An aerial photograph of a tropical coastline with a large circular graphic overlay. The background shows a lush green forest bordering a blue body of water with a winding river or lagoon. The circular graphic is a light gray ring that frames the central text.

THE **CIRCULARITY** **GAP** REPORT

Latin America and
the Caribbean

Closing the Circularity Gap in
Latin America and the Caribbean

BEHIND THE COVER

These vibrant blue-and-green waterways, found in the Anavilhanas National Park in Amazonas, Brazil, point to Latin America and the Caribbean's flourishing biodiversity and wealth of natural resources. Home to the world's second-largest river archipelago, the national park is bursting with life—representing the region's multitude of diverse cultures. The circular economy can ensure the people and nature of Latin America and the Caribbean thrive in harmony for years to come.

THIS PUBLICATION HAS BEEN DEVELOPED
IN PARTNERSHIP WITH:



We are a global impact organisation with an international team of passionate experts based in Amsterdam.

We empower businesses, cities and nations with practical and scalable solutions to put the circular economy into action. Our vision is an economic system that ensures the planet and all people can thrive.

To avoid climate breakdown, our goal is to double global circularity by 2032.



The Latin America and the Caribbean Circular Economy Coalition was formed in 2021 to provide a regional platform to enhance inter-ministerial, multi-sectoral and multi-stakeholder cooperation, increase knowledge and understanding on circular economy, provide capacity-building and technical assistance for the development of public policies for circular economy and sustainable consumption and production.

It is currently coordinated by the United Nations Environment Programme (UNEP), and led by a steering committee composed of four high-level government representatives on a rotating basis. Currently Colombia, Costa Rica, the Dominican Republic and Peru are part of the steering committee, together with nine strategic partners: the Climate Technology Centre & Network (CTCN), the Ellen MacArthur Foundation, the Inter-American Development Bank (IDB), the Konrad Adenauer Foundation (KAS), Platform for Accelerating the Circular Economy (PACE), the United Nations Industrial Development Organization (UNIDO), the World Economic Forum (WEF), the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), and UNEP.

IN SUPPORT OF THE CIRCULARITY GAP REPORT LATIN AMERICA AND THE CARIBBEAN

JAVIER OBACH
MARTINIELLO
Circular Territory Programme
Manager at SOFOFA Hub Chile



'Knowing our Circularity Metric allows us to understand key leverage points for accelerating the transition to a circular economy, through circular management models that guarantee triple impact. For example, Latin America and the Caribbean export a large portion of their raw materials to developed countries. The impact of this—including carbon emissions, biodiversity loss and waste generation—are rarely analysed, leading to continued material extraction, processing, and value loss. We need to change the way we do business, preserve our natural capital, and increase the efficiency of our procedures and processes. This report lays out the way forward, and highlights where more understanding is needed between countries and among business leaders, academia, civil society and public entities to help LAC countries advance with conviction towards a more circular economy.'

FERNANDO J. PACHE
President of the Chamber of
Industries of Uruguay



'Taking a circular economy perspective is key to countries' sustainable development. According to the *Circularity Gap Report Latin America and the Caribbean*, there are still many challenges to overcome the linear model of production and consumption. The Chamber of Industries of Uruguay is a benchmark for the implementation of changes in the sector's processes, promoting capacity-building for companies that allows them to grow by using resources more efficiently.'

WALTER VERRI
Undersecretary of Industry,
Energy and Mining Uruguay



'One of Latin America and the Caribbean's main sustainability challenges is finding a balance between satisfying international demand for natural resources and reducing our economic dependence on it, given extractive activities' environmental impact. Maintaining materials' value and maximising secondary material use is another great challenge. Research, such as that provided by this *Circularity Gap Report*, both provides a greater understanding of our economies and consumption patterns and helps shape regional harmony. Through this, we can develop public policies for a sustainable planet across nations.'

MANUEL ALBALADEJO
Representative for the
Regional Office for Argentina,
Chile, Paraguay and Uruguay
at UNIDO



'Transitioning to a circular economy must begin with reliable and comparable metrics. The *Circularity Gap Report Latin America and the Caribbean* is a first effort to generate a circularity baseline for the region—a fundamental step in understanding where we are compared to other regions. It also helps uncover which targets should be set and which policies are needed to achieve these targets. The report sends a strong message to policymakers, the business community and multilateral organisations: the circular economy can be an engine of wealth, job creation and decarbonisation in Latin America and the Caribbean.'

SERGIO CAMPOS
Water and Sanitation Division
Chief at IDB



'Embracing circular economy strategies in Latin America and the Caribbean are key to address the effects of climate change, improve lives and reduce greenhouse gas emissions. The *Circularity Gap Report Latin America and the Caribbean* highlights actionable strategies for key economic sectors such as agrifood, manufacturing, and waste management, to steer the course towards a circular economy transition in the region. By providing governments with these tools, the report effectively lays the groundwork for an enabling environment that can drive a region-wide transformation towards circular practices.'

IN SUPPORT OF THE *CIRCULARITY GAP REPORT* *LATIN AMERICA AND THE CARIBBEAN*

JUAN BELLO

**Regional Director and
Representative, Regional
Office for Latin America and
the Caribbean at UNEP**



'This report's message is loud and clear: our region only stands to benefit from the transition to a circular economy. According to the report, the adoption of circularity in key industrial sectors—agrifood, the built environment, mobility and waste management—has the potential to create 8.8 million formal jobs. This transformation will have an enormous positive impact in terms of economic stability and job creation, and more importantly, in ensuring environmental resilience for the sustainable and healthy future of the region.'

MILAGROS RIVAS

**Managing Director of Advisory
Services at IDB Invest**



'The transition to a circular economy can boost economic development and regenerate and restore the environment, while creating opportunities for inclusion. This is an agenda IDB Invest promotes with the private sector in Latin America and the Caribbean. This first *Circularity Gap Report Latin America and the Caribbean* provides a circularity baseline for our countries, as well as an insightful analysis of the potential impact this transition can have on climate action and the creation of circular job opportunities.'

CARLOS DE MIGUEL

**Sustainable Development and
Human Settlements Division
Director at CEPAL**



'The *Circularity Gap Report Latin America and the Caribbean* tells us what we all know to be true: we urgently need better quality data and better reporting efforts across LAC in order to make progress towards a circular economy.'

EXECUTIVE SUMMARY

The economy of Latin America and the Caribbean (LAC) is largely linear. A resource-rich region with a diverse configuration of 33 nations, LAC plays a key role in the global extraction and use of materials. The region provides over 11% of the world's raw materials by weight, despite representing 8.3% of the world's population. It is largely self-sufficient from a raw materials perspective, and comprises many countries with moderate material footprints. However, material cycling—and thus secondary material consumption—is minimal. The region has potential to build an environmentally safe and socially just economy. Doing so will require reducing the environmental impact of key sectors—such as agrifood, construction and manufacturing—as well as adjusting the demand for its natural resources coming from global markets. By tackling how materials are used to satisfy its societal needs, and balancing the satisfaction of external demands, countries across LAC can reduce environmental pressures, bolster their people's quality of life and unlock economic opportunities and new business models within the region. The circular economy, an economic model that minimises waste, circulates products and materials, and regenerates nature, is increasingly being recognised as a means for doing so, with many countries across the region incorporating circular principles in their policy frameworks. The challenge now is mainstreaming circular practices in priority sectors, such as Agrifood, Construction, Manufacturing and Waste management.

This analysis aims to provide data-driven insights on LAC's material flows to measure how circular the region is—while highlighting data gaps—to contribute to the circular economy debate and inform regional decision-making. This report explores the relationship between two deeply intertwined systems: the economy and nature. The analysis examines the material flows of the economy of LAC. Using 2018 as a baseline year (the latest for which data is available), it uncovers how material resources—including metal ores, non-metallic minerals, biomass and fossil fuels—are extracted, used and disposed of, as well as the key drivers of these processes. It analyses how materials flow through the regional economy as the starting point for measuring

its level of circularity. Although the data is relatively outdated (pre-pandemic), the results shed light on structural characteristics of LAC's economy. It's also important to note that to measure circularity in the region a consumption-based perspective is taken and demand-based indicators are used: only domestically consumed materials are considered, and exports are excluded.¹ The report's two main objectives are: 1) Provide a snapshot of how circular LAC is by identifying metrics for circularity and 2) Spotlight possible interventions within significant sectors and value chains—Agrifood, Construction and the built environment, Manufacturing, Energy and Waste management—that can aid LAC's transition to circularity and solve systemic inefficiencies in its material use. However, it must be noted that measuring circular performance in the region remains a challenge: limited data, metrics and indicators are slowing the transition.

LAC is a crucial provider of raw materials to the global economy, but the exponential rise of global material demand is a major driver of the region's environmental degradation and social liabilities. While characteristics vary across countries, the vast natural wealth available in the region and strong extractive industries make LAC a global hotspot of material extraction and a key provider of raw materials to the global economy, particularly of biomass and metal ores. In 2018, of the approximately 10.7 billion tonnes of materials extracted domestically, around 40% were eventually exported to meet global material demand. That LAC's material export footprint is more than double its material import footprint, as well as with the large difference between LAC's share of global material extraction (11.2%) and of the global population (8.3%), indicate that global raw material demand for the region's resources is placing excessive pressure on its natural resource base.² Domestic material extraction is a robust proxy to measure domestic environmental impacts.³ Increasing extraction rates to supply global markets with rapidly growing quantities of raw materials,⁴ coupled with the fact that extractive activities are often highly impactful and lack

remediation and mitigation measures, mean that LAC is a major sink for global environmental impacts.⁵ This imbalance in environmental degradation and costs is not only rapidly degrading the region's natural capital and destabilising ecological integrity, but also directly undermining social wellbeing and threatening future economic resilience.⁶

Although the region's per capita material footprint is moderate, it exceeds the level considered sustainable. In 2018, LAC countries consumed 7.9 billion tonnes of virgin materials, equivalent to 12.4 tonnes per person per year. This is largely on par with the global average of 12.2 tonnes but still exceeds the estimated 'sustainable' level of material consumption: 8 tonnes per person per year.^{7,8} At the same time, high levels of domestic material extraction across the region contribute to LAC's high raw material self-sufficiency: only 20% of LAC's material footprint was imported (mostly non-metallic minerals and fossil fuels). Most material use and environmental impacts are concentrated in a few primary productive activities that reflect the overall economic structure of the region. The top ten productive activities (out of 163) represent 4.9 billion tonnes—approximately 61%—of the material footprint.⁹ This is significantly higher than what other Circularity Gap Report analyses typically report (40–45%). In particular, the societal needs of Housing & infrastructure, Nutrition and Manufactured goods contribute three-quarters of the total material consumption¹⁰ in the region (29%, 26% and 19%, respectively). It will be imperative to solve systemic inefficiencies in these sectors by optimally transforming resources into societal benefits to maximise social wellbeing and economic resilience, while minimising ecological impact. See Chapter four for more details.

The circular economy can fundamentally influence the decarbonisation of LAC's economy. The region has a unique carbon footprint profile, with primary productive activities, such as Agriculture, Forestry, and Other Land Use (AFOLU), representing almost half of the region's net territorial greenhouse gas (GHG) emissions.¹¹ LAC also holds the highest absolute and

per capita AFOLU emissions of any world region.¹² This has wide-ranging implications beyond the obvious impact on the climate: drivers of land use change, such as rapid deforestation, are linked to biodiversity collapse and cut through local communities' livelihoods and quality of life. Overall, the region's carbon footprint is moderate: however, this analysis only considers what is consumed locally in LAC, and thus doesn't include the emissions embodied in the products LAC exports around the world. This allocates responsibility to the economies consuming these goods, inflating carbon footprints elsewhere—but the production of these goods slated for export still has a major environmental impact within the region, and elsewhere. Of LAC's total carbon footprint, only 17% is linked to imports, while almost 30% of territorial emissions are linked to exports. Regardless, implementing circular strategies in the region's primary activities, such as agriculture, can reduce its carbon footprint by over one-third.

Secondary material consumption—materials that have been used once and are recovered and reprocessed for subsequent use—is very low in LAC; but data limitations highly influence this figure. This analysis estimates the region's secondary material consumption—or Circularity Metric—is very low, below 1%. This is well below the rate of circularity for the global economy, currently estimated at 7.2%.¹³ This means that the region almost entirely uses virgin raw materials to satisfy people's needs and that once materials reach their end-of-life, small volumes are cycled back into use. However, this analysis estimates that approximately two-thirds of total waste generated, such as construction and demolition waste, and industrial waste, remain unaccounted for or unreported in official statistics. These waste streams are substantial in terms of weight, but are not currently captured by official statistics—and are thus not fully captured by this analysis. These limitations make it very challenging to provide a wholly accurate Circularity Metric.

Low secondary material consumption is just one part of the picture: there's more to LAC's socioeconomic metabolism. Several other indicators help to shape a picture of LAC's material use:

1. **Renewable, carbon-neutral biomass** with the *potential* for cycling, such as food crops and agricultural residues, represents around **40%** of LAC's material consumption. This figure is almost double the global average of 21%, evidencing how biomass dominates the region's material flows.

2. **Non-renewable biomass**, that is, *non-carbon-neutral biomass*, which is measured indirectly through Land Use, Land-Use Change and Forestry (LULUCF) emissions, represents 4% of material flows (slightly higher than the global average of 3.8%). This reveals that the rate of biomass extraction in the region is becoming less sustainable and indicates that biomass stocks are increasingly under strain.

 As LAC continues to develop economically in the coming years, the sustainable use of renewable natural resources will be a top priority if the region is to become more circular.

3. Fossil fuels, which are inherently **non-circular inputs**, represent nearly **10%** of material flows.

4. **Non-renewable inputs**—which include materials such as metals, rocks, chemicals, glass and plastics—also represent nearly **10%**. This indicator captures the share of these materials that *could* be cycled but currently are not. For both non-circular and non-renewable inputs, LAC is well below the global average of 15%.¹⁴

 Accelerating the transition to renewable energy sources, particularly in transport and industry, as well as a combination of upstream circular strategies, such as circular design, and more downstream ones, such as revamped waste management, are key to ensuring the share of these flows relative to total material use decreases.

5. **Stock build-up**—materials locked in the economy, mainly in the form of buildings, infrastructure, vehicles and machinery—represent around **35%** of LAC's total material consumption. This stocking rate is moderately high, but still falls below the global average of 38%, indicating that while the region's stock is undergoing rapid expansion, it's doing so at a slower rate than other emerging economies.

 Crucial circular elements like design for durability, repairability and cyclability must be considered now to enable positive outcomes further down the road, as materials put into stock now won't be available for cycling for many decades.

It must be noted that LAC contains a diverse range of countries, all at different points on their journey to a more circular economy. The figures mentioned above are averages: individual countries' performance on each indicator can differ substantially.

Implementing circular economy strategies in just two sectors—Agrifood and Manufacturing—can cut LAC's material and carbon footprints by one-third each. Key insights have emerged, particularly regarding sectors for which data is more plentiful: Agrifood appears to be the region's most impactful sector, environmentally, economically and socially. Shifting to circularity in the sector could cut the material and carbon footprints by 34%. Key circular interventions in the Manufacturing sector could also bring about significant footprint reductions of over 30% for both the material and carbon footprints. Other key circular economy interventions across the Built environment, Energy, and Waste management sectors also hold strong potential for reducing material use and GHG emissions.

The LAC region stands to benefit from the transition to a circular economy. Fostering a circular economy in the region can strengthen ecological resilience, a fundamental building block for sustaining life and human wellbeing, as well as for economic stability.¹⁵ The circular economy—with supply and demand measures working in tandem—provides LAC with a toolbox of strategies with huge impact potential that can tackle systemic inefficiencies and reverse ecological breakdown while regenerating ecosystems. These include regenerative agriculture practices, reducing and valorising food waste, prioritising renovation and material-efficient urban design, rapid and inclusive deployment of renewable energy, and revamping waste management infrastructure, for example. Impacts go far beyond emissions and material use. The circular economy can help LAC increase value addition and diversify its economic structure, and shape a better balance between exports and imports. Bolstering resource efficiency and making more from less can deliver cost savings, and help diversify and dynamise the production structure towards more technology-intensive sectors. It can also provide better conditions that enhance the competitiveness of circular business models.

LAC can boost its Circularity Metric—but this will require improved data collection, investments in enabling infrastructure and changes in the labour market. By implementing circular economy principles—improving recovery, reuse and recycling systems, for example—LAC can maintain materials' value, promote sustainable practices and maximise the benefits of domestic secondary material use. This report's final scenario explores how secondary material use could

change if waste management for technical materials—such as concrete and scrap metal—were to improve incrementally, from the current 3% to the average level for: 1) countries with a mid-level Human Development Index (HDI) (13%), 2) the global average (20%) and 3) high-level HDI countries (33%). These changes could bring the Circularity Metric from below 1% to up to 6%, if the necessary investment is devoted to high-value waste management infrastructure. As noted, the lack of data for key waste streams—construction and demolition waste and industrial waste—precludes scenario modelling for key areas, such as the Built environment and the Energy sector. This is because quantitative data only showcases material flows within the 'formal' economy in LAC—yet, on average, around half of economic activities in the region are 'informal'.¹⁶ These activities have market value but aren't formally registered or trackable. Although this analysis can only provide a partial picture of the circular economy's potential due to the data limitations explained, it provides a foundation to launch circular economy initiatives across the region.

The circular economy has a high job creation potential—but the transition must be inclusive and just to capitalise on the benefits fully. If approached well, the transition towards a circular economy also has the potential to act as a catalyst for social change: the transition is expected to be labour-intensive across certain sectors, spurring the creation of new and different jobs and skills.¹⁷ The analysis estimates that 8.8 new million formal jobs could be created by driving the region's circular transition for key industrial sectors: Agrifood, the Built environment, Mobility and Waste management. This report also helps uncover how adopting circular economy strategies, policies and business models could impact labour markets in LAC. The region has the opportunity to shape the transition justly, ensuring that these new roles are safe for workers and improve their livelihoods. To materialise these social outcomes, circular economy interventions must address the existing technical and soft skills gaps in the region while ensuring that these new opportunities do not further marginalise the existing informal workers already engaged in vital circular practices. However, deep skills development will require overcoming challenges related to vocational education: from attracting more young professionals to integrating

vocational skills into higher education curricula, for example. Also importantly, job loss and the related redeployment of linear and extractive jobs does not mean channelling talent and ensuring a just transition towards core circular jobs but rather foreseeing the potential synergies with existing occupations in the broader economy.

The circular economy will be a worthy pursuit, but the road ahead is not free of obstacles. No single country or stakeholder can act alone: knowledge and human capital exchange and collaboration amongst LAC countries and stakeholders will be crucial to accelerate the transition. To advance circularity and achieve a systemic shift, solid policies must put environmental and social challenges at the forefront. Bold action will also be needed to overcome LAC's structural challenges and drive the transition forward through coordinated long-term macroeconomic and industrial policies. A clear, shared objective must underpin all policy development: without a clear direction, policy efforts are at risk of becoming fragmented—resulting in isolated initiatives that, while beneficial, have much smaller impacts than broad, coordinated action. This fragmentation also makes policy vulnerable to future changes in the political arena across LAC. Identifying shared objectives will help galvanise political action and ensure that circular principles are here for the long term. Some LAC nations are already paving the way, with momentum building towards a circular economy in Chile, Costa Rica and Colombia, for example. This can allow other nations in the region to follow the lead from nearby frontrunners.

Rising consumption in other regions drives material extraction in LAC—this must be tackled to support a global circular economy. As a resource-rich and export-dominant region, the economic growth of economies worldwide drives material extraction demands on LAC—and its associated environmental and social pressures. Demand from abroad for a relatively small number of commodities coming from LAC: metals, animal feed and beef, for example, limits LAC's ability to navigate this transition alone. Ultimately, the transition to a circular economy must be a global effort, particularly in sectors such as mining and livestock production, with a sharp drop in material consumption from the world's richest nations, a growing international collaboration landscape and sound trade policies. This will serve to reduce pressure on LAC and allow for more sustainable development.

Achieving a more circular economy requires more than technical solutions. This report lays the path forward for a more circular LAC and governmental action on the following six recommendations:

- 1. Increase public-sector-led investment in enabling infrastructure.** Boosting public investment in high-quality circular infrastructure is fundamental to minimise waste generation and emissions while enabling secondary material use. Aside from public funding, private sector engagement is necessary to foster circular and green infrastructure investments and help close the infrastructure gap. Additionally, streamlining regulatory frameworks and ensuring transparent and efficient procurement processes can create a conducive environment for domestic and international investors to participate in infrastructure development.
- 2. Realign incentives with circular economy objectives to ensure that the private sector and financiers can accelerate the transition.** Strengthening regulatory instruments—such as Extended Producer Responsibility schemes—advancing Circular Public Procurement, and engaging in Environmental Fiscal Reform by reshaping taxes, subsidies and other fiscal instruments can help scale up and mainstream circular business models and make them significantly more attractive and viable from an economic and financial perspective.
- 3. Invest in the production, use and dissemination of high-quality statistics on resource use and waste management.** This analysis estimates that up to two-thirds of waste generated remains unreported or unaccounted for in official statistics. Addressing large data gaps in industrial and construction and demolition waste streams is necessary to effectively monitor circular economy interventions. Mandating standardised waste reporting protocols for municipalities and businesses while directly funding municipal data collection schemes and engaging with the private sector can help ensure consistent and comprehensive data collection.
- 4. Support investment in innovation through research and development (R&D).** By introducing policy measures incentivising R&D such as direct funding, tax breaks, or even preferential market access, governments can act as potent catalysts in accelerating research and encourage private enterprises to invest more heavily in sustainable innovations. Additionally, fostering collaborative platforms where academia, industry, and policymakers can synergise efforts will accelerate the flow of knowledge and resources, spurring innovative solutions in circularity.
- 5. Align on a long-term, strategic and shared vision and support multi-level and multi-stakeholder collaboration and coordination.** By fostering coordination and collaboration, stakeholders can coalesce around a shared vision, ensuring that each step taken is synergistic and amplifies the collective impact. This shared vision may act as a guiding star, enabling stakeholders to navigate the complexities of the circular transition with greater clarity, unity and purpose.
- 6. Decouple economic development from the infinite extraction of natural resources, and set targets around human wellbeing and environmental sustainability.** Maximising human wellbeing within planetary boundaries will require rethinking the use of the traditional GDP metric. Through more holistic tools, such as the United Nations Environment Programme's Inclusive Wealth Report, nations in LAC can strive to select circular strategies that blend overall systemic efficiency with social equity and environmental sustainability.



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1. INTRODUCTION

We are living in the Anthropocene, a geological epoch in which human activity has become the dominant driver of Earth system change and has caused increasing harm to the natural environment.¹⁸ As of 2023, at least six of the nine planetary boundaries supporting life on Earth have been transgressed.¹⁹ The planet has entered its sixth mass extinction, while global atmospheric carbon dioxide (CO₂) concentration is at its highest level in millions of years.^{20,21} Exponential growth in raw material extraction,²² which has more than tripled globally since 1970 to 92 billion tonnes a year in 2019, is a major driver of this ecological overshoot—yet if business as usual continues, it's set to double again by 2050.²³ For Latin America and the Caribbean (LAC), the ever-expanding global economy has translated into increasing levels of domestic material extraction, highly driven by demand from abroad.²⁴ The region's vast natural resources hold immeasurable value and play a crucial role in global climate regulation and ecological processes: the Amazon Rainforest is a key influencer of world climate and circulation of ocean currents, for example. However, the sheer scale and nature of extractive activities put these precious ecosystems and irreplaceable natural assets at risk, accelerating and amplifying environmental pressures and further eroding socio-ecological resilience in the region.

LAC is a complex and diverse region: it boasts unique national cultures, yet is often shaped by shared history, languages and customs.²⁵ The region is known for its remarkable geographical and ecological diversity and richness, from vast tropical rainforests like the Amazon and Orinoco,^{26,27} However, despite LAC's abundant natural resources, its societies continue to struggle with providing all citizens with a decent quality of life: staggering levels of destitution, poverty and inequality are prevalent.²⁸ At the same time, ongoing environmental challenges threaten its ecological resilience. Unsustainable and polluting production, consumption and waste management practices drive the overexploitation of natural resources, rampant

deforestation and land-use changes, threatening long-term environmental and economic stability as well as social wellbeing.

This report explores the relationship between two deeply intertwined systems: the economy and nature. Material resources—including biomass, metal ores, fossil fuels and non-metallic minerals—are the bedrock of the economy. As economies expand, the need for raw materials, energy, and additional natural resources such as land and water intensifies, resulting in resource depletion and increased waste and pollution if not managed effectively. The extraction and utilisation of raw materials spur environmental, economic and social impacts within individual countries and across international boundaries. This analysis examines the material flows of the economy of LAC. Using 2018 as a baseline year (the latest for which data is available), it uncovers how materials are extracted, used and disposed of, as well as the key drivers of these processes. It also calculates LAC's Circularity Indicator Set, which estimates the consumption of secondary materials, biomass and fossil fuels, among others. While the analysis reveals relatively moderate material and carbon footprints, domestic extraction is well above the world average.

Aims of the *Circularity Gap Report Latin America and the Caribbean*:

1. Provide a snapshot of how circular LAC is by identifying metrics for circularity.
2. Identify how materials flow throughout the economy and how they may limit or boost circularity.
3. Spotlight possible interventions within significant sectors and value chains that can aid LAC's transition to circularity and solve systemic inefficiencies in its material use.
4. Shed light on existing data gaps and avenues for decision-makers within government and business to enable the revamping of production and consumption patterns.
5. Communicate a call to action based on the above analysis, to inform future goal-setting and agendas.
6. Promote the exchange of information and best practices on the circular economy among LAC countries.

THE RISKS OF THE LINEAR ECONOMY IN LAC

LAC presents a highly extractive and predominantly agrarian (biomass-based) socioeconomic structure. This can be partly attributed to its vast stores of natural resources, from rich mineral deposits to the large availability of land, fertile soils and water reserves. From a materials perspective, the region's underlying economic model is mainly primary-based and export-oriented: economic activity is concentrated on a few productive, extractive activities, largely based on satisfying global demand for a few high-value commodities.²⁹ Extractive activities such as large-scale mining, monoculture agriculture and cattle ranching are prevalent, for example. The highly globalised nature of LAC's activities make the region more vulnerable to global economic shifts, crises and slowdowns.³⁰ The analysis also indicates a strong link between the exploitation of natural resources and global markets, suggesting that LAC is currently not only a source of raw materials but also a tap for biophysical capacity and sink for waste. Within this context, this report aims to illustrate how the circular economy can be put to work to maximise human wellbeing while preserving the ecosystems on which society depends.

LAC's extractive activities—such as agriculture and mining—have historically formed the backbone of the economy. Now, these activities are key drivers of economic activity, exports and employment.³¹ However, their scale and characteristics also make them a source of concern: they disrupt fragile socio-ecological balances and, in many cases, amplify already existing economic, social and environmental crises.³² Agricultural sprawl³³ and mining³⁴ are the main drivers of deforestation in the region, directly impacting climate change, biodiversity loss and ecosystem health, while creating social conflict.^{35,36} Biomass production—characterised mainly by livestock and monoculture agriculture—is a primary source of environmental impacts, leading to water stress, land-use-related biodiversity impacts, soil degradation, waste generation and pollution. Biodiversity has declined by an astonishing 94% since 1975,³⁷ more than any other world region, while emissions,³⁸ soil degradation³⁹ and waste generation⁴⁰ are growing at unsustainable rates. The rapid erosion of ecological

resilience has significant implications for long-term economic stability and societal wellbeing. LAC is highly vulnerable to climate change-related disasters, which are already having disruptive impacts on agricultural output, infrastructure and living conditions, for example.⁴¹ Managing and conserving the region's abundant and rich natural resource base will be critical for sustainable development and global ecological resilience.

CURRENT STATE OF PLAY: A SOCIAL, ENVIRONMENTAL AND ECONOMIC CROSSROADS

While each country in the region is unique, structural challenges are similar between countries: reliance on commodity exports,⁴² highly unequal societies,⁴³ and limited public sector capacity to provide public goods and support the economy,⁴⁴ for example, all within a difficult fiscal context.⁴⁵ Importantly, these challenges are interconnected, interdependent and critical for building socio-ecological resilience.⁴⁶

The covid-19 pandemic highlighted the limitations of the global 'take-make-waste' economic model, highlighting fragile global value chains, wide social inequalities, and the high and accelerating levels of natural resource depletion. A circular economy presents a viable alternative for a different, more resilient and inclusive economic model for countries in the region. Many LAC countries are already actively formulating climate policies,⁴⁷ and some have begun to integrate circular economy principles into their national policy frameworks.⁴⁸ However, these vary widely across countries, and often lack comprehensive and integrated policies and frameworks: the regional circular economy policy landscape remains insufficient and fragmented.⁴⁹ While progress has been made, 'circular economy' is still conflated with traditional waste management—and policies and incentives supporting the transition are lacking.

