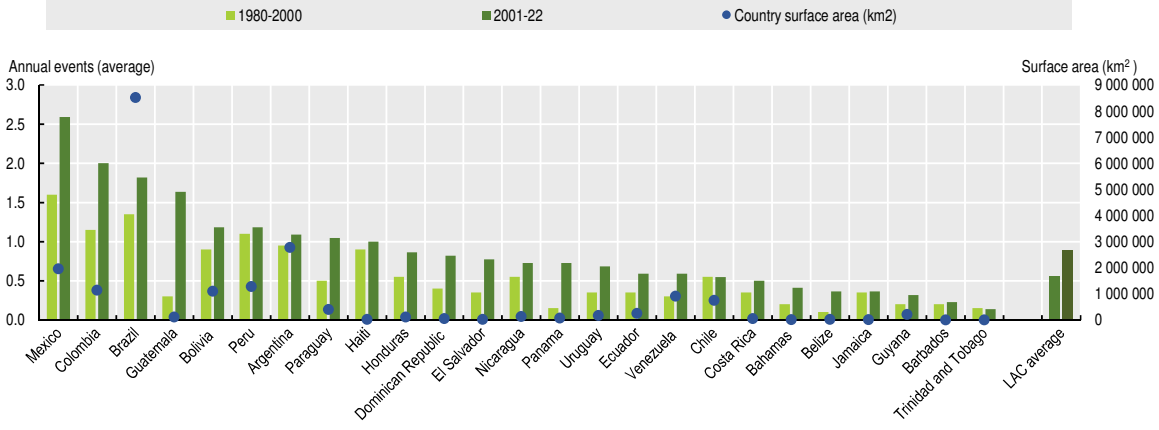
The region has slightly decreased its energy intensity in the last three decades, but mainly because of limited industrial development, the impacts generated by COVID-19 and Russia's invasion of Ukraine. In final energy consumption across the region, the main economic activities are transport (36%), industry (30%) and the residential sector (17%), agriculture, fisheries and mining (6%), and trade and services (5%) (Sistema de Informacion energetica de Latinoamerica y el Caribe (SieLAC), 2020[22]). Governments should progress

faster to improve energy intensity in all uses and sectors. The electrification of transport and industry through renewables can offer an alternative to significantly reduce fossil fuel dependency, improve energy security, and greatly increase energy efficiency (e.g. an electric vehicle is 3 to 4 times more efficient than a combustion vehicle, however the electricity must come from renewable sources) (Chapter 3). This should be complemented with the promotion of more efficient public transport systems to ensure a well-being-centred approach. Nuclear energy could also be considered, as it does not produce GHG emissions. Nevertheless, given the radioactive waste management challenges, the potential risk of accidents and the security issues it implies, governments should closely follow the developments of promising innovations such as nuclear fusion in the medium term.

### The effects of climate change are severely felt in LAC

LAC is one of the world's most vulnerable regions to the consequences of climate change. Among the 50 countries most affected by climate emergency, 13 are in LAC,[10] based on 2000-2019 data (Germanwatch, 2021[26]). Considering geophysical and climate-related disasters together, the region is the second-most disaster prone in the world (OCHA, 2020[27]). Nearly half the population is assumed to be highly or extremely vulnerable to risks of climate-related impacts (CAF, 2014[28]). The average number of extreme climate-related weather events in LAC increased in most countries between 2001 and 2022 compared to the previous two decades. (Figure 2.11). In total, of the 11 933 climate-related extreme weather events registered worldwide between 1970 and 2022, 17.1% occurred in LAC. Warming temperatures, extreme precipitation events that result in floods, landslides and droughts, sea level rise, coastal erosion, ocean and lake acidification resulting in coral bleaching, and storm surges are expected to increase in frequency and severity, with adverse socio-economic consequences on populations (IPCC, 2022[29]). The region's vulnerability highlights the real and urgent need to address climate change.

Figure 2.11. **Frequency of climate-related extreme weather events in LAC, 1980-2022**




*Notes*: Based on (Alejos, 2018[30]), extreme weather events were defined as a natural disaster resulting in 100 000 or more people affected, or 1 000 or more deaths, or at least 2% of GDP in estimated economic damages. The following natural disasters were considered: landslides, storms, droughts and floods. The secondary axis refers to the countries' surface area.
*Sources*: Authors' elaboration based on data from (EM-DAT, 2022[31]); (IDB, 2021[32]); (Alejos, 2021[33]); (FAO, 2018[34]).
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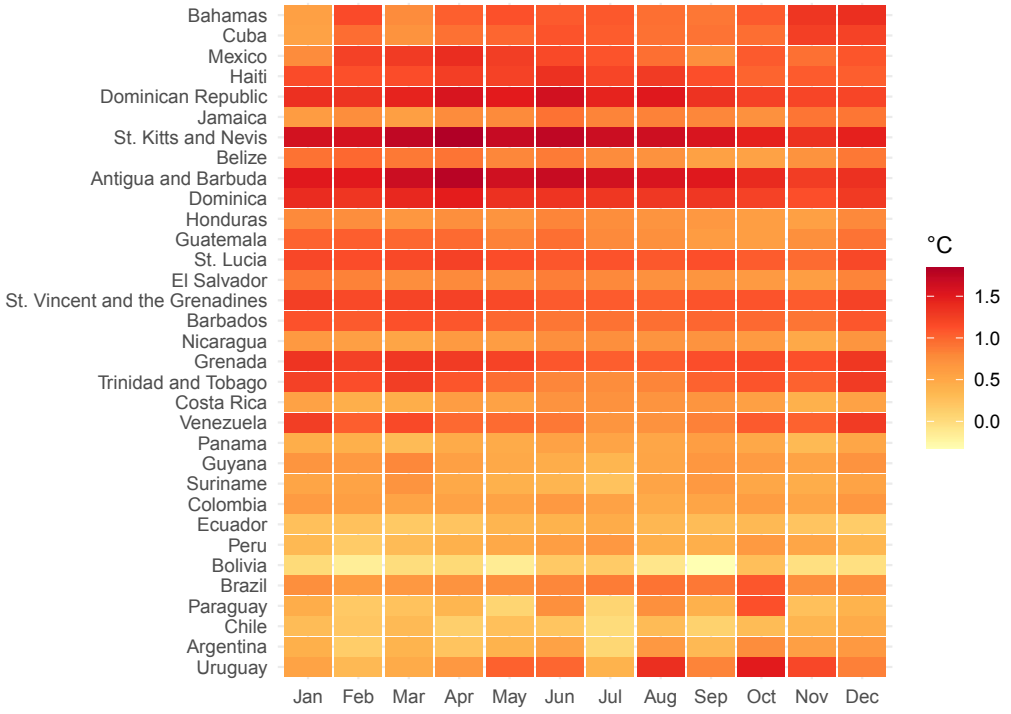
The impacts of climate change vary due to differing geographies, capacities to adapt and differing levels of socio-economic vulnerability (IPCC, 2022[29]). Central America and the Caribbean are two of the most vulnerable regions in the world,[11] mainly due to their geographical location and large coastal extensions with high population concentration. Adaptation is therefore among their top development priorities (Bárcena et al., 2020[6]; Germanwatch, 2020[35]; Bleeker et al., 2021[36]). More than half of Caribbean countries are extremely exposed to risks (CAF, 2014[28]) generated by extreme weather events, such as hurricanes and severe storms, increased intensity and frequency of droughts, sea level rise and ocean acidification. In Central America, extreme weather events have increased, on average, by 3% per year over the past 30 years (IPCC, 2022[29]). Vulnerable groups in both regions are the least prepared and the most affected by these events. Lower income households in the Caribbean have a greater chance of suffering longer periods of displacement after a natural disaster, as they might not receive enough financial help to rebuild their houses (Bleeker et al., 2021[36]). In Puerto Rico, after Hurricane Maria (2017), families from upper quintiles were able to rebuild their houses quickly or even leave the island, while poorer families waited months or even years for underfunded relief efforts to help them (McCarthy, 2020[37]). The severe impacts of climate change illustrate the need to continue building resilience and adapt to the current and future effects of climate change.

Climate change is having a direct impact on LAC's biodiversity, declining at twice the rate seen in OECD countries. Chile, Ecuador and Mexico account for the largest falls, but every country in the region is considered to have "high-risk" rates (OECD, 2021[38]). The entire LAC region is home to major ecosystems that are directly under pressure because of climate change and unsustainable development strategies. Retreating glaciers, bleaching coral reefs or loss of ecosystem services undermines the ability of ecosystems to provide a shield against growing climate-related risks and creates additional vulnerabilities (IPCC, 2022[29]). The Amazon rainforest in particular is projected to continue being increasingly threatened by fires and forest degradation.

Average temperatures will continue to rise throughout LAC. The average temperature recorded for the period 1991-2020 is more than 1°C higher than the average for 1901-30 (Figure 2.12). The last 30 years have been the warmest on record, with the sharpest increases in countries located at the region's most northern and southern latitudes. Some locations in Brazil and Paraguay, such as Asuncion, Belo Horizonte, Cuiaba and Curitiba, recorded their highest temperatures ever, and the Caribbean, Central America and Mexico were affected by heatwaves and extreme temperatures. The year 2020 was one of the warmest in the region's history, one of the three warmest in Central America and the Caribbean, and the second-warmest in South America. The largest temperature increases were recorded in the Caribbean, confirming its greater vulnerability to climate change (WMO, 2021[39]).

Figure 2.12. **Latin America and the Caribbean: Temperature anomaly, 1991-2020 compared to 1901-1930**




*Note*: Temperature reported in °C.
*Source*: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of (World Bank, 2021[40]).

Global warming has direct impacts on ocean and coastal ecosystems. Global warming is one of the main causes of sea level rise and will increase the intensity and timing of extreme weather events in the Caribbean. More than 50% of Caribbeans live within 1.5 km of the coastline and one-third live in low-elevation zones. Given the region's proximity to the equator, sea level rise generated by higher temperatures will continue to erode coasts, damage ecosystems and lead to land loss, household damage, relocations and business closures (Bleeker et al., 2021[36]).

