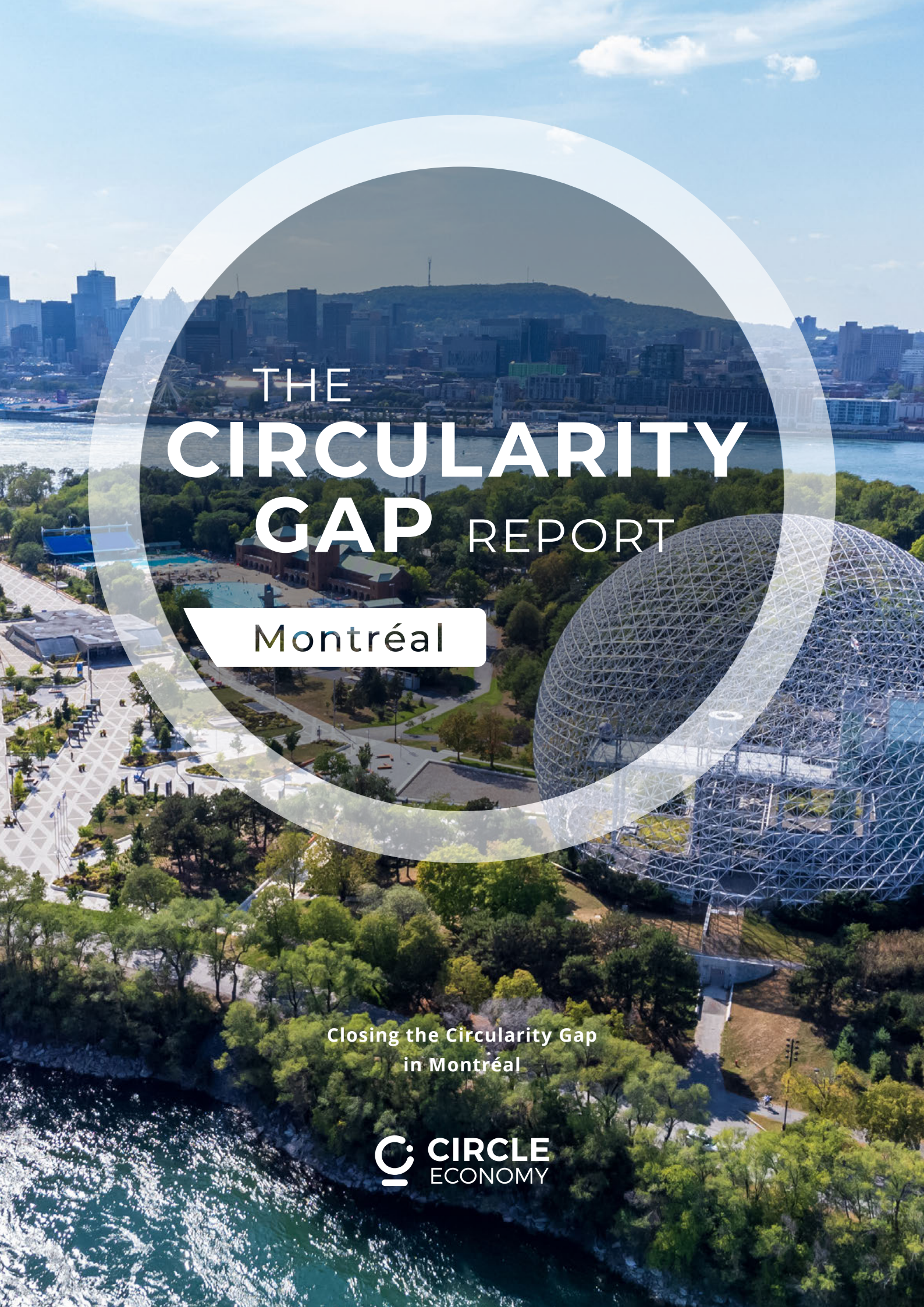

THE CIRCULARITY GAP REPORT

Montréal

Closing the Circularity Gap in Montréal

CIRCLE ECONOMY

BEHIND THE COVER

The Biosphère of Montréal and Sainte- Hélène's Island stand prominently in the foreground, bearing witness to the city's commitment to the conservation of its natural environment.

In the distance, the skyscrapers of downtown Montréal display the city's urban dynamism, while the imposing silhouette of Mount Royal dominates the horizon. This image embodies the harmony between nature and urbanism in Montréal, where modernity and heritage coexist in a riveting landscape.

CIRCLE ECONOMY

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.

Montréal

The French-speaking metropolis of the Americas and Canada's second-largest city, Montréal is a leader in the circular economy, ecological transition and biodiversity protection in North America.

Québec's economic driver, Montréal is home to several hundred head offices, numerous research hubs and a wide variety of industrial clusters. With its Circular Economy Roadmap, the City is firmly committed to transforming its own practices and mobilising the agglomeration's rich business ecosystem towards an ever more sustainable, innovative and prosperous economy.

Resolutely committed to the circular transition of its economy and in line with international efforts to combat climate change, Montréal intends to double its circularity by 2030 and achieve a Circularity Metric of 17% by 2050.

IN SUPPORT OF THE *CIRCULARITY GAP REPORT MONTRÉAL*

MARIE-ANDRÉE MAUGER

Responsible for Ecological transition and the Environment on the Executive Committee at Ville de Montréal

‘Thanks to the creativity, innovation and dynamism of our businesses, Montréal is a leader in the circular economy. Every day, new ideas and new modes of production based on this model take shape. To bring these initiatives to fruition and fundamentally transform our economy, we need to pick up the pace. Through a rigorous analytical process, this *Circularity Gap Report* provides us with our first quantifiable portrait of the circular economy in Montréal. It is an essential tool for mobilising Montréal's entrepreneurial forces around our ambitious goals for an ecological and economic transition.’

EMMANUELLE GÉHIN

President & CEO at RECYC-QUÉBEC

‘In 2021, RECYC-QUÉBEC launched the *Circularity Gap Report Quebec* with Circle Economy, with the aim of inspiring and accelerating the transition to a circular economy. We're delighted to see that the transition in now continuing at the metropolitan level with the publication of Montréal’s own *Circulairty Gap Report*, accompanied by a variety of actions to implement. RECYC-QUÉBEC is pleased to contribute to this initiative. We salute the Ville de Montréal's initiative, which continues to demonstrate its leadership in the field, and which we hope will inspire other municipalities to follow suit.’

FRANÇOIS SAUNIER

M.Sc.A., Deputy Director at the International Reference Center for Life Cycle Assessment and Sustainable Transition (CIRAIG) at Polytechnique Montréal

‘Thanks to this report, the Ville de Montréal now has an initial assessment of its performance in terms of its material consumption, carbon footprint and circularity. This assessment—which goes far beyond the City's boundaries by including the complete life cycle of materials consumed by citizens—is an essential step in identifying and prioritising avenues for improvement. The links between the material footprint and carbon footprint presented in the report are highly instructive on the role of circular economy strategies in reducing greenhouse gas emissions.’

CLAUDE MAHEUX-PICARD

Eng, M.Sc.A., Executive Director at Centre de Transfert Technologique en Écologie Industrielle (CTTÉI)

‘By measuring its level of circularity, the Ville de Montréal is positioning itself as a leader in Québec's socio-ecological transition. In addition to mobilising the community's vital forces, the concrete actions resulting from this initiative will have a positive impact on economic, environmental and human health.’

MARC JOURNEAULT

Ph.D, MBA, CPA, Co-titular of the Québec Circular Economy Research Network (RRECQ), Head of a research group at Centre de recherche en comptabilité et développement durable (CerCeDD) and Professor at the Université Laval School of Accountancy

‘With this *Circularity Gap Report*, Montréal is inspiring the world's major cities and paving the way for a more sustainable future. By identifying opportunities for improvement, and tracking and assessing the impact of the initiatives implemented, this report firmly positions Montréal as a leader in the transition to a more sustainable and circular economy and community.’

EXECUTIVE SUMMARY

As Canada's second-largest and Québec's largest city, Montréal is a hub of economic activity, infrastructure and technological development: it stands at the epicentre of the modern world, but like most big cities, is a heavy consumer—exterting impacts well beyond city limits. Cities place immense pressure on our planet's life-sustaining systems, far exceeding the boundaries of what Earth can naturally replenish. The circular economy—a new economic system in which waste doesn't exist, materials are used at their highest value for as long as possible, and nature is regenerated—offers a means to mitigate these consequences. To provide insight into how Montréal can shift to a circular economy, the *Circularity Gap Report Montréal* applies the Circularity Gap Methodology—previously used at the global and national level—to the city, assessing how Montréal consumes materials to meet various societal needs and how circular interventions could tackle its environmental impacts. As such, its main objectives are threefold: 1) Measure Montréal's current urban metabolism, 2) Identify key levers for accelerating the circular transition, and 3) Measure the potential effects of circular economy interventions on Montréal's material and carbon footprints.

Montréal's Circularity Metric is 3%, leaving a Circularity Gap of 97%. This means that the vast majority of materials the city consumes are of virgin origin. This figure lags behind the global Circularity Metric of 7.2%, measured in 2023, but is close to that of Munich, a comparable city (2.4%) and the province of Québec (3.5%). A range of other inputs make up the Circularity Gap. Renewable Material Inputs—or primary biomass consumption, including trees, manure, food products and agricultural residues—make up 21% of total material consumption. Recyclable Inputs—including metals, plastic, paper and glass—*can* be recycled but currently are not, and thus do not contribute significantly to the Circularity Metric. These make up 30% of total material consumption. Fossil Fuel Inputs represent 10% of total consumption, while Net Additions to Stock—materials added to long-term 'reserves' in the form of buildings, infrastructure, machinery and equipment—contribute 36% of total consumption. Stock build-up is clearly a high impact consumption category: ensuring additions to stock are made as circular as possible will be a key avenue to boost the city's circularity. At the same time, Montréal may aim to further reduce Fossil Fuel Inputs and Recylable Inputs to see relative increases in its Circularity Metric.

Montréal's urban metabolism drives significant amounts of raw material consumption and GHG emissions. Montréal consumes 57 million tonnes, or **27 tonnes per capita**, of virgin materials each year. While this is lower than Québec's material footprint of 32 tonnes per capita and the Canadian average of 36 tonnes per capita, it surpasses the world average of 12 tonnes per capita and the sustainable global target of 8 tonnes per capita. Over half of the city's material footprint is embedded in imports from outside Canada (roughly 33 million tonnes). The sectors contributing the most to Montréal's material footprint are Construction and Manufacturing, representing 31% and 30% of the city's material footprint, respectively. From an emissions perspective, Montréal's total carbon footprint was 27.4 million tonnes of CO_2e, equivalent to **13 tonnes per capita**. While lower than the national average (19 tonnes per capita), Montréal's carbon footprint also exceeds the estimated global sustainable levels of 2.3 tonnes per capita. About 70% of Montréal's carbon footprint is generated beyond the city's boundaries, with Manufacturing and Construction also making up the lion's share of the city's carbon footprint.

Circular interventions can cut Montréal's material and carbon footprints. By exploring five counterfactual 'what-if' scenarios, the *Circularity Gap Report Montréal* illustrates the potential impact of the circular transition on the city's urban metabolism. The scenarios are: 1) Build a circular built environment, 2) Shift to a circular food system, 3) Advance circular manufacturing, 4) Redesign mobility and 5) Promote a circular lifestyle. Although the impact of each individual scenario is limited, when combined, Montréal's **material footprint** could be lowered by a remarkable **38%**, from 57 to 35 million tonnes. The combined scenarios also offer deep emissions reduction potential: the **carbon footprint** could decrease by **46%**, bringing it from 27 to 15 million tonnes of CO_2e. In turn, this would mean an increase in the Circularity Metric from 3% to 7%.

The results of the analysis provide a strong evidence base to inform Montréal's long-term Circular Economy Roadmap. Informed by the *Circularity Gap Report*, Ville de Montréal has now set the ambitious target of increasing circularity to 6% by 2030 and further boosting circularity to 17% by 2050. Additionally, the City can use the results to prioritise actions to reach these targets, starting from those actions identified by the previously published *Circle City Scan* conducted for Ville de Montréal by Circle Economy in 2022. Although Montréal's material consumption is high, it has the power to become a global circular hotspot—transforming its economy and drastically reducing its environmental impact to ensure future generations can thrive.