The complex nature of the circular economy also poses challenges. The circular economy is broad: it tackles production, consumption, waste management and resource use. Measuring it, therefore, requires a holistic approach which can be challenging due to the complexity and interconnectivity of these dimensions. Within this context, limited data availability and quality are key challenges:

1. **Comprehensive, reliable, and up-to-date data** on material flows, waste generation, recycling rates, and resource efficiency is often lacking in LAC countries. This data gap hampers the ability to measure and monitor the transition to a circular economy.
2. **Much of LAC's waste management, recycling and resource recovery activities occur within the informal sector.** The high level of informal activity makes it difficult to obtain accurate data, and to measure these activities' circularity.
3. **A lack of standardised definitions and metrics** makes it difficult to measure progress and compare the performance of different countries or sectors within the region.

A REGION FULL OF POTENTIAL: CIRCULAR ECONOMY AS A MEANS TO AN END

The circular economy is a means to an end goal: an ecologically safe and socially just society. In the case of LAC, this will mean transforming resource management to reduce environmental pressures and bring economies within planetary boundaries, while enhancing the social wellbeing of its people. Circular economy principles can be used to ensure sustainable, inclusive development while revamping consumption and production systems. This will require mobilising and directing productive capacities towards supporting and improving social and environmental wellbeing, rather than maximising overall production and consumption.

Each nation is unique, making it difficult to draw broad conclusions about the LAC region. But one thing is clear: an alternative, more sustainable model for economic development is necessary.⁵⁰ The concept of circular economy is becoming more prominent in LAC as a means for achieving more sustainable development,⁵¹ recognising that many activities linked to this 'technical' concept are already deeply-rooted in Indigenous regional knowledge, culture and practices.⁵² Established in 2021 as part of covid-19 recovery, the Circular Economy Coalition of Latin America and the

Caribbean (CECLAC) brings together governments, the private sector, civil society and academia to promote knowledge sharing, collaboration and the development of circular economy initiatives and projects. Additionally, to ensure that regional stakeholders agree and can work together effectively towards a shared objective, *A Shared Vision*⁵³ for a regional circular economy was rolled out in 2022. These regional initiatives and frameworks provide a strong foundation from which LAC countries can grow, by sharing guidance, collaboration, best practices and technical resources. This report aims to build on and strengthen these initiatives by providing new insights into the state of circularity in the region.

The circular economy can help LAC countries meet their climate goals and environmental commitments, such as conserving natural capital and material resources as well as preserving ecosystems and biodiversity.^{54, 55} A circular economy can also deliver cost savings, stimulate innovation and enhance national economies' competitiveness in domestic and global markets by optimising material use, minimising waste and increasing resilience. Finally, circular economy interventions can promote new employment opportunities in many areas ranging from waste management and (re)manufacturing to seemingly less obvious roles in education and community organisation, for example. To fully realise this potential, labour market policies that focus on skills development and training programmes should be prioritised. These efforts will not only enable marginalised groups currently involved in circular activities to benefit from the transition, but also ensure that the new jobs created offer a better quality of life than their linear counterparts.

This report builds an evidence base for how systemic transformation and a circular economy can benefit LAC. To this end, it presents five scenarios—Shift to a circular food system, Build a circular built environment, Advance circular manufacturing, Transform the energy system, and Reduce waste generation and improve waste cycling—that can help the region significantly cut its material and carbon footprints, and substantially increase material circulation in the economy. It also presents key interventions to unlock new economic opportunities and boost job creation and formalisation in these key sectors.





2

SIZING LATIN AMERICA AND THE CARIBBEAN'S MATERIAL FLOWS

THE RESOURCE REALITY OF
MEETING SOCIETAL NEEDS

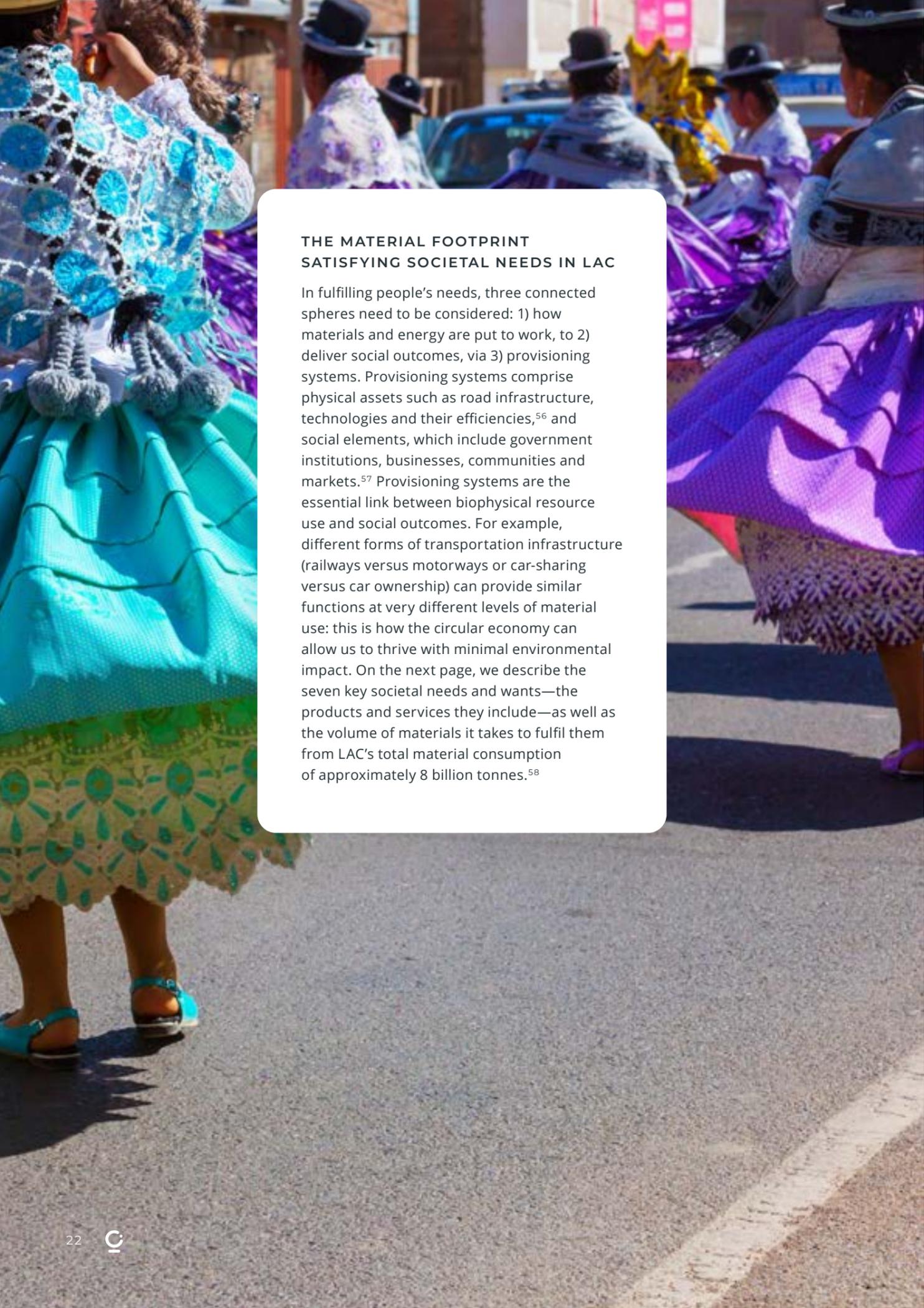
Latin America and the Caribbean (LAC) has a moderate material footprint, yet its consumption of secondary materials is very low. This chapter dives into the region's socioeconomic metabolism, exploring how materials are used—and at which proportions—to meet various societal needs and wants (see page 23). Key themes have emerged that illustrate how the region's economy relates to its material use: LAC exhibits very high domestic extraction, an export footprint twice the size of its import footprint, a biomass-dominated socioeconomic metabolism and significant stock build-up.

LATIN AMERICA AND THE CARIBBEAN'S SOCIOECONOMIC METABOLISM: MEASURING MATERIAL FLOWS AND ENVIRONMENTAL FOOTPRINTS

Societies consume materials and energy to operate, often referred to as their 'metabolism'. This analysis takes the socioeconomic metabolism of LAC—the way in which materials flow through the region's economy and are kept in long-term use to satisfy societal needs and wants—as the starting point for measuring its level of circularity. Knowing how materials are extracted, transformed, delivered, consumed and wasted in an economy is essential for identifying and addressing opportunities for a more circular economy. Figure one depicts LAC's socioeconomic metabolism, showing the amounts of materials (clustered into four key material groups) embodied in the inputs and outputs of highly aggregated industry groups (read more in Appendix B, on pages 110–111).

To ensure our data is in line with the reality of the region, Circle Economy used data from the Statistical Division of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC, known as CEPAL in Spanish and Portuguese) and other project partner initiatives such as the Inter-American Development Bank's (IDB) Waste and Circular Economy Hub for LAC. We make use of 2018 data from national statistical offices as well as a variety of other sources, including recognised international databases.

The analysis reveals an extractive, export-driven economy, with a few primary industries contributing the bulk of the material and carbon footprints. This is largely due to 1) highly material- and carbon-intensive international trade flows, primarily exports, and 2) systemic inefficiencies in how materials are used to satisfy societal needs, particularly in the case of Nutrition. LAC's domestic extraction, raw material exports, deforestation rates and territorial emissions are also strongly linked.



THE MATERIAL FOOTPRINT SATISFYING SOCIETAL NEEDS IN LAC

In fulfilling people's needs, three connected spheres need to be considered: 1) how materials and energy are put to work, to 2) deliver social outcomes, via 3) provisioning systems. Provisioning systems comprise physical assets such as road infrastructure, technologies and their efficiencies,⁵⁶ and social elements, which include government institutions, businesses, communities and markets.⁵⁷ Provisioning systems are the essential link between biophysical resource use and social outcomes. For example, different forms of transportation infrastructure (railways versus motorways or car-sharing versus car ownership) can provide similar functions at very different levels of material use: this is how the circular economy can allow us to thrive with minimal environmental impact. On the next page, we describe the seven key societal needs and wants—the products and services they include—as well as the volume of materials it takes to fulfil them from LAC's total material consumption of approximately 8 billion tonnes.⁵⁸

SEVEN SOCIETAL NEEDS & WANTS



HOUSING AND INFRASTRUCTURE
2,358 million tonnes (29% of total material consumption)

This includes the construction, maintenance and renovation of housing, other buildings and physical infrastructure—such as transport, communications, water and sanitation, and energy—with materials such as concrete and steel.



NUTRITION
2,069 million tonnes (26% of total material consumption)

Agricultural products such as crops and livestock are used to create food and drink products. These tend to have short life cycles in our economy, being consumed quickly after production.



MANUFACTURED GOODS
1,486 million tonnes (19% of total material consumption)

Manufactured goods consist of a diverse group of products—appliances, clothing, cleaning agents, personal-care products, paints and more—that generally have short to medium lifetimes in society. Textiles, for example, also consume many different kinds of material resources such as cotton, synthetic materials like polyester, dye pigments and chemicals. Manufactured goods belonging to other societal needs, such as vehicles and capital equipment for healthcare, are not included in this category.



MOBILITY
772 million tonnes (9.6% of total material consumption)

A considerable share of total material consumption is taken up by the need for mobility. Specifically, two material types are used: the materials used to build transport technologies and vehicles like cars, trains and aeroplanes and, most importantly, the fossil fuels used to power them.



SERVICES
724 million tonnes (9.1% of total material consumption)

Public services like government administration, and commercial services like banking and insurance, typically require the use of buildings, professional equipment, office furniture, computers and other infrastructure.



HEALTHCARE AND EDUCATION
453 million tonnes (5.7% of total material consumption)

Providing healthcare and education is crucial to improve quality of life. This requires materials for buildings and their operations—maintenance, heating, cooling and food services—as well as a wide range of medical and educational equipment, for example.



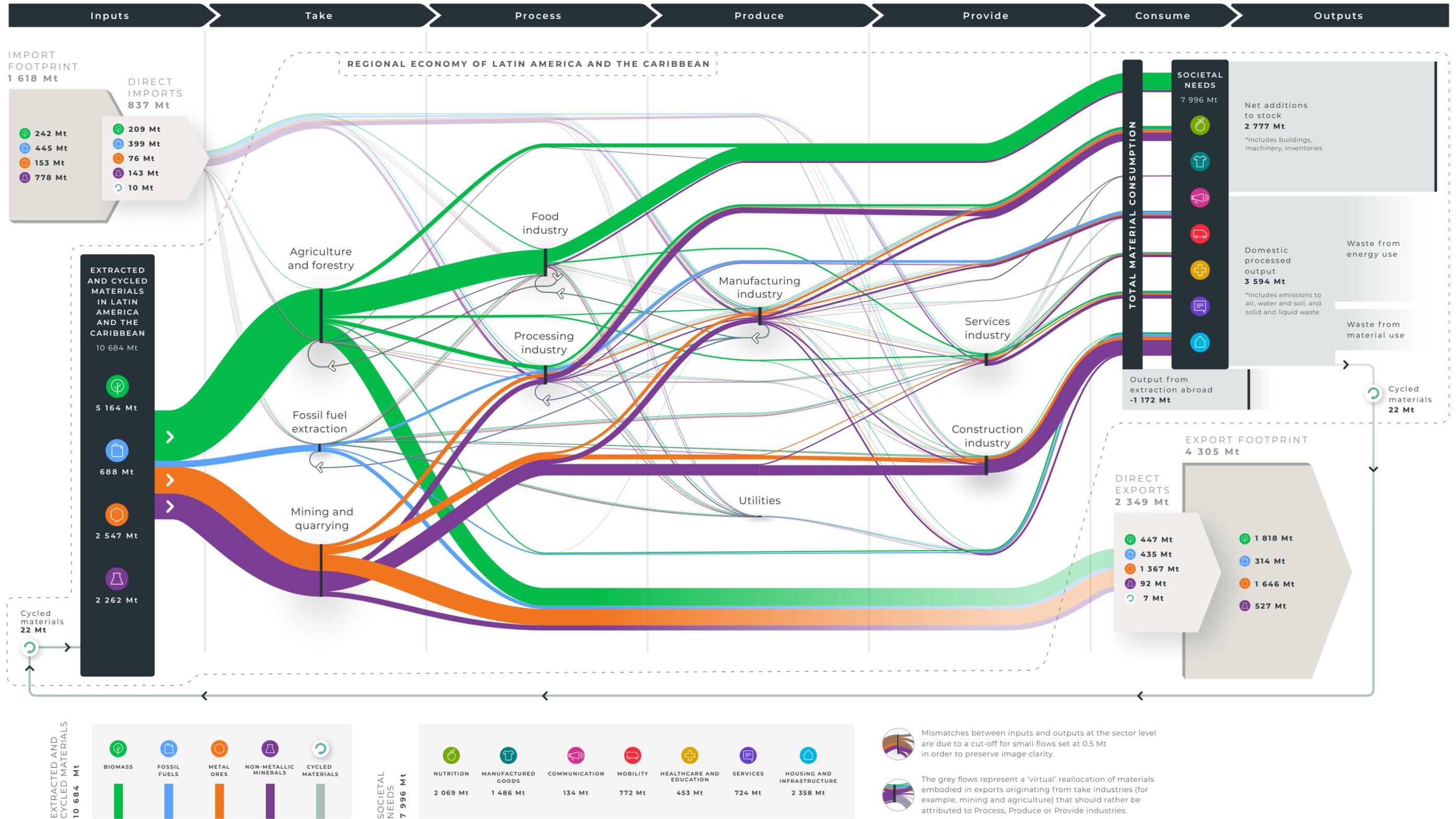
COMMUNICATION
1.2 million tonnes (1% of total material consumption)

Communication is an increasingly important aspect of today's society, provided by a mix of equipment and technology ranging from personal mobiles to data centres. Increased connectivity is also an enabler of the circular economy, where digitisation can make physical products obsolete or enable far better use of existing assets, including consumables, building stock or infrastructure—smart meters and teleconferencing instead of in-person meetings, for example.

**Figures may not sum to total due to rounding.*

X-RAY OF LATIN AMERICA AND THE CARIBBEAN'S ECONOMY

Figure one shows an X-Ray of LAC's economy: the relationship with the environment and the rest of the global economy as well as the materials that feed key societal needs.



	LAC TOTAL	LAC PER CAPITA	EU PER CAPITA	GLOBAL PER CAPITA
Domestic extraction	10,662 million tonnes	16.6 tonnes	10.3 tonnes	12.2 tonnes
Material footprint	7,974 million tonnes	12.4 tonnes	17.8 tonnes	11.9 tonnes
Carbon footprint	3,576 million tonnes of CO ₂ e	5.6 tonnes of CO ₂ e	9.5 tonnes of CO ₂ e	5.5 tonnes of CO ₂ e

Table one shows a comparison of regional and global figures for material extraction and consumption, as well as consumption-based emissions.

DOMESTIC EXTRACTION: HOW LATIN AMERICA AND THE CARIBBEAN EXPORT NATURE

Domestic extraction measures, in physical weight, the amount of raw materials extracted from the natural environment for use in the economy. It excludes bulk water and air. Domestic extraction is a robust proxy to measure domestic environmental impacts.

LAC is a global extractive centre of raw materials: in 2018, the region's domestic extraction totalled 10.7 billion tonnes of materials, or 16.6 tonnes per person, roughly a third higher than the global average of 12.3 tonnes per capita, per year. LAC is a substantial provider of raw materials to the global economy: while the region hosts around 8.3% of the global population, 11.2% of global raw material extraction occurs within its borders. High domestic extraction and a high share of exports indicate that global raw material demand places excessive pressure on the region's natural resources.^{59,60} Societies require raw material resources to support development and wellbeing, yet, ecological life support systems and key ecosystem services must be protected. These systems are essential to address adverse impacts on the region's territories and the livelihoods of its people.

Breaking down domestic extraction by material group reveals a rather unique composition. **Biomass** extraction, largely comprising a few commodities such as grass, straw, animal feed, soybeans, corn and wood, represents almost half (48%) of all materials extracted by weight. The extraction of **metal ores**, predominantly copper, iron, gold and silver, represents slightly less than a quarter (24%) of total domestic

extraction. **Non-metallic minerals**, commonly the most extracted material group, only comprise around a fifth (21%) of the total, although gravel and sand are the second most extracted commodities of all material groups.⁶¹ Lastly, **fossil fuels**, primarily crude oil and fossil gas, represent just 6% of total domestic extraction.

Approximately 40% of the materials extracted domestically (about 4.3 billion tonnes) are exported. Global value chains heavily rely on material extraction from LAC countries: around 60% of LAC's domestic extraction feeds into final domestic consumption. In comparison, around 80% of domestic extraction in the EU is used domestically.⁶² Direct exports stand at 2,349 million tonnes, with metal ores amounting to more than half, and biomass and fossil fuels making up almost all of the rest.⁶³ Meanwhile, the material footprint of these exports is 4,305 million tonnes. Biomass and metal ores claim four-fifths of the export footprint: 42% and 38%, respectively. The high export footprint also makes LAC one of the largest raw material exporters, both in absolute and per capita terms: the raw material equivalent of the region's physical trade balance stands at negative 2.7 billion tonnes or 4.2 tonnes per person.

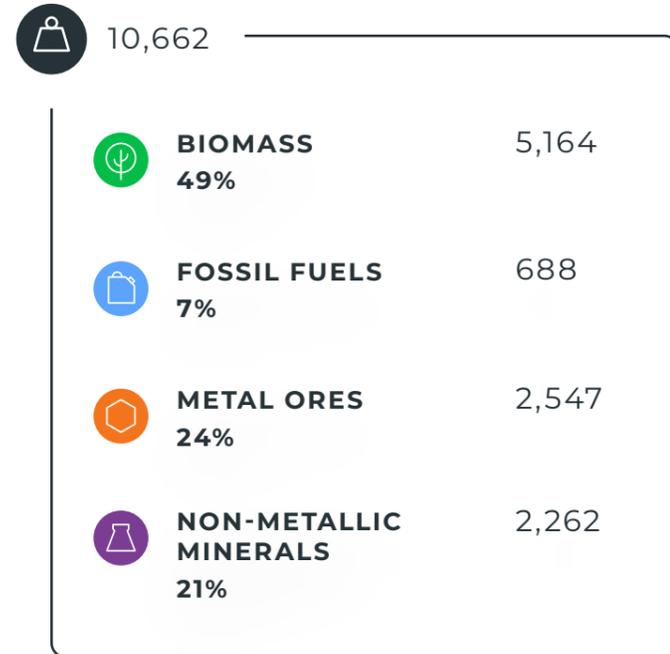
Looking to the past reveals how domestic extraction has rapidly accelerated, nearly quadrupling over the last 50 years⁶⁴ and outpacing the average global rate.⁶⁵ Extraction has increased in tandem with growth in the global economy: as economies grow, so does demand for raw material exports. This is especially true for the LAC region, which is deeply integrated into international commodity markets.⁶⁶ Raw material exports play a major role in the economies of most countries in the region. The results of this analysis thus reflect the reality of a primary-exporting economy and reveal the region as an exporter of nature (i.e. biophysical capacity) to the rest of the world.⁶⁷ Resource extraction has long been integral to the public and private sector's economic development strategies, rendering the region rather economically dependent on these raw material exports.⁶⁸ While the extraction of all material groups has grown (in absolute terms), the distribution has changed: biomass is still the largest material group, but its share of the total has decreased. In contrast, metal ores and non-metallic minerals have grown the most as a share of the total.

LAC's relatively low share of global Domestic Material Consumption also implies that modest changes in global material demand can have quite large effects on the region (transferred via trade).⁶⁹ This trade imbalance in material flows reveals the unequal ecological trade relationship of LAC with the rest of the world,⁷⁰ which has detrimental effects on economic development, the environment and the local population's wellbeing.⁷¹ Countries in LAC bear larger environmental loads and social liabilities than their trading partners.^{72,73} At the same time, LAC's specialised trade pattern involves the export of low-value primary goods and the import of high-priced manufactured goods. While relating physical trade to monetary trade is challenging, it is clear that if the economic costs of raw material extraction's social, environmental and productive impacts are accounted for—including local externalities and resource depletion—the economic benefits of these activities disappear.⁷⁴ These unequal exchanges extend beyond raw materials and GHG emissions and can also apply to other resources such as energy, land and labour.⁷⁵

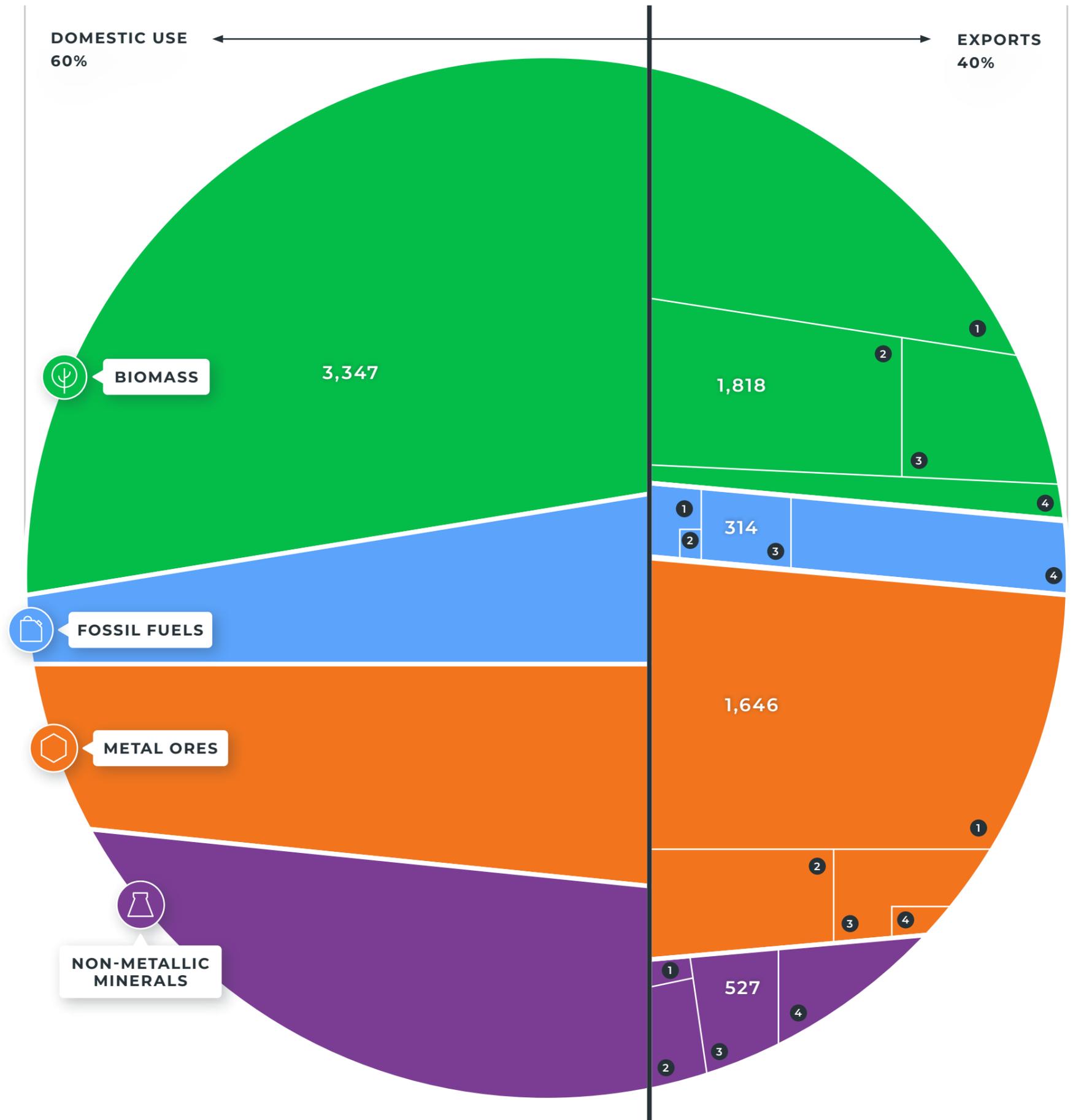
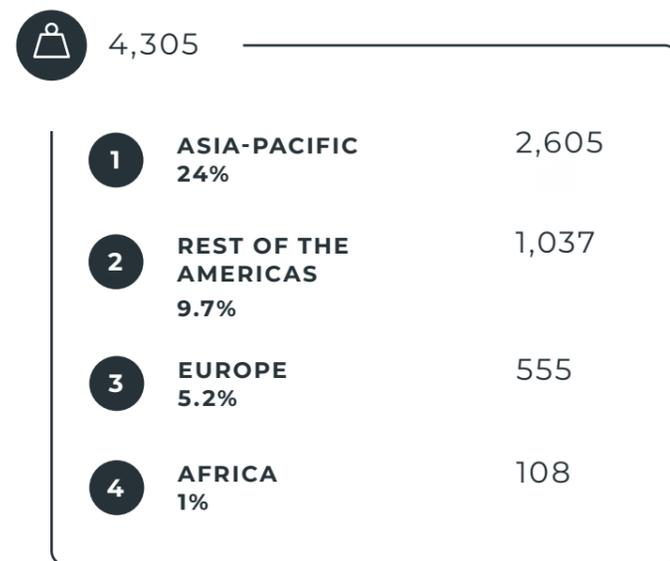
BREAKDOWN OF DOMESTIC MATERIAL EXTRACTION

(million tonnes)

TOTAL DOMESTIC EXTRACTION



SHARE OF DOMESTIC EXTRACTION EXPORTED



MATERIAL FOOTPRINT: MODERATE AND LARGELY SELF-SUFFICIENT

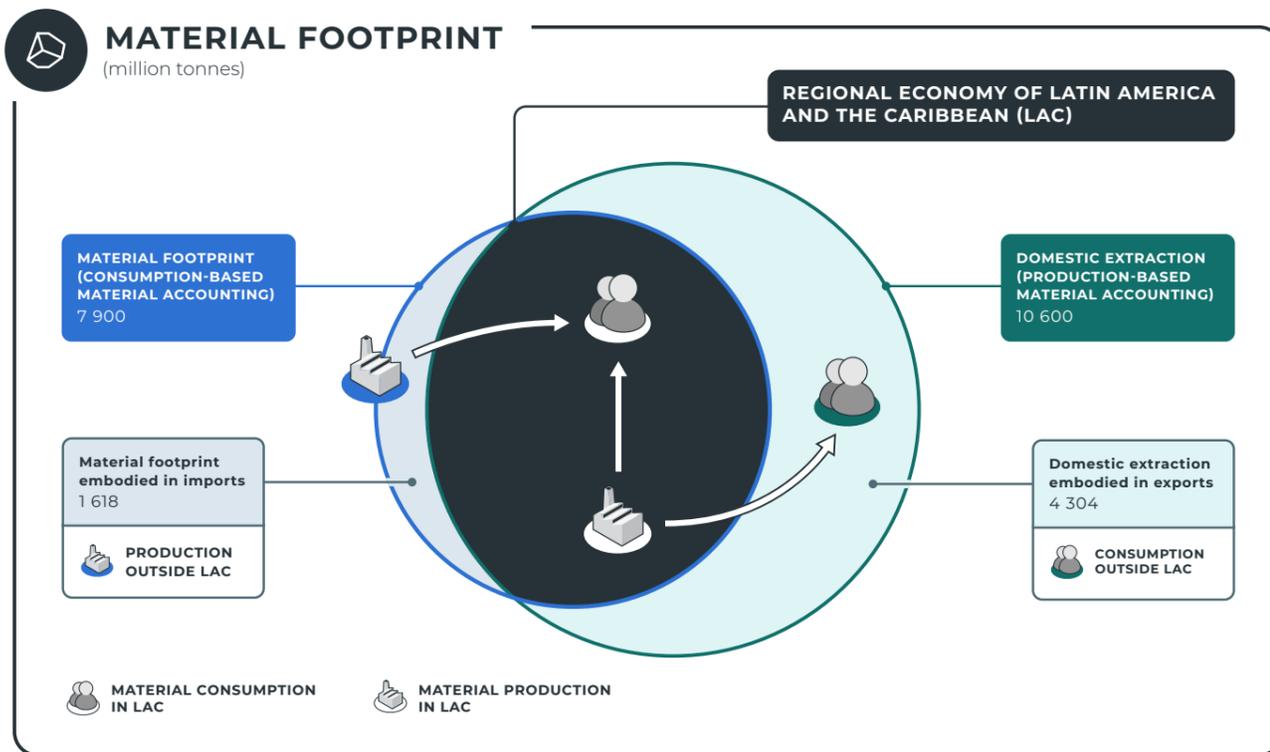
Consumption-based material flow accounting measures the amount of materials used to meet the consumption needs of a country or region, regardless of where the materials were extracted or where the products were produced. This approach accounts for the physical flows of materials embodied in imported products and excludes services and the flows of materials exported in the form of products and services. Thus, the material footprint, also referred to as Raw Material Consumption (RMC), is the total amount of raw materials extracted to meet the final demand of an economy. Additionally, imports and exports are considered both in their direct form (physical weight) as well as in terms of the material footprint embedded in them (in Raw Material Equivalents). The results of the material flow analysis thus show that LAC is an emerging, middle-income region.