Temperature rise also directly affects other water sources. Decreasing water availability is another impact of climate change that can particularly affect Central America. By 2100, per-capita water availability in Central America is projected to decrease by 82% and 90%, on average, under low- and a high-emissions scenarios, respectively (ECLAC/DFID, 2010[41]). Water stress in LAC (below 15%) is lower than the OECD (20%) average; however, there is a lot of heterogeneity in the region. In countries including Brazil, Colombia and Peru, the share of withdrawal from freshwater sources is well below 5%, whereas in the Dominican Republic and Mexico, figures are above 25% (OECD, 2021[38]). Even if some of the long-term changes, such as sea level rise, ocean acidification or melting of Arctic ice, will be irreversible, there is still a window of opportunity to avoid the worst consequences, if the right policies are adopted (Chapter 3) (Hickey and Wellenstein, 2021[42]).

The promotion of mitigation and adaptation policies in LAC will require a deeper understanding of its complexities, further funding and a strengthening of their policy coherence. The lack of trustworthy information is a main barrier to better mitigate and adapt to the effects of climate change in LAC is. The governments of the region need to invest in data creation and analysis; raising awareness; financial and technical capacity; co-ordination among relevant policy makers with potentially diverging objectives; and

integration of Indigenous and local knowledge systems. Effective climate mitigation and adaptation should include as much detailed information as possible to identify the most exposed areas and their vulnerable groups. Reliable and specified data are also crucial to develop more and better digital risk mitigation tools (CAF, 2014[28]). The transparent design of public policies, as well as the research and development of innovative responses to climate change, depend directly on the availability of this kind of data. LAC countries should continue strengthening the statistical infrastructure and advancing in the construction of digitalised databases, the integration of tools to measure risks, and the design of policies based on solid evidence. These efforts need to be multiplied and better co-ordinated, while also including as many stakeholders as possible (Chapter 5).

Further funding is needed for the implementation of more and better adaptation policies. During 2019 and 2020, funding for mitigation policies in LAC averaged USD 28 billion, while adaptation policies only received USD 4.5 billion (Chapters 4 and 5) (Buchner et al., 2021[43]). While there is marked heterogeneity in the region, overall results are positive and exemplify why the region should deepen its efforts by increasing the funding of adaptation policies. Adaptation policies and strategies designed to address climate risks at the local and national levels can reduce both exposure and vulnerability to climate change impacts. Positive signs of progress show that LAC can implement more and better adaptation policies. Protected areas are the most important policy instrument for biodiversity protection implemented in LAC, namely for ecosystem-based adaptation through conservation and restoration (OECD, 2018[44]). The region has the largest extent of biodiversity protection (8.8 million $km^2$) in the world (RedParques, 2021[45]). In total, 25% of land and 24% of marine areas are protected, both above the OECD average. Terrestrial protection has increased by 9 percentage points since 2000, while protection of marine areas has more than doubled in some LAC countries (Chapter 3) (OECD, 2021[38]).

Policy coherence among short-, medium- and long-term objectives should also be encouraged, to better preserve the accomplishments and future goals of mitigation and adaptation policies. This can be accomplished by ensuring that short-term actions are consistent with long-term goals and by enforcing existing policies. Addressing the transboundary and long-term effects of policies will help LAC governments to take more informed choices about sustainable development while ensuring the well-being of future generations. Besides a proper funding and access to updated data, governments can strengthen policy coherence with investment in human resources, development of new skills for local bureaucracies, an inclusive governance and strong systems of monitoring and evaluation (M&E) systems (Chapter 5) (IPCC, 2022[29]).

## Why should the green transition be a priority for LAC?

In LAC, government's efforts to recover from and offset the impacts of the COVID-19 pandemic have not incorporated the environmental dimension. So far, the opportunity to target recovery spending towards more transformative and green sectors has not been seized. The recovery has prioritised a high demand of non-renewable resources, which underlines the unsustainable nature of the pre-pandemic development pattern (ECLAC, 2022[46]).

The green transition is a structural challenge that LAC will have to contend with sooner or later. The estimated cost of inaction highlights the benefits of urgently adopting policies for adaptation and mitigation, while the extreme consequences of climate change are increasingly being experienced in the region. Given the impact the pandemic had on the region, the post-COVID-19 context is a timely opportunity to combine recovery measures with green policies, and to advance a just transition that could help achieve higher levels of well-being. A new sustainable development model in LAC demands a

green transition that is just throughout its process, from its design to its implementation (AFD, 2020[4]). A green transition can also reduce the region's vulnerability to the effects of climate change while opening new, future-oriented market opportunities.

Despite LAC's relatively lower contribution to total GHG emissions, the region is highly vulnerable to the effects of climate change. The last 30 years have been the warmest on record, with the sharpest increases in the countries located at the region's northern and southern latitudes. In 2021, the region experienced several extreme weather events, such as low temperatures and snowfall in southern Brazil and droughts and high temperatures in central Chile. In 2020, for the fifth consecutive year, the Atlantic hurricane season was abnormal (IPCC, 2021[7]).

Climate change and environmental degradation are generating a direct social and economic impact. Many countries in LAC are experiencing a fall in agricultural productivity and tourism, as well as climate-driven migration and high reconstruction costs after natural disasters. In the Dominican Republic, the heavy rains of 2016 generated severe economic losses in crops such as plantain, cassava and sweet potato. During the hurricane season of 2017, an estimated loss of USD 52 million was recorded due to lower touristic activity (OECD/UNCTAD/ECLAC, 2020[48]). Natural disasters create a need to increase expenditure and thus have direct impacts on fiscal deficits and public revenues. On average, a natural disaster results in a reduction of public revenues equivalent to 0.8% and 1.1% of GDP, for lower middle-income and low-income countries respectively (Chapter 1) (Alejos, 2021[33]). In the case of the Caribbean, the annual cost of inaction to deal with the effects of sea level rise, is estimated to reach USD 22 billion per year by 2050 (10% of GDP) and USD 46 billion by 2100 (22% of GDP) (AFD, 2022[47]). In the case of Haiti and Puerto Rico, two of the three most affected countries in the world between 1999 and 2018, annual GDP losses reached 2.38% and 3.76%, respectively (Internal Displacement Monitoring Centre, 2022[49]). If environmental degradation is not addressed soon, LAC governments will have to add the costs of climate change to those of social vulnerability. The link between the dependence on biodiversity and financial security has proved to be very close, and the cost of inaction could have unprecedented economic and social consequences (Chapters 1 and 4) (Bárcena et al., 2020[6]).

### A recovery strategy aligned with a green transition is an opportunity to overcome the region's development traps

The crisis generated by COVID-19 has led to a historic economic downturn in LAC. Almost 25% of the jobs lost in 2020 were not recovered in 2021, deepening the social gap that characterises the region (ECLAC/ILO, 2022[50]). The COVID-19 recovery can be a strategic moment to align LAC policy objectives with a green and just transition. Productivity, social vulnerability, institutional and environmental traps – which are closely interlinked – are today the main inhibitors to further inclusive and sustainable growth in the region (OECD et al., 2019[3]).

A recovery based in decarbonising investments and climate mitigation and adaptation policies could promote a more competitive productive matrix, boost job creation and enhance social inclusion (Chapter 3). Most LAC countries adopted measures to respond to the impact of the COVID-19 crisis. For the recovery, further actions are needed to advance towards a more sustainable, resilient and sustainable development model. Advancing sustainable production and consumption patterns and improving the quality and coverage of social services is key for the recovery (ECLAC, 2022[46]).

Combining adaptation strategies with social and economic dimensions through a systemic lens could help overcome the region's development traps. A systemic design of the green transition could be a way to address the unavoidable trade-offs presented

by any transformative transition. Confronting climate change is not the only reason for advancing decarbonisation efforts. It can also contribute to stronger public institutions, as governments could increase policy coherence and deliver a more just society based on a new sustainable social contract. If properly designed, a green transition can also help increase the overall well-being of LAC citizens (Chapter 5). A systemic approach with a multi-dimensional perspective could transform the COVID-19 recovery into an opportunity to advance a more sustainable and inclusive development model. Setting green policies at the centre of the recovery ensures countries invest in sustainable long-term economic models, while making the best of the growing international green agenda (Chapter 6) and its emerging market opportunities and various investment and financing initiatives (IPCC, 2021[7]).

### Integrating social dimensions into the green transition is key for a better development model

Close interaction between humans and their environment highlights the need to address the challenges of inequality and environmental degradation together (OECD, 2021[51]). If not addressed, the effects of climate change will continue to deepen poverty and inequality in the region. The green transition has the potential to help LAC address all dimensions of inequality, across countries, socio-economic groups, territories, generations and gender.

Both climate change and inequality are pressing issues demanding integrated solutions at the subnational, national, regional and international levels. Climate change exacerbates inequalities within societies and also among countries. Developing countries face a kind of "double asymmetry" in the sense that those who produce the most emissions (the richest countries and social groups) have the greatest capacity to defend themselves against the effects of climate change, while those who produce the least emissions (the poorest countries and social groups) suffer the most and have the least resources to recover (Tambutti and Gómez, 2020[23]; OECD, 2021[51]; ECLAC, 2020[52]). The first asymmetry stems from the fact that the level of emissions reflects consumption capacity and therefore reproduces patterns of income inequality (Figure 2.6). The second asymmetry is derived from unequal distribution of the cost of environmental degradation. The rise in temperature has affected poor countries (Tambutti and Gómez, 2020[23]) and their poorest social groups in particular. After Hurricane Mitch (1998) in Central America, low-income households suffered larger relative loss of assets (31%) than the non-poor (11%) (UNDESA, 2017[53]).

At the international level, the green transition offers a possibility to rebalance the disproportionate burden of climate effects on LAC and developed countries through stronger international co-operation (Chapter 6). If national efforts are not co-ordinated internationally, the speed and effectiveness of mitigation and adaptation policies adopted globally, particularly in the developing world, will continue to prove insufficient (Chapter 6) (IPCC, 2018[1]).