Credit © Mathieu Sparks – Ville de Montréal

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1. INTRODUCTION

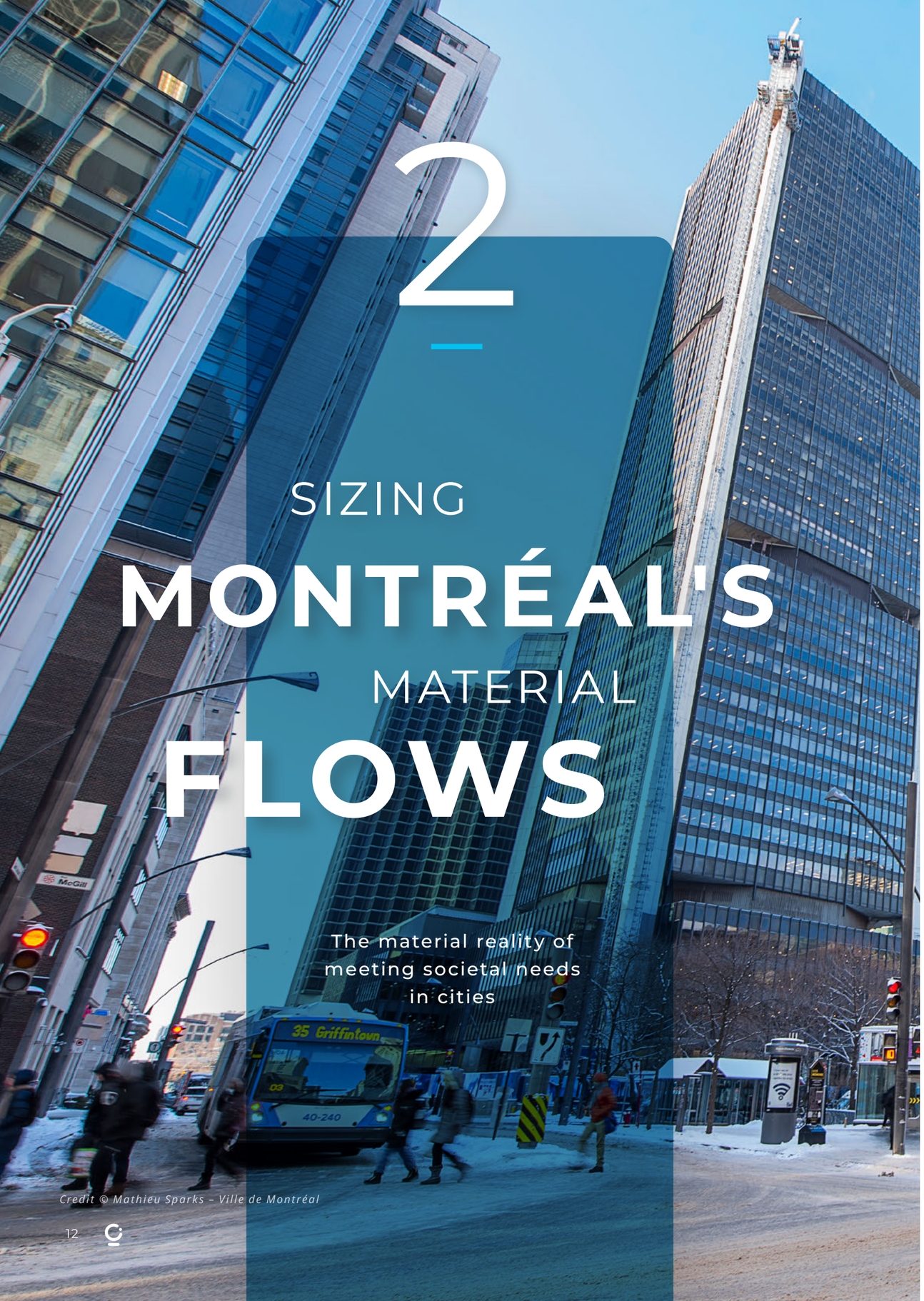
The current linear economic model is putting enormous stress on our planet, threatening the conditions needed to sustain human life.[1] Cities lie at the core of this system: they are home to more than half the global population and drive the majority of economic output. Most cities operate based on a linear 'take-make-waste' model: materials are extracted, processed, used and discarded at a rate and scale never seen before, causing environmental impacts both within and beyond cities' borders. The circular economy—a system in which waste is designed out, products and materials are used at their highest value for as long as possible, and ecosystems are regenerated—is being championed as a solution, allowing societies to operate within safe ecological limits.

Canada has already kick-started the transition to a circular economy. However, while the world's circularity sits at 7.2%,[2] a report by the Council of Canadian Academies (CCA) found that the country is lagging behind.[3] Canada's consumption rates of materials, energy, and water are currently among the highest in the world, and 73% of waste ends up in landfills or is incinerated, even that which still holds value. While the country is still lacking any concrete circular plans, many cities and provinces have begun working towards circular economy goals.[4]

Montréal, the second-largest and second-most populated city in Canada, is making strong efforts to shift towards a circular economy. The local government, Ville de Montréal, has set ambitious targets, aiming to achieve zero waste status by 2030, carbon neutrality by 2050 and boost its circularity to 17% by 2050. Despite a number of challenges, the City's commitment to circular practices has already resulted in positive outcomes. A Circular Economy Roadmap was recently adopted in spring 2024, with an action plan to follow in autumn 2024. The creation of the roadmap mobilised the entire business ecosystem through public consultation. The roadmap aims to effectively push for circularity in an effective and harmonised manner in the coming decades, bringing together other existing initiatives, such as the City's *Zero Waste Strategy*, the integration of circular criteria in the *Responsible Procurement Policy*, a *Climate Plan* targeting carbon neutrality by 2050 and the 2030 *First Strategic Plan*.[5, 6, 7, 8] Moreover, in 2022, Ville de Montréal conducted a Circle City Scan—a comprehensive, multi-stakeholder initiative identifying tailored opportunities to foster a circular economy. The City Scan assessed circularity in four key sectors: the Food System, Built Environment, Textiles and Mobility. It further outlined eight potential circular actions that the City can pursue to accelerate its transition and served as a basis for the roadmap that has just been adopted.[9]

To amplify the positive impacts of the circular transition, Ville de Montréal has now joined forces with the Circularity Gap Reporting Initiative (CGRi) to produce the *Circularity Gap Report Montréal*. This report takes a holistic view of the city's urban metabolism to complement the sector-specific focus of the *City Scan*. It establishes a crucial set of baseline indicators, facilitating the comprehensive measurement and monitoring of circularity throughout the entire urban economy. Then, through 'what if' scenario modelling, the report explores the potential impact of integrating different circular strategies across the four key urban systems analysed in the *City Scan*. Additionally, it assesses the implications of adopting a more circular lifestyle for households, shedding light on the combined impact of these strategies to reduce the city's material and carbon footprints.

While this methodology has been deployed globally, Montréal is one of the pioneering cities to undergo this analysis, potentially positioning it as a future circular leader. In 2021, the *Circularity Gap Report* methodology was applied to the province of Québec, revealing a Circularity Metric of 3.5%.[10] This means that of the total materials flowing through the region's economy, only 3.5% come from secondary sources. Considering the global Circularity Metric of 7.2% and the Québec Metric of 3.5%, Montréal falls slightly behind at 3%. This report investigates possible explanations for these differences and highlights where caution must be taken in interpretation.[11] Beyond this Metric, the analysis allows us to understand Montréal in context: it is Québec's largest city, and the province has an industrialised economy encompassing activities such as extraction, production, trade and manufacturing. With this in mind, Montréal stands out as a highly developed city and a consumption hotspot with a few sectors contributing to the bulk of material consumption: Construction, Manufacturing and Agrifood. The environmental impacts of these sectors extend far beyond Montréal's borders, and advancing its overall circularity will be key to addressing these impacts. Ville de Montréal's ambition to increase its Circularity Metric from 3% to 17% will require deep reductions in the city's high material consumption and a slowing of its metabolism. This indicates that the circular economy is about much more than recycling: Montréal's circular transition must be a holistic process.



2

SIZING MONTRÉAL'S MATERIAL FLOWS

The material reality of meeting societal needs in cities

Credit © Mathieu Sparks – Ville de Montréal

There is a clear global correlation between a society's material and carbon footprints and the way its economy is organised, especially in terms of its efficiency, affluence and population density.[12,13] Montréal exhibits higher per-capita material and carbon footprints than the global averages, generally reflecting the high rates of consumption in North America and notably in Canada. These results mirror the economic reality of a major North American metropolis—an industrialised hub with significant contributions from the Manufacturing and Construction industries. While these industries bolster the local economy, they also impose substantial environmental costs that extend well beyond Montréal's borders, impacting Québec, Canada and the global sphere.

Cities like Montréal play a significant role in satisfying the societal needs of their urban population, consuming extensive quantities of material resources, water and energy—a collective process known as an 'urban metabolism'.[14, 15] A comprehensive understanding of how materials move through an urban economy—from extraction, transformation and delivery to consumption and waste—is crucial to assess the level of circularity in a city and identify opportunities to meet societal needs with a reduced environmental impact. Figure one provides a depiction of Montréal's urban metabolism using 2019 as the baseline year.[16] It shows the amounts of materials (clustered into four key material groups) embodied in what the city consumes and produces. Further details are provided in the Methodology Document.

Measuring Montréal's material and carbon footprints illustrates the correlation between material use and greenhouse gas emissions. Cities are responsible for over 70% of global greenhouse gas (GHG) emissions, about 70% of which are tied to material use and handling. Therefore, the circular economy and climate agendas are inherently intertwined.[17] Quantifying carbon footprints from a consumption-based perspective (tracking emissions embedded in global supply chains) is useful in understanding how and where GHG emissions are produced during the consumption of goods and services in Montréal. This provides a more accurate picture of an urban system's contribution to global emissions and helps identify opportunities to reduce emissions and improve environmental performance.

MATERIAL FOOTPRINT

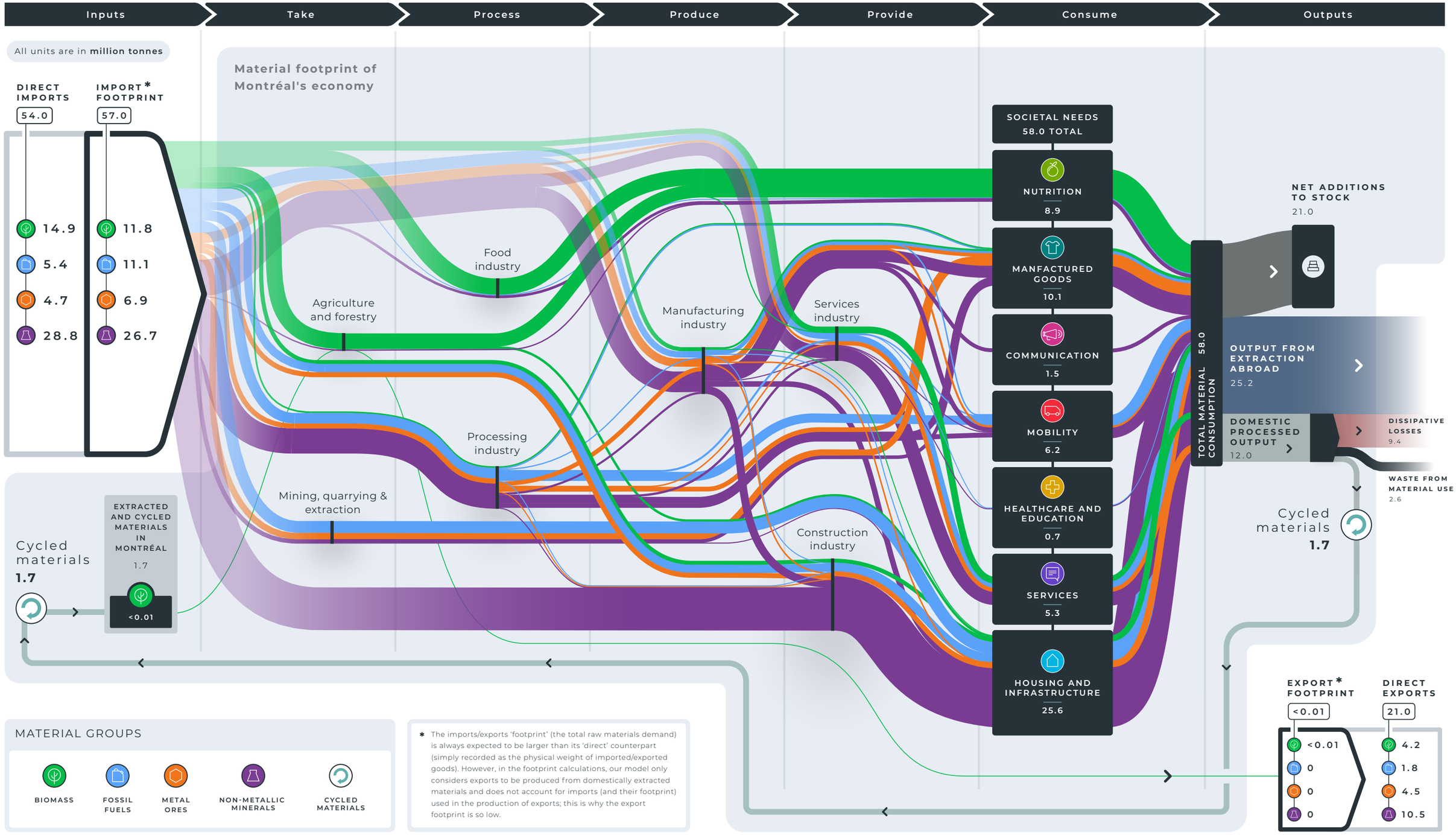
Montréal has a high material footprint; it needs large quantities of raw materials to supply its citizens with goods and services. This necessitates the extraction of materials from regional, national and international supply chains. In 2019, the city's total material footprint was estimated at **57 million tonnes or more than 27 tonnes per capita**—beyond the current global average of 12 tonnes per capita per year and surpassing the sustainable global level of 8 tonnes per capita per year.[18, 19] If we also account for secondary material consumption, that is, the consumption of recycled materials re-introduced into the economy, Montréal's total material consumption amounts to 58 million tonnes.[20]

Montréal's footprint stems from well beyond the city's borders. Only a very minimal share of total consumed materials are actually extracted within the city and broader urban area. This share primarily comes from urban and peri-urban agriculture. Over half of the city's material footprint is embedded in imports from outside Canada's borders (roughly **33 million tonnes**, or 58% of the total). One-quarter of the total material footprint is derived from imports originating in Asian and Pacific countries, while a slightly lower portion (19%) is linked to imports from neighbouring United States. In comparison, the footprint embedded in imports from the rest of the world regions (Latin America, Europe or Africa) contributes to smaller shares of the total (8%, 3.3% and 1.8%, respectively). The rest of the footprint (**24 million tonnes**, or 42% of the total) originates within the territory of Canada.