The region appears to consume its 'fair share' of raw materials. LAC represents around 8.3% of the global population and is responsible for the same share of the global material footprint.^{76,77} In 2018, LAC's material footprint stood at approximately 8 billion tonnes.⁷⁸ This makes LAC's raw material consumption around 25% smaller than its domestic extraction, further highlighting the ecological pressures the global economy places on the region via trade.⁷⁹ While the per capita material footprint of 12.4 tonnes exceeds the estimated sustainable level of 8 tonnes per capita,⁸⁰ it is close to the global average of 12.2 tonnes per year.⁸¹ It is worth noting that this is a regional average; material footprints differ between countries depending on the structure and efficiency of each economy, income levels and population density.^{82,83} For example, the annual material footprint per capita of Brazil alone (18.3 tonnes per person per year) is almost double the average of Central America (10.1) or over three times that of the Caribbean (4.8).

The breakdown of the material footprint by material group largely mirrors that of domestic extraction. Biomass flows, closely linked to the Agrifood value chain, contribute the highest share of the total material footprint (45%). Non-metallic minerals—largely composed of flows of heavy materials commonly used by the construction sector, from cement to sand and gravel—represent nearly one-third (31.5%). Metal ores include flows of processed metals such as steel and copper, which are largely used in manufacturing and construction value chains. They represent around 13% of the material footprint. Fossil fuels, predominantly processed products with higher added value, such as refined petroleum and other derived products, still make up the smallest share of the material footprint (around 10%).

From a raw materials perspective, the region boasts a very high level of self-sufficiency. Only 20% of LAC's material footprint stems from raw material extraction abroad: around 80% of the material footprint comes from domestic extraction. However, this breakdown differs when examining individual material groups. LAC is self-sufficient for under half of its fossil fuels, 60% of its non-metallic minerals, and around 90% of its biomass and metal ores. In 2018, LAC directly imported 837 million tonnes of materials, primarily non-metallic minerals and fossil fuels. However, when the footprint of these imports is considered, the figure roughly doubles, with non-metallic minerals accounting for almost half of the import footprint. By region of origin, the bulk of the material footprint embedded in imports comes from Asia-Pacific (12% of the total material footprint) and the rest of the Americas (6.6%).

The heavy concentration in weight and structure of the material footprint's top contributing activities reflects the overall economic structure of the region. The top ten productive activities (out of 163) contribute 4.9 billion tonnes, approximately 61% of the total material footprint, which is significantly higher than other similar analyses typically report (40–45%). These activities are mainly from four sectors: Agrifood, Construction, Manufacturing and Processing, and, to a lesser extent, Services. This composition varies from more industrialised economies, where service sectors are more dominant. The LAC region is strongly based on a few material-intensive, export-oriented industries and features a mix of highly productive and more subsistence-based systems, with exports heavily reliant on a small set of commodities.⁸⁴ The industrial sector suffers from a lack of diversification and minimal sectoral interconnectivity,⁸⁵ further intensifying the concentration of material use and environmental impacts.



Measuring the material impact of an economy depends on the perspective from which the material flows are measured. Figure three provides a schematic depiction of the difference between a consumption and a production perspective in material flow accounting.

CARBON FOOTPRINT: AN INCREASINGLY ERODED GLOBAL CARBON SINK

Consumption-based carbon footprinting measures the GHG emissions generated by the consumption of goods and services, regardless of where they are produced. This approach provides a more comprehensive view of an economy's contribution to global emissions and helps identify the carbon footprint of consumption patterns, which may differ significantly from production patterns (which only consider emissions generated within a territory's borders). By accounting for the emissions embodied in imports and exports, carbon footprinting can provide a more accurate picture of a country or region's contribution to global emissions and identify opportunities to reduce emissions and improve environmental performance.

In 2018, LAC's consumption-based carbon footprint stood at 3,576 million tonnes of carbon dioxide equivalent (CO₂e), or 5.6 tonnes per capita (in line with the global average of 5.5 tonnes per capita, per year). It is important to note that the per capita figure is an average: it hides important inequalities within and between countries in the region. For example, in 2018, the carbon footprint per capita of the top 10% of LAC emitters stood at 19.2 tonnes of CO₂e, almost four times the regional average, and almost ten times higher than the average of the bottom half of the population in the region.⁸⁶

Of the total carbon footprint, almost two-thirds (65% or 2,322 million tonnes of CO₂e) stemmed from domestic consumption.⁸⁷ Land use, Land-use change and Forestry (LULUCF) emissions (384 million tonnes of CO₂e or 11%), imports (609 million tonnes

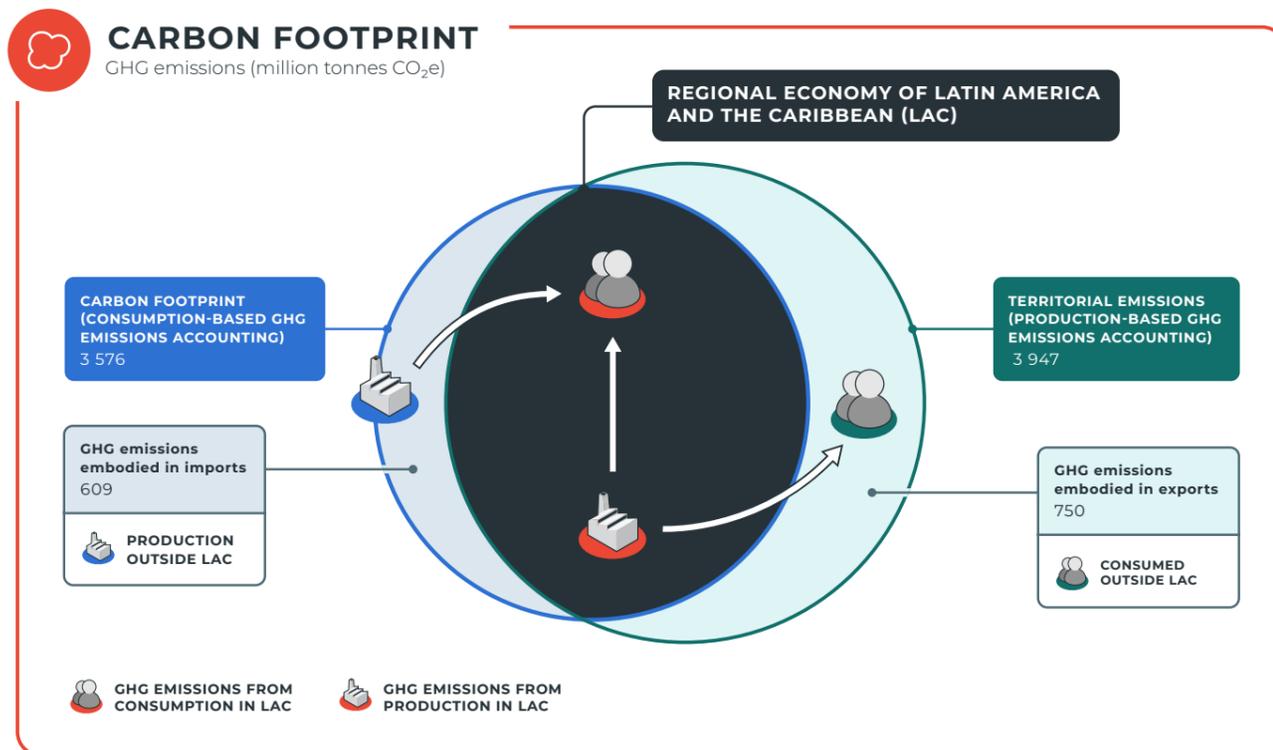
of CO₂e or 17%),⁸⁸ and direct household emissions (261 million tonnes of CO₂e or 7.2%) comprised the rest. Taking a consumption-based approach reveals the imbalance between LAC's share of the global population (8.4%) and that of the global (anthropogenic) carbon footprint (7.2%).^{89, 90} This indicates that LAC is a carbon sink for its trading partners, which use the region's natural resources to absorb carbon emissions, allowing them to continue emitting GHGs without fully bearing the environmental costs.⁹¹

Excluding LULUCF emissions, the top ten productive activities (out of 163) contribute to approximately half (49%) of the total carbon footprint, totalling 1,750 million tonnes of CO₂e. Including LULUCF emissions, the top ten contributing activities would make up around 60% of the carbon footprint. The top ten productive activities fall into four sectors: Energy, Agrifood, Households and Government, and Construction. Four activities from the **Energy** sector account for around 659 million tonnes of CO₂e (18.4% of the total carbon footprint): Production of electricity by gas and oil derivatives, Petroleum refinery and Chemicals. Three industries within **Agrifood** account for 504 million tonnes of CO₂e (14.1%): Processing of meat cattle, Cattle farming and Processing of dairy products.⁹² A combination of activities by **Households and Governments** account for 390 million tonnes of CO₂e (11%), such as transport and heating. Finally, the **Construction** sector is highly carbon-intensive. The Building industry is the fourth largest single activity, contributing 196 million tonnes of CO₂e (5.5%). The sector's contribution to the carbon footprint differs from that of high-income, industrialised countries in other world regions, where secondary and tertiary sectors (such as manufacturing and utilities) are more predominant than primary sectors, such as agriculture.

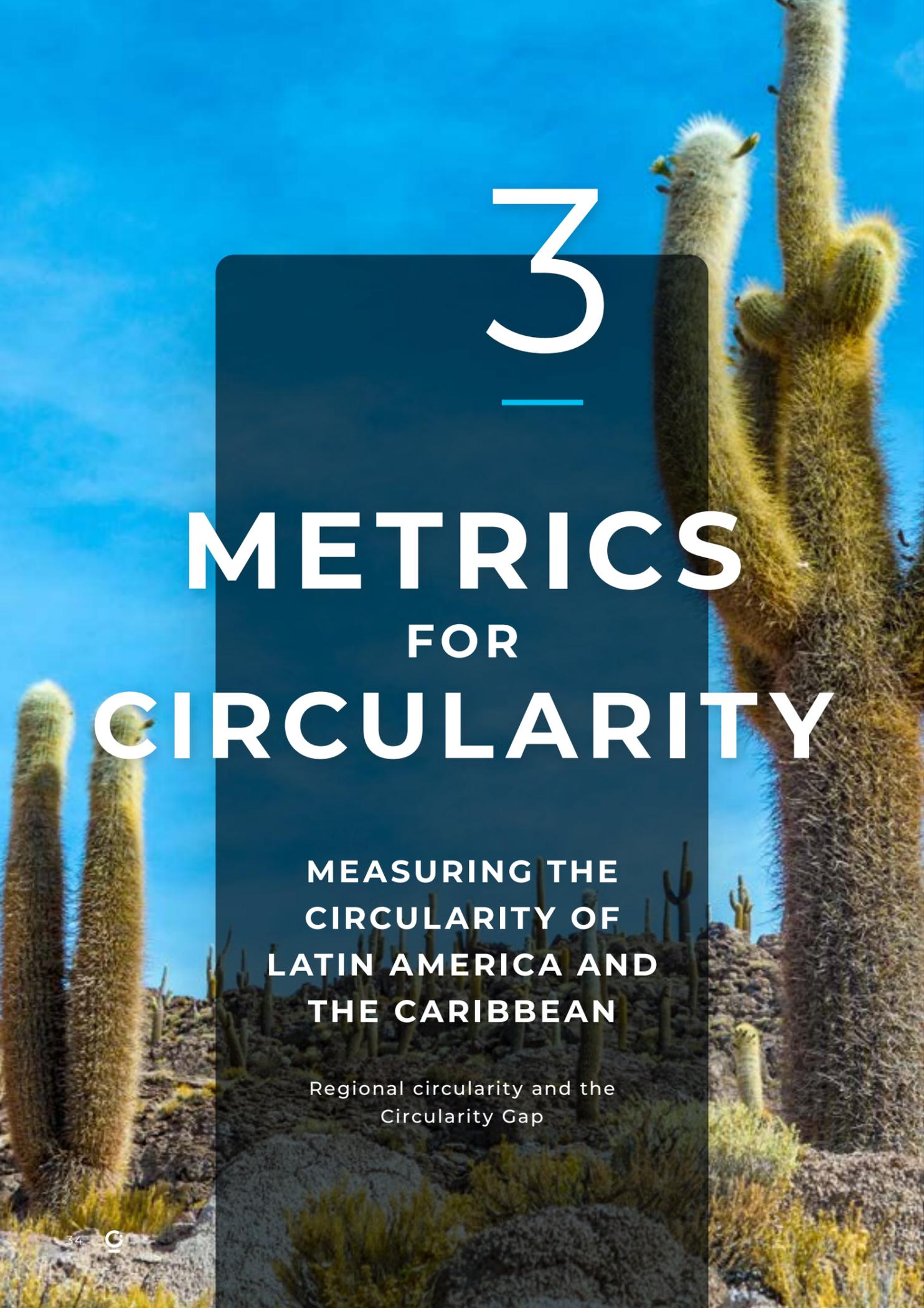
Looking at territorial emissions paints a different picture. In 2018, LAC was responsible for approximately 10% of global GHG emissions, a significant jump from its 5.5% contribution in 2000.⁹³ Territorial emissions stood at 3,947 million tonnes of CO₂e (6.2 tonnes of CO₂e per capita), approximately 10% larger than its consumption-based carbon footprint. This indicates that the region emits GHG emissions to satisfy material demand from the rest of the world, which imports carbon-intensive products. This dynamic is reflected in the carbon

intensity of the region's exports, which amounted to 750 million tonnes of CO₂e, almost a fifth (19%) of territorial emissions. Asia-Pacific, with 396 million tonnes CO₂e (53%), and the Rest of the Americas, with 236 million tonnes CO₂e (32%), were responsible for the bulk of LAC's carbon footprint embodied in exports. In fact, the carbon footprint of LAC's exports has steadily grown during the past two decades,⁹⁴ indicating an increasing offshoring of environmental pressures by the region's trading partners.

Land use changes and agricultural activities weigh significantly in LAC's GHG emissions structure, a notable difference in composition compared to the rest of the world. While the energy sector is still the leading driver of emissions globally, it accounts for 43% of GHG emissions in LAC, well below the world average of 74%.⁹⁵ This difference reflects the region's cleaner energy sources compared to most other regions. LULUCF emissions amounted to 614 million tonnes of CO₂e (15.5% of territorial emissions), 50% higher than their contribution to the consumption-based carbon footprint. This indicates once more how demand from abroad (particularly for carbon-intensive beef) significantly drives territorial emissions, deforestation and other land-use changes, as well as other environmental impacts such as biodiversity loss.^{96, 97} Additionally, if we were to include Agriculture, Forestry, and Other Land Use (AFOLU) emissions,⁹⁸ the region stands out for its large share of net GHG emissions (45% of the total territorial emissions of the region), compared to the world average of 14%, and significantly higher than the 15.5% contribution estimated from LULUCF emissions. This also shows that the LAC region holds the highest absolute and per capita AFOLU emissions of any world region.⁹⁹



Measuring the carbon impact of an economy depends on the perspective from which GHG emissions are measured. Figure four provides a schematic depiction of the difference between consumption and production perspectives to carbon accounting.



3

METRICS FOR CIRCULARITY

MEASURING THE CIRCULARITY OF LATIN AMERICA AND THE CARIBBEAN

Regional circularity and the
Circularity Gap

Measurements are critical to understanding the world around us. In the first edition of the global *Circularity Gap Report* in 2018, Circle Economy launched the Circularity Metric for the global economy. The analysis in this report adapts the Metric to a regional level for the first time and applies it to Latin America and the Caribbean (LAC). This chapter explains how this report has assessed the region's circularity, introduces supporting metrics that help to quantify the material flows that contribute to the Circularity Gap and highlights how these metrics can continue to change based on data availability. These insights provide an initial assessment of material flows and circular opportunities to help shape a departure point for LAC's circular journey. By measuring circularity in this way, national governments and other actors, including businesses, can track circular performance over time, put trends into context and engage in coordinated goal-setting.

THE CIRCULARITY METRIC EXPLAINED

To measure circularity with one figure, we have to reduce the complexity of material flows significantly. This analysis takes the socioeconomic metabolism of a system—how materials flow through the economy and are used over the long term—as the starting point. This approach builds on and is inspired by the work of Haas et al. (2015)¹⁰⁰ and expands upon the approach applied in all other *Circularity Gap Reports*. Taking an 'X-ray' of the economy's material use, this report considers six fundamental dynamics of what the circular economy transition aims to establish and how it can do so. This translates into two core objectives and four strategies, based on the work of Bocken et al. (2016):¹⁰¹

- **Objective one:** Material extraction from the lithosphere is minimised, and biomass production and extraction is regenerative;
- **Objective two:** The dispersion and loss of materials are minimised, meaning all technical materials have high recovery opportunities, ideally without degradation and with optimal value retention; emissions to air and dispersion to water or land is prevented; and biomass is optimally cascaded.

The four strategies we can use to achieve these objectives are:

- **Narrow flows—Use less:** The amount of materials (including fossil fuels) used in the manufacture and/or use of a product or the delivery of a service is decreased. This is done by solving systemic inefficiencies and revamping provisioning systems through principles such as circular design, sufficiency¹⁰² or increasing the usage rates of materials and products. **In practice:** Climate-smart and resource-efficient urban planning, cultivated meat, sharing and rental models that increase product utilisation whilst decreasing the total number of products needed, material lightweighting (mass reduction), design for durability, multifunctional products or buildings, and energy efficiency.
- **Slow flows—Use longer:** Material use is optimised as the functional lifetime of goods is extended. Durable design, materials and service loops that extend life, such as repair and remanufacturing, contribute to slowing extraction and use rates. **In practice:** Durable material use, modular design, design for disassembly, reuse, repair, remanufacturing, refurbishing, renovation and remodelling over building new structures and products.
- **Regenerate flows—Make clean:** Production processes, for example, in agriculture, are replaced with regenerative and circular practices that increase, or at the very least maintain, value in natural ecosystems. Fossil fuels, pollutants and toxic materials are also replaced with renewable sources. **In practice:** Regenerative and non-toxic material use, renewable energy deployment, regenerative agriculture and aquaculture.
- **Cycle flows—Use again:** The reuse of materials or products at end-of-life is optimised, facilitating a circular flow of materials. This is enhanced with the improved collection and reprocessing of materials and optimal cascading by creating value in each stage of reuse and recycling. **In practice:** Design for cyclability (both technical and biological), design for disassembly, reuse and recycling.

While each of the four strategies is important, their deployment may lead to potential overlaps or even anti-synergetic effects. For more information on how these strategies affect each other in practice, refer to Appendix B on pages 110–111.

Ultimately, by solving systemic inefficiencies in the provision of goods and services, strategies to narrow, slow, regenerate and cycle material flows can lead to fewer materials being used to provide for similar societal needs. By extending material lifespans and making reuse more effective, the total amount of materials used by the economy will drop—reducing environmental impacts. For the Circularity Metric to capture this crucial process, we measure the share of materials that are cycled back into the regional economy after the end of their useful life (secondary materials) as a share of the total material consumption.

The Circularity Metric is an 'input-focused' metric and captures circularity in one number. Communicated as a percentage, it is a relative indicator of how well an economy balances sustaining material-based societal needs and wants with materials that already exist in the economy. The value of this approach is that it allows us to track changes over time, measure progress and engage in uniform goal-setting, as well as compare

countries and regions' circularity against each other as well as to the global level. It also provides guidance as to how LAC can become more circular.

DYNAMICS INFLUENCING THE CIRCULARITY METRIC

Applying the Circularity Metric to the global economy is relatively simple, largely because there are no exchanges of materials in and outside of planet Earth. For countries and regions, however, trade dynamics introduce complexities to which the Metric must be adapted, resulting in certain methodological choices.¹⁰³ These are:

1. **A consumption-based perspective is taken.** This means only domestically consumed materials are considered, and exports are excluded. This presents limitations for LAC, as approximately 40% of domestic extraction is exported.
2. **Demand-based indicators are used.** This allows for a reallocation of environmental stressors from producers to final consumers, which ensures that resource depletion is allocated to countries based on their roles in driving production through their consumption. This

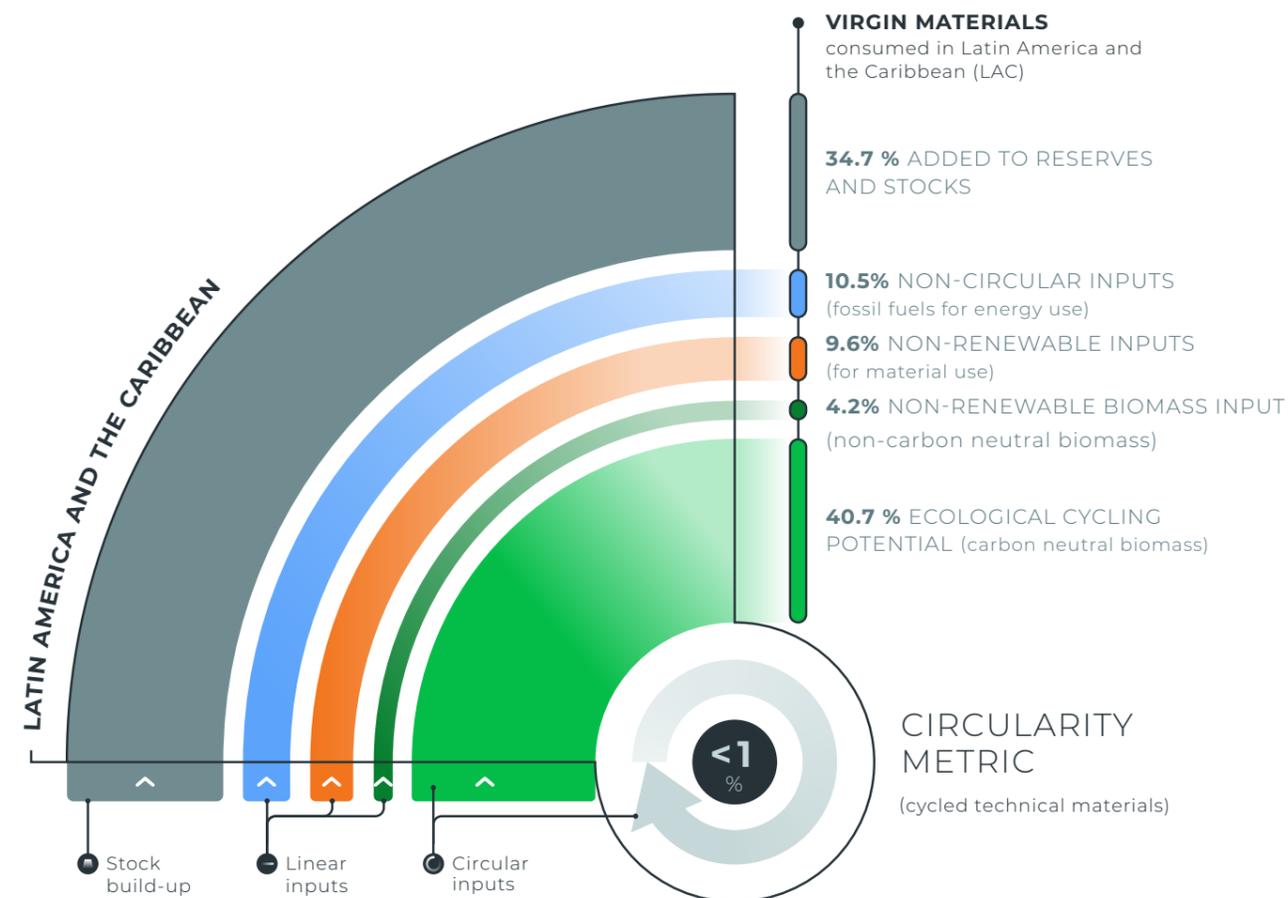


Figure six shows the full picture of circular and linear inputs as well as stock build-up, which together make up LAC's Circularity Indicator Set.

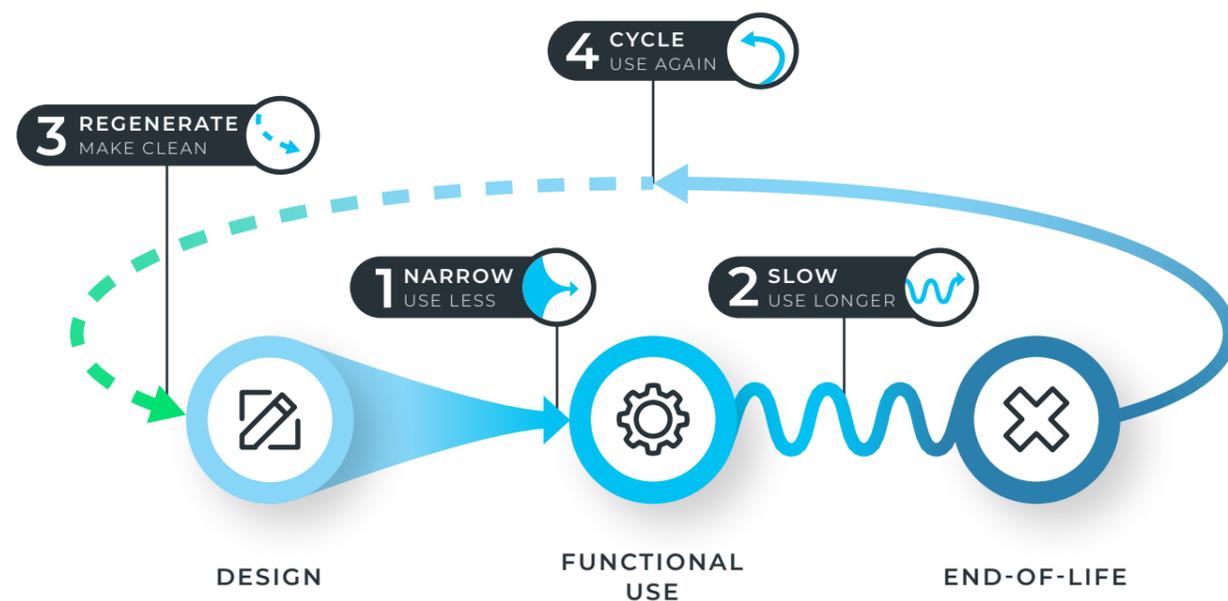


Figure five depicts the four flows to achieve circular objectives: narrow, slow, regenerate and cycle.

ensures transparency for countries with high import levels and highlights the importance of reducing aggregate demand.