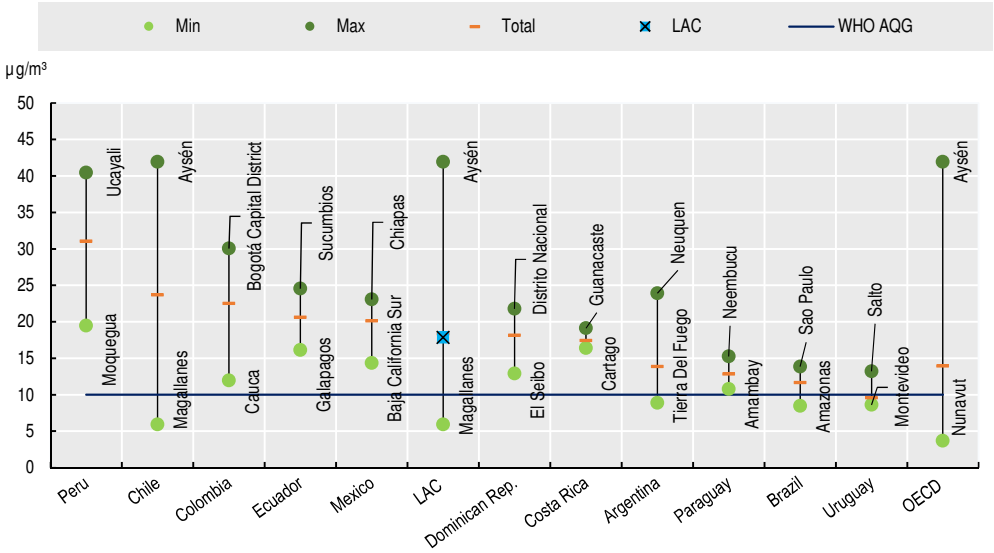
At the regional level, the green transition presents several opportunities to promote better collaboration and integration within LAC. The effects of climate change are also aggravating inequalities among LAC countries. Regional co-operation can help improve data and information generation, water resource management, sustainable production and consumption, and biodiversity management. Regional initiatives based on active co-operation for a more green and just transition could help contain the most vulnerable groups. In LAC, sea level rise, droughts, flooding and wildfires will force people to migrate, exposing them to further vulnerabilities. In 2017, three million Caribbeans were forced to relocate due to the Atlantic hurricane season (Bleeker et al., 2021[36]). The effects of climate change are forecast to drive an estimated 17 million Latin Americans to migrate by 2050

(World Bank, 2021[54]). Relocation programmes co-ordinated at a regional level would help anticipate and contain forced migration due to climate change and reduce unnecessary exposure to risk.

At the national level, a new sustainable development model could help reduce social inequalities across socio-economic groups. The combined impacts of the pandemic and climate change deepen the urgent need for such a model. About 49.2% of the urban population in LAC is either poor or extremely poor (Bárcena et al., 2020[6]). The pandemic increased the number of people living below the poverty line in LAC and climate change is projected to contribute an additional 5 million by 2030 (Hickey and Wellenstein, 2021[42]). Governments should focus on protecting those most in need through targeted social programmes (Chapter 1). As climate change threatens to reverse global health gains of the past 50 years, national healthcare programmes could be an essential element of a more just green transition (Watts et al., 2015[55]; Landrigan et al., 2017[56]).

At the subnational level, environmental degradation is deepening disparities among urban and rural areas and its effects on most vulnerable groups. In some Latin American cities, high rates of socio-economic residential segregation make people living in precarious neighbourhoods more susceptible to climate change effects and other phenomena, such as exposure to heatwaves. This exposure increases their health risks and vulnerability to extreme climate events as a function of their socio-economic status (OECD et al., 2021[2]). High urbanisation rates and unregulated expansion of urban areas have pushed vulnerable groups to locate in high-risk zones with deficient or non-existent infrastructure, such as floodplains and landslide-prone slopes. Those who live near highways or industrial sites are often exposed to high levels of air pollution. In Chile, for example, there is a pronounced difference in exposure to PM2.5 (particulate matter with a diameter of less than 2.5 µm) between Magallanes with the least exposure (5.9 µg/m$^3$) and Aysén with the greatest exposure (41.9 µg/m$^3$) (Figure 2.13). A systemic green transition will have to include urban designs that internalise how citizens from poorer areas experience the largest negative impacts of climate change while lacking the capacities necessary to adapt.

Figure 2.13. **Subnational regional disparities in mean annual exposure of the population to outdoor PM2.5, selected LAC countries, 2019**




*Notes*: WHO AQC = World Health Organization Global Air Quality Guidelines. The mean population exposure to outdoor PM2.5 is calculated as the mean annual outdoor PM2.5 concentration weighted by population living in the relevant area, e.g. the concentration level, expressed in µg/m³, to which a typical resident is exposed throughout a year. The country "total" considers the country as a single entity to which each region contributes proportionally. The LAC regional average is calculated by the Organisation for Economic Co-operation and Development (OECD) based on the countries selected.

*Sources*: (OECD, 2021[38]); (OECD, 2020[61]).

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The effects of climate change on rural areas are particularly relevant for LAC. Agricultural activities are particularly sensitive to climate change, which is expected to produce changes in structure, yields and crop cycles. Certain crop cycles will probably speed up, which will alter the physical properties of the soil and the supply of water for irrigation, lead to greater evaporation and place greater stress on those crops (Bárcena, et al., 2018[58]). The region's economy relies significantly on agriculture, either through subsistence production (comprising around 15 million smallholder farms in LAC and 20-30% of the workforce in the Caribbean) or through large industries (CAF, 2014[28]). Changing rainfall patterns, droughts and extreme climate events are likely to worsen significantly during the next decade, implying greater vulnerability related to land labour and food and water security (IPCC, 2022[29]). The effects of climate change have direct impacts on rural productivity, which could increase poverty, particularly in Central America (IDB, 2021[57]), as real income is highly dependent on land use. Income declines not only because of reduced availability of fertile land dedicated to agricultural production and livestock but also because heat stress forces lower labour productivity. In most cases, the capacity of farmers to react and adapt to the effects of climate change depends on their wealth. In Peru, temperature rise has forced farmers to sell their livestock, move their crops into fallow land and include children in their farming activities to compensate for income deficits (IFS, 2018[59]).

The gender gap is also deepening in LAC, as women and girls are more vulnerable to the effects of climate change (OECD, 2021[60]). Women are the main food producers in developing countries and have higher dependence on natural resources. When it comes to planted food, the impact of climate change on land and water directly affects their harvests (IUCN/GGO, 2015[62]). This not only reduces the amount of food women can take home but also potential micro-selling initiatives to gain financial independence from

their couples. In extreme scenarios, the fall in agricultural production might even cause forced relocations. In the dry corridor of Central America, 62% of poor families depend on corn, beans and sorghum to survive – all products likely to become impossible to grow as temperatures continue to rise (Hickey and Wellenstein, 2021[42]). Women and girls, who also tend to be responsible for water gathering, cleaning and cooking, experience disproportionately the consequences of climate change. While poor water connections and droughts impose greater distances and time to search for water, floods and hurricanes increase the exposure to risk situations (OXFAM, 2018[63]).

The income gap and the uneven distribution of domestic labour deepen the impact of climate change for women, as their lack of access to resources or their greater burden of domestic care activities hampers their capacity to recover quickly after a climate-related natural disaster. As women are likely to be responsible for staying home and taking care of children out of school and injured family members after a hurricane or flooding, they have more chances of losing their jobs or suffer a reduction in their wages. Moreover, women are less likely to be employed in "cash for work" programmes implemented after a disaster to rebuild infrastructure (Bárcena et al., 2020[6]). Additionally, in the context of stressful events, such as climate disasters, the level of domestic violence and street aggression against women rises (IPCC, 2018[1]). Green policies should promote and ensure the development of new skills in future green jobs for women and encourage their involvement throughout the decision-making process for policy to ensure an inclusive response (Chapter 5) (IPCC, 2018[1]).

Climate change also has unequal effects across generations. Nearly 60% of countries had an increase in the number of days people were exposed to very high or extremely high fire danger in 2017-20 compared to 2001-04, and 72% of countries around the world had increased human exposure to wildfires across the same period (Romanello et al., 2021[64]). By 2050, the population over 65 years will double in Latin America, increasing the number of elderly people who are vulnerable to heatwaves and other consequences (CAF, 2020[65]). Exposure to extreme heat poses a health hazard, particularly risky for individuals older than 65 years, populations in urban environments, and people with health conditions. Heat disproportionally affects people who are marginalised or with scarce resources, because they have limited access to cooling mechanisms, fresh water, and health care (Romanello et al., 2021[64]). An active, green education strategy is key to ensure that future generations envision and interact differently with the environment (Vona, 2021[66]), having learned from the experiences of current approaches to production and consumption.

Negligent land use and deforestation will have effects on how much each generation will benefit from a clean and safe environment. Forest land cover in LAC decreased by 8.2% between 2000 and 2020 (World Bank, 2021[21]), meaning that future generations will enjoy less green capital. The region has an important role in preserving forests, being home to 23% of the world's forests including the Amazon, the world's largest rain forest which is shared by eight countries. These ecosystems are key for climate change mitigation and adaptation due to their capacity to absorb $CO_2$. They also provide environmental services by regulating the water cycle, protect soils, supply resources such as timber, medicines, food and fibres, and provide opportunities for recreation and tourism. More than half of the world's forest area is distributed in just five countries, with Brazil being the world's second more forested. While most LAC countries suffered a significant net loss, Chile and Costa Rica increased their forest area between 2000 and 2020 (Figure 2.9). After a long period of forest loss last century, Costa Rica implemented recovery and reforestation policies and has managed to increase forest cover replacing land previously used for farming and livestock activities (ECLAC, 2021[20]). In Chile, massive exploitation of primary forests and extensive agricultural areas in places with high rainfall were eroding volcanic

soils generating problems of stability and water quality. Policies implemented since 2015 focus on the conservation of natural forests, and have encouraged large forest companies to take action in rural development and funding fire prevention which has translated into the recovery of forest land (European Forest Institute, 2019[67]).

## Harnessing the green transition through a systemic approach to improve well-being

The wide range of post-COVID-19 recovery strategies have shown several frameworks that can be adopted to build forward better. Each country's conception of recovery prioritised different economic, social or environmental goals and the best strategies to achieve them. How this policy priorities are conceived and aligned, determine the kind of recovery pathway adopted. Each recovery pathway distinguishes itself in the way in which each encompass GHG emission reductions, and integrates these with considerations for wider well-being outcomes (e.g. SDGs) (OECD/IEA, 2021[13]). Globally, how the recovery is designed and implemented will determine how inclusive the transition could be.

The Rebound path disassociates the recovery from the environment and focuses solely on the economic recovery and measures to attain the pre-crises economic indicators such as GDP, job creation, firms' profits or trade rates. Even though this approach might have put certain economies back on track, they have also reversed much of the environmental progress gained during the previous years in terms of GHG emissions or clean air. The Decoupling strategy also conceives recovery in terms of growth and production, but unlike the rebound path, places the mitigation strategy in the centre of its efforts. It aims to decouple the economic growth from the $CO_2$ emissions associated with it, through initiatives such as energy efficiency or transition to low carbon energy. Nevertheless, this green growth does not conceive the recovery as an opportunity to shift towards policies and consumer patterns that place well-being as their central focus.

