BASELINING FOR
A CIRCULAR
TORONTO

FINAL REPORT

Technical
Memorandum #3

July 30th, 2021

TORONTO

CIRCLE ECONOMY

DAVID SUZUKI FOUNDATION
One nature.

FONDATION DAVID SUZUKI
Un monde. Une nature.

COLOPHON

This report represents the final output of the *Baselining for a Circular Toronto* research project conducted by Circle Economy and David Suzuki Foundation for the City of Toronto between 2020 and 2021. It reflects on the findings of the Landscape Analysis (finalized in August 2020) and the Material Flow Analysis and Business as Usual Projections (finalized in May 2021) to identify key considerations in transitioning Toronto towards a circular economy.

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1 INTRODUCTION

As centres of human activity, cities are in a prime position to capitalize on the transition towards a circular economy. The City of Toronto has recognized this potential and has initiated work to support the transition towards circularity as a means of achieving its ambitions to become a thriving, healthy, and resilient city. In recent years, the City has taken the lead among Canadian cities in examining how to move away from linear "take-make-dispose" approaches towards a more circular economy. With the goal of becoming the first municipality in Ontario with a circular economy, the City of Toronto is working towards zero waste[1], among other circular economy initiatives (e.g., investment in infrastructure to turn organic waste into renewable natural gas, development of a 'Circular Procurement Implementation Plan and Framework').

Toronto is working toward a circular economy that offers a resilient, inclusive, green and prosperous future for residents and businesses.[2] The City of Toronto cannot move towards a truly Circular Toronto by acting alone. The transition will require all relevant stakeholders to play a role in order to achieve positive social, economic, and environmental impacts for the wider community.

To support Toronto's circular transition, the City of Toronto launched *Baselining for a Circular Toronto*, a research project to study Toronto's current state of circularity and inform future efforts to advance circular economy goals. The research project is one of the first of its kind in Canada and includes three main outputs:

TECHNICAL MEMORANDUM #1: LANDSCAPE ANALYSIS

A Landscape Analysis was completed to understand the existing state of Toronto's socio-economic and policy context as it relates to the circular economy. The analysis was complemented with a household spending analysis and scan of local business and community initiatives already contributing to the circular economy in Toronto. The main results of the Landscape Analysis helped to select three sectors that would be analyzed further to identify where circular interventions would have the most beneficial impacts, in alignment with the City's other strategic priorities.

TECHNICAL MEMORANDUM #2: MATERIAL FLOW ANALYSIS

A Material Flow Analysis (MFA) was conducted to provide a quantitative assessment and visualization of the current state of circularity in three sectors: Waste Management, Construction and Food Systems. The purpose of the MFA was to generate system-level estimates of material consumption and waste flows in each of the three sectors, rather than quantifying the overall level of circularity of each sector. The MFA was then complemented by a Business as Usual (BAU) Analysis to anticipate what material consumption and waste generation patterns might look like in 10 years' time if nothing changes. Visualizing complex data has helped to build a shared understanding of the resource flows of the three sectors in Toronto and provided an evidence base to further reflect on some of the key challenges and barriers in moving towards a more circular economy, while identifying opportunities and existing processes that enable circular flows.

TECHNICAL MEMORANDUM #3: FINAL REPORT

Building on the current state analyses, the present document outlines the final output of the project *Baselining for a Circular Toronto*, a report that identifies key considerations in transitioning Toronto towards a circular economy. This document is a forward-looking report that begins to define what a vision for a Circular Toronto could look like, identifies a range of circular goals and stakeholders that could help achieve those goals, and provides some examples of indicators that could help monitor progress towards circular goals.

The establishment of a shared, concrete vision for a Circular Toronto and identification of firm circular economy targets, performance measures, and partnership opportunities will be agreed upon through the development of the Circular Economy Road Map.[3]

1 INTRODUCTION

The structure of this report is informed by the Results-Based Accountability (RBA)[4] step-by-step process to decision-making. The RBA framework was adopted as a new performance measurement tool by the City of Toronto in 2019.[5] The framework focuses both on **population accountability** (i.e., community impact and the conditions of well-being for all) and on **performance accountability** (i.e., well-being of customer or client populations for programs or services) (Figure 1). The RBA framework is an "ends-before-means" approach that provides a structured way of thinking and taking action. It can be used by communities to focus on results and outcomes that have a positive impact on the lives of individuals and of the community as a whole, and by organizations to improve the effectiveness of their programs.

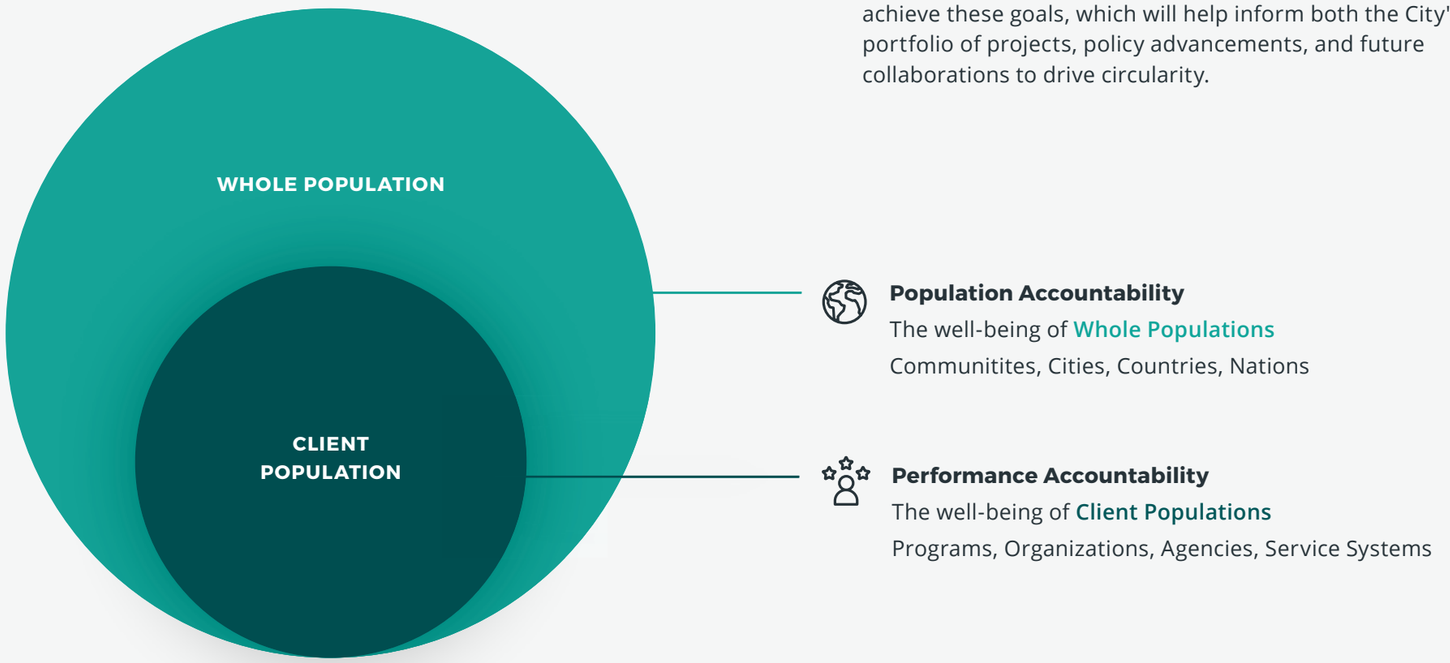


Figure 1. RBA Framework. Retrieved from: Clear Impact

Baselining for a Circular Toronto is the first research step to establish a foundation for future circular economy strategy and policy framework for the municipal government. The study has also shown that the circular economy interventions needed to achieve positive environmental, social and economic outcomes often involve actions beyond the direct scope of influence of municipal governments. A Circular Toronto cannot be achieved by the City of Toronto alone.

Within this context, the RBA framework and its "ends-before-means" approach offers a useful strategic planning tool to begin to understand and work toward a Circular Toronto. RBA helps to:

- Identify the results (goals) that future circular economy programs could be designed to achieve or contribute to; and,
- Identify the types of partnerships that are necessary to achieve these goals, which will help inform both the City's portfolio of projects, policy advancements, and future collaborations to drive circularity.