3. **Imports and exports are considered in terms of their Raw Material Equivalents (RME).** This allows for a more accurate interpretation of the true impact of finished and semi-finished products. Learn more about RMEs on page 110.
4. **Waste imported from abroad for reuse is included in the calculation of the Circularity Metric.** The national or regional economy under study is credited for using secondary materials recovered from former 'waste'. LAC has a positive net physical trade balance of 3.3 million tonnes of recyclable waste.

For a more detailed explanation of these choices, please refer to Appendix D on pages 111–112.

INSIDE LATIN AMERICA AND THE CARIBBEAN'S CIRCULARITY GAP

We account for 100% of inputs into the economy in our Circularity Metric Indicator Set, which includes Circular inputs, Linear inputs and Stock build-up. This allows us to refine our approach to closing the Circularity Gap in a particular context and answer more detailed and interesting questions: how much biomass is LAC extracting domestically, and how sustainable is it? How dependent is LAC on fossil fuels? How much material is added to LAC's stock, such as buildings and roads, every year? The following categories are based on the work of Haas et al. (2020).¹⁰⁴

CIRCULAR INPUTS

Circularity Metric (<1%)

This refers to the share of secondary materials in the total consumption of an economy (cycled technical materials). These materials are items that were formerly considered waste but are now cycled back into use, including recycled materials from both the technical (such as recycled concrete and metals) and biological cycles (such as paper and timber). In LAC, secondary material use stands below 1% of total material use. This is well below the global average of 7.2%.¹⁰⁵ Crucially, the limited availability and reliability of waste management data for LAC countries, partly due to the prevalence of informality in these activities, hinder a more accurate calculation of secondary material use. Another limitation stems from the fact that renewable energy sources, which are high for the region, are not captured by the Circularity Metric.

Ecological cycling potential (40.7%)

While biomass *products*, such as timber and wood, are included in the Circularity Metric, Ecological cycling concerns *primary* biomass such as trees, manure, food crops and products, or agricultural residues flowing through an economy. To be considered ecologically cycled, biomass should be wholly sustainable and circular. Meaning that it must, *at the very least*, be carbon neutral and guarantee full nutrient cycling—allowing the ecosystem's biocapacity to remain the same. Because detailed data on the sustainability of primary biomass is not available, to estimate the Ecological cycling potential in LAC we can look at the overall carbon balance of the economy's biomass. If the amount of carbon that is emitted by Land Use, Land Use-Change and Forestry (LULUCF) activities is equal to the amount of carbon 'absorbed' by the economy through primary biomass consumption, then all consumed biomass could be considered carbon-neutral. In LAC, around 40% of biomass falls into this bracket.

WHY IS ECOLOGICAL CYCLING POTENTIAL NOT INCLUDED IN THE CIRCULARITY METRIC?

While carbon neutrality is necessary for biomass to be considered sustainable, it is not the only condition: nutrients must be fully circular as well. As of yet, methodological limitations exist in determining full nutrient cycling. To this end, in line with past *Circularity Gap Reports*, Ecological cycling potential is excluded from the calculation of LAC's Circularity Metric, even though this could boost the region's circularity rate to approximately **40%**. For all reports, we take a precautionary stance by excluding nutrient cycling. This is due to the fact that the accuracy of the impact on the Metric cannot be guaranteed. For example, biomass extracted in LAC cannot be tracked to its final end-of-life stage, so it is not possible to ensure that the nutrient cycle is closed. If sustainable biomass management was the norm, carbon neutrality would be ensured, and the nutrient cycle closed, circularity could be significantly boosted. Ensuring the circular management of biomass is a key avenue for LAC to increase its circularity. personal devices to data centres.

LINEAR INPUTS

Non-renewable biomass inputs (4.2%)

This metric indicates the share of primary biomass inputs that are not carbon-neutral. As long as LULUCF emissions are positive, a share of biomass is certainly carbon emitting as not all CO₂ is being sequestered through consumption (CO₂ embedded in biomass in Domestic Material Consumption). For LAC, such biomass represents around 4.2% of total material consumption, largely due to emissions from changes in land use (mainly deforestation).¹⁰⁶ Given the enormous level of biomass extraction, many renewable resources, such as forestry and fertile soil, become non-renewable because the extraction rate is much higher than the ecological renewal rate. Latin America has the highest absolute and per capita Agriculture, Forestry, and Other Land Use (AFOLU) greenhouse gas (GHG) emissions of any world region.¹⁰⁷ Additionally, an estimated 13% of the original Amazon forest—the world's largest rainforest—has been lost,¹⁰⁸ and currently acts as a net carbon source: it emits more GHGs than it absorbs.¹⁰⁹ The Amazon is also rapidly approaching a tipping point, converting from a lush tropical forest into a dry, degraded savannah.¹¹⁰

Non-renewable inputs (9.6%)

Non-renewable inputs into the economy—those that are neither fossil fuels nor non-cyclable ecological materials—include, amongst others, the metals, plastics and glass in consumer products. These are materials that can potentially be cycled, but are not (both in LAC and abroad). LAC's Non-renewable input rate stands at 9.6%, below the global average of 15%.¹¹¹

Non-circular inputs (10.5%)

This category centres on fossil fuels for energy use. Fossil-based energy sources, such as petrol, diesel and natural gas, are inherently non-circular: they are burned and emitted into the atmosphere as GHGs. As they combust and disperse, circular economy strategies such as cycling and regenerating are not applicable as the loop cannot be closed or 'cleaned'. However, circular strategies that narrow and regenerate flows will inherently reduce emissions. At 10.5%, LAC's rate of Non-circular inputs is significant, although well below the global average of 14.6%. The vast majority (94%) of all fossil fuels used were consumed for energy purposes, such as powering transport and industry and electricity generation, as opposed to other industrial uses, such as chemical production.¹¹²

STOCK BUILD-UP

Net additions to stock (34.7%)

Stocks form a direct connection between basic services and the flows of materials and energy, making them a primary determinant of material flows. However, building, maintaining and refurbishing these stocks requires significant amounts of materials and energy, especially across resource-intensive sectors such as manufacturing and construction. The configuration and quantity of these stocks are crucial factors in determining material demand, future waste flows and (re) cycling potential. At roughly 35% of total material consumption, LAC's **stocking rate** is higher than other countries for which we've measured this indicator but lower than the global average of 38.2% (which is largely driven by rapid stock build-up in emerging economies, primarily in East Asia).^{113,114}

This indicates that although the stock is expanding rapidly in LAC, it is doing so at a lower rate than other emerging regions. In absolute terms, Net additions to stocks amounted to 3.6 billion tonnes (3.7 tonnes per person per year, compared to the global average of 5). 3.8 billion tonnes of raw materials were added to the socioeconomic stocks, while an estimated 160 million tonnes were depleted from the stocks in the form of end-of-life waste.¹¹⁵

STOCKS AND FLOWS: IF CONTINUED STOCK BUILD-UP IS INEVITABLE— SHOULD IT BE CONSIDERED PART OF THE 'GAP'?

Many of the raw materials extracted worldwide accumulate in stocks such as buildings, infrastructure and machinery. Stocks form the physical infrastructure to provide vital services such as shelter, mobility and communication. This stock build-up is not inherently bad; material stocks are essential for societies and economies to function and are a prime example of how materials are used to provide social benefits. These materials do, however, remain locked away and are not available for cycling—therefore weighing down the Circularity Metric.

For LAC, stock build-up will continue to be necessary as the population grows, the provision of new, decent housing and public services is secured, and renewable energy and transport infrastructure development continues to expand. For these reasons, it may be argued that Net additions to stocks should not be considered part of the Circularity Gap. If all the materials locked into stock were not considered part of the

full Indicator Set, the Circularity Metric would increase substantially. By employing circular strategies, such as circular design and lifetime extension, we would expect to see the rate of stock build-up decrease.

Nevertheless, the Circularity Metric is ultimately a measure of what is cycled—not just what is circular—and materials added to stock can't be cycled for decades, if not more. What's more, the circularity of materials added to stocks cannot be ensured: it is not always clear which portion of these materials are designed and used with cycling in mind or to what extent they are regenerative and non-toxic, for example. The bottom line is that the built environment consumes a huge volume of materials: its impact on LAC's overall consumption should not be ignored, especially given crucial resource depletion and decarbonisation concerns. The role of circular strategies in optimising Net additions to stock for circularity—and decreasing material consumption overall—is critical, as it helps reduce total material demand as well as waste and emissions generation in a circular economy.¹¹⁶

CIRCULARITY METRIC INDICATOR SET	LATIN AMERICA AND THE CARIBBEAN	GLOBAL AVERAGE
Circular inputs		
Circularity Metric	<1%	7.2 %
Ecological cycling potential	40.7 %	21.2 %
Linear inputs		
Non-renewable biomass	4.2 %	3.8 %
Non-circular inputs	10.5 %	14.6 %
Non-renewable inputs	9.6 %	15 %
Stock build-up		
Net additions to stock	34.7 %	38.2 %

Table two provides a comparison of the Circularity Indicator Set for Latin America and the Caribbean and the global economy. Figures may not add up due to rounding.

PRACTICAL CHALLENGES IN QUANTIFYING CIRCULARITY

Providing a baseline measurement for circularity based on material flows offers many advantages. It can be used as a call to action and can guide legislative action and targets. But the circular economy is full of intricacies, and capturing it in one number is difficult without making some crucial simplifications. However, these simplifications do result in limitations that must be considered.

1. **There is more to circularity than (mass-based) cycling.** The Metric focuses on one aspect of circularity, but as seen from the examination of the four flows, there are other crucial aspects to circularity: namely, using less, using longer and regenerating natural systems. Additionally, this set of metrics does not measure its relation to biodiversity loss, pollution, toxicity and so on.

2. **Data quality isn't always consistent.** Data on the end-of-life stage of materials can vary between countries and can often be weak. This has proven especially challenging for LAC given the regional approach to the analysis as well as limited data availability.
3. **We consider relative, not absolute, numbers.** This means that if cycling increases faster than raw material consumption, the Metric will improve—even if the ultimate goal is for total material consumption to decrease.
4. **Achieving 100% circularity isn't feasible.** Cycling has technical and practical limits, and some materials will always be required for stock build-up. Some materials, like fossil fuels, are also inherently non-circular and cannot be cycled.

For more details on these points, please refer to Appendix E on page 112.

CHALLENGES FOR MEASURING CIRCULARITY IN LATIN AMERICA AND THE CARIBBEAN: FROM SPARSE DATA TO HIGH LEVELS OF INFORMAL WORK

Across the 33 countries that make up the region, data availability and quality vary greatly. Although many circular economy initiatives exist across LAC countries, consistent monitoring and reporting for circularity has yet to occur. Data is often incomplete, inconsistent or outdated: standardisation across countries is lacking, and data collection systems and methodologies are often fragmented. Many LAC countries may also have limited resources and capacity to carry out data-gathering activities—as well as comprehensive analyses of material flows. Without reliable data, it's difficult to understand the current state of resource use and waste generation, identify priority sectors for intervention, and design effective policies and initiatives.¹¹⁷ Some governments—in Colombia, Chile and Uruguay, for example—are already making moves to report on data related to the circular economy.¹¹⁸ Building on these best practices to develop comprehensive, integrated policies that support the circular transition will be a crucial next step. Strengthening the capacity to collect and analyse data on material

flows, national accounts and waste management could involve improved collection systems and methodologies—promoting the standardisation and harmonisation of data across countries and sectors, and investment in developing human resources and technical capabilities. Statistics on the efficiency of production processes must also be collected to complement those on material flows, shedding light on how resources are optimally transformed into social benefits.

The prevalence of informal economic activities—estimated at around 50% of the region's employment—also poses a significant challenge to scaling circularity.¹¹⁹ Within this context, informal waste collectors and recyclers take on a large part of the region's waste management efforts yet aren't formally integrated into the waste management system.¹²⁰ This makes their inclusion in circular economy initiatives difficult. Integrating informal workers into formal waste management systems could help boost efficiency and sustainability—and, if done well, could provide these workers with recognition, security and protection. This research estimates that approximately two-thirds of total waste generated remains unaccounted for or unreported in official statistics (learn more about this in the [Methodology document](#)).



4

BRIDGING LATIN AMERICA AND THE CARIBBEAN'S CIRCULARITY GAP

'WHAT-IF' SCENARIOS FOR
KEY SECTORS

After deep diving into Latin America and the Caribbean's (LAC) material and carbon footprints, presenting the Circularity Metric Indicator Set and investigating the key themes of the economy, it's possible to explore pathways for change. In this chapter, five scenarios across key sectors explore the 'what-if', ultimately sketching a future for a more circular LAC that's resource-light, low-carbon and wellbeing-focused. These scenarios explore a potential path forward for LAC, outlining which sectors and interventions could be the most impactful in reorienting the material and carbon footprints of the region and increasing secondary material consumption.

BRIDGING THE CIRCULARITY GAP: 'WHAT IF' SCENARIOS

Scenarios in the *Circularity Gap Reports* are largely free from the constraints of law or political realities. They are deliberately non-time-specific and exploratory. This approach allows us to freely imagine what society could look like with truly transformational change: a close to fully circular economy. On the global level, and for many nations, a few sectors have the biggest environmental and socioeconomic impact and are thus key leverage points for impactful change.

The selected scenarios span five key sectors of the regional economy. These scenarios are 1) Shift to a circular food system, 2) Build a circular built environment, 3) Advance circular manufacturing, 4) Transform the energy system, and 5) Reduce waste generation and improve waste cycling. While the first four scenarios focus primarily on tackling systemic inefficiencies to satisfy social needs at a lower environmental footprint, the fifth scenario explores revamping waste management to increase secondary material consumption. Although we cannot quantify the impact of strategies in all of these areas for the entire LAC region, we can assume the biggest leverage points will exist within these five sectors based on the research conducted. All five scenarios explore changes in the links between 1) the economic and financial dimension (monetary flows, financial transactions and capital accumulation), 2) the material and biophysical dimension (aggregate material throughput, infrastructure and stock expansion) and 3) the sociocultural dimension (desires, efficiency, employment and productivity).

The scenarios are informed by and developed based on the ultimate aims of slowing, narrowing, cycling and regenerating material flows, as described on page 35. Additional environmental and social co-benefits are also explored.

1. SHIFT TO A CIRCULAR FOOD SYSTEM

LAC's agricultural systems play a key societal role: feeding a rapidly increasing global population and facilitating regional economic development. LAC is an agricultural powerhouse: it's the largest net food exporting region worldwide, producing almost a quarter of all meat consumed globally. Brazil alone is the fourth largest food producer in the world.¹²¹ The sector has also contributed to economic growth and diversification, employment generation and poverty reduction in the region.¹²² However, this positive image only paints a partial picture of reality. While LAC's agriculture and food systems have achieved remarkable success in increasing output and productivity, they have also imposed considerable social and environmental burdens, threatening long-term economic viability.¹²³ For example, greenhouse gas (GHG) emissions and biodiversity loss stemming from agriculture are impacting key ecosystem services, such as pollination, soil health and favourable weather patterns, which are crucial for the sector's success.

The food system is the largest driver of environmental damage worldwide.¹²⁴ It barrels past several planetary boundaries,¹²⁵ from climate change to biodiversity loss,¹²⁶ contributing one-third of total GHG emissions¹²⁷ and taking hold of nearly 40% of total landmass to grow crops, graze livestock and produce animal feed.¹²⁸ In LAC, agriculture uses more than one-third of the region's land area, consumes almost three-quarters of its freshwater resources and is responsible for 46% of its GHG emissions.¹²⁹ Meanwhile, despite the region's significant food surpluses, 22.5% of the population can't afford a healthy diet, and over 40% remain food insecure.¹³⁰

The region is characterised by a mix of traditional, small-scale farming and large-scale, industrialised agriculture. The predominant agricultural model is large-scale, export-driven monoculture production: this is advanced, innovative and extremely important for economic activity, yet at a steep cost to environmental and public health.^{131, 132} The growing (global) demand for a few commodities—primarily meat—is driving agricultural sprawl, causing a range of environmental pressures from land degradation and deforestation¹³³ to changing weather patterns and biodiversity collapse.¹³⁴ LAC also has the world's highest average pesticide use per hectare of cropland, directly impacting soil degradation, water pollution and biodiversity loss.¹³⁵

Food loss and waste are also problematic from an economic, environmental and social perspective. One-third of all food produced globally is lost or wasted.¹³⁶ From farm to fork, the global food system is responsible for around one-third of annual GHG emissions—food waste accounts for half of these.¹³⁷ In LAC, primary bio-based sectors such as crops, livestock, fisheries, aquaculture and forestry generate considerable biomass waste. For instance, a staggering approximately 550 million tonnes of food is lost or wasted every year, equivalent to around 30% of the region's total production.¹³⁸ Food loss and waste occur at different points along the supply chain. On average, two-fifths occur during the production, handling and storage, and processing and packaging stages, while three-fifths occur during the final sale and consumption stage.¹³⁹

Dietary shifts during the past two decades have also had profound environmental and social consequences.^{140, 141} LAC suffers simultaneously from increasing rates of food insecurity and obesity: while 40% of the population is food insecure, 60% of adults are overweight, and 20% are obese.^{142, 143} In particular, the overconsumption of processed meat products and ultra-processed and sugary foods has rapidly increased and is connected to unhealthy diets, especially among children.¹⁴⁴ There is also a lack of access to nutritious food: in 2020, one in five individuals across the region lacked the financial means to maintain a healthy diet. This inability to afford nutritious meals greatly impacts the most at-risk populations, particularly women and children.¹⁴⁵

CIRCULAR ECONOMY INTERVENTIONS

Transforming the food system is a key lever for the region to achieve its climate goals and reverse ecological degradation. A circular and regenerative food system optimises resource use, minimises waste, and enhances soil health and biodiversity. It promotes sustainable diets, protects human health and supports communities' livelihoods. Changes across the entire food system, from farm to fork, are necessary to build a food system compatible with planetary boundaries. LAC's diverse landscapes require context-specific agricultural practices that regenerate ecosystems, enhance biodiversity, and reduce emissions and chemical inputs. To this end, this scenario proposes three circular interventions: adopting sustainable food production practices,

reducing food waste and promoting balanced diets. These actions can significantly reduce LAC's environmental footprint, create jobs and pave the way for a more sustainable future.¹⁴⁶

1 Shift to more sustainable food production. The first intervention tackles food production. We explore the impact of a shift to organic, local and seasonal food production—strategies that will **narrow** flows by reducing the need for synthetic fertilisers and lowering transport distances. **Regenerative** and nature-based agriculture practices, such as agroforestry, permaculture and integrated livestock management, can enhance soil health, carbon sequestration, biodiversity and nutrient cycling—without compromising productivity.^{147, 148}

2 Reduce and valorise food loss and waste. This intervention considers strategies to reduce avoidable food loss and waste: such as preventing unnecessary or excess food production, thus **narrowing** flows. All unavoidable food loss and waste should be **cycled**. Composting and organic waste recycling infrastructure—such as anaerobic digesters and biorefineries—can serve to divert food waste from landfills and turn it into a valuable resource for agriculture and various industrial applications. This biowaste can be a valuable resource for creating new value chains with multiple potential uses—from producing biomaterials and bioenergy to recovering proteins and enzymes for pharmaceuticals—rather than a mere environmental problem.¹⁴⁹

3 Endorse a balanced diet. This demand-side intervention addresses the nexus between agriculture, nutrition and health. It centres on food consumption: keeping caloric intake within 2,700 per day and favouring nutritious diets that shift the current balance between plant and animal-based foods to **narrow** and **regenerate** material flows.¹⁵⁰ Dietary changes are also key for consistently reducing the amount of land allocated for agriculture and, instead, allocating more land to carbon sequestration and the protection of biodiversity.

IMPACTS

Material and carbon footprints: The impact of this scenario is remarkable. If we harness the cross-intervention synergies, LAC's **material footprint could be lowered by over one-third** (34%), from 7,975 million tonnes to 5,230 million tonnes. The scenario also offers the potential for deep GHG emissions reductions: the **carbon footprint could be decreased by approximately one-third** (34%), bringing it from 3,576 million tonnes of CO₂e down to 2,353 million tonnes of CO₂e. In particular, LULUCF emissions could be cut by 57%.

Co-benefits: A series of additional co-benefits could also emerge. For instance, optimising caloric intake and shifting to more balanced diets could positively impact health.^{151, 152} More sustainable agriculture practices could also build the resilience of the region's food system by improving air and water quality, halting deforestation, and benefiting soil health and biodiversity.¹⁵³ This scenario could also lead to the creation of good-quality local jobs in the formal sector. If carried out with the development of policy that recognises the informal sector, this scenario can also improve livelihoods and help shape more decent working conditions. If backed by suitable policy and investment, reducing organic waste alone could create about 4.1 million jobs in the region.¹⁵⁴



A HOLISTIC APPROACH TO TRANSFORM LAC'S FOOD SYSTEMS

- **Costa Rica Regenerativa**¹⁵⁵ is a community of practice advancing regenerative farming methods. It brings together a transdisciplinary community to reflect, plan and activate projects that facilitate the transition towards a regenerative paradigm. To achieve this, the community works on research and mapping, leadership and education, networking, narrative-building and project implementation. Its multiple regenerative farming projects, from community gardens to mid-scale greenhouses to holistic livestock management and responsible fishing, focus on restoring and regenerating soil health, creating zero waste production processes and scaling cooperativism.
- **Digital solutions can reduce food loss and waste.** *Fruta Imperfeita*, for example, is a Brazilian start-up that aims to reduce food waste by selling 'ugly' fruits and vegetables that would otherwise be discarded.¹⁵⁶ The company works with small-scale farmers to purchase produce that doesn't meet supermarkets' aesthetic standards and sells it at a discount to consumers.

Buen Provecho is an Uruguayan digital platform that tackles food waste in the retail industry.¹⁵⁷ It connects stores that have surplus food with people interested in buying it at a discount. This initiative has a triple positive impact: economic (shops recover costs), social (access to quality food is extended) and environmental (reduced GHG emissions due to less waste).

- **Increased policy support can encourage healthier diets.** Several countries in the region have already taken steps to encourage a shift to healthier diets. For example, Mexico and Chile extensively tax unhealthy foods while subsidising and providing tax exemptions for food production to promote improved access to healthier diets.^{158, 159} Examples of other policy instruments used include Chile's mandatory front-of-package labelling, Brazil and Peru's restrictions on marketing unhealthy foods to children, and Ecuador's policy requiring schools to provide healthy meals to students.¹⁶⁰

2. BUILD A CIRCULAR BUILT ENVIRONMENT

The impact of the built environment is enormous: construction and operation activities account for approximately one-third of material consumption, carbon emissions and solid waste generation worldwide.^{161, 162} With over 80% of its population living in urban areas, LAC is the most urbanised region worldwide. As urbanisation has accelerated, the demand for housing and infrastructure has increased, thus ushering in considerable expansion of the region's built environment over the past two decades. The increasing demand for housing and infrastructure has outpaced new builds and this, along with ineffective urban planning, have led to the unplanned development of informal settlements and slums. This rapid growth has resulted in territorial imbalances, vast low-density areas, and a qualitative and quantitative housing deficit.¹⁶³

Material use and waste generation have increased along with the expansion of cities, largely stemming from construction activities. For instance, in 2018, stock build-up accounted for around one-third of total material input to the economy, with the construction of buildings alone representing over 14% of the total material footprint. Projections suggest that the material footprint per capita could escalate to between 14 and 25 tonnes by 2050 if current trends persist.¹⁶⁴

Sustainability is a significant challenge for LAC's Construction sector. Construction and demolition waste claim the largest portion of total waste generation, sometimes up to 70%. Less than 10% of this is reused.^{165, 166} Construction with secondary, local and sustainable materials is very low, particularly in urban areas, where cement use is prevalent. Cement is often used for informal constructions, resulting in material-intensive and low-quality housing.¹⁶⁷ What's more, construction costs are relatively high due to inefficiencies in the sector, as well as its reliance on imported materials. Buildings account for almost a quarter of total final energy consumption in Central and South America, while informal dwellings use twice as many construction materials as formal dwellings: both factors that generate a large carbon footprint.¹⁶⁸

CIRCULAR ECONOMY INTERVENTIONS

Circular practices will be critical to reducing the sector's environmental impact, especially given the large build-up of housing and infrastructure expected in the coming decades. Circular economy strategies yield multiple benefits: they reduce the need for new construction materials, cut waste and save money.¹⁶⁹ This scenario includes three interventions to reduce negative impacts: prioritising renovation and limiting the construction of new dwellings with raw materials, increasing the energy efficiency of buildings, and prioritising material-efficient urban design and construction practices that reduce material demand, GHG emissions and construction and demolition waste.

1 Optimise building stock expansion.

Maximising the use of secondary materials through the recovery, reuse and recycling of building materials—such as cement and steel (among others)—will **narrow** and **cycle** flows. Prioritising the extension of buildings' lifespans through renovation, maximising occupation rates and the efficient use of space, and prioritising compact, resource-efficient urban environments that promote systemic efficiency can also reduce the need for new buildings, thus **narrowing** flows.¹⁷⁰ This will require the enforcement of improved urban planning rules.

2 Create a low-carbon, energy-efficient building stock.

This will include deep retrofitting practices to increase energy efficiency and saving, as well as the large-scale deployment of low-carbon technologies like photovoltaics, sustainable insulation, green roofs, natural ventilation systems and heat pumps. These will serve to **narrow** material flows, particularly for fossil fuels. Retrofitting activities should use secondary and non-toxic materials to the greatest extent possible to **cycle** and **regenerate** flows. Realising this intervention may generate certain trade-offs: improved energy efficiency may cause an increase in energy consumption, for example. These strategies must thus be complemented with the promotion of sufficiency lifestyles to prevent rebound effects.¹⁷¹

3 Shift to resource-efficient building practices.

This intervention focuses on scaling material-efficient construction practices—thereby cutting material input and waste—in an effort to **narrow** flows. Changes in construction practices such as off-site construction, prefabrication and the adoption of local and sustainable materials can promote circular economy principles by minimising the use of raw materials and incorporating recycled and renewable materials into building designs. Designing buildings to use space most efficiently, designing spaces that can be easily repurposed or adapted and using multi-functional spaces can also reduce buildings' overall environmental footprint.

IMPACTS

Material and carbon footprints: Implementing a circular built environment in LAC cities could reduce residents' annual material consumption by 6–7 tonnes in 2050—50% of the expected material footprint growth per capita by 2050.¹⁷² Similarly, prioritising circular strategies for energy efficiency, such as deep renovation and retrofitting, could decrease the expected growth in buildings' energy consumption, helping to decarbonise the building stock.¹⁷³

Co-benefits: Aside from the expected positive impact on the material and carbon footprints, particularly due to the reduction of highly impactful materials such as fossil fuels and concrete,¹⁷⁴ building a circular built environment could bring many co-benefits. Embracing circular economy interventions in this sector could benefit communities by providing affordable housing options, improving living environments, and reducing the health risks associated with poor housing conditions. Strategies that promote the use of local, sustainable materials can also support local economies and promote sustainable supply chains. For example, lower energy bills can help lift people out of fuel poverty, while improved ventilation and solutions for draughts and dampness can prevent certain health conditions.

Due to data limitations, the impact of this scenario on the material and carbon footprints could not be quantified for the LAC region as a whole. For further detail on the key data gaps that emerged, please refer to the [Methodology document](#).



ADVANCING THE CIRCULARITY OF
CONSTRUCTION AND HOUSING:
PARTNERSHIPS, POLICY AND NEW
BUSINESS MODELS

- **Circular housing partnerships can integrate both environmental and social considerations.** Launched in Bogotá, Colombia, in 2021, this partnership between HABI (a real estate platform), Green Factory (a sustainability construction and certifications company) and *Banco de Bogotá* (a financial institution), promotes the purchase of refurbished apartments that integrate circular economy principles, provide certified resource efficiency benefits and offer lower loan rates. Properties are adapted to maximise the use of existing resources and minimise the usage of essential services. This enables cutting energy consumption by up to 30% and water usage by as much as 40%.¹⁷⁵
- **Mexico's EcoCasa Programme supports passive design and resource-efficient housing.** The EcoCasa programme is managed by the state-run development bank *Sociedad Hipotecaria Federal* and issues credits for houses with a 20% reduced energy consumption. The EU funded an extension to this programme, supporting houses with an 80% reduction in energy consumption and those that meet the Passive House Standard.^{176, 177} Some EcoCasa buildings

have more than 20% less embodied carbon, while some with additional EDGE certification cut embodied carbon by as much as 44%.¹⁷⁸ EcoCasa aims to bring more environmental concerns within scope as the programme develops, eventually hoping to target water use, transport and embodied energy. The programme is receiving recognition for its ability to transform the whole construction sector, as well as its replication potential.¹⁷⁹

- **RCD Reciclaje** is an Uruguayan company that recycles concrete from construction and demolition waste to produce a wide range of secondary construction materials, from recycled aggregates to floor tiles.¹⁸⁰ It also offers essential management services for construction and demolition waste: collection and transportation of rubble; waste management and treatment; and traceability, reporting, and certification of correct waste management in which their circularity process is certified. It then offers clients its products at a discount relative to the cost of virgin construction materials.