The consumption of non-metallic minerals dominates Montréal's material footprint. Materials such as construction aggregates, gravels, clay and sand contribute to almost half (47%) of the total material footprint or around **27 million tonnes**.[21] The second largest contribution to the material footprint is the consumption of **biomass** (21% or 11.8 million tonnes) in the form of agrifood commodities (cereals, livestock and animal feed, for example) as well as other bio-based materials (such as timber). This is followed closely by **fossil fuels**, like petrol, natural gas or coal, which make up around 20% of the total material footprint (**11.1 million tonnes**). Finally, **metal ores**—flows of processed metals (such as steel and copper) that are closely linked to manufacturing and construction value chains—make up the smallest share of the material footprint (12%), totalling **7 million tonnes**.

A SNAPSHOT OF **MONTRÉAL'S URBAN METABOLISM**

Figure one shows an X-Ray of Montréal's economy: the materials that feed into meeting key societal needs.



MATERIAL GROUPS

BIOMASS · FOSSIL FUELS · METAL ORES · NON-METALLIC MINERALS · CYCLED MATERIALS

* The imports/exports 'footprint' (the total raw materials demand) is always expected to be larger than its 'direct' counterpart (simply recorded as the physical weight of imported/exported goods). However, in the footprint calculations, our model only considers exports to be produced from domestically extracted materials and does not account for imports (and their footprint) used in the production of exports; this is why the export footprint is so low.

The Construction and Manufacturing sectors contribute the most to Montréal's material footprint, reflecting the overall economic structure of the city. Construction and Manufacturing activities are by far the largest contributors to Montréal's raw material consumption, representing 31% and 30% of the city's material footprint, respectively. This high consumption can be attributed to a reliance on material- and carbon-intensive resources—namely cement and steel for construction, and refinery and chemical products, vehicles and machinery or household appliances for manufacturing activities—which are produced outside of Montréal and subsequently imported. Agrifood—the largest source of biomass consumption—is another important sector of Montréal's economy, representing 16% (**8.9 million tonnes**) of the total footprint. To a lesser extent, activities such as Mining and extraction (11%) or Services (9%) represent smaller but non-negligible shares of raw material consumption, while the remaining 4% is distributed across less resource-intensive sectors of the economy, like healthcare, education, or wholesale and retail.

CARBON FOOTPRINT

In 2019, Montréal's total carbon footprint was 27.4 million tonnes of CO_2e, equivalent to 13 tonnes per capita. This is comparable to the value found by a recent study conducted by CIRAIG for 2017: 26.1 million tonnes.[26] While lower than the national average (19 tonnes per capita), Montréal's carbon footprint also exceeds the estimated global sustainable levels of 2.3 tonnes per capita, which aligns with staying well under 2-degrees of warming as defined in the Paris Agreement.[27] **About 70% of Montréal's carbon footprint (around 19 million tonnes of CO_2e) is generated beyond the city's borders across global value chains** and embedded in imports mainly from the rest of Canada (approximately 24%), Asia and Pacific countries (20%), and the US (15%), while Europe, Latin America and Africa represent smaller shares (4%, 3% and 1% of the total carbon footprint by origin, respectively). The remaining 31% (8.4 million tonnes of CO_2e) stems from **domestic emissions** occurring within Montréal.

Manufacturing and Construction also make up the lion's share of Montréal's carbon footprint. Together, they contribute to nearly half of the total, with 11.1 million tonnes of CO_2e (6.5 and 4.6 million tonnes of CO_2e, respectively). Most of this can be attributed to carbon-intensive activities such as the production of motor vehicles, furniture, machinery and equipment, clothing, construction and real estate activities. Other significant contributors include services (3.6 million tonnes of CO_2e or 13%), agrifood industries (2.9 million tonnes of CO_2e or 11%) and the use of mobility (2 million tonnes of CO_2e or 7%, corresponding mainly to the consumption of fossil fuels for combustion). Similar to the material footprint, less resource- and energy-intensive sectors (such as Healthcare and education, Wholesale and retail) have a limited contribution to the city's total carbon footprint.

	MONTRÉAL	MONTRÉAL (PER CAPITA)	PROVINCE OF QUÉBEC (PER CAPITA)	GLOBAL (PER CAPITA)
Material footprint	57 million tonnes	27 tonnes	32 tonnes	12 tonnes
Carbon footprint	27 million tonnes of CO_2e	13 tonnes of CO_2e	11 tonnes of CO_2e (in 2018)[28]	6 tonnes of CO_2e

Table one compares regional and global figures for raw material consumption (material footprint), as well as consumption-based emissions (carbon footprint).

SEVEN SOCIETAL NEEDS & WANTS

THE MATERIALS SATISFYING SOCIETAL NEEDS IN MONTRÉAL

Satisfying societal needs requires energy and materials. As such, it is important to consider how materials and energy are used to deliver social outcomes via provisioning systems, which include physical assets (such as infrastructure and technologies),[22] and social elements (governmental institutions, markets and businesses).[23] Provisioning systems are the essential link between how materials and energy are used and their social outcomes.

In this box, we highlight the seven key societal needs and wants as well as the volume of materials it takes to fulfil each of them out of Montréal's total material consumption of 58 million tonnes.[24, 25]

HOUSING AND INFRASTRUCTURE
25.6 million tonnes (44% of total)

NUTRITION
8.9 million tonnes (15% of total)

MANUFACTURED GOODS
10.1 million tonnes (17% of total)

HEALTHCARE AND EDUCATION
0.7 million tonnes (1% of total)

MOBILITY
6.2 million tonnes (11%)

COMMUNICATION
1.5 million tonnes (3% of total)

PUBLIC AND COMMERCIAL SERVICES
5.3 million tonnes (9% of total)

Each of these societal needs includes a wide range of goods and services, which currently have large ecological footprints and, in many cases, do not necessarily contribute to the improved well-being of people. The circular economy can satisfy the above-mentioned social needs but with a much lower environmental impact, reducing Montréal's material and carbon footprints, as highlighted in the 'Combined Interventions' section in Chapter Four.

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

THE BUILT ENVIRONMENT CAPTURES THE BULK OF MONTRÉAL'S 'HIDDEN' ENVIRONMENTAL IMPACTS

In addition to the material and carbon footprints of construction activities, the built environment has a hidden, indirect role in concentrating the city's total environmental impacts. As a key feature of the urban space, the built environment determines how cities function and encompasses several of the most material- and carbon-intensive activities. For example, a large share of the materials consumed by Services, Healthcare and education, or Wholesale and retail actually result from the consumption of building materials (such as non-metallic minerals and metals) and fossil fuels for heating in different commercial (restaurants, hotels and office spaces) and public (hospitals, schools, and administrative or commercial offices) buildings. The same applies to their respective carbon footprints: they are almost directly correlated to material consumption and are mostly a result of the combustion of fossil fuels for heating.

Similarly, part of the material consumption and emissions associated with electricity and gas comes from the interlinkages between the energy system and the built environment. This entails the existence of complex and interconnected energy infrastructure (transmission and distribution equipment, transformers, voltage regulators, circuit breakers), which demands a significant amount of materials (specifically non-metallic minerals and metal ores) for energy to reach end customers in domestic, commercial and municipal establishments. On the other side, energy, in the form of heating in buildings, is currently responsible for direct GHG emissions in Montréal (especially from gas and fuel oil combustion), where electrification generally is not yet present (in the form of electric ovens, for example).

Combining impacts from the Construction sector, a significant part of public and private services and energy distribution to end consumers, **the built environment could be considered the biggest contributor to Montréal's material footprint and the largest source of total (direct and indirect) GHG emissions. This is, therefore, the single most important area on which to focus to reduce Montréal's local and global environmental impacts.**

UNCOVERING MONTRÉAL'S MATERIAL FOOTPRINT

Material footprint by country of origin refers to the country in which the raw material is extracted before being imported to the country of consumption.

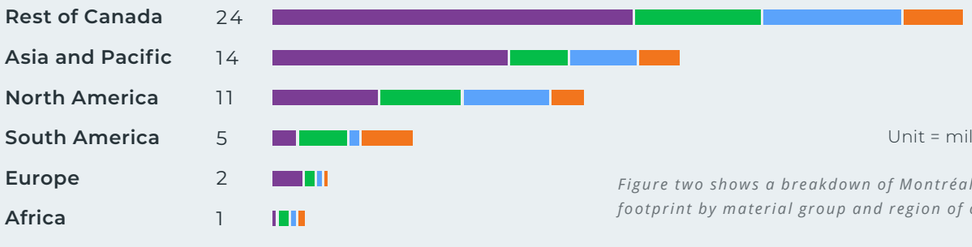
Total material footprint
57 Million tonnes

Material footprint per capita
27 Tonnes

Material footprint by material group

Non-metallic minerals	Fossil fuels	Biomass	Metal ores
27	12	11	7

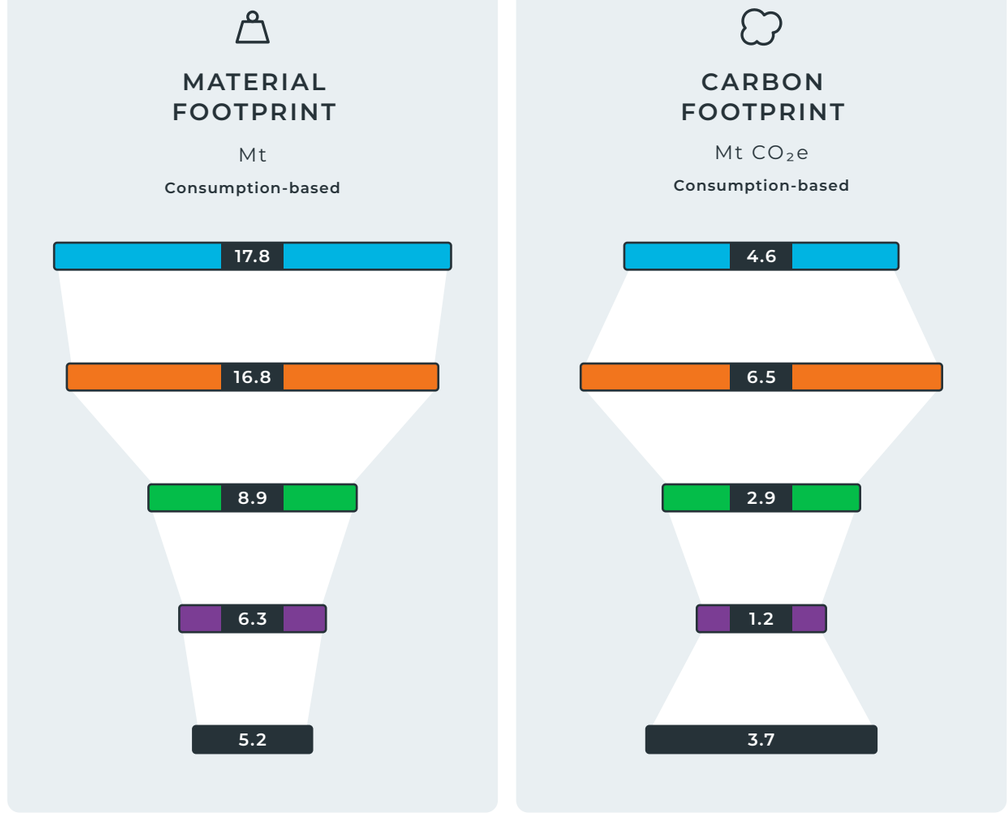
Material footprint by region of origin



Unit = million tonnes

Figure two shows a breakdown of Montréal's material footprint by material group and region of origin.

WHICH SECTORS CONTRIBUTE THE MOST TO MONTRÉAL'S MATERIAL AND CARBON FOOTPRINTS?



Legend

- CONSTRUCTION
- MANUFACTURING
- AGRIFOOD
- MINING AND EXTRACTION
- OTHER SERVICES

  Primarily covers public sector services (3.5 million tonnes) and hotels & restaurants (1.1 million tonnes)

3

ASSESSING CIRCULARITY IN MONTRÉAL

A circular indicator set

Credit © Mathieu Sparks – Ville de Montréal

Measurements and indicators are critical to understanding the world around us. Since the first edition of the global *Circularity Gap Report* in 2018, the Circular Indicator Set has been used to complement the materials and carbon footprint analysis. Now adapted to suit urban and regional contexts,[29] the Circular Indicator Set can be used to evaluate a city's circular economy state. To measure circularity, we use Montréal's urban metabolism—the way in which materials flow through the city's economy and are used long term—as the starting point.