The goal of this report is to identify areas of focus that would help Toronto to transition towards a more circular economy and to communicate to the broader community what a Circular Toronto could look like in the future. The report is structured around four main questions:

1. **What do we want to achieve?** Propose visions and definitions of a future Circular Toronto.
2. **How are we doing?** Summarize the current state of circularity in three key sectors in Toronto.
3. **What might we be able to change?** Identify a range of circular goals and indicators that could be explored in future work to measure progress towards those goals.
4. **What could we do next?** Identify high-level next steps that could be taken by the City of Toronto and and identify possible partners to advance circularity in Toronto.

2

A VISION FOR A CIRCULAR TORONTO

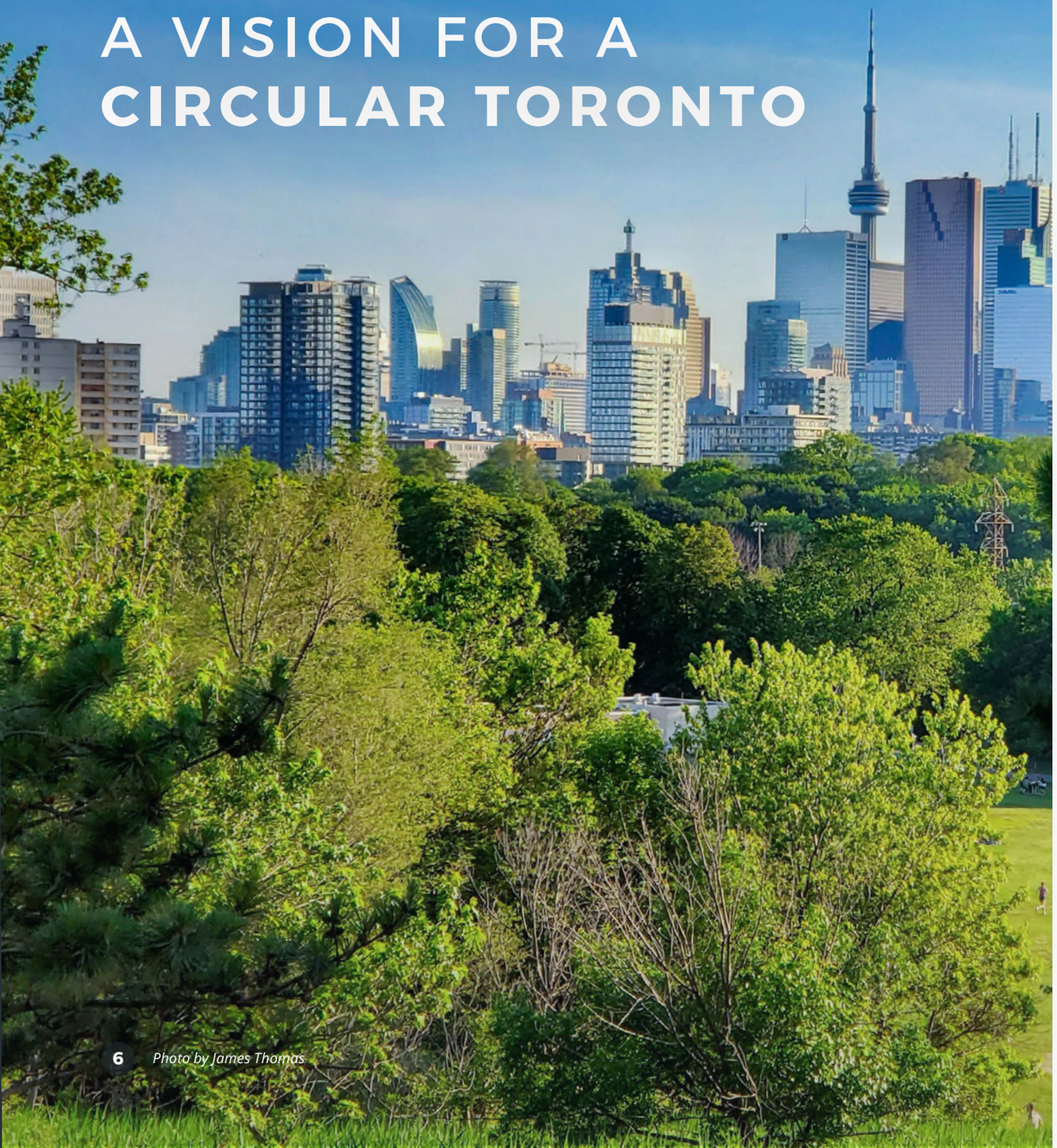


Photo by James Thomas

The first question to answer is what do we want to achieve? What is the end goal? The aspiration of the City of Toronto is to become a circular city, a Circular Toronto. For a long time, the economy has been 'linear'. The linear economy is driving overconsumption and mismanagement of natural resources. To ensure that in the future Torontonians will thrive within planetary boundaries, through a fair transition in harmony with nature and the resources that it provides us with, our economy must become 'circular'. The circular economy is an industrial system that is regenerative and restorative by design and aims at decoupling growth and resource needs.

In an effort to define a common language for the circular economy, Circle Economy has developed a conceptual framework of eight key elements that can be applied at different intervention levels (for example, national, regional, sector, business, product, process, or material) towards a circular economy. The Key Elements Framework (KE) consists of three **core elements** and five **enabling elements**. Core elements deal directly with physical flows and align with other common frameworks related to the circular economy. Enabling elements deal with creating the conditions of removing barriers for a circular transition.

As highlighted by the KE framework (see next page), the unique role and added value of the circular economy is about closing material cycles, preventing resources from becoming waste and decreasing resource depletion through sustainable production and consumption. In turn, this can also improve economic performance and profitability and contribute to greater prosperity, while improving resilience of City services and infrastructure.[6] However, the circular economy is not only about improving resource efficiency and eliminating waste, but also about supporting federal, provincial and municipal governments to improve the health and wellbeing of communities, achieve climate neutrality, protect and enhance biodiversity, and promote social justice, in line with the United Nations' Sustainable Development Goals (SDGs).[7]

2 A VISION FOR A CIRCULAR TORONTO

Cities like Toronto rely on the land, biodiversity and resource stocks of their surrounding geography, as well as national and global sources, to meet their demand for energy and materials and to accommodate waste streams. The way cities develop has a direct impact on the health of ecosystems and the distribution of their beneficial services to different groups in society.[8] Transitioning to a circular economy ensures that all infrastructure and production-consumption systems positively contribute to local resource and nutrient cycles and respect ecosystems' regeneration rates.[9] In addition, a circular economy can significantly contribute to the reduction of global greenhouse gas (GHG) emissions and mitigate the effects of climate change, being closely linked to material use.[10] Finally, a circular economy provides opportunities to foster new and better jobs and promote decent work and livelihoods.[11] For these reasons, the circular economy can be a viable tool to achieve economic, social and environmental benefits.

Cities lie at the forefront of the circular economy transition. Although they only occupy 3% of the earth's surface, they are the consumption centres of the world's resources and hotspots of global GHG emissions.[12] However, they also hold the key to curbing the overconsumption and waste generation trends through the circular economy and realizing a just and safe space for society within the planetary boundaries. A circular city is one that promotes the transition from a linear to a circular economy in an integrated way across the urban space in collaboration with its people, businesses and the research community.[13]

So what will the implementation of circular economy principles look like in Toronto?

THE KEY ELEMENTS OF THE CIRCULAR ECONOMY

CORE ELEMENTS

Prioritize Regenerative Resources: Ensure renewable, reusable, non-toxic resources are utilized as materials and energy in an efficient way.

Stretch the Lifetime: While resources are in-use, maintain, repair and upgrade them to maximize their lifetime and give them a second life through take back strategies when applicable.

Use Waste as a Resource: Utilize waste streams as a source of secondary resources and recover waste for reuse and recycling.

ENABLING ELEMENTS

Design For the Future: Adopt a systemic perspective during the design process, to employ the right materials for appropriate lifetime and extended future use.

Rethink the Business Model: Consider opportunities to create greater value and align incentives through business models that build on the interaction between products and services.

Incorporate Digital Technology: Track and optimize resource use and strengthen connections between supply-chain actors through digital, online platforms and technologies.

Team Up to Create Joint Value: Work together throughout the supply chain, internally within organizations and with the public sector to increase transparency and create shared value.

Sustain & Preserve What's Already There: Maintain, repair and upgrade resources in use to maximize their lifetime and give them a second life through take-back strategies, where applicable.