3. ADVANCE CIRCULAR MANUFACTURING

Although its economic role has been decreasing, manufacturing is an important sector in LAC, contributing to economic output (16% of GDP)¹⁸¹ and employment (21%), for example.¹⁸² LAC's manufacturing sector is diverse, with countries across the region specialising in particular sub-sectors such as food and beverages, textiles and apparel (especially in Central America, the Caribbean and Brazil), chemicals, electric equipment and automotive products (particularly in Mexico and Brazil).¹⁸³

Manufacturing in the region faces several challenges. LAC's specialisation in natural resource extraction and lack of intermediate manufacturing services mean that it struggles to be competitive in the trade of manufactured goods.¹⁸⁴ This partly stems from the structural innovation deficit in the region. Productivity is negatively impacted by three factors, resulting in low product diversification and value creation: 1) extremely low levels of investment in research and development (R&D) which represents an average of just 0.6% of regional GDP; 2) a high geographical concentration for R&D spending, with Brazil representing around 65% and Brazil, Argentina and Mexico together representing 86%; and 3) the relatively minor participation of the private sector in the financing and execution of R&D investments.¹⁸⁵ Unsupportive regulatory environments, economic volatility and frequent policy changes can disincentivise investment and innovation. Additionally, inadequate transport, power supply and telecommunication networks often translate into operational inefficiencies and reduced competitiveness on the global stage.

Transitioning to less resource-intensive and wasteful manufacturing practices is both a global imperative and a local challenge for LAC manufacturers. While the trend towards sustainable manufacturing is increasing, the region faces hurdles such as price constraints, lack of financial instruments to guide investments, limited technological access and a general lack of know-how. New technologies are key to achieving greater circularity, efficiency and productivity in manufacturing processes, and can enable a transformation in productive capacities that can lead to more sustainable resource use.¹⁸⁶ The digital transformation will also be crucial for LAC to increase its competitiveness and capitalise on the relocation of manufacturing centres serving global value chains currently installed elsewhere, particularly in China.¹⁸⁷

This is especially relevant in the current context of geopolitical tensions and shifting trade dynamics. However, the path to the widespread adoption of Industry 4.0 is proving challenging for many LAC manufacturers: despite ongoing efforts, even regional powerhouses such as Brazil and Mexico continue to grapple with high implementation costs, an insufficiently skilled workforce and persistent deficits in (digital) infrastructure.

CIRCULAR ECONOMY INTERVENTIONS

The growth of value-added manufacturing, regional integration and workforce development represent promising opportunities. Although challenging, the shift towards regional, circular supply chains presents an opportunity to build resilient intra-regional trade networks that can mitigate risks associated with overdependence on international partners. What's more, addressing the skills gap via collaborative initiatives between educational institutions, government agencies and industry can prepare the workforce for digital transformation and sustainable manufacturing challenges. This scenario proposes two interventions to advance high-value circular manufacturing in LAC.

1 Implement resource-efficient manufacturing and Industry 4.0. This scenario's first intervention centres on adopting cutting-edge technologies to improve manufacturing's material efficiency—both during the initial stages, where materials are formed, and in the final stages, where products are created. Reducing the need for metal inputs, such as steel and aluminium, by improving industrial processes will serve to **narrow** flows. Gains in material efficiency should be integrated into the early stages: cutting yield losses involves making the most of technological advances to get more from less. Further along the value chain, where metals will be used to make a vehicle or equipment, for example, process improvements will bring similar benefits. Reducing scrap material—a by-product of standard procedure—would also boost efficiency and reduce the need for virgin material inputs, further **narrowing** flows. All unavoidable scrap can also be reused, **cycling** flows.

2 Employ circular business models via R-strategies for machinery, equipment and vehicles. While the circular economy is often associated with lower-value strategies such as recycling, much potential lies in practices higher up the strategy hierarchy, such as remanufacturing, repair and reuse. Remanufacturing and refurbishment practices can be leveraged to extend product lifetimes, **slowing** flows. The region could also benefit from a shift to more circular supply chains, using leasing or other Product-as-a-Service (PaaS) systems as an alternative to ownership-based models. In an ownership-oriented system, the aim is to maximise the number of products sold. PaaS circumvents this and therefore contributes to **narrowing** flows. Incorporating circularity in the early phases of design, both at the process and material levels, will also be crucial to enable high-value circular practices.

IMPACTS

Material and carbon footprints: Harnessing cross-intervention synergies, LAC's **material footprint could be lowered remarkably by around one-third** (32%), from 7,975 million tonnes to 5,387 million tonnes. This scenario also offers the potential for deep GHG emissions reductions: the **carbon footprint could be decreased by approximately one-third** (31%), bringing it from 3,576 million tonnes of CO₂e down to 2,553 million tonnes of CO₂e.

Co-benefits: Additional co-benefits could include increased resilience against supply chain disruptions and price volatility, reduced waste generation, and reduced supply volumes as materials are kept in use, for example. This will have positive implications for local economic development and community wellbeing, as it may help mitigate the negative impacts of resource extraction and waste disposal on local ecosystems and public health. An important contribution of this scenario is its potential to increase access to necessary, yet highly-priced, goods, by making them more affordable. This can be done through PaaS, for example, where access to a product is prioritised over ownership. If complemented by specific legislation and social consumer protection, circular business models can enhance social equity and improve quality of life, particularly within marginalised and low-income communities.



CIRCULAR MANUFACTURING:
FROM INDUSTRIAL SYMBIOSIS
AND ECO-INDUSTRIAL PARKS TO
REMANUFACTURING

- **Public-private partnerships have been central for building Colombia's industrial symbiosis networks.**¹⁸⁸ The RedES-CAR189 and UNIDO's Eco-Industrial Parks¹⁹⁰ programmes have both employed collective learning and technical aid to reinforce Colombia's industrial symbiosis networks. The achievement of RedES-CAR is notably anchored in the cooperation between public institutions, private organisations and the academic community. In this sense, the project has fostered an alliance between these three sectors, facilitating a platform where different players can align their objectives and amplify benefits. UNIDO's Eco-Industrial parks Colombia programme enables two industrial parks to meet environmental, social and economic performance benchmarks, facilitating their evolution and establishment as Eco-Industrial Parks.¹⁹¹
- **Neptuno Pumps**¹⁹² uses 100% scrap metals and other secondary materials for the production of centrifugal pumps and other products for the mining industry in Chile. The company also implements industry 4.0

technologies such as 3D printing and digital manufacturing to optimise material input and cut waste generation in production processes. The company also incorporates other circular business activities such as repair, remanufacturing, refurbishment and eco-design processes to its business model.

- **Sinctronics**, a Recycling and Innovation Centre devoted to creating **reverse logistics systems**, promotes the growth of recovered materials markets by incorporating recycled content into new HP products.¹⁹³ HP's expansive reach is leveraged to set up a solid reverse logistics system, paired with Sinctronics' capability and expertise in retrieving and valorising end-of-use electronic equipment. This partnership is crucial as it enables feedback and information exchange on practical possibilities, which are instrumental in enhancing circularity.¹⁹⁴ Furthermore, Sinctronics actively collaborates with a network of partners to disseminate knowledge and shape an inclusive circular economy within Brazil's electronics sector.

4. TRANSFORM THE ENERGY SYSTEM

LAC presents a complex yet compelling picture of its energy mix and transition trends. Although traditionally reliant on fossil fuels, the region has evolved significantly over recent years, with renewable energy gaining a more substantial foothold in the region's energy matrix. Today, it represents almost 30% of primary energy, twice the global average.¹⁹⁵

Moreover, energy consumption per capita is quite low: in 2019, LAC accounted for approximately 6% of global energy consumption,¹⁹⁶ despite representing 8.3% of the world population. The region's energy mix is dominated by fossil fuels, which made up 70% of the energy mix as of 2019.¹⁹⁷ This is largely due to significant domestic reserves in countries such as Venezuela, Brazil and Colombia. Numerous Central American and Caribbean nations continue to rely heavily on fossil fuels for power generation, while virtually all transport in the LAC region is powered by fossil fuels.

Nonetheless, LAC boasts abundant renewable resources, and has made considerable strides in transitioning to cleaner energy sources—also driven by increasing international momentum to develop the renewable energy sector.¹⁹⁸ Compared to other world regions, LAC is advanced in terms of renewable energy adoption: clean energy accounted for nearly two-thirds (63%) of the region's electricity generation in 2022,¹⁹⁹ up from just 5% in 2004.²⁰⁰ Due to the rich hydrological resources available across the region, hydropower is the main renewable energy source, representing 45% of the total electricity supply. However, its growth has slowed recently due to social and environmental concerns associated with large hydroelectric projects: habitat loss, ecosystem disruption and human rights abuses such as the displacement of Indigenous populations and violence, for example.^{201, 202} What's more, some countries are facing potential declines in renewable energy capacity as climate change renders hydroelectric generation less reliable.²⁰³ Biomass energy, another significant renewable source, has been predominantly used in countries with considerable agricultural output. For example, Brazil, where sugarcane-based biofuel (ethanol) contributes significantly to the energy mix—despite its high water footprint and socioeconomic implications.²⁰⁴ ²⁰⁵ However, biomass utilisation varies greatly across the region, contingent on local agricultural practices and available resources. Its sustainability depends on

various factors, including the production practices used.²⁰⁶ Wind and solar power have grown rapidly due to favourable natural conditions, supportive government policies and decreasing technology costs.²⁰⁷

The region's energy transition has not been without challenges. Technical issues like grid infrastructure and market regulatory frameworks often lag behind renewable energy growth, causing bottlenecks. The social dimension of renewable energy deployment is also critical. Community participation, particularly for Indigenous communities, and the delivery of tangible benefits to local communities—via co-ownership of projects, for example—will be key to promote social acceptance,²⁰⁸ especially as projects are often directly linked to land tenure, collective rights and cultural traditions.²⁰⁹ At the same time, while expanding renewable energy can significantly benefit the environment, environmental consequences—such as deforestation and ecosystem disruption—must also be considered.²¹⁰

These challenges underline the importance of careful, inclusive planning and implementation of renewable energy projects, incorporating comprehensive social and environmental impact assessments (such as free, prior and informed consent) and adopting best practices to minimise harm. Within this context, renewable energy initiatives driven by communities present untapped potential in the region.²¹¹ Just as seen in other parts of the world, citizens and communities in the LAC region can assume innovative, positive roles: they can become informed consumers of renewable electricity, investors in related projects, and even producers (acting as prosumers or participants in community-led endeavours). If the region's abundant renewable resources are carefully socially and environmentally managed, LAC has the potential to become a global leader in renewable energy, particularly solar and wind.²¹² A major challenge is that many of the region's economies are strongly linked to oil and gas extraction. It is within this context that the large-scale deployment of green hydrogen can serve as a key way to divest or diversify fossil fuel flows and support the region's energy transition plans.²¹³

CIRCULAR ECONOMY INTERVENTIONS

Energy is the basis of the economy. Transforming the energy system is key to positively influencing material flows and stocks while providing social benefits. Doing so at the scope, speed and scale required is equivalent to a foundational restructuring of modern industrial economies.²¹⁴ Through two interventions, this scenario explores how the circular economy can transform energy systems to support primary energy consumption and carbon footprint reductions whilst bolstering social wellbeing and employment in an expanding sector.

1 Prioritise systemic optimisation. Increasing efficiency and reducing the amount of energy that is wasted is crucial for transforming the energy system. Energy-intensive systems—be it mobility, the built environment or industrial sector—have great potential to improve efficiency and narrow flows, particularly for fossil fuels. Provisioning systems are key for optimising energy use, satisfying societal needs and providing wellbeing with much lower levels of energy use.^{215, 216} Embedding circular principles into the design, development and deployment of renewable energy infrastructure can enable and support the sustainable recovery, management and return of valuable materials to productive use at their end-of-life stage.

2 Scale up renewable energy deployment while implementing deep electrification. Electrification is key for reducing primary energy demand, particularly of highly-impactful fossil fuels, thus helping **narrow** flows. Renewable energy solutions, from wind and solar to green hydrogen and large batteries, are market-ready, and LAC holds great potential for their large-scale deployment. These solutions also contribute to **regenerating** flows. Ranging from electric vehicles to heat pumps, renewable energy options are more efficient than conventional, fossil fuel technologies. The deep electrification of activities currently heavily dependent on fossil fuels—particularly transport, building operations and industrial processes—must happen in tandem with the exponential growth in renewables in the region, especially given the projected growth in electricity demand.²¹⁷

IMPACTS

Material and carbon footprints: While upgrading the energy system would reduce the demand for fossil fuels, the energy transition is also an incredibly material-intensive process.²¹⁸ Developing a low-carbon energy sector will require huge volumes of materials, primarily in the form of valuable metals—such as lithium, copper and steel—as well as concrete. Optimising the sourcing of these additional materials, of which the region holds vast reserves, will be key to balancing the environmental and social challenges that arise from increased mining.²¹⁹

Co-benefits: Expanding renewable energy sources reduces fossil fuel dependency and can drive economic benefits such as job creation. Deep electrification can enhance local resilience and improve quality of life through cost savings and better air quality. By optimising how energy is used to provide goods and services, LAC can enhance wellbeing while using less energy. It can also improve access to affordable and sustainable energy, particularly for marginalised communities, in turn easing poverty and promoting local development. If properly approached, the transformation of the energy system can take a strong social justice standpoint, ensuring fair access to benefits and opportunities. This involves inclusive decision-making, engagement of affected communities and targeted policies to support a just and sustainable transition.

Due to limitations in the methodological approach, the impact of this scenario on the material and carbon footprints could not be quantified for the LAC region as a whole. For further detail on our approach, please refer to the [Methodology document](#).



BRIDGING THE CIRCULAR ECONOMY AND RENEWABLE ENERGY EFFORTS

- **Costa Rica's renewable energy cooperatives**²²⁰ promote local and just economic development. Thanks to its abundant hydroelectric generation resources, Costa Rica has an almost entirely renewable electricity mix. Within this context, the country's four renewable energy cooperatives operate 14 power plants that together generate around 7% of the country's electricity and deliver electricity to over a million Costa Ricans, most of them in remote and difficult-to-access locations. Not only do these cooperatives produce and distribute energy, they also promote local and just economic development by reaching the most remote homes and reinvesting profits in local development by providing education and engaging with local communities in collective efforts to protect natural resources.²²¹
- **Midas Chile**²²² is a recycling company that combines urban mining and solar power. It first collects waste from electric and electronic equipment (WEEE), from laptops and smartphones to household appliances, voluntarily sent by large tech and telecommunication companies. Once collected, Midas then manages the WEEE and classifies it into three different

material streams: metals, plastics and others, which are further processed. The company then uses 100% solar generated electricity to transform the metal extracted from the WEEE to produce secondary metal ingots that are exported internationally. Midas is now testing new processes to recycle lithium from collected batteries.²²³

- **Uruguay's Renewable Energy Innovation Fund (REIF)**, supported by the Joint SDG Fund and several UN agencies, aims to advance the country's second energy transition (2ET).²²⁴ Uruguay now generates nearly all of its electricity from renewable sources. However, it is facing challenges in reducing its reliance on fossil fuels: to fully decarbonise its economy, it needs to transform the transport sector and progressively phase out other non-renewable energy uses within the industrial, residential and commercial sectors. With this in mind, the REIF is devoted to mobilising large-scale funding for innovative and emerging technology projects that facilitate the 2ET. Promoting the energy transition also presents a chance to speed up Uruguay's economic and social advancement, specifically gender equality and women's economic empowerment.

5. REDUCE WASTE GENERATION AND IMPROVE WASTE CYCLING

LAC countries are grappling with the rapid increase in waste generation stemming from population growth, urbanisation and linear consumption patterns. As economies develop and urban areas expand, the volumes of waste generated increase, straining existing waste management infrastructure and systems. Enhancing waste reduction strategies and promoting circular economy principles can minimise waste generation, conserve resources and foster more sustainable economic activities.

Although waste management costs claim a significant portion of municipal budgets, waste generation outpaces waste management capacity in many LAC countries. Inadequate infrastructure, limited resource allocation, and insufficient governance and regulations hinder proper waste management practices. As a result, a considerable portion of waste is unaccounted for, disposed of in open dumps, uncontrolled landfills or informal waste disposal sites, leading to environmental pollution, soil and water contamination, and health hazards for nearby communities.²²⁵ What's more, the informal sector plays a significant role in waste management in LAC. Informal waste pickers—an often marginalised and vulnerable group—engage in waste collection and recycling activities. Although they substantially contribute to waste diversion and recycling efforts, they still face challenges such as poor working conditions, lack of legal recognition and limited access to resources and support.

Waste reduction, circular economy, and, ultimately, (re)cycling practices all pose challenges for LAC. While certain areas boast commendable initiatives and recycling programmes, overall recycling rates for the region as a whole remain low (around 3% for technical materials, according to this analysis). Inadequate waste segregation systems coupled with limited investment in (re)cycling infrastructure contribute to these challenges. Despite some legislative progress, special waste streams, such as hazardous wastes, hospital waste, construction and demolition waste, organic waste, and electrical and electronic equipment waste, are often inadequately managed. This includes improper treatment, lack of control and insufficient inventory of the waste generated, collected and treated, posing risks to human and environmental health. Strengthening legal frameworks, implementing targeted programmes and encouraging the establishment of appropriate treatment plants will be crucial to addressing these challenges.

While large gaps exist in overall waste data collection and reporting, particularly for heavy waste streams such as industrial and construction and demolition waste (which this analysis estimates to account for two-thirds of overall waste generation), municipal solid waste data is more complete.²²⁶ LAC generated a total of around 230 million tonnes of municipal solid waste in 2021, of which around 85% was collected and over 4% was recycled. It is important to note that, left unchecked, municipal solid waste generation—a strong proxy for waste generation by private households—is projected to grow to 290 million tonnes in 2030, reaching 369 million tonnes by 2050. Waste generation per capita is projected to reach similar levels to that of Europe and Central Asia: 1.3 kilogrammes per capita per day.²²⁷

The circular economy should not be reduced to recycling. End-of-the-pipe solutions should be a last resort—measures that prevent waste in the first place should be prioritised. Science tells us that we 'can't recycle our way out' of the environmental burdens generated by our current production and consumption systems.²²⁸ However, in the current context of rapidly growing and unmanaged waste flows, it's essential that waste management is given adequate financing. For the sector's success, current shortcomings such as management costs, neglect by municipalities, insufficient investment and flawed service charging systems must be addressed. Additionally, budget allocation for waste management competes with other resource-consuming priorities. It is important to consider the cost of inaction: from health impacts and environmental consequences to hindered development. These costs can be significantly higher than the cost of proper waste management.

Data will be crucial to improving waste management across LAC—yet lacking information poses a huge hurdle for many countries in the region. Establishing systematic data collection, processing and analysis will be vital for informed decision-making, system evaluation, control and improvement. While information on municipal solid waste generation and collection is generally accessible, integrating data between national and local levels and across countries proves difficult due to the absence of harmonised waste generation and management indicators. This urgency is particularly pronounced for large-volume waste streams—such as industrial and hazardous wastes and construction and demolition waste—for which data is almost non-existent.²²⁹

CIRCULAR ECONOMY INTERVENTIONS

To prevent the negative impacts of the prevailing system while maximising health and environmental benefits, effective waste management policies and systems must be implemented. Due to the limitations in adequately estimating and modelling this scenario's impact on the Circularity Metric, an 'exploratory approach' was taken. This scenario analyses how secondary material consumption could change by incrementally revamping waste management (for technical materials) while also improving waste accounting. The following strategies introduce the key levers to realise these improvements:

1 Revamp waste management. Increasing the circularity of waste management will necessitate investment in infrastructure, stronger governance and regulations, and the empowerment of the informal sector. For this intervention, technical material cycling was increased incrementally from the current 3% to:

- (1) the 13% **average of countries with mid-level Human Development Index (HDI) rankings**—mostly emerging, mid-income economies;
- (2) the 20% **global average**; and
- (3) the 33% **average of countries with high HDI rankings**—mostly high-consumption, mid to high-income economies.

2 Improve data reporting. Because industrial and construction and demolition waste streams are largely unaccounted for, it is uncertain which circular economy interventions would be most effective. It is estimated that up to two-thirds of waste generated remains unreported or unaccounted for in official statistics. This means insight into these waste streams' material composition, state or potential for cycling is minimal. Bringing reported total waste generation over domestic consumption shares to a more realistic indication helps us foresee the impacts of circulating waste streams if all waste was accounted for in official statistics. Therefore, the reporting of total waste generation over domestic consumption shares was incrementally increased to observe the potential impact of increasing it from its current share (13%) to the global average (35%).

IMPACTS

Circularity Metric: This modelling exercise indicates that improved waste management systems, greater recycling capacity and increased data reporting could bring the Circularity Metric **from below 1% to close to 6%**. It is also important to highlight that the impact of increased secondary material consumption is considered along with reduced virgin material use. This, in turn, makes the increase in cycling have a bigger impact on the Metric.

Social: This scenario tackles the complex challenges of waste management in the region by addressing the role of the informal sector. It emphasises the need to invest in infrastructure while simultaneously strengthening governance and regulations to ensure the legal recognition of existing waste workers. By ensuring the implementation of relevant policies and investments, the 'increase recycling' intervention is projected to create 1.9 million jobs in the Waste management sector. It is important that such fiscal policies and circular economy interventions prevent the further marginalisation of the informal sector, namely by guaranteeing workers legal recognition and equitable participation in the policy process. What's more, this scenario highlights the importance of capacity-building and training programmes that prioritise occupational safety and health for all workers in the waste management sector.



CIRCULAR CONSUMABLES AND WASTE MANAGEMENT

- **Latitud R²³⁰** is a regional public-private platform for fostering a more circular and inclusive waste management model in LAC. Since 2011, it has implemented actions in 17 countries across the region. Its initiatives include accelerating circular business models, scaling up innovative solutions to increase material recovery, developing a data science unit to inform strategic decision-making, the development of consumer strategies to foster sociocultural change and global alliances to position the work taking place in the region. These actions have so far benefited more than 17,000 waste pickers and resulted in the exchange of information and training activities with almost 300 municipal officials in ten countries across the region.
- **Cataki²³¹ is a recycling cooperative** launched in Sao Paulo, Brazil, in 2017. The initiative successfully employs waste pickers to collect and sort waste materials, which are then recycled and reused—all via an app. The cooperative also provides training and support to waste pickers to improve their skills and increase their income. Cataki could be replicated in other cities across the region to promote more inclusive, sustainable waste management practices.
- **Club de Reparadores²³²** launched in Buenos Aires, Argentina, in 2015, is a movement that encourages repair and challenges throwaway culture and planned obsolescence. Club de Reparadores also promotes values such as care for objects and learning and can foster a sense of community if done with others. *Club de Reparadores* organises communal repair meetings where individuals of all ages and professions can share their skills. This non-profit, 'open-source' project can be replicated to expand the initiative. The club operates across multiple Argentinian cities as well as Montevideo (Uruguay) and Mexico City.

CIRCULAR ECONOMY IS NOT JUST ABOUT CYCLING: EXPLORING THE FULL POTENTIAL OF CIRCULAR ECONOMY STRATEGIES

CIRCULAR SCENARIOS		FOUR FLOWS			
Circular scenarios	Circular strategies	 Narrow	 Slow	 Cycle	 Regenerate
1. Shift to a circular food system	Shift to more sustainable food production	●			
	Reduce food loss and valorise food waste	●		●	
	Endorse a balanced diet	●			●
2. Build a circular built environment	Optimise building stock expansion	●		●	
	Create a low-carbon, energy-efficient building stock	●	●		●
	Shift to resource-efficient building practices	●		●	
3. Advance circular manufacturing	Implement resource-efficient manufacturing and Industry 4.0	●		●	
	Employ circular business models via R-strategies for machinery, equipment and vehicles	●	●		
4. Transform the energy system	Put forward systemic optimisation	●			
	Scale up renewable energy deployment while implementing deep electrification	●			●
5. Reduce waste generation and revamp waste management	Revamp waste management			●	
	Improve data reporting			●	

Table three summarises all circular economy interventions proposed across the five scenarios, and which of the four flows they address.

5

TRANSFORMING

LATIN AMERICA AND

THE CARIBBEAN'S

ECONOMY

WITH AND FOR

PEOPLE

EXPLORING THE POTENTIAL
BENEFITS OF THE CIRCULAR
ECONOMY IN THE LABOUR
MARKET

In transitioning to a circular economy in Latin America and the Caribbean (LAC), it will be essential to dive deeper into the resulting socioeconomic implications and explore how policy can foster social benefits. This may encompass fiscal measures, regulations and consumer-oriented, bottom-up interventions that can effectively channel funds towards investment in the job creation, skills development and infrastructure needed to successfully implement circular activities. This Chapter explores how circular economy interventions in LAC could lower environmental impacts while maximising social outcomes. Our analysis estimates that 8.8 million new formal jobs could be created to drive the region's circular transition for key sectors: Agrifood, the Built Environment, Mobility and Waste Management. Moreover, the successful implementation of circular strategies can also provide broader socioeconomic and health benefits, as well as enhance decent working conditions.

This report has analysed LAC's material metabolism and identified the circular policy interventions that could have a meaningful impact on the region's footprints and social fabric. In this chapter, we explore how these same interventions can be financed and implemented and uncover their job creation potential and broader socioeconomic impacts. The four sectors in scope have been selected based on their prominence in the region's labour market and environmental footprint. The specific circular economy interventions have been assessed only regarding their potential to create new formal jobs for each of the four sectors. For more details on our approach and a discussion of underlying assumptions and limitations, please refer to Appendix G and the [Methodology document](#).

THE LABOUR MARKET IN LATIN AMERICA AND THE CARIBBEAN

Overall, LAC's labour market is complex and evolving, characterised by diverse sectoral compositions and employment dynamics. Persistent issues—high unemployment rates, income inequality, gender disparities and widespread informality—remain significant challenges, impacting vulnerable groups the most and hindering access to decent work and social protection. Furthermore, the employment rate for the working-age population

(15 years and above) stood at just 58% in 2019.²³³ This figure is on par the global average of 58.4%²³⁴ and is substantially less than the OECD average of 68.7%.^{235, 236} Unemployment remains a challenge, with an average unemployment rate of almost 8% in the region.²³⁷ This rate is even more substantial for youth entering the labour market, with unemployment rates reaching 18% among individuals aged 15 to 24.²³⁸

The Agriculture, Manufacturing, Construction and Services sectors are key employers in the region. In 2019, the Agricultural sector—a primary source of livelihood for many rural communities—employed around 14% of the labour force.²³⁹ Notably, however, the International Labour Organization found that approximately 86% of workers in the agricultural sector were informal,²⁴⁰ suggesting that the sector's significance may even be underrepresented in official statistics. Similarly, the Manufacturing sector has contributed to economic growth, providing ample job opportunities and boosting export revenues. Growth in the Construction sector, propelled by urbanisation and infrastructure projects, has also been noteworthy. The expansive Services sector, which includes trades like tourism, finance, and professional services, remains crucial. As the employment landscape evolves, technological advancements and changing rural dynamics are leading to a decline in agricultural employment. In contrast, sectors such as Construction, Trade and Transportation have experienced growth, emerging as key providers of formal and informal employment, especially in urban regions.²⁴¹

Small- and medium-sized enterprises (SMEs) are crucial to the LAC labour market and represent a big part of the economy. These enterprises employ around 60% of the formal workforce and contribute 25% of the region's GDP.²⁴² SMEs are present across all key value chains of the economy: notably, they provide 66% of employment for the agriculture sector, 48% for manufacturing, 52% for transport and 62% for the construction sector.²⁴³ As SMEs are important drivers of economic growth, job creation and innovation, promoting the growth and development of SMEs can lead to increased employment opportunities and contribute to overall economic prosperity.