Based on the urban metabolism analysis, the **Circular Indicator Set** breaks down different types of inputs into its economy: secondary material inputs (the Circularity Metric), renewable material inputs, recyclable materials, fossil fuel inputs, and net addition to stocks.[30] This measurement approach allows local stakeholders to track circular performance over time, establish consistent goals and targets, and answer additional questions such as: *How much biomass is Montréal consuming? Is it sustainable? How much material is added to Montréal's stock every year, such as buildings and roads?*

Further details behind the **methodology used to calculate the Circular Indicator Set can be found in the Methodology Document.**

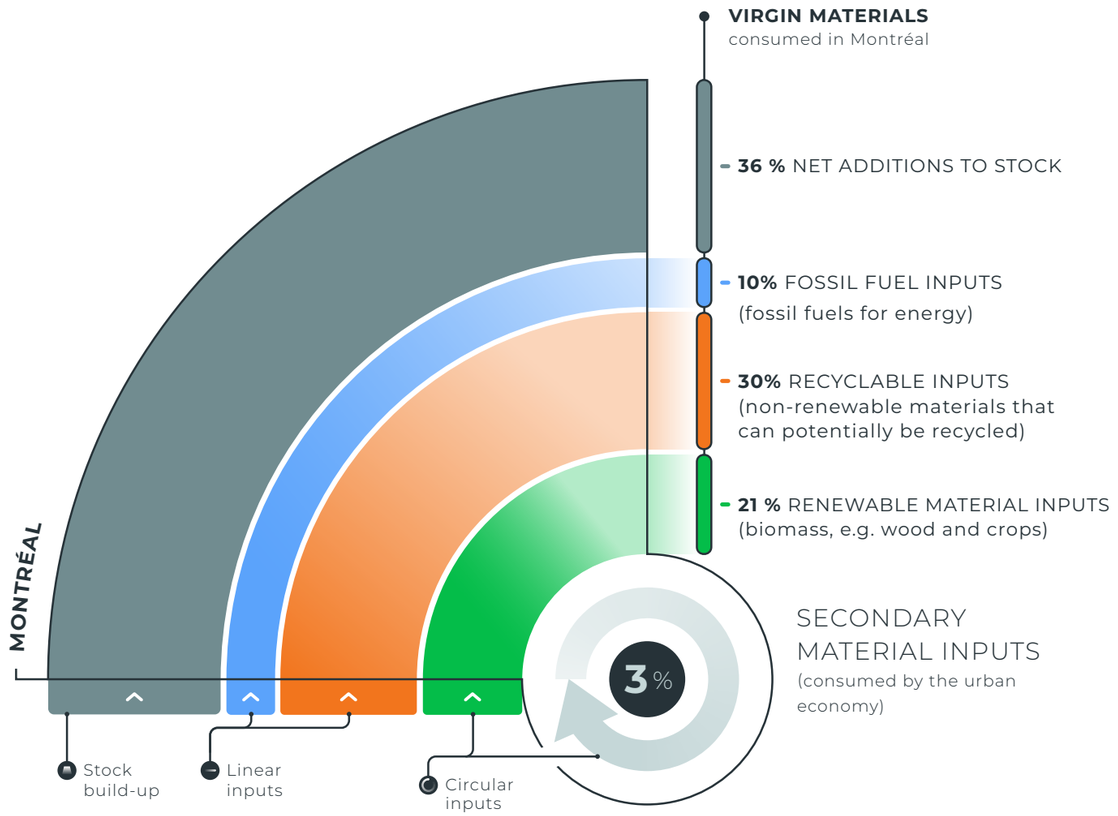


Figure four shows the full picture of circular and linear material inputs as well as stock build-up that make up Montréal's Circular Indicator Set.

INDICATOR	VALUE	EXPLANATION	WHAT DOES THIS MEAN FOR MONTRÉAL?
SECONDARY MATERIAL INPUTS (THE CIRCULARITY METRIC)	3%	The Circularity Metric, or Secondary Material Inputs, refers to the share of secondary materials out of the total consumption of an economy. It accounts for all materials that were formerly waste but are cycled back into use, including recycled materials from both the technical (such as recycled cement and metals) and recycled biological inputs (such as paper and wood).	The Circularity Metric in Montréal stands at 3%, below the global level of 7.2%.[31] This means that only 3% of Montréal's total material consumption stems from materials that have been recovered. The bulk of secondary material consumption typically comes from construction and demolition waste (C&DW) that is reused as aggregate in asphalt and concrete production. However, this is not the case in Montréal, where C&DW represents only 4% of overall recycling. Instead, the city shows particularly high rates of secondary metal consumption (contributing up to 45% of the total secondary material consumption of Montréal).
RENEWABLE MATERIAL INPUTS	21%	Renewable Material Inputs capture the share of primary biomass (such as trees, manure, food products or agricultural residues) over total material consumption. Part of this biomass can be circular, and therefore could be added to be considered within the Circularity Metric, or as secondary input. However, due to data limitations, it is currently difficult to distinguish between carbon-neutral and non-carbon-neutral biomass consumption in Montréal. This is why Renewable Material Inputs is measured by a separate indicator.	Montréal's Renewable Material Inputs accounts for 21% of its total material consumption, at 12 million tonnes. Montréal should aim to source biomass responsibly and minimise non-carbon neutral bio-based inputs. Montréal can aim to increase its carbon sinks by regreening urban and peri-urban areas, promoting regenerative agricultural practices,[32] or ensuring that imported biomass comes from traceable and certified carbon-neutral sources to the greatest extent possible.
RECYCLABLE INPUTS	30%	Recyclable Inputs include things like metals, plastics, paper and glass found in everyday products. They do not include fossil fuels or any non-cyclable biomass but rather all materials that can potentially be cycled but are not done so sufficiently.	Montréal's Recyclable Inputs rate stands at 30% (17.5 million tonnes). This means that the city could increase its circularity by improving recycling processes through measures such as increased separation of waste streams, by expanding its capacity for recycling materials locally (and thus reducing the need to export waste for recycling elsewhere). It will also be important to improve upstream processes happening abroad or in other parts of Canada to facilitate the separation and recycling of materials and goods used in Montréal.
FOSSIL FUEL INPUTS	10%	This category centres on fossil-based energy carriers, such as fuel oil, gasoline, diesel and natural gas, among others. These fuels are burnt mainly for energy and, to a lesser extent, to produce chemicals and plastics. As they burn, they release GHG emissions into the atmosphere that are inherently non-circular. Here, the circular transition will naturally prevent emissions through actions that aim to directly reduce the consumption of fossil fuels.	At 10%, or roughly 5.8 million tonnes of fossil fuels consumed, this indicator specifically highlights the consumption of oil to power transport, natural gas for residential space heating and industrial processes in the manufacturing sector.
NET ADDITIONS TO STOCK	36%	The majority of materials that are needed to meet the urban population's societal needs feed into goods and products that remain in use for a relatively long time, like buildings, industrial machinery and equipment[33] and vehicles. These materials are 'added' to the reserves of an economy for longer than a year and are therefore referred to as Net Additions to Stock. They are key features of the urban landscape and form a direct connection between basic services and the flows of materials and energy, making them a primary determinant of material flows in cities.	At 36% of total material consumption, Montréal's stocking rate stands at 20.8 million tonnes of materials, primarily minerals. To boost circularity in Net Additions to Stock, it is possible to prioritise durable and sustainable design, enhance deconstruction and recycling processes for ageing assets, and encourage reuse and refurbishment practices. However, building, maintaining and refurbishing these stocks can also require significant amounts of materials and energy. The configuration and quantity of these stocks are crucial factors in determining material demand, future waste flows and (re)cycling potential.

Table two explains each indicator and highlights what it means for Montréal.

HOW DO THESE RESULTS COMPARE WITH QUÉBEC AS A WHOLE?

Additions to stocks reflect an economy's investment in new buildings and infrastructure for various purposes, as highlighted above. But why do Net Additions to Stock in Montréal (36%) represent a larger share of total material consumption than in Québec (19%)? Here, the scope of the study is what really makes the difference. 'Stock', by definition, is very characteristic of urban landscapes, as it is principally made up of buildings and infrastructure like roads, bridges, telecommunications infrastructure, utility networks, et cetera. Cities are also where these physical 'assets' are developed and maintained more frequently. As such, when taking the scope of a study that sets the boundaries at the city level, material consumption by this so-called 'stock' represents, in proportion, a much larger part of the total material consumption of the system. On the other hand, when considering a nation or province with vast rural and natural territories like Québec, the extraction and consumption of materials like minerals, fossil fuels or even biomass are much more significant contributors to the system's total material consumption.

Since this indicator looks at the breakdown of total material consumption in a given year, all contributing groups should amount to 100%. Therefore, if Montréal has a substantially larger share of Net Additions to Stock, other shares will be smaller in proportion.

For example, Montréal's shares of fossil fuels (10%), recyclable (30%) and renewable inputs (21%) over the total material consumption are smaller than Quebec's (17%, 36%, and 26%, respectively).

However, it is worth noting that this is purely a result of differences in relative proportions (driven by the importance of Net Additions to Stock) and does not necessarily mean that Montréal is less dependent on fossil fuels or that its economy is less based on biological or renewable materials.

DYNAMICS INFLUENCING HOW WE ASSESS CIRCULARITY

Understanding the current status of the global circular economy is relatively simple, largely because there are no exchanges of materials in and outside of planet Earth. For smaller-scaled systems such as regions and cities, however, trade dynamics introduce complexities to which we must adapt our calculations, resulting in certain methodological choices. These are:

1. **We take a consumption-based perspective.** This means we only consider materials consumed in Montréal and allocate responsibility to the drivers of final demand in Montréal (private consumers, businesses and local administration) by excluding exports.
2. **We use demand-based indicators.** This allows for a reallocation of environmental impacts from producers to final consumers, which ensures that resource depletion is allocated to economies based on their roles in driving production locally and globally through their consumption.
3. **We consider imports and exports in terms of their Raw Material Equivalents (RME).** This allows us to interpret the true impact of finished and semi-finished products more accurately. Learn more about RMEs in the Methodology Document.
4. **In addition to secondary materials recovered locally, we also consider secondary materials imported from abroad.** With this approach, we give 'credit' to Montréal for reducing the extraction of virgin materials by either processing secondary materials (recovered from former 'waste') locally or importing them from abroad.

For a more detailed explanation of these choices, please refer to the Methodology Document.

Credit © MU, Ville-Marie, ElMac Gene Pendon (2017) - Photo _ Henry MacDonald (@night.shotz) – Tourisme Montréal

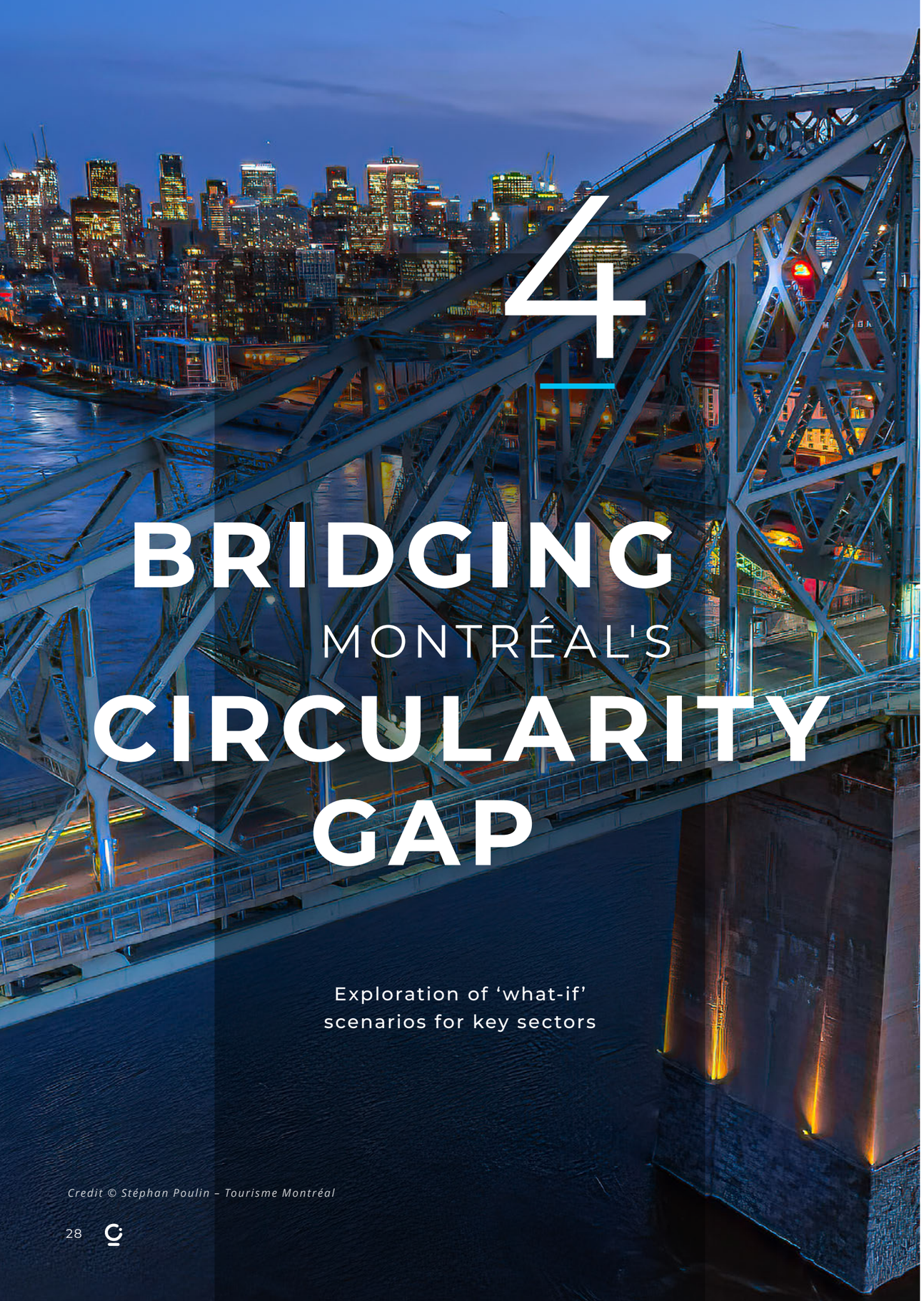
PRACTICAL CHALLENGES IN QUANTIFYING CIRCULARITY

Providing a year-zero baseline measurement of the circularity of an economy based on material flows offers many advantages, not least that it can be used as a call to action. However, the circular economy is full of intricacies, and therefore, simplifications are necessary, which result in limitations that must be considered.

1. **Measuring circularity requires more than a single indicator.** Using less, using longer and regenerating natural systems are all principles that complement the idea of 'closing the loop', which is most commonly associated with the concept of circular economy and captured by a single indicator: the Circularity Metric. By focusing on a broader Circular Indicator Set, we can provide a more comprehensive and accurate assessment of the status of the circular economy and its potential impacts.
2. **The Circularity Metric focuses on one aspect of circularity.** We focus only on secondary material use without examining other factors such as biodiversity loss, pollution, toxicity, et cetera. While the type of material resources used and the way they flow through Montréal's economy obviously affects these other factors, this study does not dive deeper into the impacts caused and the multiple and interlinked implications these have on Earth's systems and societies.
3. **We consider relative, not absolute, numbers.** In a high-consuming urban area like Montréal, increasing material cycling has a much smaller impact on the overall material cycling indicator: the bigger the denominator, the smaller the impact of increasing the numerator is on the overall percentage. This also means that in consumption-driven economies, it is not only important to increase material cycling but also to decrease consumption in order to increase the percentage metric significantly. If cycling increases faster than material consumption, the Circularity Metric will improve—even if the ultimate goal is for material demand to decrease.
4. **Achieving 100% circularity isn't feasible nor a goal in itself.** Cycling has technical and practical limits, and some materials will always be required for stock build-up. Other materials, like fossil fuels, are also inherently non-circular and cannot be cycled. However, material cycling is only one of the levers that can be employed to achieve the ultimate goal, which is to bring Montréal's material and carbon footprints closer to global sustainable averages. The circular economy must be seen as a means to an end, which is why other circular actions mentioned at the beginning of this chapter will be as important, if not more, in achieving this.