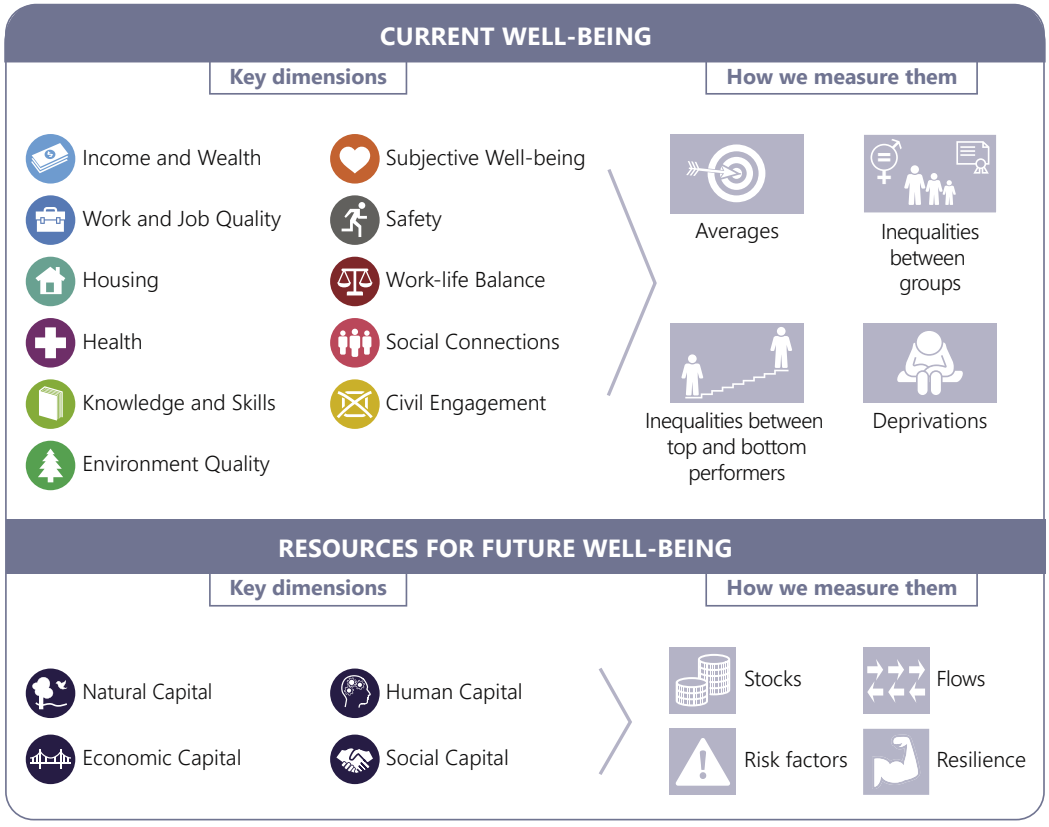
A well-being approach advocates for an economic recovery low on emissions and centred in well-being improvements. From this lens, GDP growth may not necessarily be a means to increase current nor future well-being and should not be used as the aggregate measure of progress.[12] LAC countries should especially beware of taking a recovery pathway focused on maximising GDP growth at the expense of environmental degradation and without placing other wider well-being impacts (e.g. health, equity) at the centre of decisions (as would be reflected in a Rebound pathway). Under a wider well-being recovery path, the focus is no longer on greening GDP growth (as in a Decoupling pathway), but on designing systems in ways that increase well-being while reducing emissions and material use. In practice, it means enabling the conditions that make sustainable choices the easiest and cheaper and thus those that people choose. This beyond-GDP systemic vision aims to redesign systems to achieve better results. Through a well-being pathway, policies no longer focus on solving specific problems but on designing systems that do not generate those problems in the first place.

A green transition approach specific to LAC should place citizen's well-being at the centre and account for the particularities of the region. The path towards zero emissions should not be constrained to other region's strategies, but rather it should be the result of a comprehensive analysis of how to make the transition without hampering the region's development opportunities. The "common but differentiated responsibilities" approach and the Glasgow Pact (which commits developed countries to provide USD 100 billion annually to developing countries by 2030), are two important elements to advance global climate justice. Since colonial times, history shows the consequences of not putting Latin American resource preservation and citizens well-being at the centre of decision-making

processes. Following the principles of climate justice, LAC should pursue a transition in which the burden of climate change is properly shared by the most developed countries and regions (Figure 2.1). Moreover, a Latin American approach to the green transition should focus on reducing the emissions of citizens who consume and pollute the most, usually those in the upper quintile (Figure 2.6).

A well-being approach for the green transition implies addressing the challenges of placing Latin Americans' well-being at the centre (OECD, 2021[38]). Since 2011, the OECD has been promoting a well-being framework that provides a comprehensive approach to analysing and measuring the determinants of current and future well-being, beyond aggregate traditional measures, such as GDP (OECD, 2021[38]). This approach encompasses multiple dimensions that determine people's current well-being (e.g. income and wealth, work and job quality, housing, health, knowledge and skills, safety and the quality of the environment) and proposes a broader set of indicators to track performance and guide decision making. To analyse the dimensions of current well-being, it measures well-being outcomes by looking at averages, deprivations, and inequalities between groups and between top and bottom performers. Then, it measures the stocks, flows, risk factors and resilience of resources that will determine the well-being of future generations (e.g. natural, human, economic and social capital) (Figure 2.14).

Figure 2.14. **The OECD Well-being Framework**




*Source*: (OECD, 2021[38]).

This well-being approach should be considered for developing national statistics, policies and promoting recognition of multi-dimensional well-being – e.g. measuring all dimensions, beyond income, that affect people's well-being (OECD, 2021[38]). Measuring well-being through inequalities often reveals wide variation between and within countries. In the context of environmental policy, looking beyond averages is particularly relevant as the impacts of environmental degradation are often concentrated among vulnerable groups and households (OECD, 2021[51]). In addition, a well-being approach calls for reframing measurement systems around well-being outcomes (e.g. improved learning outcomes) instead of focusing on intermediate outputs (e.g. increased education coverage) (OECD, 2019[68]).

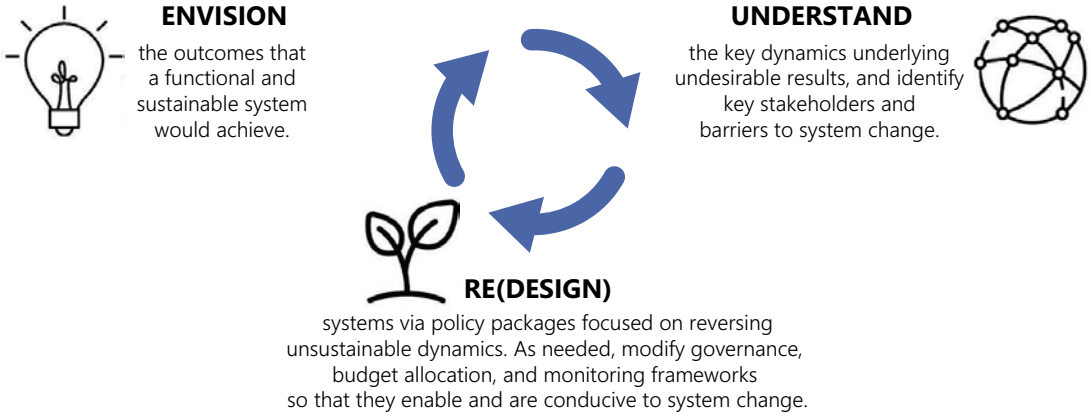
Delivering systems that can, by their design, improve well-being while reducing energy and material use, and therefore emissions, calls for policy-making that is able to understand and reshape current unsustainable systems. Analytical rather than systemic approaches are usually pursued, leaving governments ill-equipped to design effective climate change mitigation and adaptation action. An analytical approach consists of solving problems by dividing them into parts and trying to optimise those parts. For example, countries make significant efforts to improve the energy efficiency of or to electrify vehicles (a part in the transport system). Such efforts focus on reducing the undesired output (e.g. emissions) per unit of output (e.g. kilometres driven). Evidence shows, however, that the increase in the overall number of vehicles and the kilometres driven (pushed by the functioning of car-dependent systems) offset the emissions reduction obtained via such policies (Lamb et al., 2021[69]).

Complex problems, such as climate change or poverty, are rarely caused by specific parts in a system but instead by the way parts are organised and interrelated. Partially blind to the system that generates the results their policies aim to change, analytical approaches are prone to making assumptions about certain trends or behaviours. For example, analytical thinking led to decades of transport policies that assumed an increase in the number of vehicles in circulation and the congestion generated as inevitable consequences of progress. Transport policies therefore focused on increasing road capacity but ended up exacerbating congestion and directly affecting climate action.

With a systemic lens, climate action is no longer limited to reacting to or anticipating inevitable trends. Rather, it gives the opportunity to modify trends via (re)designing systems that are behind such trends. Furthermore, when policies are designed with a systemic lens, what used to be trade-offs between climate and well-being objectives may become synergies (OECD, 2019[68]).

The OECD supports the adoption of a systemic approach to help policy makers reprioritise climate action towards improving system functioning and accelerating the transition to systems that are net zero by design (OECD, 2021[70]). The OECD has developed the Systems innovation for net-zero process,[13] which builds on systems thinking and consists of three steps: 1) *envision* the outcomes that a well-functioning system achieves; 2) *understand* why the current system is not achieving such outcomes, which mental schemes support such a system and how it could be redesigned to produce better results; and 3) identify policies able to transform or *(re)design* systems (Figure 2.15). This model could serve as a framework for policy makers designing and implementing green transitions, while underpinning the importance of policy coherence across multiple dimensions and time periods (Chapter 5).

Figure 2.15. **The systems innovation for net-zero process for transformative climate action**




*Source*: (OECD, 2022[71]).