PERSISTENT CHALLENGES: INFORMALITY AND INEQUALITY

Income inequality remains staggeringly high in the region, although it has been on the decline since 2002. The region's Gini index of 49.04—a measure of income inequality, in which a higher figure corresponds to greater income inequality—surpassed the average of 45.18 for emerging and developing economies,²⁴⁴ and was considerably above the global average of 39.71.²⁴⁵ Poverty has risen, with 30.8% of the population living below the poverty line in 2019, including 11% in extreme poverty.²⁴⁶ The proportion of working poor—those living in poverty despite having a formal job—exceeded 20% in 2018, and only 47.4% of workers had access to a pension scheme.²⁴⁷

The LAC region has made substantial progress in education, marked by increased access to pre-primary education and the average adult literacy rate in the region increasing from 84% in 1994²⁴⁸ to 94% in 2020.²⁴⁹ Progress in many LAC countries regarding gender equality has been impressive: legislation has set the legal age of marriage at 18, expanded protections against violence towards women and enhanced workplace rights.²⁵⁰ Women's parliamentary representation has surged to 30%, above the global average of 24%²⁵¹ and on par with the 33% EU average.²⁵² That said, despite these advancements, **gender disparities persist in the labour market.** In 2020, only 52% of women were employed, compared to 75% of men.²⁵³ What's more, women earn 17% less than men for equivalent work,²⁵⁴ face lower participation rates and have higher unemployment rates. Cultural barriers often lead to gender segregation in certain sectors, such as the care economy (labour and services that support caregiving). And although the gender pay gap has gradually decreased over the past decade, women often find themselves in more flexible and informal roles, underscoring the persistent issue of gender inequality.

Around 130 million workers in the region are engaged in informal jobs, accounting for 60% of total employment.²⁵⁵ Informal employment refers to jobs that lack formal contracts and, therefore, access to social protection and labour rights. This phenomenon disproportionately affects vulnerable groups, including women, youth, Indigenous people and migrants.²⁵⁶ Workers in the informal sector face numerous challenges, from low wages and job insecurity to limited access to training and skills development. This hinders informal workers' socioeconomic advancement.

While informality is highly present in all major sectors of the economy, such as construction, trade and transportation—it is most prevalent in the Agricultural sector, in which 85.7% of workers are informal.²⁵⁷ Interestingly, across the globe, **sectors with high informality rates are often associated with circular economy interventions.** For instance, the wholesale and retail trade repair sector exhibits an informality rate of 50%, while the waste supply, sewage, waste management and remediation activities sector has a rate of 38.74%.²⁵⁸ Indeed, recyclers and informal waste pickers play a crucial role in the region's local recycling efforts. It's estimated that around 2 million individuals are engaged in this activity, contributing to as much as 50% of the total recovery of recycled materials from municipal waste in the region.²⁵⁹ These statistics underscore the importance of addressing informality to ensure sustainable and inclusive practices within sectors with a high potential for circularity.

Because of the context in which most circular practices in the region are carried out, informality poses a significant challenge to livelihoods and decent working conditions.²⁶⁰ This situation, referred to as a 'necessity-driven circular economy',²⁶¹ involves workers being hailed as frugal eco-innovators on the one hand, and marginalised, exploited workers on the other. Regardless of the categorisation, addressing job insecurity, promoting decent work and increasing public revenue should be the primary objectives in efforts to formalise these sectors.²⁶² This involves ensuring social protection for workers, enhancing their working conditions, and creating opportunities for skills development and entrepreneurship. Efforts have been made in recent years to formalise waste pickers' work in municipalities. Regulations and policies related to municipal waste management contemplate the possibility of contracting waste pickers, for example—but challenges remain. LatitutR is one regional initiative that reflects these efforts. By continuing with these changes, LAC can unlock the potential of circular economy initiatives to promote environmental sustainability and decent work across new and existing employment sectors, including green sector jobs.²⁶³ Focusing on **improving working conditions in informal activities and boosting the role of SMEs in major employment sectors** like agriculture, manufacturing, construction and services can help **ensure that circular economy initiatives create quality employment opportunities and gender equality in the workforce.**

REDEFINING THE INCENTIVES

Taxation is an important fiscal instrument to shape market/industry behaviour and outcomes. Effectively harnessing this tool could drive a shift towards a circular economy in the region. Redirecting fiscal incentives to support circular economy interventions could lower carbon and materials footprints and lead to substantial environmental improvements. **This subsection looks at the current fiscal capacity available in the region and the redirection of fiscal incentives needed to support circular economy interventions.**

LAC countries typically demonstrate a low tax effort coupled with a distinct tax structure.²⁶⁴ Although the tax structure in the LAC region leans more heavily on corporate and consumption taxes, the low tax-to-GDP ratio suggests a capacity for boosting tax revenue.²⁶⁵ The use of different tax types varies across the region, reflecting diversity in policies and priorities.²⁶⁶ Emphasis should be placed on **expanding the use of environmentally related taxes (ERTRs), such as fossil fuel taxes and taxes on virgin plastic, which are currently low in the region.** Accounting for only 1.0% of GDP in 2021, regional revenue from ETRTs was significantly lower than the OECD average of 1.9%,²⁶⁷ with the majority of these taxes being energy-related taxes, particularly excises on diesel and petrol.

That said, several LAC countries such as Colombia,²⁶⁸ Costa Rica,²⁶⁹ Mexico and Brazil,²⁷⁰ have taken steps to implement specific environmental taxes to address pollution and GHG emissions.²⁷¹ What's more: as the environmental impact of the growing digital economy becomes more apparent, some countries in LAC, including Argentina,²⁷² Brazil,²⁷³ Chile and Colombia,²⁷⁴ have introduced digital taxes.²⁷⁵ These taxes aim to support the twin transition: ensuring environmental sustainability while recognising the importance of digital innovation and the dematerialisation of the economy.

The region needs to strategically use its financial support, prioritising sectors that promote a circular economy. Fiscal capacity enhancement towards a tax system that is both environmentally and socially responsible could help strike a balance between environmental stewardship, economic needs and societal well-being.²⁷⁶ Globally, US\$1.1 trillion is spent annually on environmentally harmful activities, which outpaces investment in nature-based solutions by three to seven times.²⁷⁷

Shifting a portion of this spending towards green sectors and circular activities is a challenging balancing act that could yield significant environmental and societal benefits.

Energy subsidies, which make up a significant portion of this spending yet have particularly harmful implications for both people and the planet, offer a prime example of where this shift could happen.²⁷⁸ Between 2011 and 2013, energy subsidies amounted to 3.8% of Latin LAC's GDP.²⁷⁹ Though often defended as a form of social protection, in reality they are inefficient in this role. A 2017 study found that only one-tenth of spending on energy subsidies in the LAC region benefits the poorest 20% of households.²⁸⁰ Meanwhile, gasoline subsidies continue to disproportionately benefit LAC's wealthier households, with 80% of spending going to the top 40%.²⁸¹ Yet, these energy subsidies play an essential role in preserving industrial competitiveness, employment, and affordable goods and services. Therefore, the transition away from these subsidies needs to be tactical, mitigating any negative impacts. Smart, efficiency-led solutions, such as promoting renewable energy sources and transport systems, could help reduce reliance on subsidies in the medium term. These alternatives, alongside thought-out changes in infrastructure—like a potential reinstatement of more efficient railway systems—could provide a sustainable path forward that balances social, economic and environmental outcomes.

Scaling up investment in circular economy interventions and green sectors is urgent. At the same time, we must also consider the unique challenges faced by LAC countries; the restricted fiscal space, significant debt burden and high levels of labour market informality. This makes it challenging to ensure tax revenues through VAT, suggesting the need for innovative solutions like global debt-for-nature swaps. Overall there is a strong case for LAC to revise its current incentive system, shifting subsidies towards nature-positive sectors—such as regenerative agriculture and renewable energy—and phasing out nature-negative public support²⁸² with more proactive taxation strategies. Although not currently considered in this methodology, private sector investment within value chains will also be key, and can complement public investment to leverage and accelerate the circular transition. With careful deliberation, this would help the region retain more funding for crucial sectors, even in countries with high tax burdens like Uruguay, while progressively phasing out the most environmentally and socially harmful financial incentives in nature-negative sectors.²⁸³

UNTAPPED POTENTIAL FOR ADDITIONAL REVENUE STREAMS

LAC's fiscal environment has significant untapped potential for additional revenue sources, which can be used to finance green and circular policies.

Countries can tap into these potential revenue streams by exploring environmental taxes, digital taxes, property tax increases, luxury taxes, Extended Producer Responsibility (EPR) fees/programmes, circular economy incentives and taxation, and import/export taxes on non-circular goods and services.²⁸⁴ This could fund the investments necessary for a circular future LAC. In the policy interventions explored in this analysis, we propose a scenario for job creation potential in which tax revenues align with the OECD average tax-to-GDP ratio (35%). Figure eight shows an overview of 14 countries in the region, highlighting the share of additional tax revenue they would need to collect to reach this average (based on 2019 baseline figures).

Although LAC's tax-to-GDP ratio is lower than the OECD average, the focus should revolve around **shifting subsidies and exploring untapped potential revenue sources rather than simply increasing taxes.**²⁸⁵ By effectively harnessing these additional revenue streams, LAC countries can advance on progress towards the Sustainable Development Goals,²⁸⁶ promote environmental conservation and address a range of the region's pressing challenges, from land use change to biodiversity loss. For each of the four focus sectors, Table four proposes a list of suitable fiscal instruments to tap into additional revenue sources to finance the circular economy transition. The items denoted with '+' are those for which a net increase in tax revenues can be expected, while those denoted with '-' should reduce tax rates. Items denoted with '●' are those that aim to shift consumption without altering the overall tax rate. It is crucial to consider these fiscal changes carefully to avoid unintended consequences,²⁸⁷ ensuring they are performance-based or targeted specifically to circular economy targets or stakeholders within a sector.

HOW MUCH INVESTMENT COULD BE AVAILABLE?

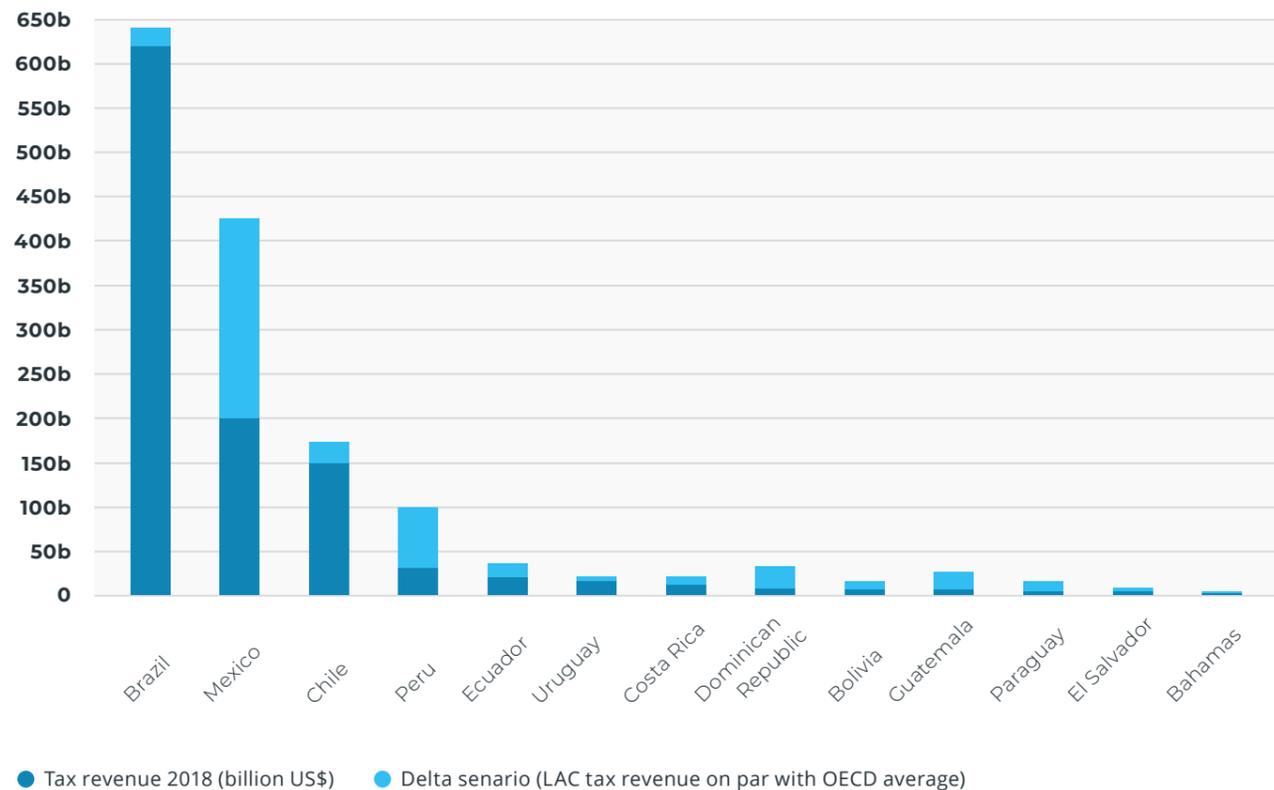


Figure seven shows the overview of the share of additional tax revenue needed to reach the OECD average in 14 countries in the region (based on 2019 baseline figures).



WHAT TYPE OF FISCAL INSTRUMENTS COULD CREATE THE RIGHT INCENTIVES?

AGRIFOOD	BUILT ENVIRONMENT
<ul style="list-style-type: none"> + Progressive increase in land tax (more than proportional to the area) + Increase tax on exports ● Change VAT* based on distance and seasonality of food products ● Reduce income tax on non managerial roles to foster formal employment²⁸⁸ 	<ul style="list-style-type: none"> + Increase in property tax + Increase profit tax on rental activities + Increase material input tax (or VAT) on different material types ● Change VAT on construction work, with lower rates on renovation activities and higher rates on new constructions - Reduce income tax to foster formal employment
MANUFACTURING AND WASTE MANAGEMENT	MOBILITY
<ul style="list-style-type: none"> - No income tax on repair and recycling activities ● Change VAT on product categories based on product weight, material scarcity, repairability, recyclability 	<ul style="list-style-type: none"> + Increase in property tax of cars, in proportion to its weight and energy efficiency - Reduced VAT on shared usage and break on repair activities and services - Reduced income tax on public transport workers

Table four highlights fiscal instruments for tax collection for each focus sector.

For each of the four macro-sectors, we compile a list of recommendations based on the aforementioned literature on the use of different fiscal instruments. The items listed with '+' are those for which we expect a net increase on tax revenues, conversely to the items listed with '-'.

* VAT refers to value-added tax.

PRIORITISING EMPLOYMENT OPPORTUNITIES FOR CIRCULAR INVESTMENT

A nuanced approach is required when considering the impact of circular economy interventions on the local economy and employment. The selection of circular economy interventions aims to reduce the material and carbon footprints while generating the largest net job creation potential through capacity-building initiatives. These would include reskilling, upskilling and training programmes that develop knowledge of circular practices. For these reasons, the remainder of this chapter focuses on the interventions that hold net job creation potential through capacity-building investments.²⁸⁹

By mapping out and prioritising these strategic interventions, it is estimated that the **LAC region could create 8.8 million new formal jobs** through an additional investment of US\$474 billion. This additional public revenue would be allocated among key sectors, with Agrifood accounting for 33%, Built Environment for 22%, Mobility for 14% and Waste Management for 31% (including the manufacturing activities related to this sector). It is important to note that the potential for job creation in a circular economy not only resides in existing sectors or the incentivisation of new sectors but also hinges on guiding young people towards exploring and developing new careers in these emerging sectors. For instance, renovation work in the built environment necessitates skills and occupations in fields such as green architecture and sustainable design, energy-efficient engineering, digital modelling and circular project management, as well as specific environmental policy and regulation: these roles span multiple sectors from construction to design, urban planning and architecture. This highlights how circular economy interventions foster an integrated, multi-disciplinary approach to developing LAC's labour market.

LINKING CIRCULAR ECONOMY INTERVENTIONS WITH LABOUR MARKET IMPLICATIONS

LAC has the power to address imminent environmental challenges while ensuring a just transition for workers if the necessary capacity-building measures and supporting policies are implemented.²⁹⁰ As discussed, circular economy interventions in LAC can have varying impacts on the labour market, ranging from job creation and reskilling opportunities to shifts in employment patterns across sectors. Beyond job creation, however, these employment opportunities can drive broader socioeconomic and environmental benefits. The following sections present the analysis results and outline the policies, occupations and skills needed to drive the circular transition in four scenarios relating to circular food systems, a circular built environment, rethinking mobility and improving waste management.



WHERE COULD THIS INVESTMENT GO?

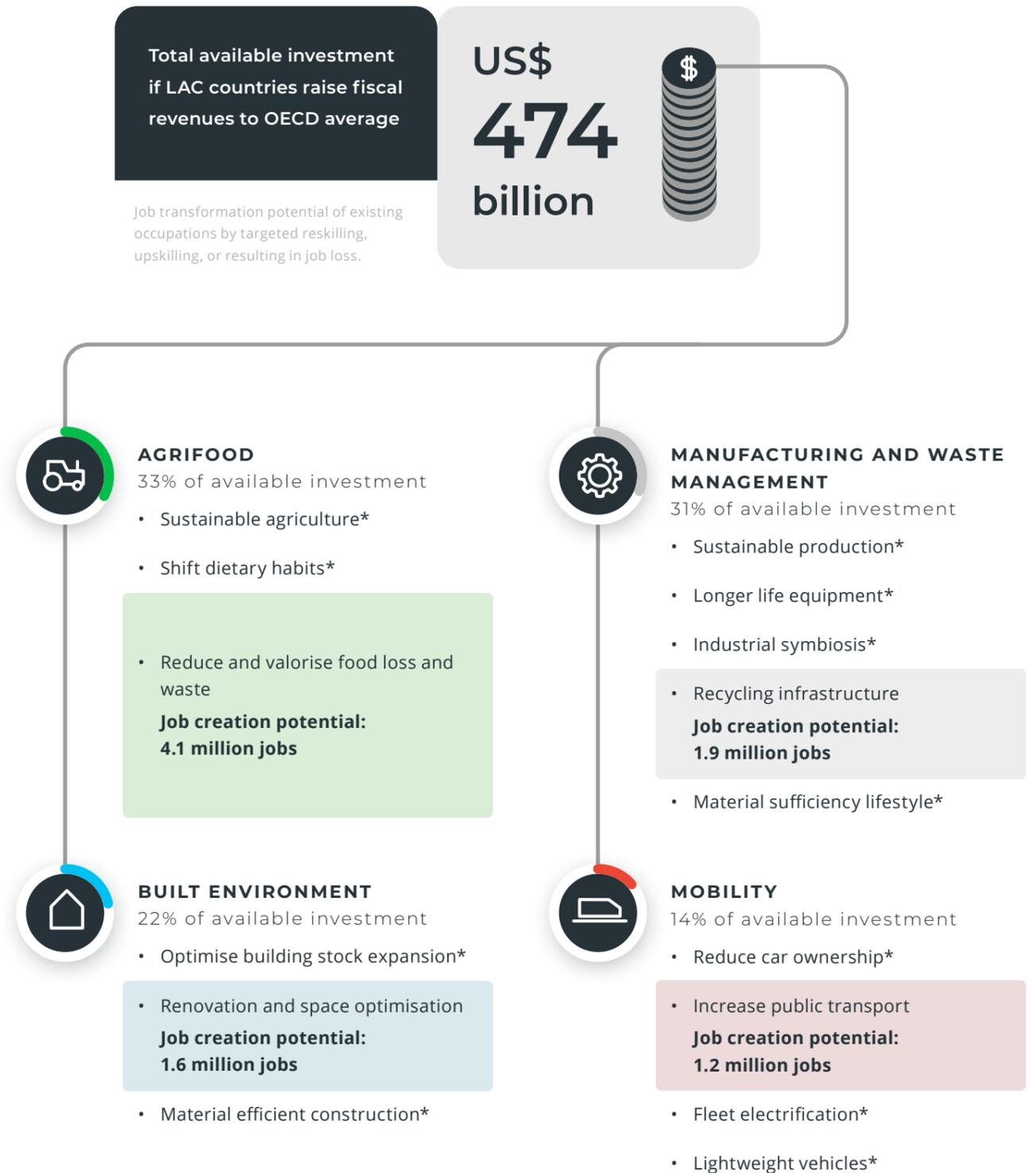


Figure eight links which circular interventions within key sectors have the greatest job creation potential

SHIFT TO A CIRCULAR FOOD SYSTEM

In this scenario, **'Reducing and valorising food loss and waste'** could offer significant job creation potential. This intervention includes preventing organic waste across the value chain: from production sites to households and industrial processes, as well as the reuse and recycling of unavoidable waste. Importantly, while this intervention doesn't directly lead to new jobs in food production, it aligns with the broader need to move towards structurally diverse, agroecological and circular farming systems. Meanwhile, this intervention opens up employment opportunities in waste prevention and innovative enterprises such as bio-packaging production and bio-inputs for pharmaceuticals. Reducing organic waste, and developing composting and recycling initiatives can create organic waste management, sorting and biomass processing jobs. The intervention also contributes to positive social impact by redirecting food to food banks and associations, as has been the case in Chile through Banco de Alimentos.

That said, the wider impact on regional agricultural employment needs careful consideration. The shift must consider the nuanced local imperatives for both job losses and gains and ensure strategies are in place to balance these dynamics. Lastly, this intervention does more than create new jobs; it forms part of an **essential shift towards a more sustainable and resilient food system**.

In practice: realising job creation potential through reduction and valorisation of food loss and waste

A combination of fiscal instruments and labour market policies can be implemented to ensure this intervention's job creation potential is realised. Fiscal instruments can include subsidies, financial incentives, and tax credits or deductions for businesses and organisations involved in organic waste reduction efforts or those that meet specific pre-established performance targets. This could support the development of waste management infrastructure, such as composting facilities or anaerobic digestion plants. To ensure capacity-building efforts are implemented, the provision of subsidies or tax exemptions to businesses and workers that hire or upskill in organic waste management and reduction activities will be instrumental. Fostering partnerships between

educational institutions, industry associations and businesses can facilitate knowledge exchange and promote innovation in organic waste reduction. Implementing this intervention would require an estimated US\$79 billion in investment. This investment is crucial to develop the necessary infrastructure, provide training and support to farmers, and incentivise sustainable practices along the agrifood value chain.

Job creation potential

With strategic policies and investments, a circular food system that minimises and revalorises food loss and waste has the potential to generate roughly 4.1 million new employment opportunities. To realise these opportunities, skill development and training programmes will be essential for workers across the food systems value chain, particularly in food waste minimisation and revalorisation. This includes emerging areas such as regenerative agriculture and precision farming. Furthermore, if properly managed, digitalisation has the potential to transform agriculture in LAC, yielding positive social, economic and environmental benefits. These strategies can further enhance social inclusion and employability if investments are strategically targeted towards skills development and education.

The key occupations and roles for realising this intervention include **food and nutrition professionals, biotechnicians, educators, public awareness campaigners, logistics and procurement managers, innovation managers, process engineers and food systems researchers.** These professionals contribute to waste reduction through healthier dietary habits, research in new biotechnologies, public awareness and sustainable food systems education, food science engineering and further applied research expertise in agrifood systems. While these job opportunities will contribute to the sector's growth and support the shift towards more circular food systems, 'just transition' policies are needed to support workers in traditional roles associated with resource overuse and waste generation. These policies could help workers in declining industries to retrain for jobs in growing sectors. Overall, circular economy policies in this scenario must focus on empowering workers with knowledge about new business strategies and more circular agricultural and farming practices while also increasing awareness of their rights and ensuring fair working conditions.

CHILE'S PUBLIC-PRIVATE EFFORTS TO VALORISE ORGANIC WASTE AND UPSKILL ITS WORKFORCE

In Chile, the industry association *ChileAlimentos* was the driving force behind the processed food sector's intra-industry Clean Production Agreements, the latest one being established in 2022.²⁹¹ This public-private agreement demonstrates the industry's efforts to repurpose nearly 98% of organic waste, mainly for animal feed and composting, with a smaller amount used for energy production and to improve soil health.²⁹²

Under the agreement, *ChileAlimentos'* Labour Skills Assessment Centre, known for its proficiency in sector-specific upskilling and workforce certification, also provides training and certification in organic waste valorisation and optimisation.²⁹³

The Centre recognises workers' skills regardless of how they were acquired, even without an academic degree. It evaluates each worker's abilities, skills and knowledge, providing certification based on their competencies.²⁹⁴

BUILD A CIRCULAR BUILT ENVIRONMENT

In the circular built environment scenario, the ‘optimise building stock expansion’ intervention holds significant potential for job creation, as well as to reduce the sector’s virgin material use and emissions. This intervention is expected to lead to a net increase in jobs as the demand for renovation activities grows, through the stimulation of private and public demand via public procurement. As the most recent figures show that the construction sector represents 6.1% of the region’s economic activity²⁹⁵ and employs 7.7% of its workers,²⁹⁶ capacity-building and upskilling the existing workforce will be necessary to carry out renovation projects and fully realise this intervention’s potential.

In practice: realising job creation potential by optimising building stock expansion

A number of fiscal instruments will be needed to achieve this potential: direct subsidies of household renovation activities, tax credits for energy-efficient upgrades and negative income tax for workers engaged in renovation activities, for example. Moreover, providing targeted or subsidised training programmes to the built environment’s current workforce could boost employment in the sector. All levels of government must prioritise renovation and public space optimisation through public procurement, which will require professionals with the knowledge needed to assess and carry out projects. Finally, it is important to implement public awareness campaigns that highlight the advantages of optimising building stock expansion. Supporting the implementation of this intervention will require US\$52.7 billion in investment. This will be crucial to create an enabling environment that encourages sustainable construction practices and facilitates the job creation potential of this scenario.

Job creation potential

With the proper policies and investments in place, it is estimated that 1.6 million new formal jobs can be created in a circular built environment that optimises the existing building stock. The type of renovation activities required are wide-ranging, from energy efficiency upgrades and the installation of smart home technologies, to increased sustainable material use in existing building stock. The occupations needed to carry out these activities are thus similarly diverse, including **(technical) installers (for insulation, roofs, windows, facades, ventilation systems), renewable energy and alternative heating systems), urban planners and spatial analysts, repair and maintenance operatives, engineers and architects, eco-designers, urban miners, material scouts and sustainable materials public procurement authorities.** Along with capacity-building, wellbeing, gender and social equity should be central concerns in the design of circular interventions. This is especially true due to the high prevalence of male and informal workers in these sectors.

EMPOWERING SKILLED TECHNICIANS: SOLAR WATER HEATER ORDINANCE IN ROSARIO, ARGENTINA

In Rosario, Argentina’s third-largest city, a new ordinance has been rolled out requiring all new or upgraded public buildings to heat at least 50% of their hot water through solar water heaters (SWH). This policy is part of Rosario’s *Sustainable Building and Energy Efficiency Programme*, which aims to increase the use of renewable energy across the municipal building stock.²⁹⁷

Partnerships between governmental and local non-governmental organisations were instrumental in developing the ordinance.²⁹⁸ In particular, Taller Ecologista, a local non-profit environmental protection organisation, provided technical expertise and knowledge-sharing during the drafting process. The municipality conducted capacity-building programmes for SWH installers and technical staff, ensuring adherence to regulations and proper operation of SWH equipment. Skills training initiatives, like the ‘energy diploma’ offered by the University of the Latin American Educational Centre, equipped local technicians with the knowledge needed for renewable energy deployment. Public awareness was raised through SWH installations and community engagement activities.

Through this policy, Rosario not only promoted renewable energy but also eliminated the need for fossil fuel-based or electric heating methods, reducing environmental impacts, improving air quality, and mitigating potential health risks associated with traditional heating methods.