For a more exhaustive look into the methodology behind the Circularity Gap, you can visit our website: www.circularity-gap.world/methodology

Credit © Mathieu Sparks – Ville de Montréal



4

BRIDGING MONTRÉAL'S CIRCULARITY GAP

Exploration of ‘what-if’ scenarios for key sectors

Credit © Stéphan Poulin – Tourisme Montréal

After deep diving into Montréal’s material and carbon footprints, presenting the Circular Indicator Set and investigating the key themes of the economy, it’s now 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 Montréal that’s resource-light, low-carbon and wellbeing-focused. These scenarios explore a potential path forward for Montréal, outlining which sectors and interventions could be the most impactful in reorienting the city’s material and carbon footprints and increasing secondary material consumption.

BRIDGING THE CIRCULARITY GAP: 'WHAT IF' SCENARIOS

We have narrowed our focus for the ‘what-if’ scenarios to five key material and carbon-intensive areas representing key leverage points for Montréal’s economy. **These key leverage points are based on the sectors with the highest impact—namely Construction, Agrifood and Manufacturing—revealed by the baseline analysis in Chapter Two.** The Construction and Agrifood sectors are explored directly in their respective scenarios. In contrast, the Manufacturing sector is explored via three scenarios in which it has influence: manufacturing from a supply perspective (‘Advance circular manufacturing’), manufacturing from a demand perspective (‘Promote a circular lifestyle’) and mobility (‘Redesign mobility’).

Each of the five scenarios consists of several interventions, as follows:

1. **Build a circular built environment**
   - 1.1 Optimise building stock expansion and increase occupancy
   - 1.2 Create a low-carbon, energy-efficient building stock
   - 1.3 Scale resource-efficient building processes
2. **Shift to a circular food system**
   - 2.1 Increase local, sustainable food production
   - 2.2 Endorse a balanced diet
   - 2.3 Reduce and valorise food loss and waste
3. **Advance circular manufacturing**
   - 3.1 Advance resource-efficient manufacturing processes
   - 3.2 Extend product lifetimes through various R-strategies
4. **Redesign mobility**
   - 4.1 Shift modes of travel and reduce travel when possible
   - 4.2 Drive cleaner urban mobility forward
5. **Promote a circular lifestyle**
   - 5.1 Embrace a 'material sufficiency' lifestyle

Focusing on a few key areas allows us to pinpoint where and which circular interventions can optimise the transformation of materials into social benefits. The scenarios envision the technological and sociocultural changes necessary to alter the economy’s material flows. **The effects of these changes are then measured in terms of reductions in the material and carbon footprints and an increase in the Circularity Metric.**

The scenarios are informed and developed with the ultimate aim of **slowing, narrowing, cycling and regenerating** material flows, as described on page 30, which provides a jumping-off point for the strategies needed to spur systemic change. The following sections dive into the impact potential of each of the five scenarios. All assumptions behind the modelling of these scenarios can be found in the Methodology Document.

CORE CIRCULAR ECONOMY STRATEGIES BEHIND THE ‘WHAT-IF’ SCENARIOS

Taking an ‘X-ray’ of the economy’s material use, we consider six fundamental dynamics of what the circular economy transition aims to establish and how it can do so. This translates into two objectives and four strategies based on the work of Bocken et al. (2016).[34]

The core objectives are:

- **Objective one:** Resource extraction from the Earth’s crust is minimised, and biomass production and extraction is regenerative, meaning that it contributes to ecosystem preservation and restoration;
- **Objective two:** The dispersion and loss of materials is minimised, meaning all technical materials have high recovery opportunities, ideally with minimal degradation and with optimal value retention; emissions to air and dispersion to water or land are prevented; and biomass is optimally cascaded.

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

- **Narrow flows—Use less:** This approach involves decreasing the consumption of materials, including fossil fuels, by productive activities while still satisfying the societal needs of an economy. This can be achieved through circular design or increasing the utilisation rates of materials and products. Practical examples include climate-smart urban planning, sharing and rental models, material lightweighting (mass reduction) in production and construction processes, multifunctional products or buildings, energy efficiency, digitisation and more.
- **Slow flows—Use longer:** This approach focuses on optimising resource use by extending the functional lifetime of materials and products. It can be achieved via design for durability, repair and remanufacturing, and all other activities that can contribute to slowing rates of extraction and use. Practical applications include modular building design, renovation and remodelling over building new structures, and second-hand consumption of textiles, furniture and electronics, for example.
- **Regenerate flows—Make clean:** In this approach, virgin raw materials, fossil fuels, pollutants and toxic materials are replaced with regenerative alternatives, thereby increasing and preserving value in natural ecosystems. Practical implementations of this include using regenerative and non-toxic materials for building renovation and new construction, transitioning to renewable energy sources, and adopting regenerative practices in urban farming and nature-based solutions.
- **Cycle flows—Use again:** This strategy emphasises the optimisation of reusing materials and products at end-of-life, facilitating a circular flow of resources. It involves improved collection and reprocessing of materials, along with optimal cascading, by creating value in each stage of reuse and recycling. Practical applications include designing for recyclability (both technical and biological), disassembly, and advanced (re)cycling technologies for construction and demolition waste, for example.

While these four strategies are 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 the Methodology Document.

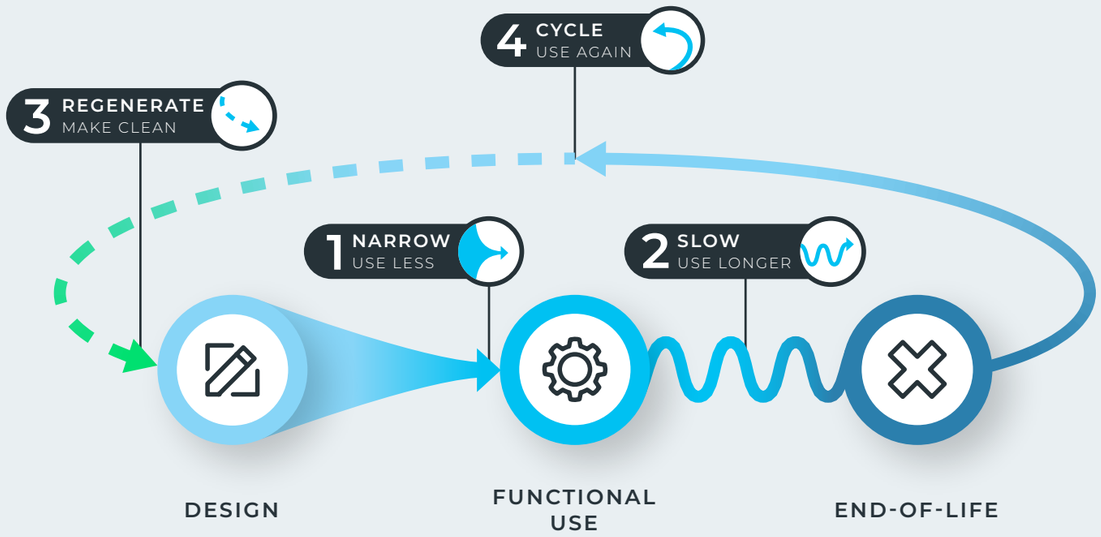


Figure five displays the four flows to achieve circular objectives: narrow, slow, regenerate and cycle.

1. BUILD A CIRCULAR BUILT ENVIRONMENT

The results of the baseline analysis showed that the built environment is a sector of high impact. Additionally, Montréal's *Circle City Scan* revealed that construction and demolition waste (C&DW) amounted to 1.6 million tonnes in 2019—69% of which was landfilled.[35] This amount of waste is largely a result of the city's rapid urbanisation and rising population[36] that is forcing the expansion of building stock with no signs of stopping in the near future. Understanding how different interventions can influence the material footprint, carbon footprint and Circularity Metric can help us better understand how to use materials within the sector, particularly in building stocks. Ville de Montréal is already taking steps in the right direction, with its *Climate Plan 2020–2030* identifying circular construction practices as a key opportunity to increase resilience to climate change whilst improving residents' quality of life.[37] The city has also recognised the built environment as a key lever to improve its overall waste management performance. This section introduces the three interventions modelled to showcase the potential of a circular built environment in Montréal:

1.1 OPTIMISE BUILDING STOCK EXPANSION AND INCREASE OCCUPANCY

The first intervention targets the construction sector's material use through strategies that **narrow** material flows and **cycle** materials back into the economy at their end-of-life. Optimising new builds and increasing the reuse of building materials (steel, concrete and timber, for example) and components (doors and window frames, for example) will reduce the demand for raw material inputs. At the same time, this intervention presents a range of strategies to optimise the use of buildings through increasing occupancy rates of residential and non-residential buildings (offices, public buildings), cutting the total number of new buildings needed—**slowing** and, ultimately, **narrowing** material flows.

1.2 CREATE A LOW-CARBON, ENERGY-EFFICIENT BUILDING STOCK

This intervention comprises two strategies: deep retrofitting practices and furthering the already developed deployment of low-carbon energy management and heating technologies, such as heat pumps and smart meters. These will serve to **narrow** material flows, particularly fossil fuels. Retrofitting activities should use secondary and non-toxic materials to the greatest extent possible, **cycling** and **regenerating** flows. Material choice is important, as carbon embodied in certain materials may generate knock-on effects, counteracting benefits from improved energy efficiency.

1.3 SCALE RESOURCE-EFFICIENT BUILDING PROCESSES

This third intervention focuses on scaling material-efficient construction practices—thereby cutting material input and waste—to **narrow** flows while increasing the lifetime of bearing materials like steel, thus **slowing** flows. Material choice is important, as embodied carbon in certain materials can counteract benefits from improved energy efficiency. Using bio-based construction materials such as wood is an option to **regenerate** material flows in the built environment of Montréal. We further seek to **narrow** flows through improved construction practices like off-site construction, for example. Incorporating circular design principles, such as modularisation and multi-purpose building, will extend the lifetime of buildings, thus **slowing** flows.

IMPACTS

This scenario's three interventions have the highest overall potential to reduce Montréal's material and carbon footprints. See a detailed breakdown of the impacts of each intervention in Table three on the next page.

Fostering Montréal's circular built environment can bring many **co-benefits** beyond just environmental. Retrofitting, for example, can serve to increase energy efficiency and cut energy consumption,[38] thus reducing energy bills and costs for households and businesses while increasing resilience by lessening dependence on foreign materials. Additionally, if designed strategically, retrofitted housing can help tackle multiple issues—from health inequalities to affordability—by cutting costs and improving housing standards. The same holds for modular design, as modular building parts and construction methods could become a quick and affordable way to house residents. Employing circular strategies for the built environment—such as off-site construction, novel materials, better material management, renovation and retrofitting—also provides an opportunity to create new jobs and business opportunities.[39, 40, 41]

INTERVENTION	MATERIAL FOOTPRINT	CARBON FOOTPRINT	CIRCULARITY METRIC
1.1 Optimise building stock expansion and increase occupancy	-8%, down to 52.1 million tonnes	-5%, down to 26 million tonnes of CO_2e	+0.71 percentage points (p.p.) to 3.7%
1.2 Create a low-carbon, energy-efficient building stock	-2%, down to 55.3 million tonnes	-3%, down to 26.3 million tonnes of CO_2e	+0.04 p.p. to 3.04%
1.3 Scale resource-efficient building processes	-2%, down to 55.4 million tonnes	-2%, down to 26.6 million tonnes of CO_2e	+0.03 p.p. to 3.03%
Combined scenario impact	**-12%, down to 49.6 million tonnes**	**-9%, down to 24.7 million tonnes of CO_2e**	**+0.93 p.p. to 3.9%**

Table three shows a detailed breakdown of the impacts of each intervention.

** Overlaps between and the sequentiality of interventions mean that our combined intervention and scenario calculations yield different results than simply adding up the impacts of individually modelled strategies and interventions.*

HOW CAN VILLE DE MONTRÉAL BUILD A CIRCULAR BUILT ENVIRONMENT?

To harvest the potential material and carbon footprint reductions that circularity can deliver for the built environment, Montréal has already identified two strategies in its *Circle City Scan*:[42]

1. **Leverage circular public procurement for buildings**

Ville de Montréal is one of the largest property managers in the city and is responsible for urban planning and land use management. With this in mind, circular public procurement for buildings and roads is an effective way to encourage the upgrading and reallocation of the current building stock. This would also entail selective demolition of existing buildings, followed by collection, sorting and transformation into secondary materials.

2. **Incentivise high-value reuse and recycling of C&DW**

Making the deposit of C&DW free for small businesses—given that the materials are stored—can prohibit the discard of mixed C&DW. The city can also invest in physical and digital infrastructure to connect both ends of the high-value reuse and recycling chain: the suppliers responsible for providing the reusable materials and the consumers responsible for incorporating these materials into new construction projects.