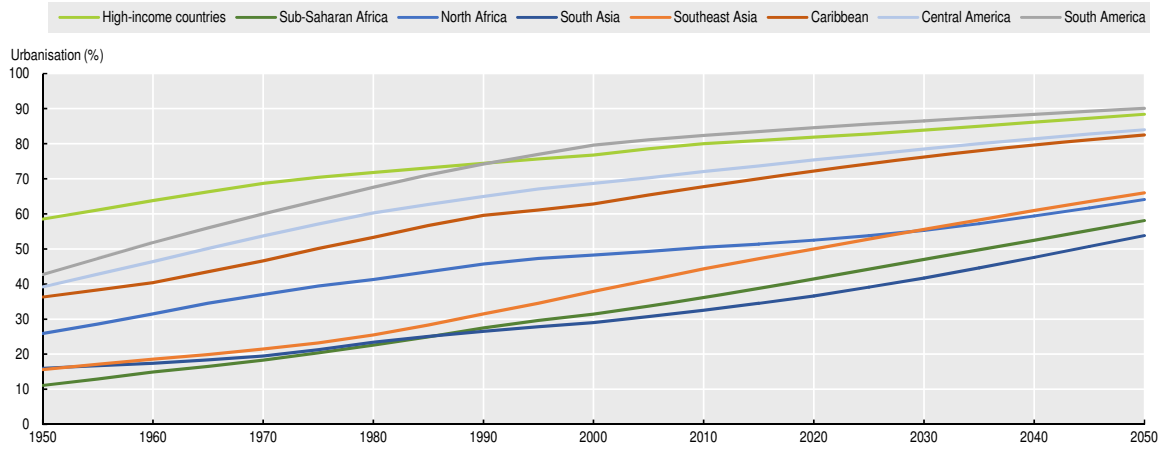
### Thinking in systems for sustainable territorial development

The urbanisation process in LAC has had favourable economic and social consequences, such as greater dynamism in production activities, development of services, increased productivity and harnessing economies of scale (ECLAC/MINURVI/UN-Habitat, 2017[72]). However, the lack of a systemic approach has also given rise to negative impacts such as air pollution and GHG emissions, road congestion and accidents, health problems, and water pollution, all of which are eroding the foundations of economic dynamism (Bárcena et al., 2020[6]).

Air pollution is the world's single largest environmental health risk (UNECE, 2021[73]). Of its components, PM2.5 has the highest health impacts. Although PM2.5 emissions are, on average, lower in LAC cities than in Southeast Asia or North America, levels have been rising faster lately (Florczyk et al., 2019[74]). As Latin American cities grow, their pollution levels are increasing (Gouveia et al., 2019[75]). In general, $CO_2$ emissions have been growing faster than populations in cities, resulting in increased $CO_2$ per capita across the region.

The percentage of people living in urban areas in LAC has doubled since 1950 (UNDESA, 2019[76]). South America is the most urbanised subregion in LAC (84.6%), above the high-income countries group (81.9%). Slightly lower in Central America (75.4%) and the Caribbean (72.2%) are still much higher than other developing regions including Sub-Saharan Africa (41.4%) and Southern Asia (36.6%) (Figure 2.16). The Caribbean has experienced the greatest increase in urbanisation, from 36.3% in 1950 to 72.2% in 2020. In particular, the countries with greater urbanisation increases are the Dominican Republic (from 23.7% to 82.5%) and Haiti (from 12.2% to 57.1%) (UNDESA, 2019[76]). The Caribbean's fast urbanisation has had direct impacts on the environment. Most urban, industrial and commercial developments did not follow sustainable urban design. Activities, including tourism and its infrastructure, have thus contributed to destruction of natural habitat, landscape transformation and coastal erosion (Ecosystem Profile, 2019[77]). Many metropolitan areas in LAC, including their residents and infrastructure, that experienced rapid urbanisation now face significant climate-related risks, such as flood plains or slopes prone to landslides. Such risks are projected to increase in the future (IPCC, 2022[29]).

Figure 2.16. **Global urbanisation trends, 1950-2050**




*Notes*: Available data until 2018; from 2020-50, the values are forecasts. Urbanisation trends refers to annual percentage of population at mid-year residing in urban areas. The country classification by income level is based on 2016 GNI per capita from the World Bank.

*Source*: Authors' elaboration based on (UNDESA, 2018[78]).

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### Car-dependent territories with high sprawl perform poorly in terms of well-being

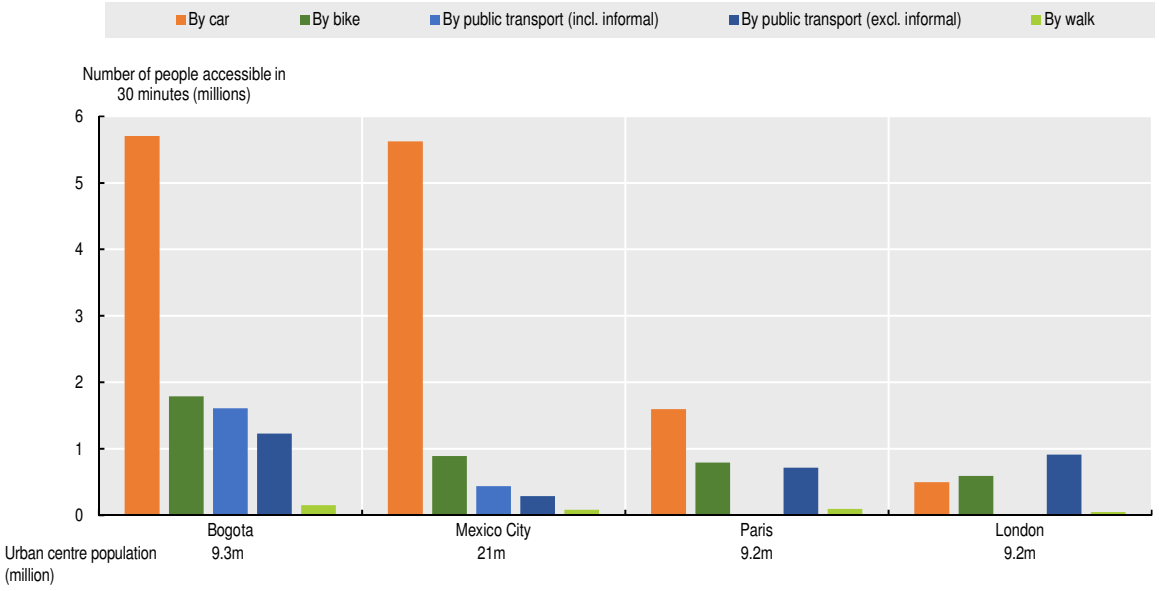
Transport is one of the main sources of air pollution and high GHG emission levels, mainly due to the large size of many LAC countries. In Latin American cities, private motorised transport is responsible for 75% of $CO_2$ emissions and produces 82% of PM10 pollutants, both of which are negatively associated with health outcomes (Vasconcelos, 2019[79]). Moreover, the Caribbean, land-based transportation accounts for the second-largest share of fossil-energy consumption. The subregion has one of the highest vehicle motorisation rates in the world, with 201 vehicles per 1 000 inhabitants. In Latin American and Caribbean countries, the urban layout and the availability and quality of public transport influence automobile use and shape car-dependent and sprawled territories (ECLAC, 2020[52]). This concept refers to the dynamic by which people move away from city centres but still commute daily to such centres. To a great extent, this is the result of decades of short-sighted transport and spatial planning policies (or sometimes the lack of these policies). While this section focuses on transport, a systemic approach can be applied to other sectors in LAC countries. Applied to the residential sector, for example, a systemic approach can shed light on the drivers of urban sprawl (why people "choose" to move further away from city centres) and thus inform policy decisions aiming to contain such development.

Car-dependent and sprawled territories perform poorly in terms of present and future well-being of citizens. Undesirable results include traffic congestion,[14] growing inequalities, poverty perpetuation, road fatalities, high emissions, air pollution and reduced capacity to adapt to climate change. Peripheries host most of the low-income settlements (ITF, 2019[80]; IDB/ITF, forthcoming[81]), and after decades of transport investment heavily biased towards highways (ECLAC, 2020[82]; Lardé, 2021[83]; Sanchez et al., 2017[84]), these areas lack proper public transport infrastructure, preventing the most vulnerable groups from easily accessing labour (ITF, 2020[85]). For example, for a similar trip duration, inhabitants of peripheries of Bogota have access to four times less job opportunities by public transport (around 20 000 jobs) than people living in the city centre (IDB/ITF, forthcoming[81]). Moreover, the predilection for highways is directly detrimental to the well-being of citizens since, of all modes of transport, highways have the highest

$CO_2$ emissions (between 55 and 256 grams per tonne-kilometre), a figure much higher than maritime transport (between 11 and 101), river transport (between 17 and 38) and rail transport (between 2 and 21) (ITF, 2022[87]).

The infrastructure of many cities in Latin America prioritises mobility by car, making it the transport mode that provides higher access to opportunities compared to other transport modes such as public transport. In Mexico City, car users can reach 13 times as many people (representing essential opportunities) in 30 minutes than public transport users, and 20 times as many people if informal public transport is excluded. In Bogota, cars also provide access to a significantly higher number of people than other modes of transport (Figure 2.17) (ITF, forthcoming[86]). In comparison, access to opportunities in cities such as London and Paris is relatively similar regardless of the transport mode used, showing higher effectiveness of the transport system and better urban planning. In LAC, low-income households that are unable to afford cars[15] are "captive users" of public transport (and, most recently, motorcycle use); they spend more time traveling than higher income households able to afford cars, face unsafe travel conditions and may need to pay various single tickets per commute. In Brazilian cities of more than 60 000 inhabitants, the average commuting time in public transport is 36 minutes – more than double the 15 minutes the same trip would take using individual transport (Vasconcelos, 2019[79]).

Figure 2.17. **Absolute accessibility to opportunities by transport mode, 2019**




*Notes:* The number of people accessible in 30 minutes within an 8 km radius is used as a proxy for the number of opportunities a person can access with each transport mode (ITF, forthcoming[86]). The figure illustrates the differences in access to opportunities via different transport modes within cities. The population density and total area vary across cities, which in turn affects the number of people that can be reached in 30 minutes within an 8 km radius. The area of each city refers to the Urban Centre, which is usually larger than the administrative city. It is suggested that the data be interpreted comparing transport modes within not across cities.

*Source:* (ITF, forthcoming[86]).