RETHINK MOBILITY

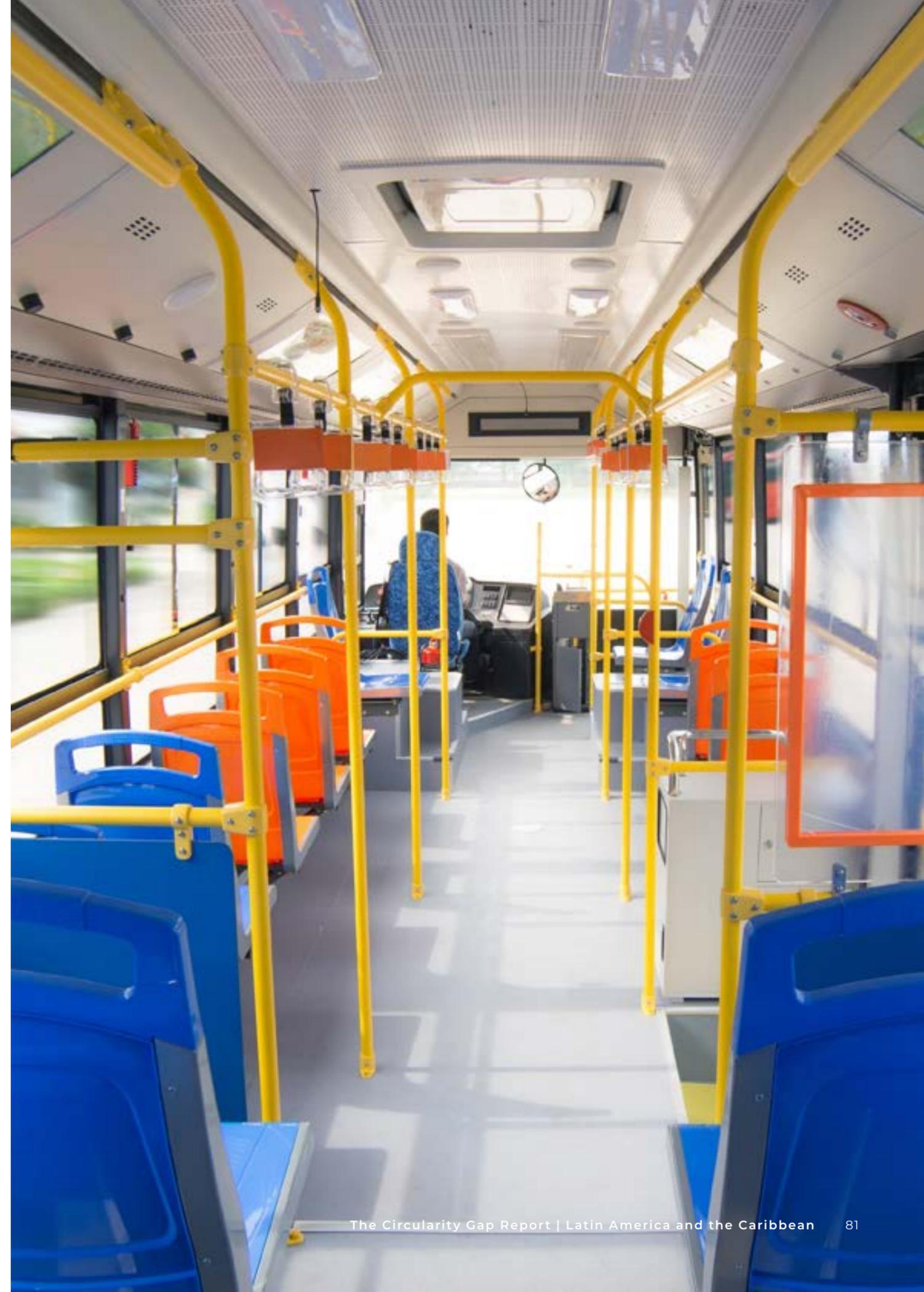
In the mobility scenario, the **'Increase public transport'** intervention holds significant potential for job creation. This would involve the construction and operation of new transport infrastructures, such as public transit systems. Expanding public transportation networks could create various employment opportunities, in infrastructure development, vehicle maintenance and related services, for example. A skilled workforce will be needed to meet the needs of an expanding and evolving sector, especially given the growing demand for public transport services.

In practice: realising job creation potential through the expansion of public transport systems

Increasing public transport use in LAC will require a combination of fiscal instruments and labour market policies, including subsidies to incentivise private sector investment in public infrastructure development. Policies that regulate ticket pricing and subsidise fares can help ensure affordable and accessible transportation, while public-private partnerships in large-scale investments could enhance the quality and efficiency of existing systems through public transport fleet upgrades and the adoption of technology-savvy solutions. Moreover, awareness campaigns, integration and intermodality initiatives, and funding programmes for research and innovation will be important, while specific skills development and training programmes for public transport workers and attractive job openings for driving, maintenance and customer service roles will be needed. An estimated investment of US\$28.2 billion will be required to implement this intervention. This investment would be allocated towards infrastructure development, technological advancements and capacity-building initiatives.

Job creation potential

If backed by appropriate policies and investments, mobility solutions that emphasise the expansion of public transport systems could yield around 1.2 million new jobs in the formal sector. The main occupations and roles in demand for increasing public transport use in LAC include **urban and transport planners, public transport operations and logistics managers, environmental educators promoting the benefits of public transport, transportation policy analysts, regulatory affairs specialists, transportation engineers, signal and systems engineers, vehicle technologists for buses, trams, trains, including lithium battery refurbishment and recycling, and urban transport researchers.** These job opportunities could enhance the region's public transportation system while promoting equitable access to mobility needs.





IMPROVE WASTE MANAGEMENT

The ‘**Increase recycling**’ intervention boasts significant job creation potential in this scenario. Jobs can be created by investing in recycling infrastructure, improving collection and sorting activities, and formalising the employment of informal waste workers. This intervention addresses waste management challenges and contributes to the circular economy by maximising the recovery of valuable materials such as critical raw metals, plastics, organic waste and glass. Expanding recycling activities will require a skilled workforce, the creation of employment opportunities in formal waste management and the development and deployment of various recycling technologies. This intervention would also require education and public awareness campaigns to realise, and would likely spark further research on circular product design and recycled materials use.

In practice: realising job creation potential by enhancing recycling rates

To implement this policy intervention, effective measures are needed, including subsidies to support the establishment of new recycling facilities, implementing a negative income tax on labour-intensive circular activities, and strengthening existing mechanisms that ensure fair wages and labour practices. Financial incentives should be given to businesses using recycled materials and training subsidies related to recycling activities. The implementation of Extended Producer Responsibility (EPR) laws can actively drive improved collection and recycling practices in the region. Chile’s EPR Law N. 20920 and its related decrees present a set of indicators and objectives related to waste collection, recycling and valorisation, for example. Furthermore, as recycling services are often determined by the municipalities, these incentives must address the challenges and contexts at this level of governance—such as limited funding available, lack of infrastructure, and varying and conflicting local environmental regulations. Combined with sector-specific training, public-private partnerships, and public awareness campaigns, these measures can create an enabling environment for job creation to deliver this intervention. Implementing this intervention will require an estimated investment of US\$54 billion. This investment may be allocated to infrastructure development, training programmes,

technological advancements, or incentivising the development of upstreaming solutions such as eco-product design, product lifetime extension, or new X-as-a-Service business models to offer reuse and refill options.

Job creation potential

Implementing relevant policies and targeting investments could create an estimated 1.9 million new jobs in the formal recycling and waste management sector. This encompasses a wide range of roles, from **waste collectors and sorters to engineers, technicians, and both public and private sector specialists in resource management and recycling.** These formal roles encompass waste management planning, recycling coordination, material recovery, engineering, compliance, education and training, research and innovation, operations and logistics, marketing and sustainable product manufacturing. Overall, these roles also contribute to the transition towards a more circular manufacturing industry, by promoting resource efficiency, waste reduction and the development of innovative, more environmentally-friendly production processes. Therefore, this intervention should be coupled with reskilling in related industrial sectors, by promoting roles in **remanufacturing, reverse logistics and lifetime extension activities**, for example. Additionally, **fostering industrial symbiosis** will have a significant role to play in making activities more efficient and complementary. Alongside these efforts, focus may also centre on increasing R&D on circular design and recycled material use.

It is important to stress that this shift should address ubiquitous informal waste management workers. This will require more than just formally recognising informal workers, by providing occupational safety and health (OSH) training, improving precarious working conditions, and offering assistance in the organisation of cooperatives should workers choose to do so. This approach would promote upskilling, safeguard workers’ rights, and improve their working standards.

RECYCLING AND SOCIAL INCLUSION IN BELO HORIZONTE BRAZIL

Belo Horizonte, Brazil’s third-largest metropolitan region, initiated a transformative recycling initiative in the 1990s, combining waste management with social inclusion.²⁹⁹ The city partnered with the Association of Waste Pickers (ASMARE), formalising waste picking as a recognised profession.³⁰⁰ This partnership led to public awareness campaigns and capacity-building in new recycling techniques and waste sources, health and safety, legal labour rights, cooperative management, and entrepreneurship. Waste pickers increasingly became acknowledged environmental service providers rather than marginalised workers, benefiting from improved safety, earnings and working conditions. Trust was built through continuous dialogue and cooperation between the local government and waste pickers’ representatives. This became instrumental in effectively addressing emerging challenges such as safe and stable access to waste, upgrading recycling equipment and infrastructure, and co-determining the payment schemes for such services. That said, at present, an increase in recycling rates, more up-to-date waste management infrastructure, and overall public environmental awareness require further improvements. Overall, **the city’s model effectively illustrates how legal recognition, participatory deliberations, and integration of waste pickers can both improve livelihoods and cities’ waste management systems.** Inspired by Belo Horizonte, bottom-up alternative waste management systems such as the Zero Waste Santa Tereza project—which involves door-to-door collection services, community involvement, and other sustainable activities—underscore the potential for broader application of this inclusive recycling model.³⁰¹

BROADER SOCIOECONOMIC EFFECTS

Redeployment strategies and a just transition in lac's labour market

Modelling the potential negative impacts of the prioritised interventions was beyond this project's scope. However, the successful implementation of these interventions—and mitigation of potential negative impacts—will hinge on the deployment of successful capacity-building and re-skilling programmes. Outside OECD countries, there is still little understanding of the skills required for circular economy activities, such as remanufacturing. It is worth noting that **shifting away from linear and extractive jobs does not mean the entire workforce will be redirected to the aforementioned sectors and occupations. Instead, we argue that realising these scenarios can catalyse the circular economy transition in the region.** Overall, to succeed, circular economy policies in LAC must incorporate and discuss the role of social dialogue and inclusive decision-making between government, trade unions, businesses and communities, as well as decent work pillars and the necessary mechanisms for a just transition.

Promoting decent work and addressing informality in circular economy interventions

Although there's limited academic research regarding the relationship between decent work and circular economy interventions in the LAC region, **it is essential to understand and enhance the role of workers in these interventions.**³⁰² The rise in the working poor, the expansion of flexible employment relationships, and the prominent role of the informal sector in circular economy activities necessitate that these interventions align with principles of decent work. Informal workers already play a substantial role in providing livelihoods through circular economy activities, particularly during economic downturns. This can include the operation of informal second-hand markets, the informal reuse or repair of building materials, and informal freelance upcycling. Recognising and supporting these activities can ensure the circular economy not only contributes to environmental sustainability but also promotes fair and inclusive economic development. With an increasing number of self-employed gig workers in LAC, it's crucial to examine how these existing labour market trends interact with circular interventions, often linked with an enhanced service-oriented economy.

Addressing informality within traditionally 'circular' sectors is critical—although formalisation is not necessarily the end goal. Initiatives in Paraguay,³⁰³ Peru,^{304, 305} and Chile³⁰⁶ that transitioned informal workers into the formal economy provide valuable insights regarding potential benefits and challenges. Implementing a nuanced approach that supports informal workers, recognises their essential role in circular activities, and aims to improve working conditions and livelihoods in alignment with circular economy goals will be key. **There are several barriers to including non-organised workers:** a lack of city-level statistics relating to the population and working conditions, as well as more generally comprehensive policies addressing the specific needs of these workers, such as mobility, accessible health care, affordable housing and greater social protection.³⁰⁷ A persistent challenge in the waste management sector has also been the development of adequate pay schemes³⁰⁸ that consider various stages of the value chain, involving a wide-ranging group of actors (for example, co-ops, independent waste pickers, operators of zero waste sites) as well as their varying degrees of environmental impact. Overall, information about informal and alternative models is still lacking.

Gender and social equity in circular interventions

Currently, women are underrepresented in high-value sectors of the circular economy and overrepresented in low-value, informal sectors due to systemic barriers, such as limited participation in STEM subjects. To ensure a circular economy transition is equitable, it's crucial to enhance women's participation across all sectors: the circular economy transition can be leveraged as an opportunity for women to diversify their professional roles beyond traditional fields.³⁰⁹ A global analysis conducted by the International Labour Organization (ILO) in 2019 suggests that the transition to a circular economy could increase the employment of women globally.³¹⁰ The wider adoption of circular strategies could result in a net job increase of 12 million for women by 2030, if the gender distribution across sectors remains and if women benefit from new jobs in the service sector. At the same time, jobs belonging to linear sectors that would require redeployment are largely male-dominated, mid-skill occupations.^{311, 312}

An important point to highlight is that the projected net employment opportunities for women are not expected to offset prevailing gender inequalities, unless countries adopt strong policies and programmes to address the feminisation of poverty, and the precariousness of the new service-oriented jobs modelled.³¹³ What's more, existing circular economy activities and occupations globally, as well as in LAC, are currently considered socially undesirable.³¹⁴ For this reason, they are largely performed by marginalised social groups such as non-citizen migrant workers, informal workers, minorities and youths. Effective circular economy interventions must acknowledge the existing social, financial and political barriers these groups face in the LAC labour market. If these considerations are not embedded in circular economy policies, they risk perpetuating the same inequalities as the linear economy. It is important for policymakers to promote circular economy policies that go beyond recycling in formalisation programmes, and provide diverse opportunities—such as organic composting, reuse and repair—for these workers.

Broader issues of social equity must be considered in the transition. In LAC, where material consumption is already moderate and asset ownership is often viewed as a form of social insurance for low-income households, the shift from ownership to access-based models in circular economy interventions, such as product-as-a-service offerings, necessitates a critical assessment to ensure equitable access, especially for essential goods, considering their pricing and potential social implications.

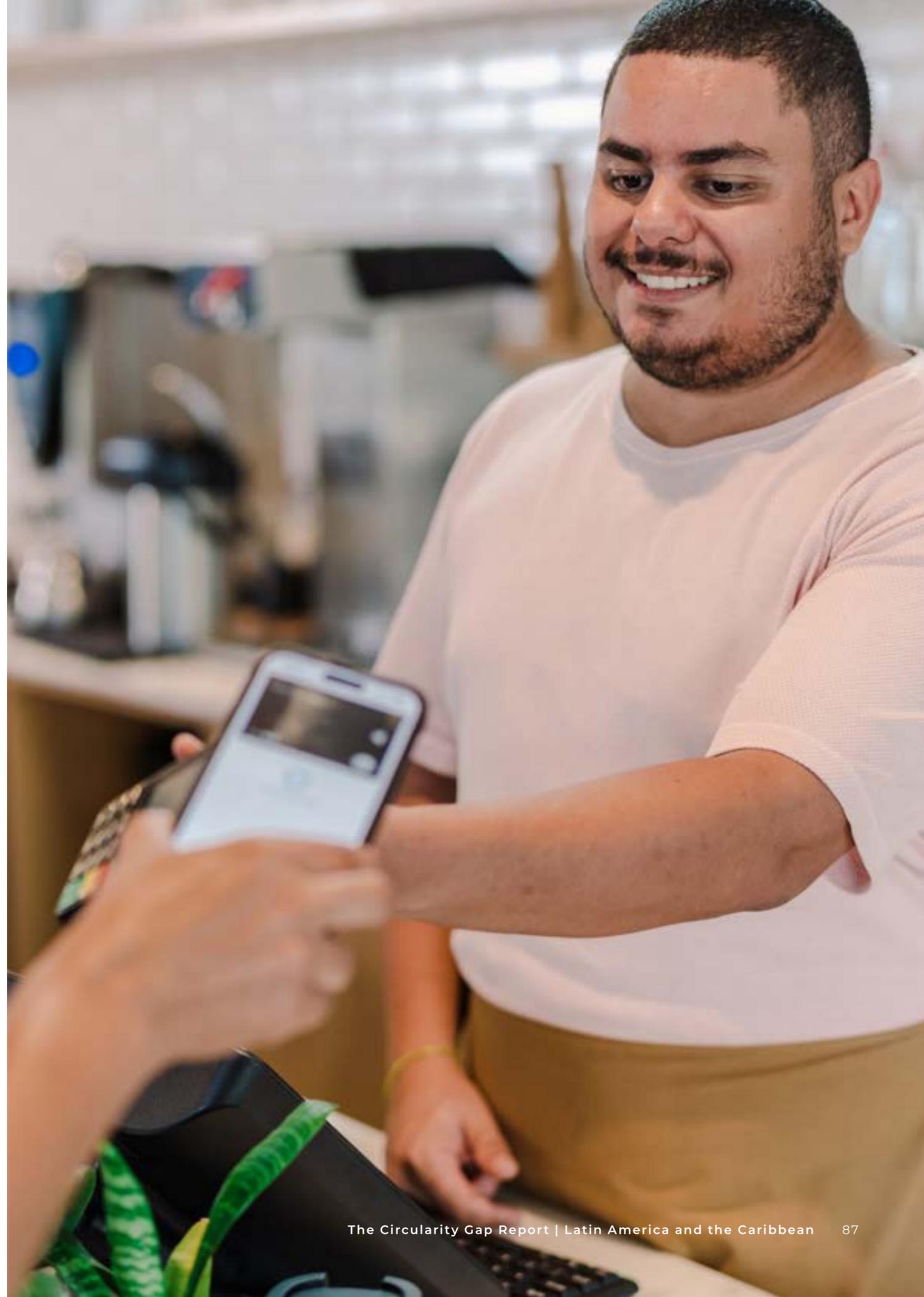
Skilling and capacity building

Circular economy interventions are embedded in the growing demand for cross-disciplinary collaboration to solve complex societal issues. These occupations and related skills demand the updating and strengthening of practical and vocational learning, alongside higher education pathways.³¹⁵ The T-Shaped skills approach provides a helpful framework for understanding how specialist (deep) skills and generalist (transversal) skills can be combined in these circular economy interventions.³¹⁶ Deep skills encompass traditional and technical circular skills, while transversal skills facilitate collaboration and service-related tasks. Within the LAC context, transversal skills needs among the formal and informal workforce include effective communication, customer engagement and foundational professional competencies. As a global trend, including the LAC region, **deep skills development faces challenges due to social stigma surrounding vocational education and slow integration into higher education curricula. This challenge is compounded in LAC due to a lack of attractive career pathways and financial incentives for young professionals entering vocational professions.** Furthermore, although circular practices are common in LAC, there are no efforts to incorporate this inherent practical knowledge—that of informal electronics repair workers or informal waste upcyclers, for example—into existing educational curricula and retain such embedded (and informal) circular knowledge and skills. A policy addressing knowledge sharing in this context could empower current (often marginalised) knowledge brokers.

These factors have resulted in a 'deep skills' gap, which hinders the formal implementation of circular economy principles in LAC. For example, existing capacity-building efforts in the waste management sector have mainly focused on providing legal training and technical waste handling techniques—but largely overlook the importance of occupational safety and health knowledge for workers operating in the informal waste management and recycling sectors.³¹⁷ It's crucial to highlight that effective capacity-building initiatives are essential and must be implemented in a manner that resonates with the target group—informal workers who may lack formal education and are often not familiar or equipped with digital knowledge or tools, for example.

That said, while collecting, handling and processing waste will require limited basic-skilled employment, there is little mention in the literature of the more advanced skills required for X-as-a-Service business models, remanufacturing and other circular industries in LAC. Nonetheless, promising capacity-building initiatives have been developed, coordinated by local governments or universities supporting green jobs. These include, for example, the UN Partnership for Action on Green Economy (PAGE) or the Green Jobs for Youth Pact, an initiative by the ILO, the UN Environment Programme and UNICEF.³¹⁸ The initiative aims to undertake capacity-building and educational initiatives in LAC by working with universities and other partners to assess training needs, promote access to green jobs for graduates, and incorporate sustainable lifestyles into university curricula.³¹⁹ Capacity-building initiatives are emerging at the local scale, too: the University of São Paulo now offers a course on e-waste, for example, while Brazil-based CataSaúde Viraliza offers an online capacity-building project on health issues for waste pickers.³²⁰

To ensure that the implementation of circular economy interventions reduces environmental impacts while maximising social outcomes, it's imperative to involve diverse stakeholders in decision-making processes. This requires that special attention is paid to the role of informal workers and matters of social and gender (in) equity. A cross-disciplinary approach will be necessary to develop advanced skills and knowledge in remanufacturing, as well as upstream solutions to prevent and minimise waste production, and advanced waste management practices. This can be accomplished through targeted vocational learning and collaborative initiatives. Furthermore, these circular economy interventions need to go beyond merely recycling waste and formalising processes. They must also address broader social equity issues and leverage the region's inherent circular skills and knowledge.



6

THE WAY FORWARD

CALL TO ACTION

The circular economy is a key lever for achieving more sustainable and inclusive development.

The circular economy provides a means for transformation: a new economic system that enhances ecological resilience in the long term while meeting societal needs and wants in the short term.³²¹ A well-designed circular economy can overcome the shortcomings of a resource-extractive and export-oriented development model and foster greater sustainability, actively promote reforms to make cities more liveable, drive the energy transition and climate protection, ensure safe and just working conditions in a largely informal economy and improve social participation. The transition will not be simple or quick. Instead, it will be akin to steering an ocean liner—sustained, prolonged efforts will be needed to gradually upgrade the region's development trajectory.

Political commitment is necessary to ensure the fair use of natural resources to provide social benefits within planetary boundaries.

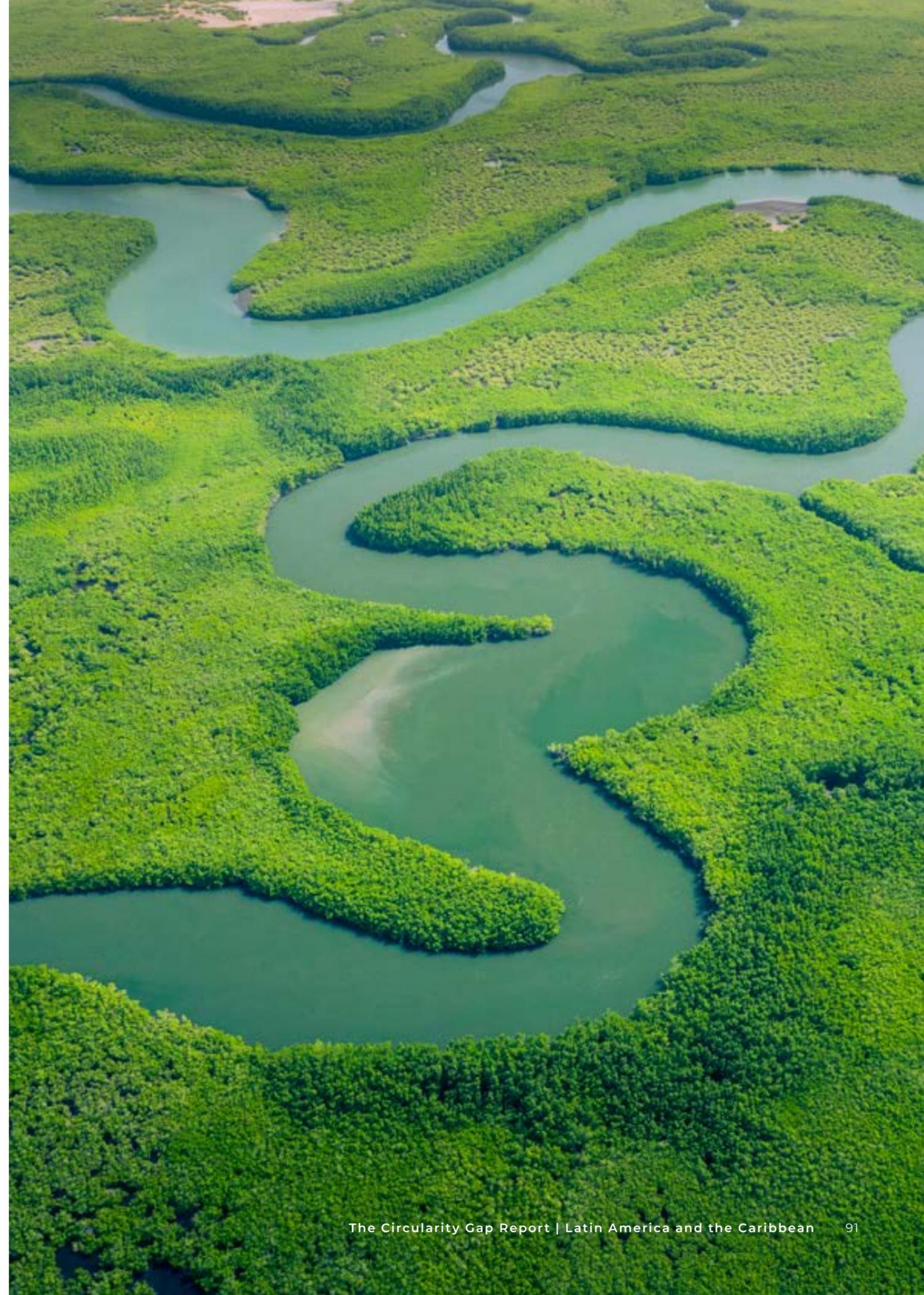
Accelerating the circular economy transition will require active public policies that direct structural transformation and create the right economic conditions. For LAC to become more circular, the starting point lies—to a large extent—in internalising externalities via true pricing and other fiscal instruments. This means adjusting the cost of goods and services to reflect the full range of their external impacts, both positive and negative, on society and the environment. By doing so, governments can incentivise businesses to adopt sustainable practices, ensuring that the true environmental and social costs are borne by producers and consumers rather than being imposed on third parties or the environment. This will require integrating environmental and social costs in strategic decision-making to ensure extractive economic activities are compatible with ecological limits and support human wellbeing. A very concrete first step will be to obtain the greatest possible social benefit from each tonne of material extracted rather than maximising extraction itself.

Targeted efforts by governments and development finance institutions can activate private finance to mobilise more capital for the circular economy.

The private financial sector falls short on investing in the circular economy at the scale and immediacy required as, in many cases, circular projects are perceived to be high-risk investments and financial risk is assessed within a linear economy model and mindset. Furthermore, the varying definitions of and assessments for circularity the type of circular economy financing available, as many circular projects aren't always labelled or acknowledged as such. To address this, public institutions may shape fiscal and regulatory conditions so that circular investments become more appealing to private finance than linear ones. New mechanisms—such as biodiversity and carbon credits—should be scaled to create financial incentives for the private sector, and to change their current practices—particularly in high-impact activities such as livestock production. In the meantime, ongoing efforts to harmonise the classification of circular economy activities for investment should be encouraged and fast-tracked, and public finance should make a concerted effort to de-risk private investment and create markets in key sectors—with new methods to assess risk developed in tandem. Grants, subsidies and blended finance initiatives should focus on developing and scaling up critical technologies that underpin many circular economy solutions. Concessional finance and public equity approaches can support growth-stage circular and regenerative business models and initiate market creation in areas where none exist.