A Circular Toronto could include:

More efficient resource management systems: Through its Integrated Waste Management System, the City of Toronto is able to divert 53% of the residential waste it collects from landfill. However, much of non-residential waste (83%) served by private waste management services is lost and not recovered.[14] The circular economy offers a new way of thinking about resources by which waste, or by-products, of an industry or commercial establishments, become input materials for another. Efficient resource management involves not only the systems to manage household and consumer goods, but also the material needs of our wider economy. Vehicles and infrastructure, from roads to streetlights, are operated and maintained so that materials, energy, and water are used effectively and can be reused and recycled. Buildings are refurbished, improving how they are used and operated.[15] By-products and production waste are recycled and used as new inputs in industries.

Transformative design for the built environment: Houses and other buildings are designed to be long-lasting, adaptable, modular (i.e., can be easily disassembled and repurposed), and simple to maintain and repurpose. The construction sector has a significant environmental impact in Toronto in terms of resource extraction, energy and water use, as well as GHG emissions and waste generation.[16] Based on the results of this research project, Toronto's construction sector is estimated to use more than 17 million tonnes of materials each year, generate 366,300 tonnes of Construction and Demolition (C&D) waste, and emit 399,200 tonnes of GHG emissions during operations alone.[17] New design principles can reduce environmental harm by allowing for the reconfiguration of buildings as needs change; by using products and parts created on-demand and on-site, transforming construction methods and storage needs; by prioritizing non-toxic, locally sourced, recycled materials that can be repurposed or recovered through environmentally friendly disposal processes.

Regenerative urban food system: In Toronto, food is a key element of household expenditure and GHG emissions.[18] In a circular economy, food production relies on regenerative techniques that protect and restore natural ecosystems, while preserving air and water quality. Food surplus is rescued and redistributed, contributing to food waste reduction and to equity and positive social outcomes. Organic resources such as food waste are returned to the soil in the form of organic fertilizer, avoiding emissions of organic matter decomposition in landfills, while other by-products can provide additional value to other industries or be used as a source of bioenergy. These cycles regenerate soil, provide renewable resources, and support biodiversity.[19] Regenerative activities can be designed for local impact as well as provincial and federal impact.

A social circular economy: Circular economy principles can inspire people to rethink, redesign and pursue a positive future. Shifting towards locally managed, decentralized, regenerative and circular production can spur innovation, adoption of new technology (i.e., digital material banks, sharing platforms), local ingenuity, skills and jobs. Through sharing rather than owning, or through product-as-a-service contracts, people are able to connect to their neighbours and communities and actively participate in the economy, while shifting their consumer perception and consumption culture.[20] The sharing and repair economy gives jobs more flexibility and freedom and results in fewer barriers in accessing ownership and deriving equity benefits. In Toronto, numerous local business and citizen initiatives, organized in different ways at different scales, are actively engaging with the circular economy in an attempt to build low-carbon neighbourhoods and address issues of resource efficiency, waste reduction, and sustainable production and consumption. There is momentum to design a Circular Toronto in which local solutions meet societal, environmental and economic needs.

An enabling environment for emissions reduction: Community-wide GHG emissions in Toronto were 16.2 megatonnes of C02equivalents in 2018. The City is likely going to exceed its 2020 target of a 30% reduction in GHG emissions.[21] Combining the complementary agendas of circular economy and climate action can pave the way for the systemic transformations needed to mitigate the negative impacts of climate change and meet climate targets. The *Circularity Gap Report 2021* revealed that by roughly doubling the global circularity metric[22] by 2032 global emissions reduction could be sufficient to stay under a +2-degree global warming.[23]

A circular City of Toronto leading the way: Toronto's municipal government can engage, incentivize, manage, and set a regulatory framework that enables the right conditions to move towards a Circular Toronto. The City of Toronto is already responsible for providing solid waste services to the majority of Torontonians and some private sector customers and has the potential to build on existing efforts and further design a system that designs out waste and pollution. Through municipal-level policies, the City can design incentives for materials to be kept in use and maintain their value and encourage a more circular resource management across all economic sectors. Through circular public procurement, the City of Toronto can lead by example within the municipality's spheres of influence and educate the community to reduce the City's ecological footprint through circular economy principles.

2 A VISION FOR A CIRCULAR TORONTO

The application of circular principles to the scale of the city can help it to become more accessible, livable, and resilient. Through improved management of materials, circularity can help to prevent some of the adverse effects of economic activities on our environment and socio-economic structures (including unequal distribution of prosperity and access to basic needs and opportunities). Aspiring to circular principles helps build a city's economic and social capital in a way that respects planetary boundaries. In other words, circularity represents a means to an end.

In designing efforts to transition to a circular economy, Toronto represents a unique confluence of communities and cultures with knowledge, lived experiences and a richness of worldviews that can help break long standing cycles of unsustainable practices; practices that have exacerbated inequalities, injustices and local-to-global environmental impacts. As informed by oral tradition and knowledge, Indigenous practices and worldview informed how societies existed in regenerative and interdependent relationship with nature.[24] Transitioning to a circular economy presents an opportunity for the City of Toronto to engage meaningfully with Indigenous Peoples (as Rights Holders) as well as equity deserving communities to co-create equitable solutions and innovations that recognize lived experiences and knowledge, and address historical and systemic injustices. By ensuring a participatory process of innovation and engagement, the City of Toronto can remove decision-making and participation barriers to promote an inclusive pathway for a circular, just and equitable Toronto.

The project *Baselining for a Circular Toronto* was the first attempt for the City of Toronto to understand how circular economy principles can be applied at city-level and start envisioning what it will mean to transition to a circular economy. The vision outlined here will need to be refined and agreed upon by a broad range of stakeholders—from internal City staff to private sector and community actors—through the development of the Circular Economy Road Map.

Photo by Sandro Schuh

3

CURRENT STATE OF **CIRCULARITY IN TORONTO**

Photo by Jorge Vasconez

This section aims to answer the question: how are we doing? What is the current circular state in Toronto? *Baselining for a Circular Toronto* has answered these questions through both a Landscape Analysis and a Material Flow Analysis (MFA) of three key sectors in Toronto—Waste Management, Construction and Food Systems. Through these analyses, several factors were identified that provide a strong foundation for a circular transition in Toronto, including:

- **Municipal ambition:** The City of Toronto has embraced circular principles in much of its work, including several ambitious waste management targets found in the Long Term Waste Management Strategy[25] and TransformTO, the City's climate action strategy.[26] As part of the Long Term Waste Management Strategy, Toronto City Council adopted the aspirational goals to work toward a zero waste future and a circular economy. This stands as a strong signal of ambition to both residents and businesses and creates a strong enabling environment in the city for circularity.[27]
- **Community and business leadership:** The amount of community- and business-led circular initiatives in Toronto indicate that there is a good level of awareness among the civil society around key circular economy issues. Business-led initiatives in different sectors complement community engagement in the circular economy and indicate that there is a receptive local market for circular economy solutions. Individuals also appear to be adopting circular and/or zero waste lifestyles and sustainability culture.[28] Finally, the City of Toronto operates one of the most progressive diversion programs in North America. The success of the City's program is due in large part to resident engagement, participation, and investment.

- **Digitalization:** At the community level, Toronto is undertaking work to modernize the delivery of public services to residents, and aims to become a smart city, where easy access to the information and data helps to build an economically, socially and environmentally connected community.[29] At industry level, digital tools and connectivity can enable a circular ecosystem by matching supply and demand of waste materials and coordinating between warehousing and material processing activities that lie outside of the city. Additionally, using advanced data analytics can help track material flows and identify where opportunities lie to close material cycles. Toronto's Information Technology (IT) sector is growing and is already being leveraged to facilitate resource sharing and waste minimization through a variety of initiatives in other sectors (e.g., online resource trading platforms and apps like the Bunz App).[30] This shows that there are opportunities to leverage digitalization to scale up circular business and move towards a more circular economy.
- **Information and financial services sector:** This sector is one of the biggest contributors to Toronto's GDP. It is a crucial asset for the City and for the whole province and country. This sector also operates beyond city's boundaries, in enabling and accelerating the transition, as it could provide financial services to people and corporations, financing and contracting circular models across multiple sectors.[31] In Toronto, the high degree of specialization in this sector, coupled with its expected growth rate in the future, should be considered where possible in steps to formulate circular economy strategies and plans.[32]
- **Real estate sector:** The Real Estate sector was not represented in the Material Flow Analysis because it is less relevant in terms of material consumption and waste generation. Resource consumption in the Real Estate sector is mainly related to utilities rather than finite raw materials, which are utilized in the Construction sector. That said, it could be a key enabler for circular economy solutions in the Construction sector as a whole. This sector can enable the large-scale implementation of new business models that accelerate the shift to a circular built environment by promoting the added value of new models to key stakeholders and developing new tools and incentives to reward investors for making decisions that lengthen the lifespan of buildings.[33]

While these elements can contribute toward a supportive environment for a Circular Toronto, the results of the project *Baselining for a Circular Toronto* have highlighted that barriers to circularity exist in Toronto. In consultation with key stakeholders, a Material Flow Analysis was conducted on three key sectors to help identify key challenges that are preventing each sector from becoming circular:

WASTE MANAGEMENT

CONSTRUCTION

FOOD SYSTEM

KEY TAKE-AWAYS FOR THE THREE SELECTED SECTORS:

- For the first time, the amount of material moving through three key sectors each year has been visualized, providing evidence of the substantial impact that Toronto's economy is currently having on the environment.
- The City of Toronto's Integrated Waste Management System is responsible for managing less than 50% of waste produced in the economy, indicating that new ways of collaborating around waste reduction goals will be necessary to achieve shared ambitions.
- Based on expected GDP and population growth in Toronto, the amount of material consumption and waste generation is expected to continue to increase in each key sector if no action is taken.
- Data gaps and limitations are a barrier to generating a comprehensive understanding of material and waste systems in Toronto and could be potential key areas for focus in future work and partnerships.