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Car-dependent and territories with high sprawl also perform poorly in terms of environmental sustainability and adaptation, which also has negative impacts on future well-being of citizens. High vehicle ownership results in disposal of used oils, tires and expired vehicles, which pollutes natural and coastal waterways and increases the use of scarce land for landfilling (ECLAC, 2021[25]). Car-dependent and sprawled territories are also very difficult to decarbonise. First, rapidly growing private car and motorcycle

use will offset emissions reduction from cleaner vehicles (Lamb et al., 2021[69]). Second, decarbonisation is costly and slow as it implies incentivising the shift of large fleets of vehicles towards cleaner technologies. Third, efforts to decarbonise car-dependent and sprawled cities can lead to trade-offs between climate and other well-being outcomes such as equity, making them politically unattractive. Fourth, trade-offs between climate actions and wider environmental goals may hinder across-government collaboration. Sprawled territories also reduce the capacity of urban agglomerations to adapt to climate change. They are space-intensive, and dedicate most public space to car use,[16] reducing space available for green areas in cities (necessary to cope with heatwaves) and/or leading to built-in development expanding into natural ecosystems that formerly provided ecosystem services (such as water absorption to cope with floods).

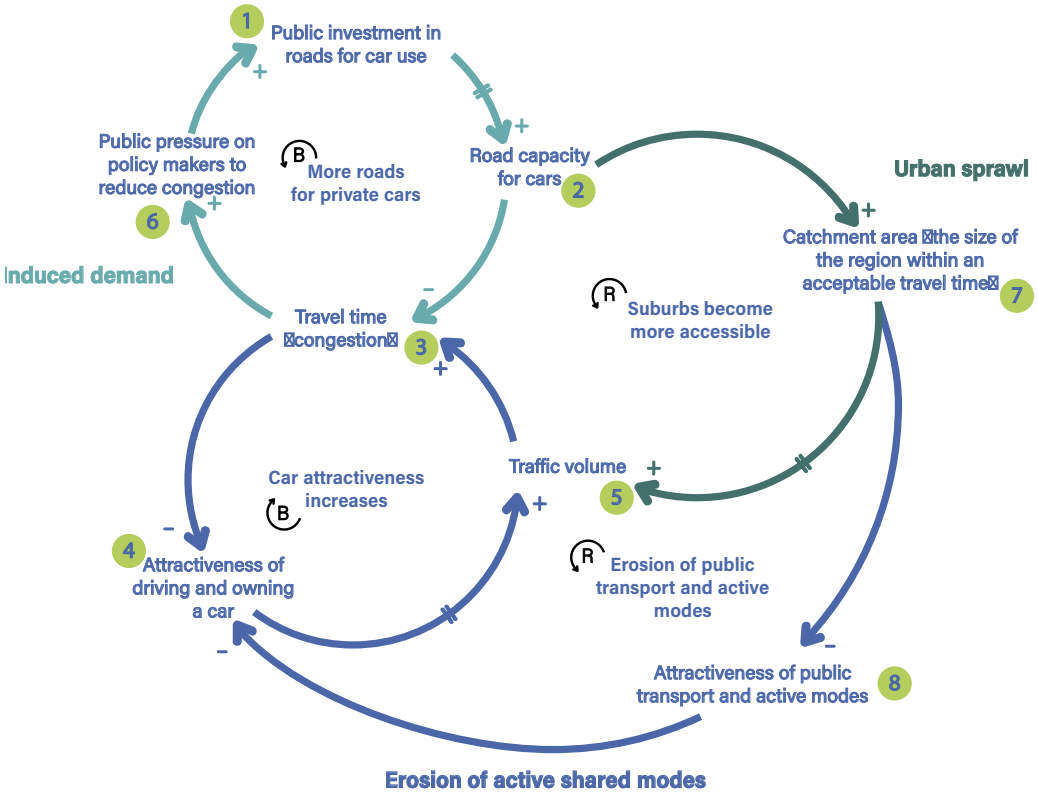
**Three vicious cycles to revert**

As cities expanded, resources for public (especially mass transit) and active transport modes have lagged, especially outside of capital cities. Deregulation of public transport services in the region during the 1980s has also contributed to the erosion of public transport service, as profits were prioritised over maintenance, service expansion and upgrades.[17] In parallel to the prioritisation of infrastructure for car use, single-use development has been the norm in spatial planning. Both low-income social housing and high-income closed neighbourhoods are now concentrated in city outskirts, far from services and activities and often with lower density than in city centres – which drives up car dependency. Such policy prioritisation has led to transport and urban systems organised around car driving and is largely driven by three unsustainable and interconnected dynamics: *induced demand, urban sprawl, and the erosion of active shared modes of transport* (Figure 2.18). These dynamics are at the source of increased car use in the region. Between 2007 and 2014, private vehicle ownership increased by 35% in LAC (CAF, 2016[88]) – a trend that is still observed in the region and in other areas of the world.

*Induced demand* refers to the phenomenon by which public investment in roads for car use ends up causing more, rather than less, traffic congestion. The dynamic works like this: public investments in road capacity for car use (1) play a major role in fostering urban sprawl. As road capacity for cars (2) increases, so does the catchment area (7). Induced demand occurs when public investment in roads for car use ends up causing more, rather than less, congestion. As mapped out in Figure 2.18 public investment in roads for car use (1) leads to increased road capacity for cars (2). While the intended objective of these investments is to reduce travel time (and thus congestion) (3) they end up having the opposite effect. As travel time (congestion) (3) by car is reduced, the attractiveness of driving and owning a car (4) increases, inducing people to "choose" cars over other modes, and causing traffic volume (5) to increase. As traffic volume (5) goes up, so does congestion (3) leading to public pressure (6) on policymakers to reduce congestion. Most countries have responded to this pressure by investing further in road capacity for cars (1), which restarts the cycle, rather than solves the problem.

Both induced demand and urban sprawl exacerbate the erosion of public transport and active modes, the third vicious cycle at the source of increased car use and emissions. As more and more people are induced to drive cars, and as policymakers respond to that "choice" by further increasing the road capacity for cars (2), traffic volume (5) of motorised vehicles increases as does the space and funding allocated to these modes. Unsurprisingly, in such systems, the attractiveness of public transport and active modes (8) is low: public transport often takes longer and provides less access to places than driving a car and riding a bike is not safe.

Figure 2.18. **Policies designed with an analytical lens have led to car-dependent and sprawled cities**

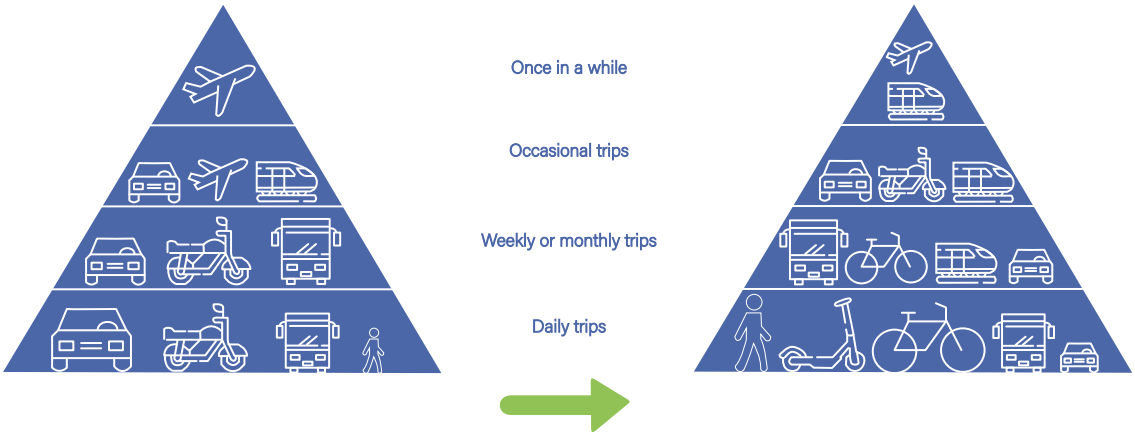



*Source*: (OECD, 2021[70]).

Taken together, these dynamics lead to territories in which most people need to travel long distances daily and private cars or motorcycles are the most attractive options for the bulk of these trips. As a result, these are the modes most people "choose" as soon as they can afford them. Understanding the dynamics above allows policy makers to see that this "choice" is not really an individual preference but the result of the systems design.

Applying a diet analogy, "unhealthy" transport systems are those in which most people use motorised vehicles (the sugar and fat in the diet analogy) for most of their trips (Figure 2.19). "Healthy" transport systems are those in which people can access places by walking, cycling and using micro- or shared mobility for most trips while high-emitting and space-intensive modes are used less frequently. Such a "diet" is possible thanks to: 1) the proximity between people and places; and 2) public space and investment being allocated to privilege active and shared modes, such that they are the most convenient and people choose them most often. By design, the "healthy system" needs less energy to function and has lower emissions, yields lower mobility but high accessibility,[18] offers more equitable and safe access to opportunities and promotes healthier lifestyles.

Figure 2.19. **From "unhealthy" to "healthy" transport systems**




*Note*: The icons illustrate the most frequent means of transportation used per type of trip.
*Source*: (OECD, 2021[70]).

### Policies to transform territories and get to better environmental and well-being results

LAC countries need to focus efforts on policies that can transform their transport systems away from car dependency. Two of these policies are the following:

Public space reallocation is a key policy to revert the dynamic of induced demand and has also the potential to contain urban sprawl and the erosion of active and shared modes (Figure 2.18). Rebalancing space use between modes and uses could lead to "disappearing traffic", the opposite phenomenon than the increase in the use of cars and motorcycles experienced in LAC. Barcelona's superblocks are a good example of a wide scale plan for road space reallocation and street redesign, implemented with climate and well-being ambitions in parallel. Barcelona's superblocks *restructure* the city into polygons of 400 m x 400 m with inner roads closed to motorised vehicles. The superblocks become spaces welcoming active modes (walking, cycling) and recreation (Ajuntament de Barcelona, 2014[89]). Superblocks are often referred to as low-cost urbanism; they have demonstrated great potential to transform the urban ecosystem and bring about health, safety, social and environmental benefits in the short run (López, Ortega and Pardo, 2020[90]). Parking policy (e.g. through parking pricing and regulation) is also crucial to public space reallocation aligned with environmental and social goals. In Mexico City, minimum parking requirements that forced developers to build a minimum number of parking spaces in each project were abolished in 2017 and replaced with maximum parking requirements as a way to limit the space allocated to cars (Ciudad de México, 2017[91]). As part of this legal reform, minimum parking requirements for bicycles were also introduced (Guzmán, 2020[92]). While there are good examples in the region, road space reallocation and street redesign need to be implemented at a wide scale and across territories; and be prioritised in climate strategies.