Credit © Getty Images

2. SHIFT TO A CIRCULAR FOOD SYSTEM

Montréal's food system is far-reaching, with a high proportion of food products being imported from other parts of North America, as well as South America and Asia. The impacts caused across global food value chains contribute significantly to Montréal's carbon and material footprints. Locally, this sector is also responsible for generating significant volumes of organic waste that ends up in landfills, contributing to methane emissions. The *Circle City Scan* estimated that in 2019, 16% of all food waste was landfilled rather than being used for feedstock, nutrients or energy.[43] Given the sector's large impact, there is ample opportunity to transform it into a low-impact, circular food system. Ville de Montréal already has plans to cut food waste by 50% by 2025 by improving its collection and processing infrastructure whilst progressively aiming to eliminate all organic waste from landfills by 2030. In terms of food production, the city is leading the way, with one recent study classifying Montréal as the capital of urban agriculture with 57 agricultural businesses and numerous community and collective gardens.[44] Moreover, exemplary efforts towards restricting the sale of the most toxic pesticides are underway.[45] An urban agriculture strategy, spanning from 2021 to 2026, aims to increase the area of cultivated land within the city by 33%.[46, 47] This scenario includes three interventions to reduce the impact of Montréal's overall footprint and subsequently boost circularity:

2.1 INCREASE LOCAL, SUSTAINABLE FOOD PRODUCTION

This scenario's first intervention tackles food production within Montréal. We explore the impact of an increase in organic, local and seasonal food production both locally but also across the entire food value chain (in the form of an increased demand for organic products)—strategies that will **regenerate** and **narrow** flows by reducing the need for synthetic fertilisers, lowering transport distances and lessening dependence on foods grown in heated greenhouses.

2.2 ENDORSE A BALANCED DIET

This intervention centres on food consumption: limiting caloric intake to 2,700 per day and favouring plant-based diets would serve to both narrow and regenerate material flows throughout the entire food value chain. This intervention is aligned with *Canada's Dietary Guidelines*, which recommend vegetables, fruit, whole grains and plant-based proteins.[48] Following such guidelines will naturally result in a lower caloric intake by consuming more nutritious and high-fibre foods.

2.3 REDUCE AND VALORISE FOOD LOSS AND WASTE

This intervention considers strategies that can reduce and valorise food loss and waste,[49] tackling both household and industry practices. This serves to **narrow** flows by preventing unnecessary or excess food production. All unavoidable food waste and loss should be **cycled**, following the food waste hierarchy.[50]

IMPACTS

This scenario's three interventions have an overall moderate impact on both Montréal's material and carbon footprints. Endorsing a balanced diet (Intervention 2.2) has the greatest impact on the footprints due to its influence throughout the entire food value chain, but this has little impact on circularity. Intervention 2.1 generates the greatest improvement for the Circularity Metric due to its indirect reduction of fossil fuel-based fertilisers. See a detailed breakdown of the impacts of each intervention in Table four below.

A circular food system could also bring a range of **co-benefits** to Montréal: improved health, better air quality, healthier soils in the peri-urban landscape and flourishing biodiversity. Preventing food waste—in addition to helping the city meet its targets of food waste reduction[51]—will also help residents save money. As the reigning capital of urban agriculture, this scenario can help Montréal to further stimulate new business models that capitalise on circular food production and processing and food waste management, creating new employment opportunities and allowing for more collaboration with local farmers.

INTERVENTION	MATERIAL FOOTPRINT	CARBON FOOTPRINT	CIRCULARITY METRIC
2.1 Increase local, sustainable food production	-0.4%, down to 56.4 million tonnes	-0.2%, down to 27.0 million tonnes of CO_2e	+0.22 p.p. to 3.2%
2.2 Endorse a balanced diet	-3%, down to 54.7 million tonnes	-3%, down to 26.2 million tonnes of CO_2e	+0.07 p.p. to 3.1%
2.3 Reduce and valorise food loss and waste	-1%, down to 56 million tonnes	-1%, down to 27.1 million tonnes of CO_2e	+0.03 p.p. to 3.03%
Combined scenario impact	**-5%, down to 53.7 million tonnes**	**-4%, down to 25.9 million tonnes of CO_2e**	**+0.41 p.p. to 3.4%**

Table four shows a detailed breakdown of the impacts of each intervention.

** Overlaps between and the sequentiality of interventions mean that our combined intervention and scenario calculations yield different results than simply adding up the impacts of individually modelled strategies and interventions.*

HOW CAN VILLE DE MONTRÉAL BUILD A CIRCULAR FOOD SYSTEM?

To harvest the potential material and carbon footprint reduction that circularity can deliver for the food system, Ville de Montréal has already identified two strategies in its *Circle City Scan*:

1. **Promote living labs and hubs to stimulate innovation and support industrial symbiosis in the food system**

Ville de Montréal can lead projects and initiatives by providing financial support and organising participants. The City can further facilitate stakeholder exchange by making spaces available to host living labs, enabling research, innovation and experimentation in a real environment. As a partner, the City could also collaborate horizontally, awarding shared leadership to other stakeholders, and participating in living lab sessions itself.

2. **Improve food waste measurement and collection from industrial, commercial and institutional establishments (IC&I)**

Ville de Montréal could increase the diversion of food waste from IC&I sources by expanding waste services and gathering data on volumes and composition of waste streams per type of waste generator (such as restaurants and hotels). This strategy can increase the organic waste available for use as local agricultural inputs (such as fertiliser), while indirectly promoting a reduction in waste generation.

Credit © Mathieu Sparks – Ville de Montréal

3. ADVANCE CIRCULAR MANUFACTURING

Montréal's manufacturing sector—which supplies residents and businesses with goods and services—is primarily based on a linear business model that relies on raw virgin materials. Some of these materials, such as steel and plastic, have high carbon intensities due to energy-intensive production processes and large transportation distances. This scenario focuses on reducing the raw material demand of the manufacturing industry by importing higher quality, longer lasting products that are produced more efficiently to reduce the overall demand for new products. Extending the lifetime of products is also explored by improving the availability and technical feasibility of R-strategies in Montréal. Although textile manufacturing forms a significant part of the city's manufacturing activities, it is currently modelled from the demand perspective as part of the fourth scenario: Promote a circular lifestyle. This section focuses on two interventions that can reduce the impact of manufacturing on Montréal's overall footprint and subsequently boost circularity:

3.1 ADVANCE RESOURCE-EFFICIENT MANUFACTURING PROCESSES

This scenario's first intervention centres on improving the manufacturing sector's material efficiency—both during the initial stages, where materials are processed and formed and in the final stages, where products are created. Reducing the need for 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 value and use out of fewer material resources. Further along the value chain—where metals are used to make vehicles or machinery, for example—process improvements will bring similar benefits. Optimising scrap material, a by-product of standard procedures, would also boost efficiency and reduce the need for virgin material inputs, further **narrowing** flows. All unavoidable scrap can also be reused, thus **cycling** flows.

3.2 EXTEND PRODUCT LIFETIMES THROUGH VARIOUS R-STRATEGIES

This intervention employs various R-strategies[52] for the manufacturing of machinery, equipment and vehicles. Remanufacturing and refurbishment practices can be leveraged in the business-to-business sector to extend product lifetimes, particularly high-value machinery and equipment, therefore **slowing** flows. Montréal's industrial manufacturing companies could also benefit from a shift to more circular supply chains, making use of leasing or other Product-as-a-Service (PaaS) systems as an alternative to ownership-based models, thus **narrowing** flows.[53] Incorporating circularity in the early design phases, both at the product and system levels, will also be crucial to enable high-value circular practices.

IMPACTS

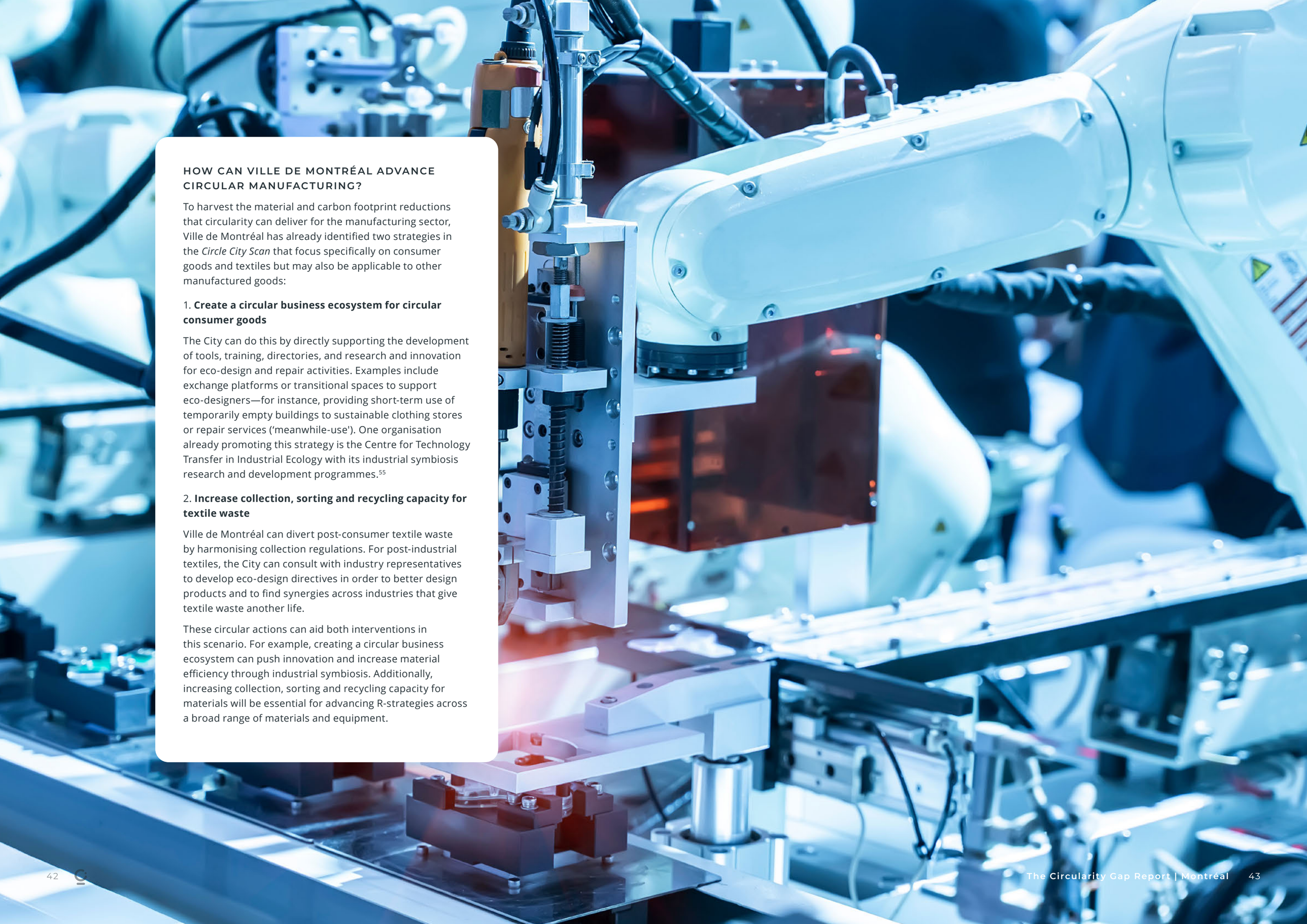
This scenario's two interventions have a moderate impact on reducing Montréal's material and carbon footprints. See a detailed breakdown of the impacts of each intervention in Table five below.

These interventions can also provide a range of social and economic **co-benefits**. Resilience against supply chain disruptions and price volatility, new business models (through circular design, PaaS and different R-strategies), and customer engagement and loyalty[54] are just a few possible outcomes. Increasing the adoption of R-strategies could also trigger private sector involvement while boosting industrial sectors, creating new business opportunities, incentivising innovation and setting businesses up for long-term competitiveness. These interventions also hold high job creation potential as they will require a higher level of manual labour, and thus require a workforce with specialised skills.

INTERVENTION	MATERIAL FOOTPRINT	CARBON FOOTPRINT	CIRCULARITY METRIC
3.1 Advance resource-efficient manufacturing processes	-2%, down to 55.5 million tonnes	-2%, down to 26.4 million tonnes of CO_2e	+0.07 p.p. to 3.07%
3.2 Extend product lifetimes through various R-strategies	-1%, down to 56.0 million tonnes	-2%, down to 26.5 million tonnes of CO_2e	+0.03 p.p. to 3.03%
Combined scenario impact	**-4%, down to 54.2 million tonnes**	**-4%, down to 25.9 million tonnes of CO_2e**	**+0.13 p.p. to 3.1%**

Table five shows a detailed breakdown of the impacts of each intervention.

** Overlaps between and the sequentiality of interventions mean that our combined intervention and scenario calculations yield different results than simply adding up the impacts of individually modelled strategies and interventions.*



HOW CAN VILLE DE MONTRÉAL ADVANCE CIRCULAR MANUFACTURING?

To harvest the material and carbon footprint reductions that circularity can deliver for the manufacturing sector, Ville de Montréal has already identified two strategies in the *Circle City Scan* that focus specifically on consumer goods and textiles but may also be applicable to other manufactured goods:

1. **Create a circular business ecosystem for circular consumer goods**

The City can do this by directly supporting the development of tools, training, directories, and research and innovation for eco-design and repair activities. Examples include exchange platforms or transitional spaces to support eco-designers—for instance, providing short-term use of temporarily empty buildings to sustainable clothing stores or repair services ('meanwhile-use'). One organisation already promoting this strategy is the Centre for Technology Transfer in Industrial Ecology with its industrial symbiosis research and development programmes.[55]

2. **Increase collection, sorting and recycling capacity for textile waste**

Ville de Montréal can divert post-consumer textile waste by harmonising collection regulations. For post-industrial textiles, the City can consult with industry representatives to develop eco-design directives in order to better design products and to find synergies across industries that give textile waste another life.

These circular actions can aid both interventions in this scenario. For example, creating a circular business ecosystem can push innovation and increase material efficiency through industrial symbiosis. Additionally, increasing collection, sorting and recycling capacity for materials will be essential for advancing R-strategies across a broad range of materials and equipment.