3.1 WASTE MANAGEMENT

Waste management is at the centre of many of the City of Toronto's circularity efforts, with a focus on achieving an aspirational goal of zero waste. The results of the Material Flow Analysis (visualized on the next two pages) showed that the Toronto economy generates over 2.1 million tonnes of waste each year, of which about 40% comes from residential sources, 41% from Institutional Commercial & Industrial (IC&I) sources, and almost 18% from Construction and Demolition (C&D) activities.[34] Solid waste generated in the city is also a significant contributor to GHG emissions, mostly attributable to emissions of methane and other gases from decomposing waste in landfills.[35] The bulk of waste disposed of in landfills is generated by Industrial, Commercial and Institutional (IC&I) and Construction and Demolition (C&D) activities, which is typically collected by private sector contractors, and is much more likely to end up in landfills than is the case with residential waste, which is largely collected and managed by the City of Toronto. Using a simple Business As Usual (BAU) calculation, by 2030, the Toronto economy might generate over 2.5 million tonnes of waste material from residential and non-residential sources per year, if no further waste reduction takes place.[36]

Three main challenges were identified for this sector to become more circular.

CHALLENGE #1: Jurisdictional and regulatory limitations and data gaps

Through its Integrated Waste Management System, the City of Toronto is able to achieve considerable diversion outcomes, but similar diversion opportunities are not consistently available to waste generators (commercial and residential) that do not receive City service. In addition, while the City of Toronto monitors and tracks the residential and non-residential waste it collects, private waste haulers are not required to share information with the City of Toronto nor adhere to the City's waste-related bylaws. Achieving compliance with Provincial regulations aimed at increasing diversion of residential, IC&I and C&D waste from disposal has so far been a challenge for waste management services.

This results in very limited data available on how and where privately handled waste (both residential and non-residential), is processed and disposed of. This means that the City of Toronto does not have a reliable means to collect data and monitor waste streams managed by other actors, making it difficult to design policy or program interventions. This represents a risk for achieving the aspirational goal of zero waste in Toronto and may lead to less circular waste management outcomes in parts of the economy that are not served by the City's Integrated Waste Management System.

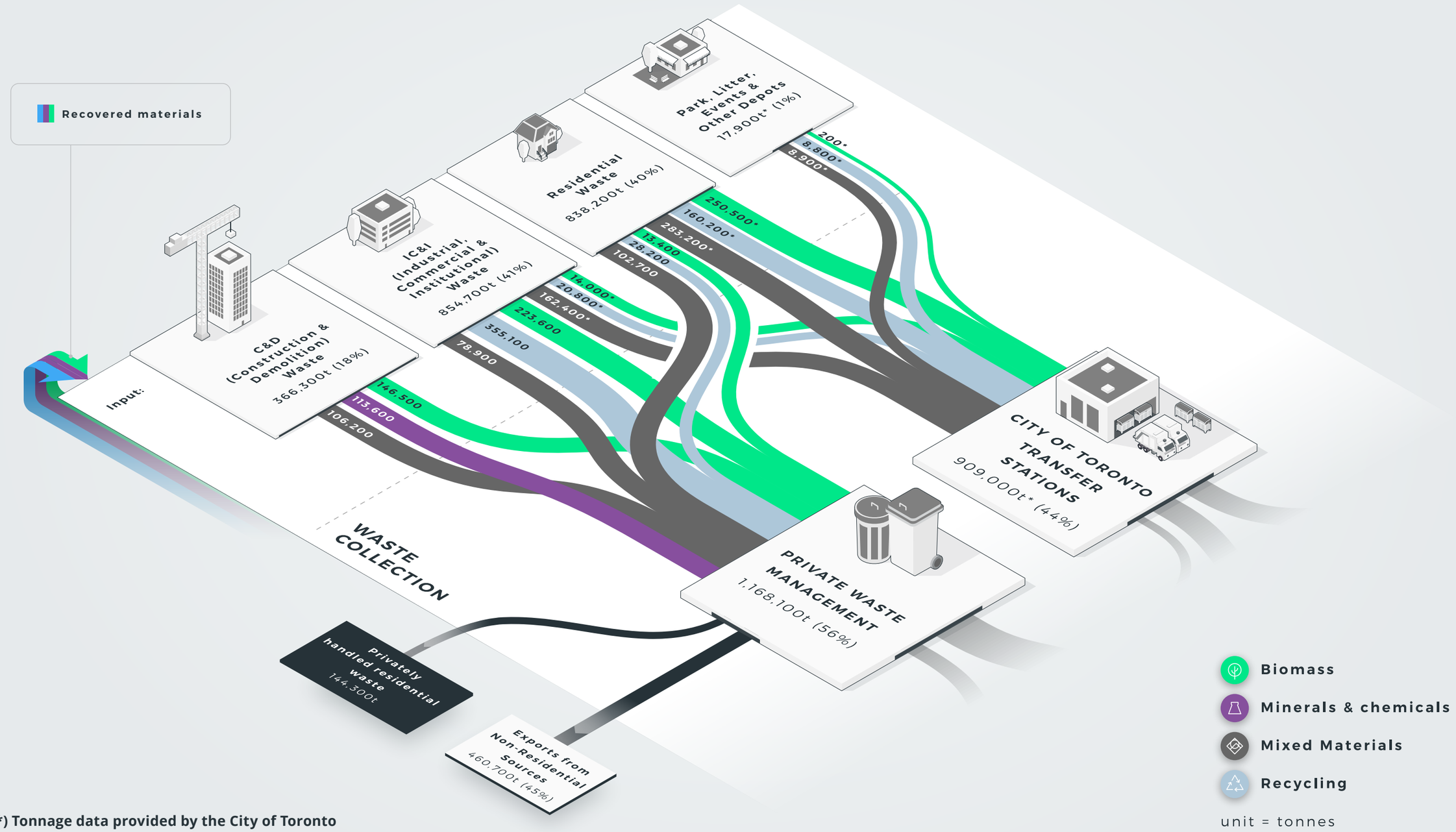
CHALLENGE #2: Changes in recycling waste streams, end markets, consumer products and packaging, and the policy landscape

Increasing contamination of recyclables negatively affects waste diversion rates, as well as long-term stability of end markets. Recycling processors do not accept contaminated materials and foreign waste importers are increasing quality standards and restrictions on the acceptance of recyclables.[37] These issues, together with the changing nature of packaging products (i.e., growing market share of compostable bioplastics), create uncertainty around how best to divert recycling waste streams. Furthermore, the regulatory context for these materials is changing both at provincial and federal levels. The current context of uncertainty and change poses challenges for municipalities in waste management planning for enhanced diversion in their systems.