Policies to mainstream shared mobility (including active modes and micro-mobility) are fundamental to reverse the erosion of active and shared transport modes and accelerate the development of multimodal and sustainable transport networks. Support[19] to mainstream shared bicycles and micro-mobility, as well as the expansion of on-demand micro-transit services can significantly increase the attractiveness of sustainable alternatives at a much faster pace than if solely focusing on existing public transport services. The development of digital tools will be key to harnes shared mobility. Global

Positioning System (GPS) technologies and apps today allow people to share vehicles (e.g. bikes) and rides and combine transport modes in cost-effective ways. If used for this purpose, these technologies could allow the shift from a system which requires car ownership to systems in which a multiplicity of transport modes (including shared electric cars) are available for people to choose from and combine according to particular needs. Importantly, increasing the feasibility and attractiveness of these modes will highly depend on the road space reallocation (discussed above) away from private car use. Thus, there is a high potential for change if implementing these two policies (mainstreaming of shared mobility and road space reallocation) in tandem.

The GHG emissions of the region's transport sector relative to GDP are 2.2 times as high as in Europe and 1.3 times as high as in Asia, which means there is ample scope to increase carbon efficiency (ECLAC, 2020[82]). If a better balance were achieved with electric railway transportation, the environmental performance of cargo transport would improve, while at the same time enhancing the competitiveness and flexibility of the sector. Decarbonising the transport sector in the region would also create 4 million new jobs in heavy vehicle operation and maintenance activities and more than 1.5 million in the light vehicle industry (UNEP, 2019[94]).

Implementing transformative policies can also increase the effectiveness and feasibility of other policies (e.g. carbon and road prices), which can help accelerate the transition towards systems that are sustainable by design. Moreover, electrifying transport will be more effective and rapid in a system that is no longer based on private vehicle ownership and use, but rather increases the participation of modes (e.g. micro-mobility, public transport) that are more resource efficient and which, as discussed in (IPCC AR6 WGIII, 2021[93]), have already a higher penetration of electric vehicles.

Infrastructure investments should shift away from hydrocarbon-based transport modes towards transport modes that allow for multimodal distribution. This could also lead to a reduction of negative impacts on ecosystems, a reduction of emissions and a better protection of biodiversity, among others. Transformative policies are especially relevant for small and medium-sized cities in LAC. As these cities are still expanding, early interventions that address the vicious cycles (Figure 2.18) can make these agglomerations sustainable by design, avoiding carbon lock-in and improving their climate resilience (OECD, forthcoming[96]).

The region is well-placed to produce the material basis for electric mobility. Three countries are major car manufacturers: Argentina, Brazil and Mexico. The Brazilian automotive industry accounts for 5% of GDP and employs 500 000 people directly and 1.3 million indirectly. In Mexico, the industry generated 3.7% of GDP and employed 824 000 people directly in 2017. In addition, three countries in the region, Argentina, Chile and Bolivia, have the world's largest reserves of lithium, and there are areas that are very well endowed with solar and wind energy that would allow hydrogen to be generated at very low costs. Chile and Peru also have large reserves of copper, a metal that is more in demand for the manufacture of electric vehicles than those with internal combustion engines (Chapter 3) (ECLAC, 2020[82]).

### Recovery pathways from a systemic lens

Focusing COVID-19 recovery on low-carbon strategies that set the basis for a systemic transformation could accelerate the transition towards transport systems based on renewable energies, able to simultaneously reduce income inequalities and emissions. The transport and residential sectors are determinant for the region's current and future energy consumption, emissions and well-being (IDB, 2016[95]); yet there is little focus on them on recovery packages. Principally, recovery packages have been mainly focused on

recovering employment and compensating the loss of household revenues (OECD et al., 2021[2]). Although these policies are fundamental to offset the COVID-19 crisis, moving forward requires holistic recovery packages that address the structural causes of social and economic vulnerability as well as the already-existing climate challenges.

The following tables categorise transport and residential sector policies found in different LAC country recovery plans[20] according to the three recovery pathways: Rebound, Decoupling and Wider well-being. The tables assess whether the transport and residential sector policies align with the Wider well-being pathway or rather are locking countries into less effective development pathways (Table 2.1 and Table 2.2).

Table 2.1. **Rebound, Decoupling and Wider well-being pathways for the transport sector**

| | Transport | Selected recovery policies implemented |
|---|---|---|
| **Rebound:** fostering car-dependency | The focus is on boosting economic growth, jobs and disposable incomes by maintaining and reinforcing car-dependent systems. The policy rationale maintains a "traditional vision" of mobility – e.g. physical movement and speed – as central performance indicators for the sector. It also reflects the belief of a positive correlation and virtuous cycle between transport volumes and GDP as the ultimate goal for the economy. Because the focus is on mobility, the role of proximity between people and places is ignored and mobility by car – a space- and carbon-intensive mode – is privileged. | Chile: Containment of paraffin, petrol and benzine prices.<br>Panama: Infrastructure projects focused on highway improvement and enlargement.<br>Colombia: Project *Concluir* to finish the construction of 400 km across 27 road projects in 23 departments. Construction of 21 road sections for legality and reactivation in 18 departments. |
| **Decoupling:** promoting clean car-dependency | The mind-set is still around "supporting mobility for economic growth". As such, the aim is not to transform transport systems but rather to decarbonise existing (e.g. car-dependent and mobility-intensive) ones. Mitigation efforts concentrate, to a great extent, on improving parts (e.g. vehicles and fuels), while maintaining current systems. Efforts focus on improving the energy efficiency and reducing the carbon intensity of the vehicle fleet (especially private cars) and the fuels they use, fostering improvement of vehicle technologies. As significant travel reduction and modal shift will not be main drivers of mitigation in this pathway, "shift" and "avoid" type policies and measures have a smaller role than "improve" actions. | Uruguay: Electric mobility solutions with major focus on electric private cars.<br>Panama: Definition of the National Strategy of Electro Mobility. |
| **Wider well-being:** shifting away from car-dependency while promoting clean vehicles | Wider well-being shifts the focus from mobility to sustainable accessibility, opening the door to envision systems that significantly reduce emissions not only by reducing mobility, but also by increasing "proximity" and "access". It places emphasis on reversing and shifting away from car-dependency while simultaneously improving the vehicles that are still needed (e.g. public buses). It prioritises the use of space for space efficient and low/zero carbon modes (walking, cycling, micro-mobility and public transport) while focusing important action on reallocation of road space and, in cases where policies have historically prioritised building infrastructure, redesigning streets for car use. Incentives for electric vehicles (EVs, including charging infrastructure) is provided and planned with the aim of embedding electrification in the wider aim of shifting away from a system based on privately owned cars with low occupancy. | Uruguay: Programme to increase the use of public and active travel (MOVÉS).<br>Argentina: Strengthen the metropolitan transport agency, extend Ecobici's capacity, and reallocate road space in Avenida del Libertador (Buenos Aires).<br>Mexico: Permanent cycling path Insurgentes and substituting moto-taxis with e-bikes –Mobility project Tláhuac (Mexico City)<br>Colombia: Public Policy for Bikes 2021-2039 (Bogota).<br>Chile: National Strategy of Sustainable Mobility and National Strategy of Electro-mobility. |

*Sources*: (Buckle et al., 2020[97]); (OECD, 2021[70]); (Gobierno de Chile, 2021[24]); (Gobierno de Panama, 2020[98]); (Greenpeace México, 2021[99]); (Gobierno de Buenos Aires, 2022[100]); (Alcaldía Mayor de Bogotá D.C., 2021[101]).

Two types of transport measures aligned with a rebound recovery pathway were the containment of energy prices, including fuels. These initiatives incentivise car use and emissions and use up resources that could bring better social and environmental value if used differently (Carlino et al., 2015[102]). The second measure found in Panama and Colombia's recovery plans is further investment in the improvement and widening of car purposed infrastructure (e.g. highways). Panama's electro mobility strategy was found to be consistent with a decoupling type of recovery, aiming to electrify 10-20% of private vehicles and only 15-50% of public buses, but doesn't transform the system's demand maintaining the prevalence of private car use vs. electric public transport.

Regarding wider well-being, Chile's National Strategy of Sustainable Mobility follows this pathway as it aims to achieve a better use of energetic resources, time, and road and urban space. It plans infrastructure projects to prioritize active transport and massive public transport over private transport. City level recovery policies stand out for being in line with the wider well-being pathway. Among these are programmes to incentivise bike-use while also improving streets for its safe and convenient use (including by increasing cycling lanes and parking), like in Bogota, Santiago, and Buenos Aires. In some cases, cycling lanes introduced during COVID-19, have been made permanent (Buckle et al., 2020[97]), as in Mexico City with Insurgentes Avenue (Greenpeace México, 2021[99]).

Table 2.2. **Rebound, Decoupling and Wider well-being pathways for the residential sector**

| | Residential | Selected recovery policies implemented |
|---|---|---|
| **Rebound** | The focus is on stimulating short-term growth and employment opportunities in the construction sector. The vision of the sector is narrow and thus concentrates on the scale of the dwelling or building (focused more on delivering housing than on its quality), disregarding location or the wider living environment (e.g. surrounding areas or services and connections around the dwelling). Also focuses on short-term – and especially private – costs and benefits, disregarding full-cost accounting of wider and longer-term well-being costs and benefits. | Chile: Subsidies to limit the rise of gas prices.<br>Panama: Support for first house purchase for lower income households (Fondo Solidario de Vivienda, with no energy efficiency or quality standards.<br>Peru: Financing for construction of households and public spaces, but with no energy efficiency or quality standards.<br>Colombia: Subsidies to interest rates for the financing of new urban housing, but with no energy efficiency or quality standards. |
| **Decoupling** | The main objectives are to foster growth and provide "access to shelter" while also decreasing emissions from energy use. Most efforts focus on attaining energy efficiency gains in buildings/dwellings. As in the case of Rebound, the scope of focus is narrow. Thus, Decoupling does not look beyond the dwelling and misses on options to reduce energy use by modifying the surrounding environment (e.g. use of greenspace to regulate the micro-climate, thereby reducing cooling needs). Decoupling does not integrate full-cost accounting; thus, while some deep retrofits may be pursued, these do not become the norm. Rather most efforts focus on shallow retrofits.[21] | Colombia: Programmes to replace home appliances with more efficient ones.<br>Panama: Design of Sustainable Building Regulations and the National Cooling Plan. |
| **Wider Well-being** | This pathway considers housing as a "bundled good" that should deliver a number of functions beyond access to shelter. It prioritises measures that reduce emissions in the residential sector while also facilitating emissions reduction in other sectors. It puts emphasis on new builds and retrofits that substantially lower energy demand (e.g. passive houses)[22] and are potentially accompanied with low-carbon energy generation (e.g. rooftop solar). Full-cost accounting is embraced by public and private actors, mainstreaming considerations (short- and long-term) on health and wider well-being when evaluating projects. Wider well-being also takes into account the need to lower energy demand by considering the surrounding environment (e.g. housing location and transport connections, existence of green space to regulate the microclimate and reduce heating or cooling energy needs). | N/A |

*Sources*: (Buckle et al., 2020[97]); (Gobierno de Chile, 2022[103]); (Departamento Nacional de Planeación, 2021[104]); (Gobierno de Panama, 2020[98]); (El Comercio, 2020[105]).