A systemic approach is necessary to mobilise resources and catalyse positive change. Going from theory to action will mean tackling the root causes of linearity and uncovering leverage points in high-impact areas such as infrastructure, agriculture, finance and governance. In this sense, realising the circular strategies outlined in the report will require the combination of new incentives, behavioural change and technologies, as well as a shift in pricing to accelerate change and attract investments through public and private channels.³²² Currently, sustainable practices—in agriculture and forestry, for example—largely lack economic competitiveness and financial attractiveness compared to conventional extraction methods, with only a few exceptions. Realigning environmental and socioeconomic goals will require redesigning fiscal systems and improving policy frameworks to create the necessary regulatory and market incentives. For example, shifting public perception of and disincentivising unsustainable, destructive practices could be a first step in the right direction. Realigning incentives will also help promote new forms of organisation and production that enhance socio-ecological resilience, such as sufficiency-driven³²³ and inclusive circular business models,³²⁴ cooperative structures³²⁵ and citizen-led urbanism.³²⁶

Change is also necessary beyond LAC. This report has highlighted plenty of opportunities for the region to improve its socioeconomic and ecological sustainability.³²⁷ It will also be necessary to reduce consumption in high-income countries, favouring goods and services that are less material- and carbon-intensive. International collaboration will be key to realising this goal. Reforming international trade and financial architecture to massively increase climate finance, incentivising green investments, and encouraging technology and knowledge transfer will be necessary to better steward the region's ecosystems and to improve socioeconomic outcomes.³²⁸



TO TRANSFORM THE LAC REGION TOWARDS
A CIRCULAR ECONOMY, WE RECOMMEND
THAT GOVERNMENTS:

- 1. Increase public-sector-led investment in enabling infrastructure.** This will be key in furthering the region's circular transition. Boosting public investment in high-quality circular infrastructure will be fundamental to minimising waste generation and emissions while enabling secondary material use. Aside from public funding, engaging with the private sector will be necessary to fund circular and green infrastructure investments. Additionally, streamlining regulatory frameworks and ensuring transparent and efficient procurement processes can create a conducive environment for domestic and international investors to participate in infrastructure development. This includes necessary physical infrastructure, such as advanced waste management,³²⁹ biorefineries, electric arc furnaces and other essential infrastructure assets. The transition will also require quality infrastructure that fosters systemic synergies between goods, services and processes, for example to minimise and valorise biodegradable waste, electronics and plastic.³³⁰
- 2. Realign incentives with circular economy objectives to ensure that the private sector and financiers accelerate the transition.** Strengthening regulatory instruments—such as Extended Producer Responsibility schemes—advancing Circular Public Procurement, and engaging in Environmental Fiscal Reform can help scale up and mainstream circular business models and make them significantly more attractive and viable from an economic and financial perspective. The better alignment of taxes, subsidies and other fiscal instruments centred on circular economy objectives. Removing subsidies for extractive industries and increasing taxes on linear activities would provide revenue for circular economy-enabling investment as well as the 'double dividend' of job creation and improved human wellbeing.³³¹
- 3. Invest in the production, use and dissemination of high-quality statistics on resource use and waste management.** LAC needs comprehensive strategies and actions that strengthen the capacity to collect and analyse data in the region. LAC countries may face financial, technical and human resource limitations, which affect their capacity to develop and implement measurement systems for the circular economy. Overcoming data challenges will require tackling these limitations and obtaining the necessary funding. Mandating standardised waste reporting protocols for municipalities and businesses while directly funding municipal data collection schemes and engaging with the private sector can help ensure consistent and compressive data collection.
- 4. Support investment in innovation, especially through research and development (R&D).** Shifting to a more sustainable approach where materials are reused, repurposed and recycled, ensuring minimal waste and maximum utility, requires cutting-edge solutions, technologies and methodologies. These often result from focused R&D efforts. Substantial backing from both the public and private sectors will be crucial for these endeavours to flourish. By introducing policy measures that incentivise R&D, governments can effectively encourage private enterprises to invest more heavily in sustainable innovations. Direct funding, tax breaks or even preferential market access can act as potent catalysts in accelerating research.
- 5. Align on a long-term, strategic and shared vision and support multi-level and multi-stakeholder collaboration and coordination.** The journey from a linear to a circular economy is a multi-faceted endeavour that demands the alignment of a variety of actors, from policymakers and businesses to consumers and environmentalists. Stakeholders working in silos can often result in fragmented efforts, wasted resources and missed opportunities. However, proactive engagement paves the way for open dialogue, the sharing of best practices, identification of common challenges, and co-creation of viable solutions. Realising a long-term strategic vision will require the integration and coordination of evidence-based, differentiated and coherent policies as well as new institutional frameworks (supranational, international cooperation) and funding (at the state and local government levels). More practically, the effective implementation of circular strategies will also require close collaboration and coordination among various stakeholders, including government agencies, academia, businesses and civil society organisations.
- 6. Decouple economic development from the infinite extraction of natural resources, and set targets around human wellbeing and environmental sustainability.** Maximising human wellbeing within planetary boundaries will require rethinking the use of the traditional GDP metric. Realising a structural transformation will require mobilising and directing productive capacities towards supporting and improving social and environmental wellbeing, not only towards maximising aggregate production and consumption. Through more holistic tools, such as the United Nations Environment Programme's Inclusive Wealth Report, nations in LAC can strive to select circular strategies that blend overall systemic efficiency with social equity and environmental sustainability.

ENDNOTES

1. This analysis takes a consumption-based approach to material accounting. This means that it focuses on the material flows and greenhouse gas emissions associated with meeting the consumption needs of an economy, regardless of where the materials and products are produced. This methodological approach has some limitations, especially given the high share of LAC's domestic extraction that is exported. For more information, please refer to Chapter two and the [Methodology document](#).
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77. The global economy's material footprint is 94.73 billion tonnes. Source: TCCC Domestic Extraction dataset from the IRP global material flow database (2022).
78. The material footprint, also referred to as Raw Material Consumption (RMC), represents the total volume of materials (in Raw Material Equivalents) embodied within whole supply chains serving the final demand of an economy. The total material footprint is the sum of the material footprints for biomass, fossil fuels, metal ores and non-metallic minerals.
79. Material footprint (MF or RMC) being smaller than Domestic Material Consumption (DMC, 9.14 billion tonnes) which is also smaller than Domestic Extraction (DE) means that the region is a net exporter of raw materials. Domestic material consumption (DMC) represents the apparent physical consumption of an economy and does not distinguish between the intermediate demand and final demand for materials, whereas the MF is a measure of the total amount of primary materials required to satisfy a country's own final demand. Differences between the two indicators are expected, depending on the level of resource extraction, processing and trading in a country. The relative position of DMC in respect to DE and MF, where 0% means DMC=DE and 100% means MF=DE for LAC is 25%, meaning that DMC is much closer to DE than MF is. The global average relative position is around 23%.
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APPENDICES

APPENDIX A: GLOSSARY

Circularity Metric & Circularity Gap. The Circularity Metric measures the share of secondary materials over total material consumption of an economy in any given year (see also: *socioeconomic cycling*). The Circularity Gap refers to the opposite: the share of virgin materials over total material consumption. For more details see also *socioeconomic cycling* and *total material consumption*.

Consumption refers to the usage or consumption of products and services meeting (domestic) demand. *Absolute consumption* refers to the total volume of either physical or monetary consumption of an economy as a whole. In this report, when we talk about consumption we are referring to absolute consumption.

Consumption- and production-based accounting.

Production-based accounting focuses on the material flows and GHG emissions associated with production activities within a country's borders, while consumption-based accounting focuses on the material flows and GHG emissions associated with meeting the consumption needs of an economy, regardless of where the materials and products are produced. Both approaches are useful in understanding the environmental impacts of material use and GHG emissions while identifying opportunities to improve resource efficiency and reduce waste. However, consumption-based accounting provides a more comprehensive view of an economy's environmental footprint.

Cycling refers to the process of converting a material into a material or product of a higher (upcycling), same (recycling) or lower (downcycling) embodied value and/or complexity than it originally was.

Domestic Extraction (DE) is an environmental indicator that measures, in physical weight, the amount of raw materials extracted from the natural environment for use in any economy. It excludes water and air. [\[Source\]](#)

Domestic Material Consumption (DMC) is an environmental indicator that covers the flows of both products and raw materials by accounting for their mass. It can take an 'apparent consumption' perspective—the mathematical sum of domestic production and imports, minus exports—without considering changes in stocks. It can also take a 'direct consumption' perspective, in that products for import and export do not account for the inputs—be they raw materials or other products—used in their production. [\[Own elaboration based on Source\]](#)

Economy-wide material flow accounts (EW-MFA) are a 'statistical accounting framework describing the physical interaction of the economy with the natural environment and with the rest of the world economy in terms of flows of materials.' [\[Source\]](#)

Environmental stressor, in Input-Output Analysis, is defined as the environmental impact occurring within the region subject to analysis. There is therefore an overlap between the stressor and the footprint, as they both include the share of impact occurring within a region as a result of domestic consumption. This is how they differ: while the rest of the stressor is made up of impacts occurring within a region as a result of consumption abroad (embodied in exports), the footprint includes impacts occurring abroad as a result of domestic consumption (embodied in imports).

Emissions We differentiate between *territorial* and *consumption-based emissions*, as well as industrial and household emissions. **Territorial emissions** are calculated based on the traditional accounting method for GHG emissions, with a focus on domestic emissions, mainly coming from final energy consumption. **Consumption-based emissions** are calculated using input-output modelling to not only account for domestic emissions but also consider those that occur along the supply chain of consumption of goods and services. In this way, the embodied carbon of imported products is accounted for. At the same time, we also differentiate between

emissions attributed to **industrial** activities, and those directly attributable to **households** through activities such as household heating and private transport.

Greenhouse gases (GHG) refers to a group of gases contributing to global warming and climate breakdown. The term covers seven greenhouse gases divided into two categories. Converting them to **carbon dioxide equivalents** (CO₂e) through the application of characterisation factors makes it possible to compare them and to determine their individual and total contributions to Global Warming Potential (see below). [\[Source\]](#)

High-value recycling refers to the extent to which, through the recycling chain, the distinct characteristics of a material (the polymer, the glass or the paper fibre, for example) are preserved or recovered so as to maximise their potential to be re-used in a circular economy. [\[Source\]](#)

Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalised indices for each of the three dimensions. [\[Source\]](#)

Materials, substances or compounds are used as inputs to production or manufacturing because of their properties. A material can be defined at different stages of its life cycle: unprocessed (or raw) materials, intermediate materials and finished materials. For example, iron ore is mined and processed into crude iron, which in turn is refined and processed into steel. Each of these can be referred to as materials. [\[Source\]](#)

Material footprint, also referred to as Raw Material Consumption (RMC), is the attribution of global material extraction to the domestic final demand of a country. In this sense, the material footprint represents the total volume of materials (in Raw

Material Equivalents) embodied within the whole supply chain to meet final demand. The total material footprint, as referred to in this report, is the sum of the material footprints for biomass, fossil fuels, metal ores and non-metallic minerals. [\[Source\]](#)

Material flows represent the amounts of materials in physical weight that are available to an economy. These material flows comprise the extraction of materials within the economy as well as the physical imports and exports (such as the mass of goods imported or exported). Air and water are generally excluded. [\[Source\]](#)

Net Extraction Abroad (NEA) represents the difference between the trade balance of products and that of the raw materials needed to produce them. The difference between the two represents the 'actual' or net quantity of raw materials that have been extracted abroad to satisfy domestic consumption.

Raw Material Consumption (RMC) represents the final domestic use of products in terms of RME. RMC, referred to in this report as the 'material footprint', captures the total amount of raw materials required to produce the goods used by the economy. In other words, the material extraction necessary to enable the final use of products. [\[Source\]](#)

Raw Material Equivalent (RME) is a virtual unit that measures how much of a material was extracted from the environment, domestically or abroad, to produce the product for final use. Imports and exports in RME are usually much higher than their corresponding physical weight, especially for finished and semi-finished products. For example, traded goods are converted into their RME to obtain a more comprehensive picture of the 'material footprints'; the amounts of raw materials required to provide the respective traded goods. When RMEs are high, it means a country is carrying a hefty '**ecological rucksack**': the weight of materials taken from nature to make a product, minus the weight of the product itself. [\[Source\]](#)

Resources include, for example, arable land, fresh water, and materials. They are seen as parts of the natural world that can be used for economic activities that produce goods and services. Materials are biomass (like crops for food, energy and bio-based materials, as well as wood for energy and industrial uses), fossil fuels (in particular coal, gas and oil for energy), metals (such as iron, aluminium and copper used in construction and electronics manufacturing) and non-metallic minerals (used for construction, notably sand, gravel and limestone). [Source]

Secondary materials are materials that have been used once and are recovered and reprocessed for subsequent use. This refers to the amount of the outflow which can be recovered to be re-used or refined to re-enter the production stream. One aim of dematerialisation is to increase the amount of secondary materials used in production and consumption to create a more circular economy. [Source]

Sector describes any collective of economic actors involved in creating, delivering and capturing value for consumers, tied to their respective economic activity. We apply different levels of aggregation here—aligned with classifications as used in Exiobase V3, a global, detailed Multi-regional Environmentally Extended Supply and Use / Input Output database. These relate closely to the commonly used European sector classification framework NACE Rev. 2.

Socioeconomic cycling is the technical term for the Circularity Metric. It comprises all types of recycled and downcycled end-of-life waste, which is fed back into production as secondary materials. Recycled waste from material processing and manufacturing (such as recycled steel scrap from autobody manufacturing, for example) is considered an internal industry flow and is not counted as a secondary material. In the underlying model of the physical economy used in this report, secondary materials originate from discarded material stocks only. The outflows from the dissipative use of materials and combusted materials (energy use) can, by definition, not be recycled. Biological materials that are returned back to the environment (for example, through spreading on land) as opposed to recirculated in technical cycles (for example, recycled wood) are not included as part of socioeconomic cycling. Energy

recovery (electricity, district heat) from the incineration of fossil or biomass waste is also not considered to be socioeconomic cycling, as it does not generate secondary materials.

Socioeconomic metabolism describes how societies metabolise energy and materials to remain operational. Just as our bodies undergo complex chemical reactions to keep our cells healthy and functioning, a nation (or the globe) undergoes a similar process—energy and material flows are metabolised to express functions that serve humans and the reproduction of structures. Socioeconomic metabolism focuses on the biophysical processes that allow for the production and consumption of goods and services that serve humanity: namely, what and how goods are produced (and for which reason), and by whom they are consumed. [Source]

Total material consumption is calculated by adding Raw Material Consumption (material footprint) and secondary material consumption (cycled materials).

APPENDIX B: MEASURING MATERIAL FLOWS

Due to the level of detail and intricacy of how materials flow through an economy, not all flows in all sectors have been visualised. The left side illustrates the four dominant domestic extraction material groups in LAC: non-metallic minerals (sand, gravel and limestone, for example), metal ores (iron, copper and lithium, for example), fossil fuels (crude oil and fossil gas, for example) and biomass (food crops and forestry products, for example). It also shows the volume of materials entering the regional economy through **imports**. These are represented in terms of Raw Material Equivalents (RMEs)—the entire amount of material extraction needed, anywhere in the world, to produce a traded product. Together, the domestic extraction and the **RME of imports** comprise an economy's total inputs (raw material input, which does not include secondary material inputs).

Once in the economy, extracted or traded raw materials—as well as traded or domestically produced components, semi-products and products—undergo operations that either transform them into end products or make them part of

the production process of another end product. Beginning with **extraction**, the material resources are **processed** (from ores into metals, for example), which are manufactured into products in the **production** stage. The finished products satisfy societal needs and wants, such as Nutrition, Housing and Mobility, or they are exported. Of these materials entering the national economy every year, the majority are utilised by society as short-lived **Products that Flow**—reaching their end-of-use typically within a year, such as an apple, food packaging or a standard toothbrush. At end-of-use, materials from Products that Flow are typically either lost or cycled back into the economy. The remaining materials enter into long-term stock—referred to as **Products that Last**. These are products such as capital equipment, buildings and infrastructure.

APPENDIX C: HOW THE FOUR CIRCULAR STRATEGIES WORK TOGETHER

There are potential overlaps between some of the four circular strategies: narrow, slow, regenerate and cycle. For example, slow and cycle interventions often work together. By harvesting spare parts to use again, we are both cycling—by reusing components—and slowing, by extending the lifetime of the product the components are used for. And ultimately, slowing flows can result in a narrowing of flows: by making products last longer, fewer new replacement products will be needed—resulting in decreased material use. There are also potential tradeoffs between the four strategies to be acknowledged. Fewer materials being used for manufacturing—narrow—means less scrap available for cycling. Similarly, if goods like appliances and vehicles are used for longer—slow—their energy efficiency falters in comparison with newer models, preventing narrowing. Using products for a long time—slowing flows—decreases the volume of materials available for cycling: this can have a significant impact on material-intensive sectors like the built environment, where boosting the availability of secondary materials is particularly important. What's more: some strategies to narrow flows, like material lightweighting, can result in decreased product quality and thus shorter lifetimes—making it more difficult to slow flows.³³²

APPENDIX D: HOW THE FOUR CIRCULAR STRATEGIES WORK TOGETHER

Applying our Circularity Gap methodology to countries is complex and has required us to make a number of methodological choices. In a bid to generate actionable insights for national economies, and to enable comparison between countries, our Circularity Gap Reports take a consumption perspective: we consider only the materials that are consumed domestically, and allocate responsibility to consumers by excluding exports. However, there are some limitations to our approach: the more 'open' an economy is the more susceptible to the limitations of both the material flow analysis and input-output analysis, the latter in particular. Some of these limitations include difficulties in calculating the import content of exports.

Secondly, most production is ultimately driven by consumer demand for certain products or services. In an increasingly globalised world, the chain that connects production to consumption becomes more entangled across regions. Demand-based indicators—applied in this analysis—allow for a re-allocation of environmental stressors from producers to final consumers. This ensures transparency for countries with high import levels and also supports policies aimed at reducing or shifting consumer demand, at helping consumers understand the material implications of their choices, or at ensuring that costs of, and responsibilities for, resource depletion and material scarcity are allocated to entities and regions based on their roles in driving production processes through consumption.

Thirdly, when considering what residents of LAC consume to satisfy their needs, we must apply a nuanced lens to the direct imports; meaning we work out the full material footprints of the products. To account for the material footprint of raw materials is straightforward, but this is not the case with semi-finished and finished goods. To represent actual material footprints in imports and exports, we apply so-called RME (Raw Material Equivalents) coefficients in this study.

Finally, the Circularity Metric represents a country's efforts to use secondary materials; this includes waste collected in another country and later imported for domestic use. The total amount of waste recycled in treatment operations is therefore adjusted by adding waste imports to—and subtracting waste exports and by-products of recovery from—the amount of waste recycled in domestic recovery plants. When we adjust the volumes of recycled waste in treatment operations using imports and exports of secondary materials, 'credit' for saving virgin materials is ascribed to the country that uses that secondary material—recovered from former 'waste'. This perspective is similar to national accounts' logic, in which most re-attributions are directed at final use. In the case of LAC, the region imports more recyclable waste (10 million tonnes) than it exports (7 million tonnes), so it has positive 'credit' for recovering more waste through imports than the amount it exports.

However, it's also possible to take a more 'production-oriented' approach, in which 'credit' for recycling efforts is given to the country that collects and prepares waste for future cycling. This is, for example, the perspective taken by Eurostat in its calculation of the Circular Material Use Rate. For more information on this, refer to the [Methodology document](#).

APPENDIX E: PRACTICAL CHALLENGES IN QUANTIFYING CIRCULARITY

The circular economy is full of intricacies: quantifying it in one number presents some limitations. These are:

- **There is more to circularity than (mass-based) cycling.** A circular economy strives to keep materials in use and retain value at the highest level possible, with the aim of decreasing material consumption. The cycling of materials measured by the Circularity Metric is only one component of circularity: we do not measure value retention, for example. The Metric focuses on the end-of-use and mass-based cycling of materials that re-enter the economy but does not consider in what composition, or to what level of quality. As such, any quality loss and degradation in processing goes unconsidered.
- **The Metric focuses on one aspect of sustainability.** Our Circularity Metric focuses only on material use: the share of cycled materials out of the total material input. It does not account for other crucial aspects of sustainability, such as impacts on biodiversity, pollution, toxicity, and so on.

- **Lack of consistency in data quality.** Whilst data on material extraction and use are relatively robust, data on the end-of-life stage can often be weak, presenting challenges in quantifying material flows and stocks.
- **Relative compared to absolute numbers.** The Circularity Metric considers the relative proportion of cycled materials as a share of the total material consumption: as long as the amount of cycled materials increases relative to the extraction of new materials, we see the statistic improving, despite the fact that more virgin materials are being extracted—which goes against the primary objective of a circular economy.
- **It is not feasible to achieve 100% circularity.** There is a practical limit to the volume of materials we can recirculate—in part due to technical constraints—and therefore also for the degree to which we can substitute virgin materials with secondary ones. Some products, like fossil fuels, are combusted through use and therefore can't be cycled back into the economy, while others are locked into stock like buildings or machinery and aren't available for cycling for many years. Products that can be cycled, such as metals, plastics and glass, may only be cycled a few times as every cycle often results in lower quality and may still require some virgin material inputs. Because of this, reaching 100% circularity isn't feasible: this calls for a more nuanced approach to calculating circularity and setting targets.

APPENDIX F: ASSUMPTIONS FOR THE SCENARIO MODELLING

About a quarter of all domestic materials consumed were turned into solid waste in the same accounting period. Out of the 1.55 billion tonnes (dry matter content) of total generated waste, 550 million tonnes were treated within the technical cycle, while 1 billion tonnes were treated within the biological cycle (i.e. returned to the environment via land spreading, composting, anaerobic digestion or incineration/open burning).

SCENARIO ONE: SHIFT TO A CIRCULAR FOOD SYSTEM

Shift to more sustainable food production

This supply-side intervention assumes a shift to organic, seasonal and local farming—practically translating into reduced demand for synthetic fertilisers and transportation services. We assume that output from organic farming remains the same as conventional farming, in part due to high variation between studies comparing the two methods.³³³ Due to the nature of our methodological approach, we provide a high-level assessment of changes to the carbon footprint, including changes in land-use management. The effect on LULUCF emissions has been estimated, although a detailed breakdown on the effects of increased regenerative farming practices, such as agroforestry, or the role of biorefining and the production of sustainable biofuels, for example is not reported. However, it's worth mentioning that these can undoubtedly play a key role in advancing circularity and diminishing environmental pressures.³³⁴

Reduce food loss and valorise food waste

Meeting the SDG target 12.3, half of avoidable food waste is eliminated. We implicitly assume that this avoided waste is being recycled—whether as substitution to fodder crops, compost for nutrient recycling, or through anaerobic digestion for the production of biogas, for example.

Endorse a balanced diet

In modelling this dual intervention, we apply demand-side measures composed of three layers. First, the average per capita food consumption of LAC residents is reduced to 2,700 calories per day from the current 3,400, as a proxy for adopting a balanced diet.³³⁵ Second, an alternative diet composition scenario is explored to meet the above-mentioned caloric intake. The scenario is based on switching the baseline LAC diet towards a mostly plant-based diet. The 'Mediterranean diet' considers reduced consumption of meat products (reduced by 80% from the current caloric intake), matched by an equivalent increase in the calorific intake of grains, fruits, vegetables and nuts, fish and dairy—in equal parts.³³⁶ We have used this diet for this modelling as prevailing dietary advice recommends a diet low in meat consumption.³³⁷

Implement resource-efficient manufacturing and Industry 4.0

In modelling this supply-side intervention, we consider a mix of strategies. We assume that mostly metal, but also other minor technical inputs for specific products are reduced by 28% due to process improvements. We also model the impact of reducing yield losses and diverting scrap from the manufacturing industry, to other sectors, thereby reducing their virgin material use.

Employ circular business models via R-strategies for machinery, equipment and vehicles

For this intervention, we first model a mix of supply-side measures. For remanufacturing and refurbishment, the overall volume of sales remains the same due to the redistribution and re-selling of the remanufactured/refurbished products, creating a new life cycle. The displacement of new sales is therefore modelled as a net reduction in the inputs needed to produce the same volume of product output. Implementing both supply and demand-side measures for repair, upgrading and reuse would yield greater benefits. This could include new business models based on servitisation (renting and leasing, for example) and more flexible supply chain management (reverse logistics, for example), where manufacturing companies can capture value by returning goods to upstream operations. For instance, companies that sell machinery may decide to rent or lease it out to customers, eventually repairing and/or remanufacturing it to extend its lifetime. For this strategy assume that the overall volume of sales is reduced, due to product lifetime extensions precluding the need for new purchases.

WHICH R-STRATEGIES DO WE CONSIDER—AND WHAT DO THEY MEAN?

- **Remanufacturing:** A procedure in which all components of a product are completely disassembled down to their smallest parts, are fully inspected and then reused for an entire new life cycle.
- **Refurbishment:** A procedure to improve the quality of a product up to a specified quality.
- **Repair:** The reparation of parts of a product that limit its performance and the maintenance of parts that can help to prolong its useful life. This can happen at the inter-industry level or be performed after consumers purchase a good. Similarly, upgrades can be carried out to improve a product's functionality and extend its useful lifetime: this goes beyond repair and implies an improvement to a product, for example, by increasing mechanical-, electrical- or ICT-related inputs, depending on the product.
- **Reuse:** The extension of a product's lifetime, that therefore displaces the sale of new goods. This assumption stems from the fact that products are often still usable—even without additional repair and maintenance—but reach their end-of-use early due to consumer attitudes and behaviours.

Revamp waste management

Increases in the share of cycling of technical materials are assumed from the current 3% to average levels for mid-level Human Development Index (HDI) countries (13%), global (20%) and high-level HDI (33%) countries.

Improve data reporting

While conducting the analysis, it was found that the ratio of non-organic (or inert) waste generated in relation to the amount of non-biomass materials consumed in the regional economy (13%) is very low compared to the global average (35%) as well as to average levels within the prevalent income group of countries in the LAC region (23.7% for Upper-Medium Income Countries, UMC, and 71.1% for High Income Countries). Such a low ratio is assumed to be the consequence of a much larger share of unreported/unaccounted waste than what was initially estimated during preliminary work (around 5%). Hence, the amount of total generated waste was recalculated as the 23.7% and 35% of the non-biomass domestic material consumption, therefore assuming an increase in the amount of reported, collected and managed waste in line with the UMC and global average, respectively. The collection and availability of waste for further processing is the precondition for an increase in the amount of recycled waste and thus secondary materials.

The combination of these three assumptions for reporting and collection together with those for cycling of technical materials provide twelve scenarios with volumes of technically recycled material from the current 17.3 Mton to the 489 Mton of the most ambitious scenario outcome.

APPENDIX G: METHODOLOGY, KEY ASSUMPTIONS AND LIMITATIONS FOR THE JOB CREATION POTENTIAL ANALYSIS

The key objective of the analysis presented in Chapter 5 of this report is to help uncover how the adoption of CE strategies, policies and business models could impact labour markets in the LAC region. The impact of potential job creation has been estimated for several interventions modelled within the agrifood, manufacturing, mobility and waste management sectors.

The methodology follows a three-step approach to measure the job creation potential of circular policy interventions:

1. **Firstly, we start by re-designing the regional fiscal system and incentives.** The current fiscal system does not incentivise the adoption of circular strategies nor discourage practices that systematically lead to environmental degradation. We, therefore, advocate for quantitative change in the tax revenue as a share of GDP and present alternative fiscal instruments to stimulate higher environmental and social performances in the region.
2. **In the second step, we allocate the additional revenue collected through a multi-criteria investment prioritisation strategy.** Initially, a stakeholder consultation through an online survey was conducted to prioritise the sectors with the most potential positive impact on job creation. From this initial selection, we considered three key indicators (material footprint, carbon footprint, and total employment) to prioritise further where the highest investment should go. Within each sector, we classified interventions as having either **transformative potential**³³⁸ or **capacity-building potential**.³³⁹ We then proceeded to an additional allocation of investment among these interventions in each sector based on their perceived cost of implementation, ranging from low to high.
3. **Finally, we assess the impact of supporting such capacity-building interventions on the labour market by using job multipliers.** We calculate the potential net creation of jobs in sectors strategic for the circular economy using the employment multipliers from Exiobase.³⁴⁰

KEY ASSUMPTIONS AND METHODOLOGICAL LIMITATIONS

Key assumptions

1. Our assumption is that changing tax levies will generate additional revenue, which forms the basis for estimating job creation potential through public investment allocation. However, the non-linear nature of price elasticity may lead to variations in the tax revenue generated from fiscal policies, presenting a limitation in our analysis.
2. We assume that only certain interventions hold the capacity for job creation, while others stimulate a transformation of jobs and skills. We do not account for potential job loss in our model nor do we look at the impact of these policies on informal workers quantitatively.

Key Limitations: methodological and data gaps

1. **The methodology does not quantitatively assess job loss but emphasises the importance of allocating investments to support job transformation.** Modelling job loss is challenging,³⁴¹ so a conservative approach has been taken. Moreover, job creation estimates did not rely on data from every country in LAC. However, reskilling is recognized as crucial for mitigating potential job loss, and the focus is placed on estimating job creation in key sectors while addressing job loss through targeted reskilling efforts.
2. **Our primary focus is on policies for building capacity which directly increase the number of skilled workers and indirectly stimulate demand for these skills in the labour market.** However, we have not quantitatively addressed the structural and highly-localised challenges faced by the different segments of the workforce involved in various circular interventions.
3. **The analysis quantifies the investments necessary for hiring workers in circular economy sectors but does not assess these policies' "formalisation" potential.** In a labour market where roughly 50% of the workforce is considered to work in the informal sector, this is therefore only a partial representation of the shift in the labour force.

4. **Public resources collected through tax were the sole focus in this analysis, as private investment is not easily captured.** This limitation in data collection resulted in a constrained representation of the job creation potential in the region. Additionally, due to data availability and the absence of comprehensive reports or research, the analysis had to be restricted to formal employment and formally recorded economic activities when modelling the potential economic and social impacts of circular economy interventions.
5. **Due to the regional scope of the analysis, we have not considered the potentially different national pathways that our regional circular intervention could take,** given the diverse political and economic conditions across LAC.

ACKNOWLEDGEMENTS

Circle Economy would like to thank the funders, authors, contributors and interviewees for their contribution to the preparation of the *Circularity Gap Report Latin America and the Caribbean*. The opinions expressed in this paper are those of the authors, and do not necessarily reflect the views of the project partners or the countries they represent.

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We would like to thank members of the advisory board and other organisations for contributing to this project and note that views expressed within the report may not necessarily be the views of individual participants or the organisations they represent.

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Version 1.0 (October 2023)

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This work was produced with the support of UNEP and Circle Economy. The opinions expressed in this work are those of the authors and do not necessarily reflect the views of the Parties, or the countries they represent.

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UN-ECLAC reference number: LC/TS.2023/128

How to cite this report: Circle Economy. (2023). *Circularity gap report Latin America and the Caribbean*. Commissioned by ECLAC, IDB, IDB Invest, UNEP and UNIDO. Amsterdam: Circle Economy. Retrieved from: circularity-gap.world/lac

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