CHALLENGE #3: Opportunities and constraints for enhanced material recovery

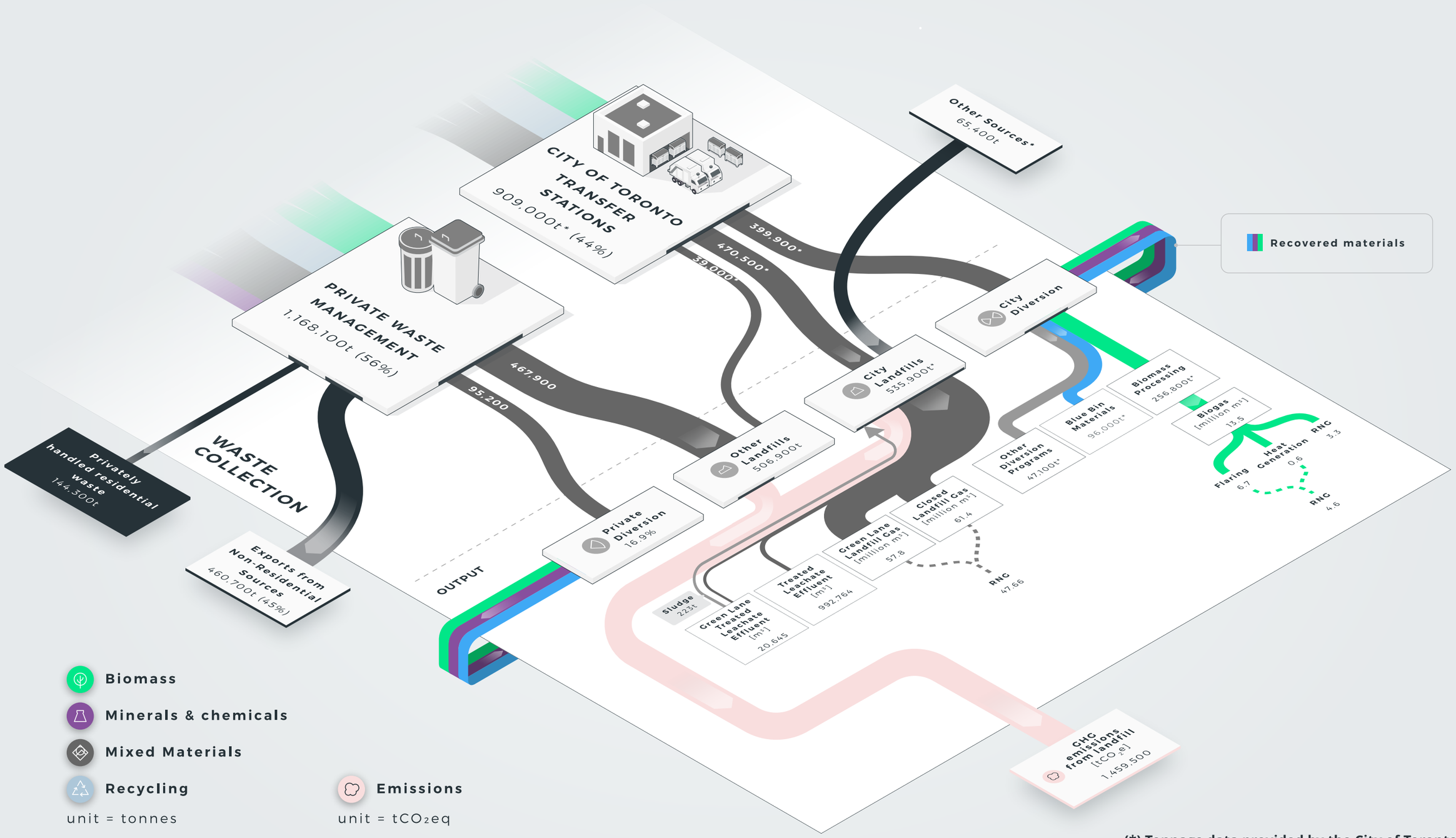
The circular economy often implies the recovery of a much broader and more ambitious range of materials than is traditionally considered divertible in or as part of municipal residential waste systems. Several materials in this range are not currently collected or diverted by the City of Toronto nor are included in any stewardship programs in Ontario (i.e., textiles, rubber, leather and wood). Despite numerous examples of successful diversion programs in other jurisdictions, the potential for these waste streams to be recovered in the context of Toronto will require market and infrastructure development that may currently be lacking at the local level. For other materials, like organics and food waste, the limited processing capacity in Ontario considerably inhibits diversion in both public and private sectors. Despite these barriers, opportunities exist to increase diversion of organic waste and increase organic processing capacity in order to support more circular and regenerative outcomes, as well as to design an ecosystem of reuse, repair and donation for those materials that do not currently have stable recycling markets.

3 CURRENT STATE OF CIRCULARITY IN TORONTO
WASTE MANAGEMENT SECTOR MATERIAL FLOW ANALYSIS



(*) Tonnage data provided by the City of Toronto

3 CURRENT STATE OF CIRCULARITY IN TORONTO
WASTE MANAGEMENT SECTOR MATERIAL FLOW ANALYSIS



(*) Tonnage data provided by the City of Toronto

3.2 CONSTRUCTION

The construction sector is highly resource-intensive. The results of the Material Flow Analysis (visualized on the next page) estimate that Toronto's Construction Sector consumes 17 million tonnes of material per year.[38] These material flows add to the resource stocks in the built environment that remain in the city for decades (or even centuries). Waste from the sector is estimated to be 366,300 tonnes per year, of which only 12% is diverted from landfill.[39] Construction and demolition of buildings also has a significant impact on emissions at approximately 399,200 tonnes of GHG emissions during operations. Given the high level of construction activity in Toronto, material consumption and waste generation are expected to increase to 18 million tonnes per year and 394,700 tonnes per year, respectively, by 2030.[40] Existing efforts such as various municipal-level policies (i.e., the Toronto Green Standard, Green Building Certifications, etc.) and community- and business-led initiatives focusing on designing for resilience, modularity, and adaptability could be the starting point to encourage more circular resource management in this sector. Still, major challenges persist.

CHALLENGE #1: Lack of detailed data on construction materials

The lack of detailed data on material consumption, resource stocks, and waste represents a significant barrier to achieving a circular economy in Toronto, as it makes policy and program interventions difficult to design. Additional data challenges relate to the complex methodology to develop an estimate of embodied energy profiles for buildings. Such an estimate could help to identify which carbon-intensive construction materials should be replaced, like concrete and steel, in order to reduce the embodied energy of buildings.

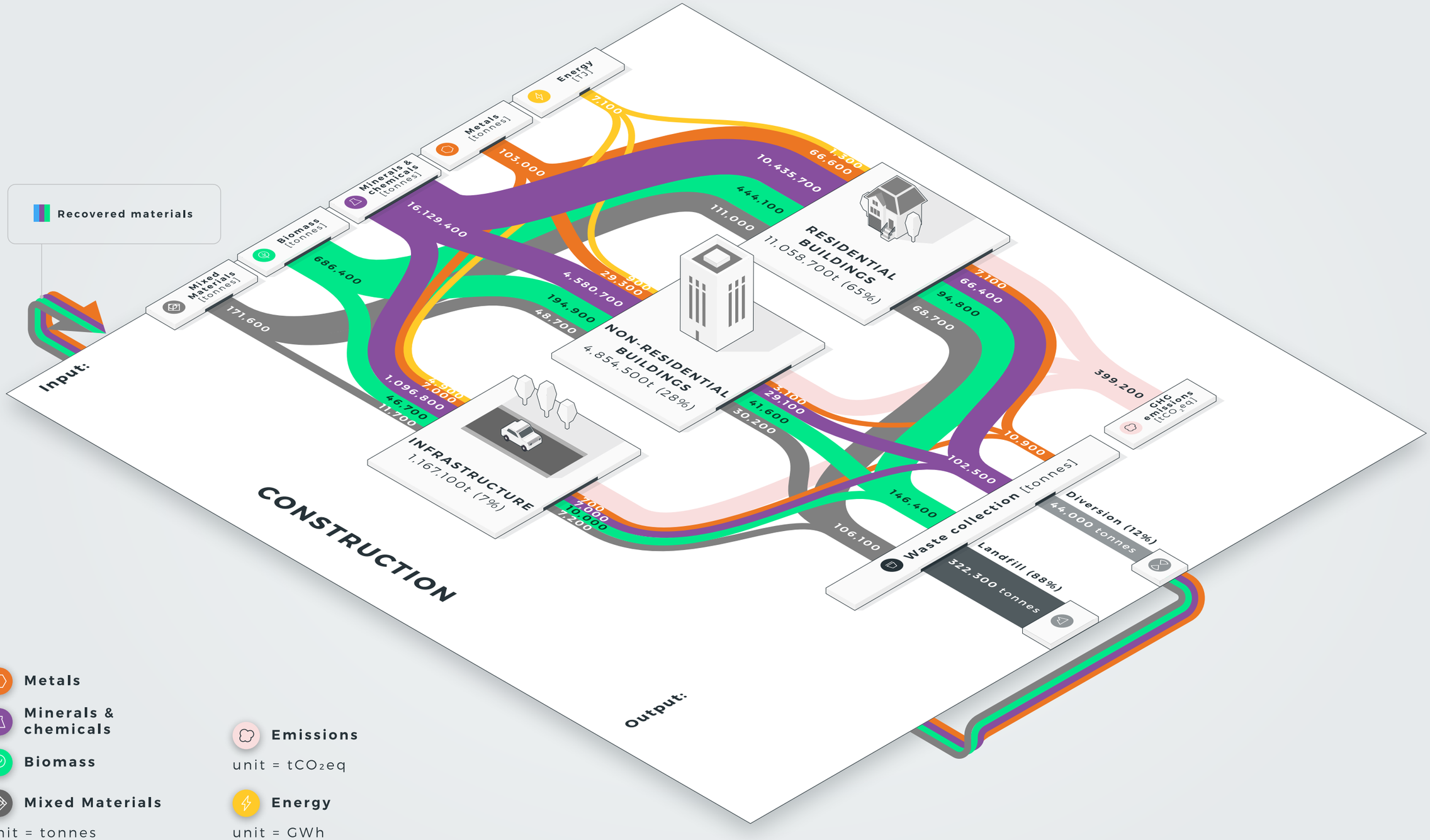
CHALLENGE #2: Low diversion rates for construction and demolition waste materials