In terms of the residential sector, two types of measures were found to be aligned with a rebound type of pathway: subsidies for gas prices and housing programmes or subsidies in Panama, Peru, and Colombia that did not include any considerations of efficiency standards, nor quality of the dwelling nor the surroundings; including

location and transport connections by sustainable modes, which can easily result in further fostering sprawl (Buckle et al., 2020[97]; OECD, 2021[70]). Colombia implemented a programme consistent with a Decoupling pathway, focused on identifying inefficient appliances and supporting the population in replacing them. Panama recently designed Sustainable Building Regulations that aim to save 15% of energy use in the construction of new buildings in the following two years and up to 20% in subsequent years. No recovery policies were found to be aligned with a wider well-being pathway.

Overall, revisiting recovery policies in the light of a systemic approach would be relevant for the region. In certain cases, a same country was found to implement recovery measures that align with different pathways. The risk of this is that investments will result in policy incoherence and conflicting goals not aligned with a sustainable and inclusive model. The recovery pathways here presented can serve countries as a guide to rethink the policies included in their recovery packages and redesign strategies that address social, economic, and environmental issues at the same time. If conceived systemically, investments in transport and urban systems could play a crucial role in improving well-being while also contributing to long-term collective climate goals.

## Key policy messages

The green transition is a structural challenge that LAC will have to face eventually. The rising emissions coming from LAC, and the disproportionate effect that climate change has in the region and on its most vulnerable groups, are evidence of how urgent it is to address a green and just transition. At the same time, LAC is better positioned than other regions in the world to adopt a more sustainable and inclusive economic model, given the richness of biodiversity and potential for renewable energies.

The post-COVID-19 context presents itself as an opportunity for governments to align the objectives of the recovery with those of a green transition, looking beyond GDP and placing Latin American and Caribbean's well-being at the centre. A truly just transition should help close the existing social gaps that characterise LAC and avoid generating new ones. A systemic approach should guide active mitigation and adaptation policies that could help reduce inequalities across countries, socio-economic groups, territories, generations and genders. In this regard, the articulation of preventive climate change and risk management policies with universal, integral, resilient and sustainable social protection systems is key for a systemic and multi-dimensional approach.

Governments should focus on reversing unsustainable dynamics and transform territories into systems that, by their functioning, allow a sustainable and just society. With a systemic lens, governments could foster various trends by (re)designing systems able to improve people's well-being while requiring less energy, producing fewer emissions and transforming what used to be trade-offs between climate and well-being objectives into synergies.

### Box 2.1. **Key policy messages**

- Adopt a recovery strategy based on low emissions and centred on well-being in LAC. Make use of lessons learned from recovery pathways to refocus policy decisions towards improving citizens' well-being and advancing transformative policies. The path towards net zero emissions should not be limited to follow other region's mitigation and adaptation strategies, but rather it should be the result of a comprehensive analysis of how to achieve a green and just transition taking into account LAC and its subregions' particular characteristics.
- Promote a systemic approach to reprioritise climate action towards improving systems' functioning rather than focusing on improving parts (e.g. more highways for private car use) while keeping unsustainable systems (e.g. private car-dependent territories). Some relevant actions are: designing and implementing climate, transport and land-use policies focused on reversing the unsustainable system dynamics underlying car-dependency (e.g. induced demand, urban sprawl and the erosion of share and active modes). Climate strategies that are focused on improving only specific parts fail to do so and are, as a result, ineffective in achieving emissions reduction at the pace and scale needed.
- Include the environmental dimension in education curricula to raise the environmental awareness among future generations.
- Invest in and develop data technologies and reliable information to better assess the complexity of mitigation and adaptation policies. To ensure a correct implementation and policy coherence in the short and long term, design systemic, sustainable decarbonisation strategies that address the particularities of each subregion and country in LAC. This will allow targeted programmes that include tailored solutions to reduce the GHG emissions at the sectoral level (e.g. transport, electricity, agriculture and livestock) while advancing holistic and cross-cutting adaptation measures that connect local needs with global commitments.
- Strengthen further climate risk preparedness measures and multi-hazard early warning systems, especially in the Caribbean. Gaining support from the international and the scientific and technological communities is essential to reinforce such systems.
- Identify the needs and characteristics of the communities and geographical areas most exposed to the negative impacts of climate change as a basis for strengthening climate resilience. Establishing climate risk repositories and risk maps, shared with all relevant stakeholders, is essential to inform climate change adaptation measures and prioritisation. These measures can help lower risk exposure of most vulnerable groups to climate change (e.g. women in rural areas).
- Identify the particularities and challenges of growing urbanisation in LAC to design more just, resilient and green cities. A greener economy should reduce urban pollution (particularly air pollution) and the exposure of the most vulnerable groups to their harmful health impacts. Sustainable and resilient city design should contribute to reduce coastal erosion and manage fragile coastal ecosystems to provide nature-based solutions against the impacts of climate risks (e.g. coastal floods, hurricanes, sea level rise), especially in the Caribbean.

### *Notes*

1. As defined by the Intergovernmental Panel on Climate Change's (IPCC), "mitigation" constitutes human efforts to reduce the sources GHGs, while "adaptation" is the process of adjustment to actual or expected climate effects (IPCC, 2014[106]).
2. Whenever Historical GHG Emissions from Climate Watch (2022[14]) were used, the Climate Analysis Indicators Tool (CAIT) was chosen as the data source. The CAIT dataset is the most comprehensive on Climate Watch and includes all sectors and gases. In order to emphasise data comparability across countries, it does not use countries' official inventories reported to the United Nations Framework Convention on Climate Change. Climate Watch Historical GHG Emissions are derived from several sources. The original source for the LUCF or agriculture indicators is FAO (2022[12]), FAOSTAT Emissions. For fuel combustion data, it is OECD/IEA (2021[13]), GHG Emissions from Fuel Combustion.
3. South America includes data for Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. Central America includes data for Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama. The Caribbean region includes data for Antigua and Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago.
4. See endnote 2.
5. GHG emissions excluding LUCF, to guarantee greater accuracy in comparisons.
6. See endnote 2.
7. See endnote 2.
8. See endnote 2.
9. See endnote 2.
10. The LAC countries ranked within the top 50 most vulnerable between 2000-19 were: Bolivia (25), Colombia (38), Dominica (11), Dominican Republic (50), El Salvador (28), Grenada (24), Guatemala (16), Haiti (3), Honduras (44), Nicaragua (35), Puerto Rico (1), The Bahamas (6), St. Vincent and the Grenadines (48) (Germanwatch, 2021[26]).
11. See endnote 10.
12. As discussed in (Buckle et al., 2020[97]) while economic growth (expressed in terms of GDP) can be correlated with well-being in some respects, this relationship may also be inexistent or negative in other ways. Taking GDP growth as proxy for success has led to high energy and material demand systems that do not necessarily deliver high well-being, and increase the challenges to decarbonise at the scale and pace needed. This is why the highest GDP growth pathway is not necessarily the highest well-being pathway.
13. The term "systems innovation" was coined around 20 years ago and can be defined as the application of a systemic approach to solve real-world problems.
14. Several Latin American capitals feature among the most congested in international rankings (ITF, 2020[85]).
15. While 47% of rich households own at least one car, only 8% of low-income families do (Daude et al., 2017[108]).
16. Around 80% of public space in cities is dedicated to car use according to (Mc Arthur et al., 2022[109]).
17. More recently, Mexico City, Santiago and Lima, among others, have attempted to re-regulate public transport and expand services, especially through the introduction of bus rapid transit (BRT) systems, and initiatives to increase active modes have emerged in the region. While important, such efforts have not been able to counteract growing car ownership and use. One of the reasons for this is that they "fight" against the unsustainable dynamics illustrated in Figure 2.18 and Figure 2.19 and explained in this section.
18. Transport policy literature suggest that transport systems' contribution to human well-being lies on the provision of accessibility, i.e. on enabling ease of access to opportunities and places of interest (e.g. jobs, consumption, leisure or health services). Most transport systems today focus instead on the provision of mobility, which results in the car-dependent and sprawled territories illustrated in this section. For more on this, see Chapter 2 of the report *Transport strategies for net-zero systems by design* (OECD, 2021[70]).
19. Integrated transport subscription cards could facilitate the use of available options, and facilitate the provision of government subsidies to low-income households if needed. Government subsidies may also foster the development of shared mobility in areas where private on-demand services can bring social and environmental benefits but may not be

profitable for the private sector. Support to the development of new vehicles (e.g. innovative micro-mobility) and the expansion of services for multipurpose trips (e.g. cargo e-bikes, shared (e-)bikes with baby seats, kids' bikes) could also contribute to making shared and sustainable mobility more attractive.

20. The national recovery packages of Chile (Chile Apoya), Colombia (Nuevo Compromiso por el Futuro de Colombia), Panama (Plan para la Recuperación Económica) and Peru (Arranca Perú) were revised. Transport and residential policies were also revised individually for these countries and for cities such as Buenos Aires (Argentina), Bogota (Colombia) and Mexico City (Mexico).
21. Shallow retrofits are one-off measures instead of deep retrofits, which reduce energy usage beyond 50%
22. For passive houses, total primary energy demand should not exceed 120 kWh per $m^2$ annually for all services.

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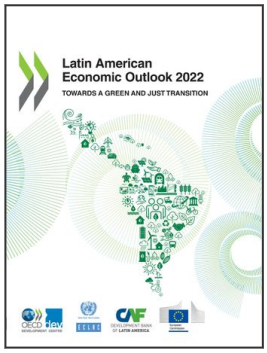


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