4. REDESIGN MOBILITY

Redesigning mobility with circularity in mind involves shifting away from a materially inefficient system towards one based on smaller, electrified vehicles, shared mobility models, public transport, cycling and fewer unnecessary journeys. Designing a mobility system based on these principles serves to reduce the overall quantity of materials consumed and decrease carbon emissions both locally and across the entire value chain, whilst still meeting the needs of Montréal's residents. Ambitious plans are already resulting from initiatives such as the *Ambition EST 2030*, a roadmap developed by Propulsion Québec that aims to advance the electric and smart transportation (EST) sector through a series of programmes, making it a global frontrunner.[56, 57] Meanwhile, Ville de Montréal has also made plans to achieve a more circular mobility system, including:[58]

- Reducing the number of cars on the road by improving public transport connections and cyclability around metro stations;
- Developing bike lanes and increasing the supply of shared bicycles and e-bikes;
- Shifting 25% of solo car trips to less energy-intensive modes (such as public transit);
- Creating a zero-emission zone by 2030 and electrifying the city's public buses by 2040;
- Increasing charging infrastructure to reach at least 30% electrification of passenger trips;
- Reducing freight emissions with the target of achieving 25% zero-emission deliveries.

This scenario will focus on two interventions to showcase how a circular mobility system can reduce Montréal's overall footprint and subsequently boost circularity:

4.1 SHIFT MODES OF TRAVEL AND REDUCE TRAVEL WHEN POSSIBLE

By rethinking the mobility system, this scenario's first intervention explores the benefits of decreasing or avoiding travel or the need for travel. This will ultimately require Montréal's residents to embrace a car-free lifestyle, and continue to allow workers to work from home, where possible. Doing so could cut the need for private car use as well as fuel consumption, both serving to **narrow** flows. Increasing active forms of transport (cycling and walking) and public transport (train and bus) coinciding with and causing a significant reduction in private car ownership and use will offset the expected decrease in material use to a degree.

4.2 DRIVE CLEANER URBAN MOBILITY FORWARD

While the focus should be on reducing overall travel—especially by private car and aeroplane—and developing new mobility systems, new clean technologies are also needed. This intervention comprises several strategies that tackle vehicles' production and use phases. Montréal can **narrow** material flows by prioritising small(er), more lightweight, fuel-efficient vehicles, thereby cutting material and fuel use. This could include private cars, public transport vehicles and freight transport. Moving forward, all new vehicles for public and private transport should also be electric. This would cut fossil fuel use and **narrow** and **regenerate** flows if the vehicles were to be powered by renewable energy. However, it is also worth emphasising that electric vehicles still consume large volumes of materials—and especially critical minerals such as lithium, cobalt and nickel for batteries, for example. This intervention must be understood in the context of the previous one—a substantial reduction in the fleet size—to mitigate certain trade-offs and knock-on effects.

IMPACTS

This scenario's two interventions have a moderately high reduction impact on Montréal's material footprint and a significantly high impact on the carbon footprint. See a detailed breakdown of the impacts of each intervention in Table six below.

A range of **co-benefits** can arise from implementing these strategies. Montréal could see improved air quality, less noise, and increased and safer space for amenities and green spaces, for example. Pedestrianisation could create more favourable conditions for neighbourhood life, community building and even tourism. Making interregional and intercity connectivity more efficient can provide economic benefits by increasing regional productivity and nurturing multiple economic centres. This scenario's interventions can also have multiple benefits for the health and wellbeing of residents: walkability and bike-ability can boost physical activity, contributing to lower rates of obesity, for example.[59] A flexible mix of work-from-home and office time could also positively influence productivity, health and wellbeing, as well as bring social benefits. That being said, the negative effects of working from home—less collaboration and social interaction, the distribution of extra costs by employers and employees, and local economic impacts—must be considered and addressed.

INTERVENTION	MATERIAL FOOTPRINT	CARBON FOOTPRINT	CIRCULARITY METRIC
4.1 Shift modes of travel and reduce travel when possible	-7%, down to 52.6 million tonnes	-16%, down to 22.6 million tonnes of CO_2e	+0.22 p.p. to 3.2%
4.2 Drive cleaner urban mobility forward	-4%, down to 54.5 million tonnes	-14% down to 23.3 million tonnes of CO_2e*	+0.11 p.p. to 3.1%
Combined scenario impact	**-9%, down to 51.6 million tonnes**	**-21%, down to 25.1 million tonnes of CO_2e**	**+0.28 p.p. to 3.3%**

Table six shows a detailed breakdown of the impacts of each intervention

** This estimate excludes tailpipe emission reductions from electrification of the vehicle fleet (due to model limitations). Therefore, it's expected that the impact of this intervention on decreasing the carbon footprint could be far greater than it appears.*

HOW CAN VILLE DE MONTRÉAL REDESIGN MOBILITY?

To harvest the potential material and carbon footprint reductions that circularity can deliver for the mobility system, Ville de Montréal has already identified two strategies in the *Circle City Scan*:

1. **Support shared mobility initiatives**

Montréal can encourage shared mobility initiatives by raising awareness and collecting data on the best use and form of shared vehicles, as well as the business models best suited for the city. On the ground, the City must continue to develop bicycle and electric vehicle infrastructure, rebalancing public spaces so that soft mobility has room to breathe and flourish. This can be in the form of financial support via incubators and investment programmes. Finally, ensuring a positive regulation environment by, for example, issuing parking permits for shared vehicles and implementing parking restrictions for e-mobility will help to improve public perception.

2. **Optimise efficient and low-carbon freight and logistics systems**

Ville de Montréal can support efficient and low-carbon freight and logistics services by creating an urban logistics plan in collaboration with local stakeholders. Such a plan can be grounded in several core activities: encouraging logistics data sharing within a harmonised data sharing framework; procurement of zero-emission public freight vehicles (such as waste collection, maintenance and repair, and deliveries to public offices); encouraging new logistics concepts and zero-emission freight vehicles through incentives (such as subsidies) and disincentives (such as low emission zones and freight capacity requirements); and increasing consumer awareness to make use of new logistics solutions.

By following these actions, Ville de Montréal will be on track to realise this scenario's results. Shared mobility initiatives and optimised freight logistics will reduce the overall travel distance needed to meet residents' needs. Ensuring that the vehicles in use are low-carbon (human-powered or electric, for example) as well as smaller and lighter, where possible, will be key to reducing the overall footprint of the system.

Credit © Mathieu Sparks – Ville de Montréal

5. PROMOTE A CIRCULAR LIFESTYLE

The transition to a circular economy requires not only action from industries but also from Montréal's residents, who influence the demand for products. Montréal can be considered a high-income economy,[60] which tends to exhibit high levels of material consumption: keeping up to date with the latest technology, buying clothes that are rarely worn or replacing products rather than repairing them. According to RECYC-QUÉBEC's Waste disposal characterization study, 84% of end-of-life textiles are disposed of rather than resold or recycled. This suggests that as long as people keep consuming more than they need, it will be very difficult to manage all of the waste that arises. Managing how much Montréal's residents consume is, therefore, key to reducing the city's raw material extraction. Ville de Montréal is already developing resources to help residents consume more responsibly, for example, by encouraging rental, exchanging and sharing of goods where possible. There are toolboxes and directories available, such as Z'Astuces reduction toolbox and the responsible consumption directory issued in conjunction with the *Semaine québécoise de réduction des déchets*, which provide tips to adopt new lifestyle practices and make better consumer choices.[61] This scenario focuses on one intervention to decrease residents' contribution to Montréal's overall footprint:

5.1 EMBRACE A 'MATERIAL SUFFICIENCY' LIFESTYLE

This scenario explores just one intervention: a low-impact lifestyle of 'material sufficiency' where high standards of wellbeing are maintained, and conscious living is prioritised over excess and wastefulness.[62] We examine a range of strategies aimed at minimising material consumption (**narrowing** flows) by rethinking needs, enabling and encouraging Montréal's residents to use products for longer (**slowing** flows), and using eco-alternatives and recycling as much as possible to **regenerate** and **cycle** flows. Cutting the number of consumables in circulation—**narrowing** flows—is the most impactful strategy.

IMPACTS

This scenario's intervention has a high impact on reducing Montréal's material and carbon footprints. See a detailed breakdown of the impact of this intervention in Table seven below.

The adoption of this intervention can bring a range of **co-benefits**. With residents consuming less, Montréal will benefit from less waste, litter and pollution—supporting the City's goal of becoming a zero-waste city through its *Zero Waste Plan*.[63] What's more, sustainable, community-based lifestyles can nurture a more inclusive and resilient society. For example, reducing the consumption of goods can alleviate the effects of the cost of living crisis and turn consumers toward products that enhance the quality of life and wellbeing. This scenario can also support local businesses and industries by steering consumers toward local products and services. Finally, businesses specialising in restoring goods and assets and managing waste will have space to flourish and develop, creating new jobs and opportunities for the city.

INTERVENTION	MATERIAL FOOTPRINT	CARBON FOOTPRINT	CIRCULARITY METRIC
5.1 Embrace a 'material sufficiency' lifestyle	-11%, down to 50.5 million tonnes	-11%, down to 24.1 million tonnes of CO_2e	+0.3 p.p. to 3.3%

Table seven shows a detailed breakdown of the impacts of each intervention.

** Overlaps between and the sequentiality of interventions mean that our combined intervention and scenario calculations yield different results than simply adding up the impacts of individually modelled strategies and interventions.*

Credit © Getty Images

COMBINED INTERVENTIONS

The power of the proposed interventions can truly be seen when they are combined. The pressures being placed on the planet are reflected in current levels of material consumption and GHG emissions. Thus, reducing them is a key strategy for lightening the environmental load. To this end, increasing materials' circularity—replacing virgin with secondary materials—is just one way to reduce the overall material and carbon footprints (and thus environmental impacts). With this in mind, reducing overall material demand has a much greater impact on lowering carbon and material footprints with fewer interventions. In this sense, the scenario analysis is very useful for illustrating the limits of cycling on reducing material consumption.

By harnessing the cross-intervention synergies of our broad 'what-if' image for the economy, **Montréal can cut its material footprint by a remarkable 38%, bringing it from 57 million tonnes down to 35 million tonnes**. On a per capita basis, the material footprint could be reduced from 27.4 tonnes to around 16.9 tonnes per year, an important first step toward the suggested sustainable goal of 8 tonnes per person per year.[64] The combined scenarios also offer deep emissions reductions: **the carbon footprint could decrease by 46%, bringing it from 27 million tonnes of CO_2e down to 15 million tonnes of CO_2e, or 7.3 tonnes of CO_2e per capita. While this still exceeds the estimated global sustainable levels of 2.3 tonnes per capita**, which is required to stay within 2-degrees of warming as outlined by the Paris Agreement, it is a positive step in the right direction.

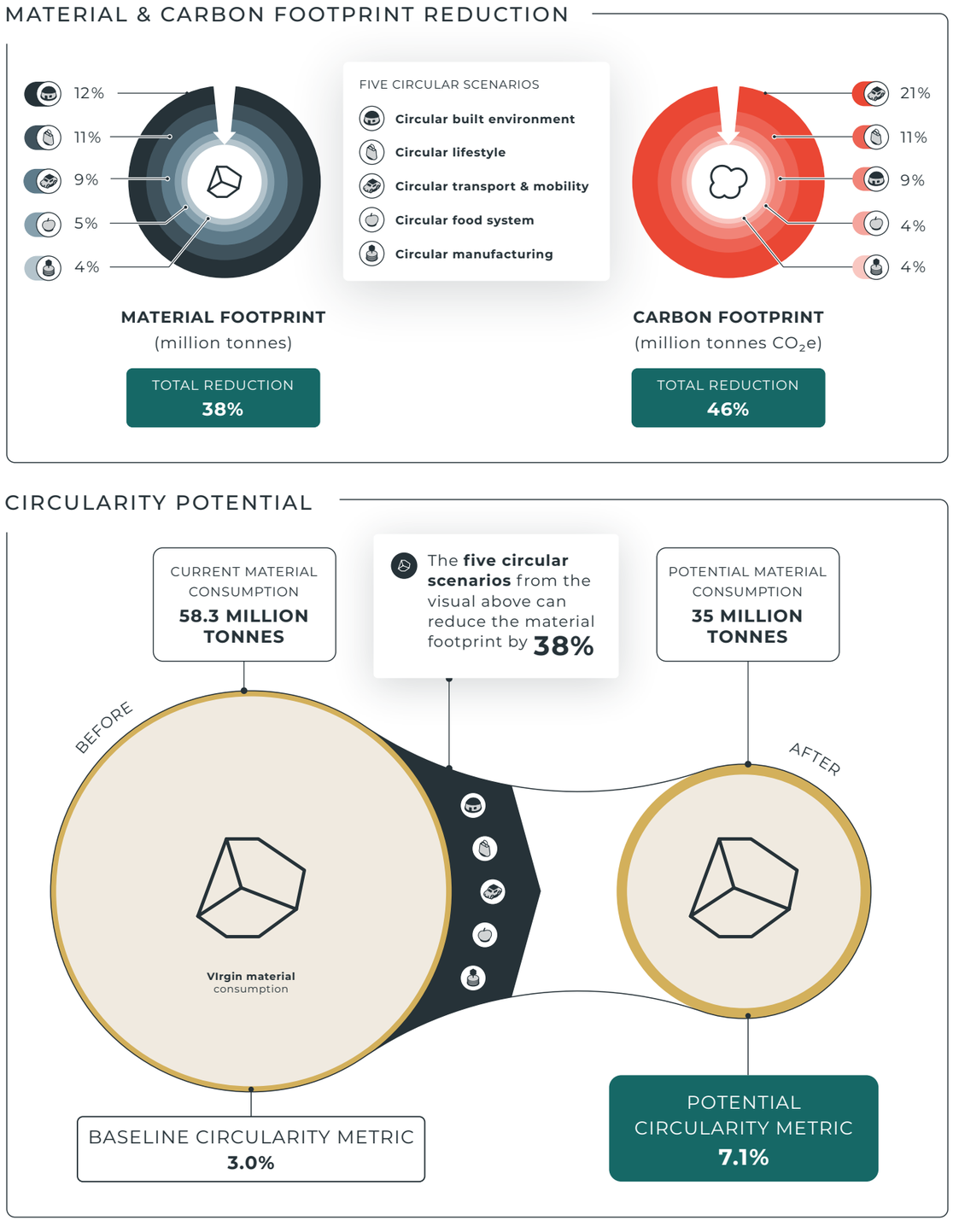


Figure six summarises the material and carbon reductions made possible by applying the five circular scenarios.