The construction sector, where data does exist, in Toronto shows very low diversion rates. The City of Toronto diverts limited quantities of C&D materials (such as drywall, metal and porcelain) primarily from residential renovations. Expanding City waste management services to this sector would require substantial political and public discussion and various technical and financial feasibility studies. Thus, collaborating and aligning with other levels of government, the private C&D sector, and local haulers that handle this type of waste is crucial to support efforts to increase C&D diversion and recycling. Moreover, while some materials like aggregates and excess soil are more complex to divert, attention could be directed to support and improve available processing technologies for other materials like cardboard, metals, and clean wood.

CHALLENGE #3: Lack of systems to upscale the diversion of construction and demolition waste

In the past, the City of Toronto has faced challenges in implementing new diversion programs for C&D materials because appropriate and stable secondary markets to make diversion programs financially viable often do not exist.[41] Another challenge to increasing C&D waste division is the fact that private sector initiatives to construct and operate C&D recycling facilities in the Greater Toronto Area (GTA) have failed due to economics, as landfill disposal remains the most affordable option.[42] Established end-markets and effective data management and material separation at source are required to enable increased diversion, along with further consideration of regulatory and financial incentives to make circular business models economically viable.

3 CURRENT STATE OF CIRCULARITY IN TORONTO
CONSTRUCTION SECTOR MATERIAL FLOW ANALYSIS



3.3 FOOD SYSTEM

The results of the Material Flow Analysis (visualized on the next two pages) estimate that over 2 million tonnes of food are available for consumption in the Toronto economy each year. Data on how this food flows within Toronto is hard to obtain, as are city-level estimates of food waste generation in processing, manufacturing, distribution, retail and service. Major data gaps persist, therefore modelling estimates rely on subject matter expertise and comparable jurisdictions and trends. For example, this study modeled the total food waste generated by the Toronto economy by consulting with various food system experts, and by relying on the assumption that approximately 30% of food produced in Canada is wasted (an estimate that is used in other, comparable nations).[43] Focusing on the sustainable transformation of the local food system is a priority for many cities, given the high environmental and social impacts associated with food—from its carbon footprint, to the high rate of food waste, and increasing pressure on land. Individual behaviour can play a key role in addressing many of these impacts. Various community and business initiatives already address the topic of food in Toronto, and organic waste streams are the focus of many policy and strategy efforts, in line with the C40 Good Food Cities Declaration signed by the City of Toronto in 2019.[44] The following are the main obstacles to reaching the circular potential of food-related activities.

CHALLENGE #1: Embodied emissions and ecological footprint of food

Lack of awareness and knowledge about the ecological footprint of different food products prevents individuals from making informed decisions on how to change diets to be more sustainable.[45] Residents may also experience disproportionate access to low-impact foods based on where they live and their food environment (e.g., accessibility and affordability of healthy and sustainable foods). Addressing the embodied impacts of food may help decrease negative environmental impacts stemming from farming to food production, processing, transportation and waste, and increasingly shift diets away from high-impact food products towards more organic and locally grown food, which in turn can support the local and regional economy.

CHALLENGE #2: Food rescue and redistribution

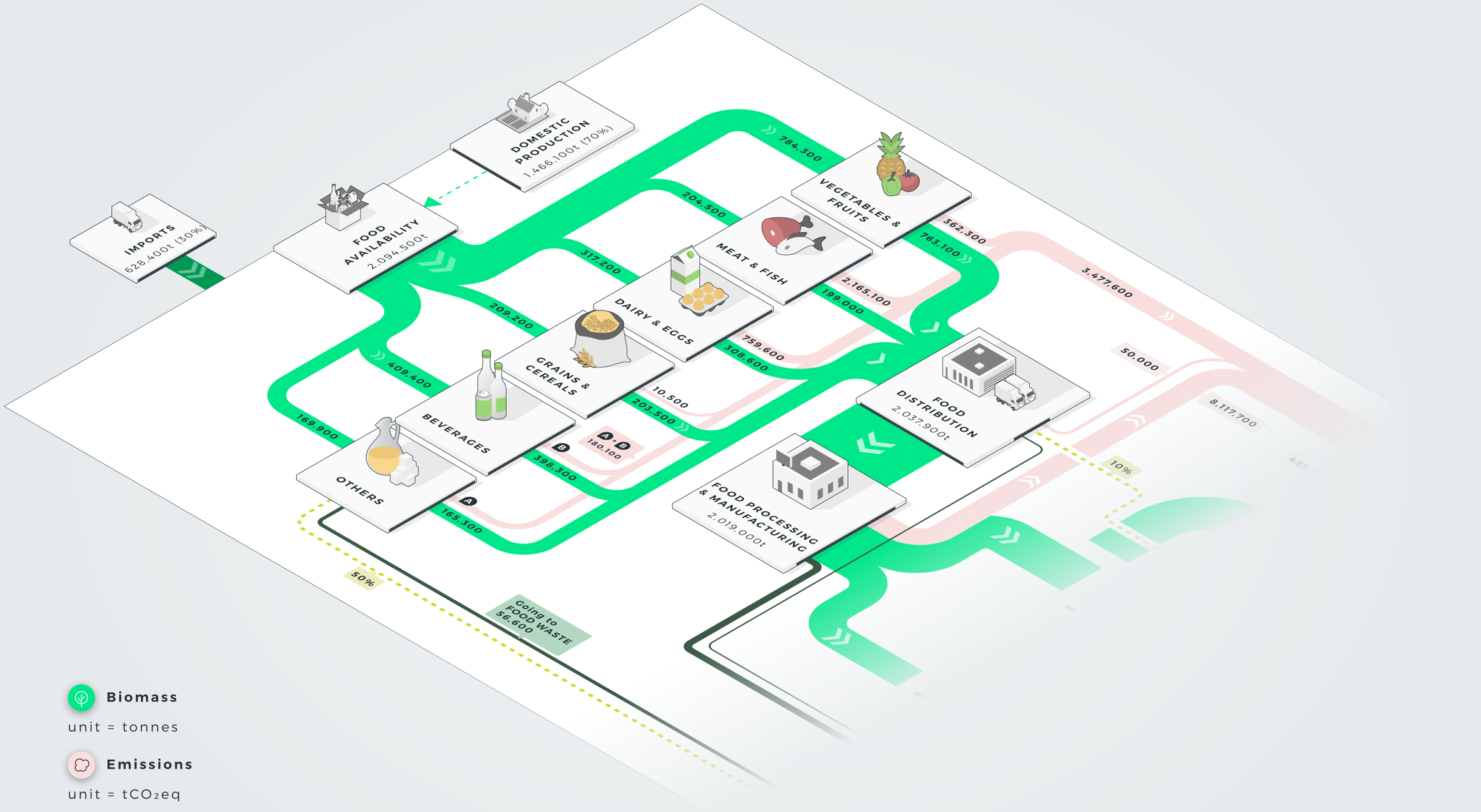
Lack of communication and coordination across the value chain impedes the upscaling of food rescue and redistribution. Increasing food rescue and redistribution efforts at production, processing and distribution phase has the potential to decrease food waste generation, avoid food waste, while providing high-quality food for the whole community and preventing social inequalities.

CHALLENGE #3: Food waste and value loss through the food value chain

Currently, only a very small share of the overall food waste in Toronto is avoided or directly managed and distributed to high-value applications for new product development. The City of Toronto successfully handles food waste via its Green Bin Program, which uses anaerobic digestion to turn organic material into compost and will soon capture the methane to use as a renewable energy. The Green Bin is widely used by single family and multi-residential households served by the City of Toronto, but most residents and IC&I establishments served by private haulers are not separating organic waste. Overall, food waste still represents 30% of all waste in landfills in Canada.[46]

In order to understand how to move toward a Circular Toronto, it is important to understand what is not circular about Toronto's economy today. The project *Baselining for a Circular Toronto* has shed light on the most important pressing obstacles to cultivate circularity within three key sectors in Toronto. Based on the challenges highlighted above, the next section will focus on how to move from the current state to a more circular system that achieves positive outcomes for the City of Toronto, residents, and businesses.

3 CURRENT STATE OF CIRCULARITY IN TORONTO
FOOD SYSTEM MATERIAL FLOW ANALYSIS



Biomass

unit = tonnes

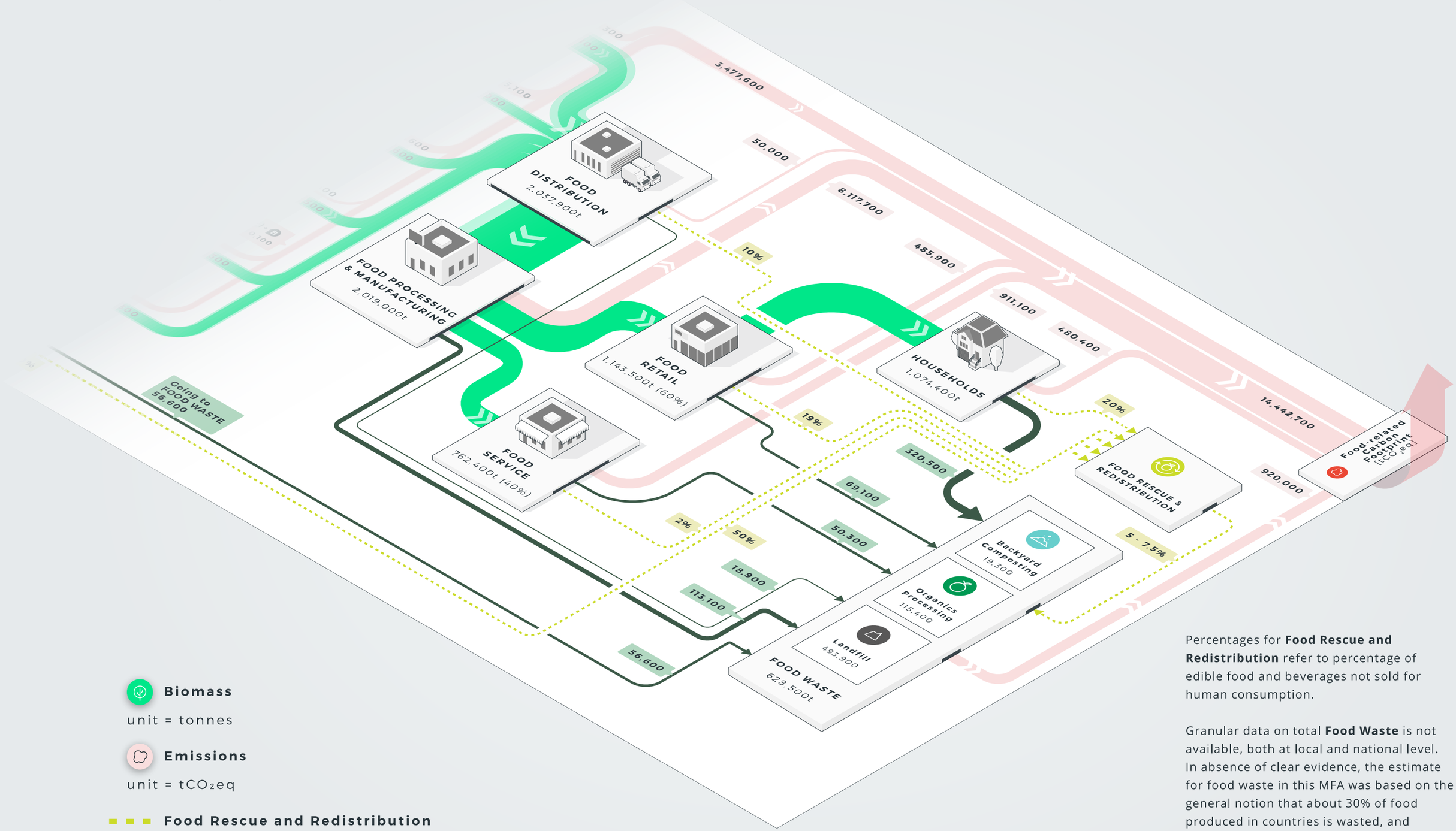
Emissions

unit = tCO_2eq

Food Rescue and Redistribution

unit = %

3 CURRENT STATE OF CIRCULARITY IN TORONTO
FOOD SYSTEM MATERIAL FLOW ANALYSIS



Biomass

unit = tonnes

Emissions

unit = tCO_2eq

Food Rescue and Redistribution

unit = %

Percentages for **Food Rescue and Redistribution** refer to percentage of edible food and beverages not sold for human consumption.

Granular data on total **Food Waste** is not available, both at local and national level. In absence of clear evidence, the estimate for food waste in this MFA was based on the general notion that about 30% of food produced in countries is wasted, and validated in consultation with experts and various stakeholders.

4

PROPOSED GOALS FOR A CIRCULAR TORONTO

 Photo by Juan Rojas

So, what might we be able to change to move towards a more Circular Toronto? To identify the circular pathways that can bridge the gap between the current circular state and the future circular state for a Circular Toronto, it is crucial to identify goals and develop a matching set of indicators that could be used to help measure progress towards those goals.

For each of the three key sectors assessed in *Baselining for a Circular Toronto*, a range of possible circular goals and associated indicators have been defined that could guide the transition towards a more circular state. Moreover, to reflect the cross-cutting nature of the circular economy, a few community-wide circular goals and associated indicators are also outlined to advance the circular economy across Toronto and throughout its communities. Since the potential benefits of shifting to a circular city extend beyond the economy and into the natural environment, and to highlight the potential contribution to achieving global climate and sustainability targets, each circular goal is linked to Sustainable Development Goals (SDGs)—Global Goals adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The proposed goals do not refer to actions that could be taken by the City of Toronto only, but extend to community wide goals that will require contributions from multiple stakeholders.

The following circular goals have been created using the insights obtained through *Baselining for a Circular Toronto*, through Circle Economy's expertise and experience with circular cities around the world, and through priorities and opportunities outlined by City of Toronto staff[47] during a workshop in January 2021. It should be noted that the following circular goals and associated indicators are not an exhaustive list of all possible goals and indicators for a Circular Toronto, nor are they all meant to be tracked by the City of Toronto in the future. Instead, this section proposes a vision around which stakeholders can align to accelerate Toronto's transition toward circularity. Future City of Toronto efforts to develop a Circular Economy Road Map and policy framework will help to further refine these goals and translate the community-wide opportunity to specific program and policy interventions that the City of Toronto can adopt.

4 PROPOSED GOALS FOR A CIRCULAR TORONTO

The goals presented in this section are modelled around the Results-Based Accountability (RBA) framework and therefore consider both **population accountability** (i.e., accountability for the wellbeing of the whole population) and **performance accountability** (i.e., accountability for the performance of a program, agency or service system). This project focuses on defining what can be achieved at a population (community and economy-wide) scale, and not by the City of Toronto alone. Guiding future programs and interventions will require the contribution of the whole community, including public and private sectors.

For each goal defined, a set of example indicators are presented that could be used to support the continued monitoring of progress towards the goal identified. Additionally, the examples of global best practices outlined here can help Toronto to visualize how each goal could be operationalized by different actors.

The main reference used for the selection of indicators was the OECD Inventory of Circular Economy Indicators published in 2020, which collects 474 circular-economy-related indicators from 29 circular economy studies (8 applied at the national level, 8 at the regional level and 11 at the local level).[48] For each goal, three indicators are selected to track 1) the size of the problem (e.g., total tonnes); 2) what the City is doing and/or 3) what the community is doing. To determine its priority, each indicator is also rated across three criteria following the RBA framework[49]:

- **Communication power:** Does the indicator communicate to a broad range of audiences? Do people understand it?
- **Proxy power:** Does the indicator represent the result (or goal)? Does the indicator bring along the data herd (i.e., does the indicator match the direction/tell the same story as other indicators)?
- **Data power:** Is quality data available on a timely basis for this indicator?