** Overlaps between and the sequentiality of interventions mean that our combined intervention and scenario calculations yield different results than simply adding up the impacts of individually modelled strategies and interventions.*

5

THE WAY FORWARD

Credit © Mathieu Sparks – Ville de Montréal

By implementing circular economy strategies across five key sectors, Montréal can start transforming its economy and reduce environmental impacts both within and beyond its borders. Satisfying the material demand of Montréal's residents and businesses requires large quantities of resources, most of which come from outside the city's borders, from the rest of Québec, Canada and beyond. This drives environmental impacts—from pollution, resource depletion, biodiversity loss and water stress to many others—worldwide. **This report illustrates how circular economy strategies can be leveraged for Montréal's systemic transformation into a sustainable and thriving city.** It outlines five scenarios that minimise material dependencies by replacing material- and emissions-intensive linear processes with those that make the most of materials' value, minimise waste, help regenerate natural systems and foster human wellbeing. **Overall, the strategies presented in this report show that Montréal has the potential to reduce its material and carbon footprints by 38% and 46%**, respectively, creating a more livable city for generations to come.

While a few key areas hold the greatest potential for impact reduction, transformative change is needed across the board—for which a systemic approach will be necessary to mobilise resources and catalyse positive change. Of the scenarios explored, **Building a circular built environment** offers the greatest opportunity for material footprint reductions, especially through strategies such as optimising future expansion of the building stock, promoting the adaptive reuse of existing spaces, and prioritising recycled construction materials for new construction. Environmental impact can also be substantially reduced through strategies for **manufactured goods**, both from the production side—with a greater engagement from manufacturing companies in offering various remanufacturing, repair, and functionality-based services—and on the consumer side—by shifting towards a material-sufficiency lifestyle. Shifts in such sectors will require strong, direct support from Ville de Montréal regarding urban infrastructure transformations and sending the right market signals. However, consumers will also have a role in the circular transition: awareness-raising and education efforts will be needed to encourage Montréal's residents to embrace a circular lifestyle, prioritise efficient energy use in their households and adopt a balanced diet, for example. Regardless of the key actor or strategy type, all strategies must be pursued with similar commitment and viewed holistically.

The analysis presented in this report provides strong evidence that can inform the City's long-term Circular Economy Roadmap. With the ambitious target of more than doubling circularity to 6% by 2030 and further boosting circularity to 17% by 2050, Montréal's Circular Economy Roadmap will pave the way for action on the ground but will require a shared vision, well-informed, coherent policies and substantial funding to realise. The goal of this report was to deliver a crucial first step: quantitative evidence of the impacts the circular economy can have over the entire economy. Based on this and the Circle City Scan published in 2022, which provided a blueprint to formulate actionable measures for the key systems of Montréal's economy, Ville de Montréal can adequately prioritise actions and pave the way forward. The journey from a linear to a circular economy will be a multi-faceted endeavour requiring alignment and collaboration between policymakers, businesses and residents—the City can nurture and encourage these relationships by assigning roles and responsibilities to various stakeholders throughout the process. Importantly, the analytical framework used in this report can be used as a monitoring framework to track progress over time. This can help to monitor which actions are working well and what should be reconsidered.

There is a significant opportunity for Montréal to become a global circular hotspot. Although the city exhibits high levels of material consumption, it is well-positioned to take on the challenge of going circular to transform its economy and drastically reduce its environmental impact worldwide. With well-formed resource management, decarbonisation goals and the acceptance of circular economy principles as a means to achieve true sustainability, Montréal has already taken its first steps to leave the linear model behind. Proactive stakeholder engagement will be key to the transition's success—and with a flourishing network of collaboration programmes and bottom-up initiatives already in place between business and academia, the city has all the ingredients needed to become a world-leading circular innovation hub and the first of its kind in North America. The circular transition can tackle multiple objectives that will bring Montréal many benefits: mitigating climate and ecological breakdown, improving human wellbeing, fostering continued research and development in local educational institutions, and shaping a more dynamic, productive, resilient and innovative economy. Through close collaboration and systemic changes that permeate local government, the private sector and consumer trends, circularity can become Montréal's new reality.

Ville de Montréal will have a crucial role in the transition: it must adopt an innovative and comprehensive governance approach to guide the circular transition.

1. **Mobilise the newly formulated *Circular Economy Roadmap* through a comprehensive action plan.** After extensive public consultation, Montréal is ready to launch its roadmap and mobilise local businesses and citizens through a concrete action plan. It's also important to keep measuring and monitoring progress to keep on track to the roadmap as possible and learn from what's working and what isn't.
2. **Bring local communities and businesses on board through education and awareness raising.** A systemic circular transition will require building skills and knowledge around circular practices. Montréal can encourage the development of living lab programmes on its territory[65] into other sectors to scale innovative knowledge into viable business models. Local authorities could also leverage the knowledge of local experts and important industries to drive change across the business ecosystem.
3. **Manage the urban landscape to create an enabling environment.** Some of this report's interventions will require a substantial transformation of the urban landscape and infrastructure, such as the deep renovation of the building stock or a modal shift in urban mobility. Ville de Montréal can do this through measures such as spatial planning (for example, planning for 15-minute neighbourhoods), procurement, asset management (such as finding new uses for idle spaces and buildings), and the development and improvement of public infrastructure (like cycling lanes and green roofs). Ville de Montréal's 2050 *Land Use and Mobility Plan* provides a good opportunity to integrate these elements.[66]
4. **Supporting and incentivising new business models and opportunities:** Ville de Montréal's strong business ecosystem can play an important role in reducing the material and carbon footprints across value chains and must, therefore, be supported by local authorities and its partners. Similarly, subsidies, grants, guarantees and technical advice can be provided to support small- and medium-sized enterprises in adopting circular models and practices. The existing partnership with Fondaction and RECYC-QUÉBEC as part of the Circular Economy Fund is a good example of this.[67] Such support can help businesses overcome typical limitations stemming from, for example, limited internal capacity and resources to launch new circular products or services and mitigate investment risks. This is essential to leverage the potential of existing initiatives that have already built momentum on the ground, deploying the circular economy on all fronts.
5. **Regulating and enforcing legislation:** Ville de Montréal can formally use its legal authority to impose obligations on itself, the local market and consumers to boost circularity through product standards or the banning of certain products or practices, for example.

Although the municipal government will be central in driving circularity forward, all stakeholders must be involved to ensure a holistic transition.

1. **Local partners can serve as role models, showcasing the benefits of circular practices** to drive innovation (for example, RECYC-QUÉBEC and Synergie Montréal), offer new services and products (for example, Communauto, Bopaq), create new markets (for example, RÉCO, Still Good), and engage with the local community to raise awareness (for example, La Remise). Pioneering businesses and initiatives are also well-positioned to provide policymakers and other businesses with valuable insights into the practical challenges they have faced on their journeys.
2. **Businesses and industry representatives, particularly from Montréal's key sectors, can drive change across all industries and can even have far-reaching influence from a business perspective.** They can do so by adopting sustainable and regenerative practices (in material or energy sourcing, for example), engaging with supply chain partners to optimise processes and ensure transparency, embracing lightweight and circular design and production processes, and ensuring that products are designed to last for as long as possible and are easy to recycle or reuse.
3. **Industry experts, knowledge partners and members of academia can complement the Ville de Montréal's efforts to improve awareness, provide technical knowledge and inform public and private stakeholders.** Montréal's *Circle City Scan* acts as a first example: roundtable discussions were held to identify circular opportunities and barriers for the city through various stakeholders' expertise. It engaged a range of local industry experts and representatives, members of academia, and technical experts. Deeper, continuous engagement from these stakeholders will be essential to guide the implementation of a circular economy roadmap.
4. **Local organisations can ensure that public interests are represented, and that civil society, as a direct beneficiary of Montréal's circular transition, is consulted and involved in the different stages of the transition.** As such, they can ensure that diverse perspectives, concerns and needs are considered, leading to a more inclusive and equitable implementation of the circular economy roadmap.
5. **Actors in private and public finance can help fund the circular transition.** Deploying the circular economy on all fronts means changing production and consumption systems, requiring significant funding for research, development and innovation. Public funding is becoming increasingly available in Canada to advance the implementation of circular projects on the ground. For example, the Federation of Canadian Municipalities, of which Ville de Montréal is a member, has launched the Green Municipal Fund programme to facilitate investment in environmental projects and initiatives in urban settings, closing the gap between projects and investors.[68] Still, public financing funnelled into these programmes must be met by private funding for long-term and full-scale impact.
6. **National legislators and policymakers can ensure that concerted efforts extend beyond the city's boundaries.** While Ville de Montréal can engage in dialogue with legislators, its legislative authority remains limited by higher-level legal constraints. Therefore, strong support from provincial and federal policies will be indispensable in advancing the circular economy agenda. Regulatory backing that addresses inconsistencies, aligns economic incentives with circular goals, supports research and development, and harmonises efforts to ensure transparency and accountability are all areas where higher levels of governmental support will be vital.

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ACKNOWLEDGEMENTS

Circle Economy would like to thank the funders, authors, contributors and interviewees for their contribution to the preparation of this edition of the *Circularity Gap Report Montréal*. Authors, contributors and interviewees have contributed to the report in their individual capacities. Their affiliations are only mentioned for identification purposes

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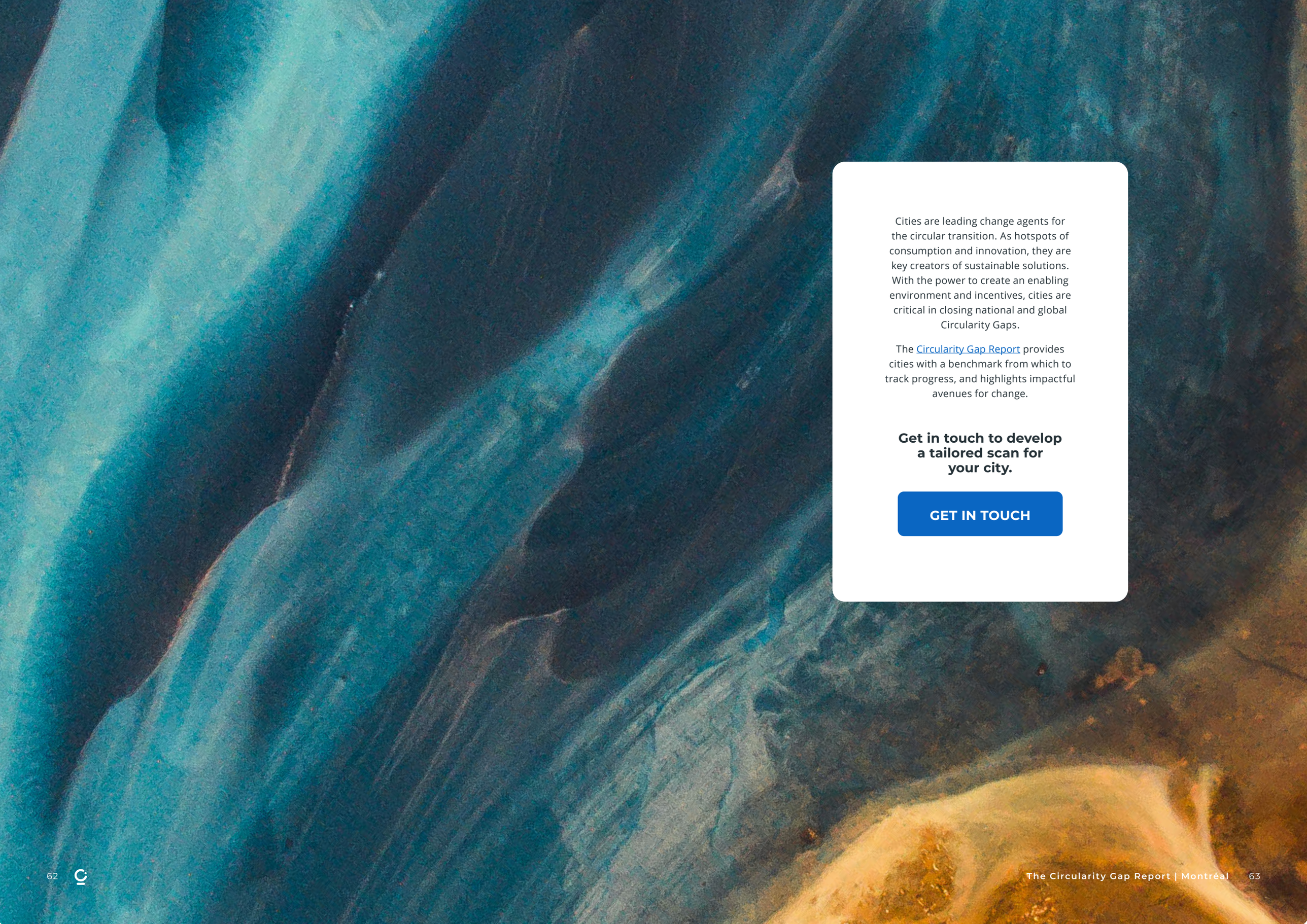

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