The evaluation of indicators against the RBA criteria is based on expert opinion provided by the project researchers and insights derived from the results of the project *Baselining for a Circular Toronto*, as well as input provided by the Circular Economy and Innovation Unit of the Solid Waste Management Services (SWMS) Division. The list of indicators will evolve as the City of Toronto continues to advance its circular economy portfolio, in particular through the development of the Circular Economy Road Map.

As the circular economy is increasingly endorsed as a way to decouple economic growth from natural resources while minimizing negative environmental impacts, supporting the local economy, lowering material consumption and minimizing waste generation, growing attention has been given to measuring progress towards those goals. However, there is no single indicator that can be used as an exhaustive measure for the circular economy. The inventory of indicators presented in this section represents only a subset of circular economy indicators. It is also important to note that, although indicators exist, it does not mean that data to measure them is readily available. Most of the indicators presented in this section show low to medium data power, meaning that data is either lacking or it would be very costly or time-intensive to gather. Only a few indicators are already monitored by the City of Toronto.

COMMUNITY-WIDE CIRCULAR GOALS

1. Toronto reduces its overall material consumption
2. Toronto is a leader in attracting and supporting businesses that contribute to the circular economy
3. Toronto sustains a robust ecosystem of reuse, repair and donation

CIRCULAR WASTE MANAGEMENT GOALS

1. Toronto minimizes waste generation
2. Toronto stimulates a thriving market for secondary materials
3. Toronto improves the transparency, accessibility and verifiability of waste data throughout the city

CIRCULAR CONSTRUCTION GOALS

1. Toronto develops a future-proof built environment aligned with circular economy principles
2. Toronto increases the quantity and quality of data on C&D materials to recover as many materials embedded in its building stock as possible
3. Toronto promotes high value recycling and material recovery of C&D waste

CIRCULAR FOOD SYSTEM GOALS

1. Toronto promotes healthy and culturally-appropriate food for all, sourced as locally as possible, and as sustainably produced, processed, packaged and distributed as possible
2. Toronto minimizes avoidable food waste through food rescue and redistribution to interested partners and/or residents
3. Toronto promotes food waste avoidance

4. 1 COMMUNITY-WIDE CIRCULAR GOALS

1 Toronto reduces its overall material consumption

Through smart strategies and reduced material consumption, the circular economy has the potential to shrink global GHG emissions by 39% and cut virgin resource use by 28%.[50] Given the high resource intensity of many major sectors in Toronto (e.g., the construction sector), making better use of the resources available and reducing overall material consumption could help to decouple economic growth from environmental degradation and promote sustainable lifestyles.

SDG 12 - Responsible production and consumption

This goal is about doing more and better with less. In doing so, it is not only possible to achieve sustainable economic development, but also to contribute to poverty alleviation and the transition to low-carbon and green economies.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Total annual material consumption per capita (tonnes/capita/year)	High	High	Low	Medium
Number of City of Toronto procurements that include circular principles in the purchasing of goods, services and works (#)	Low	Medium	Medium	Medium
Number of local businesses and charities/ community groups adopting circular economy strategies or business models (#)	High	Low	Medium	Medium

BEST PRACTICE EXAMPLE

Business sector collaboration to reduce material consumption - Amsterdam Circular Strategy 2020-2025

Through the Circular Strategy 2020-2025, the City of Amsterdam encourages businesses to collaborate to reduce material consumption within their supply chains (vertical approach) and sectors (horizontal approach) through a variety of measures, offering support where possible. Following the strategy, a sectoral collaboration was established—the 'Circular Hotels Frontrunner Group', a network of 22 leading hotels that work with the City and their suppliers to find measures to reduce food waste and unnecessary material consumption. For example, they choose to use recycled cotton for their linen, to replace the breakfast buffet with à la carte menus (to reduce overconsumption and food waste) and they use soaps made from used coffee grounds or orange peels in their bathrooms (read more here).[51]

2 Toronto is a leader in attracting and supporting businesses that contribute to the circular economy

Addressing Toronto's resource consumption challenges will require innovations in the way products and services are produced and consumed throughout the economy. Pursuing a more circular economy presents a great opportunity to generate economic value and new employment opportunities.[52] By channeling its advanced Information and Financial Services sector towards supporting the development of circular innovations, Toronto can continue to position itself as a global hotspot of circular innovation. Moreover, by promoting dialogue and fostering partnerships with businesses, the community in Toronto can nurture and encourage local companies to develop innovations to address current circular challenges, while capitalizing on the economic potential of a more circular economy.

SDG 8 - Decent work and economic growth &
SDG 9 - Industry, innovation and infrastructure

Sustained and inclusive economic growth, together with sustainable industrialization, innovation and infrastructure, can drive progress, create decent jobs that will remain relevant in the future and improve living standards for all. In particular, introducing and promoting new technologies, facilitating international trade and enabling the efficient use of resources are key to support these goals.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Percentage of businesses in Toronto that apply circular principles[53] (%)	High	High	Medium	High
Percentage of Toronto's labour force working in the circular economy[54] (%)	High	High	Medium	High
Total amount of investments in circular-economy related Research & Development (R&D) and projects (CAD)	Medium	High	Medium	Medium

BEST PRACTICE EXAMPLE

Vancouver's ambitious Green Economy ecosystem

The City of Vancouver has set ambitions to become the greenest city in the world. As part of Vancouver's ambitious sustainability strategy, Green City 2020 Action Plan, it strives to create an attractive ecosystem for green businesses and boost the city's competitive advantage. Vancouver aims to double the number of green and local food jobs, and double the number of businesses greening their operations, through the provision of funds, assistance programs, and supportive urban policy.[55] As a result of the City's efforts, approximately 23% of Canada's CleanTech companies are located in Vancouver, and the city has witnessed a 35% increase in green jobs since 2010 (read more here).

3 Toronto sustains a robust ecosystem of reuse, repair and donation

As consumers become more aware of the environmental impact of their consumption habits, the concepts of reuse, repair and donation have become increasingly popular. Participating in recycling activities, such as buying, selling, donating, repairing and sharing second-hand items provides a valuable alternative to the purchasing of new items and to the disposing of old ones, significantly reducing and avoiding waste. Residents and businesses are consumers of reuse, repair and donation activities, they are the repairers and donors, and they can share best practices to upscale the impact of these initiatives. Their participation is therefore crucial. As part of the implementation of the Long Term Waste Management Strategy and to support the Toronto Strong Neighbourhoods Strategy, the City of Toronto aims to support a robust ecosystem of reuse, repair and donation in the community. To this end, the City has created Community Reduce & Reuse Programs, which help to build sustainable communities and reduce the amount of waste going to landfill by: educating residents about the importance of waste reduction and reuse; providing opportunities for sharing and repairing; offering skills training and creating job and economic opportunities; and, creating spaces for community members to gather.[56] Through supporting reuse, repair and donation activities the City of Toronto believes it can create a resilient environment for communities to thrive whilst reducing the amount of waste going to landfill and discouraging the unnecessary production of new goods, therefore limiting the negative impact the city has on the environment. Resources like tool libraries and repair hubs are also a way to make products more accessible and reduce inequality. Tracking where these initiatives are located within the city can help identify opportunities to enhance social prosperity by supporting the equitable distribution of civic resources in all neighbourhoods.

SDG 11 - Sustainable cities and communities &
SDG 12 - Responsible production and consumption

Reuse practices such as buying, selling, recycling, restoring and exchanging used items are essential for waste reduction and avoidance efforts because they provide alternatives to buying new and discarding used items. Moreover, these types of activities often rely on community-based assets and can therefore increase the resilience of local communities and improve access to information, services and fairly priced products, while also connecting people and raising awareness about more sustainable production and consumption.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Tonnage of material repaired, reused, recovered and/or upcycled by community-based activities (recycling centres, artisans, second-hand goods stores, fab labs, etc.) (tonnes/year)	High	Medium	Low	Medium
Number of charities, initiatives and organizations focused on donation and/or sharing (#)	High	Medium	Medium	Medium
Percentage of neighbourhoods with a tool library or repair hub (%)	High	High	High	High

BEST PRACTICE EXAMPLE

Paris' network of ReUse Centres

The City of Paris has supported the creation of a network of 'Ressourceries' (reuse centres) throughout the city that support the reuse of over 3,000 tonnes of objects and materials that would otherwise have been discarded.[57] With reuse and repair positioned as priority actions within the City's Circular Economy Road Map, Paris has promoted the growth of activities that support responsible consumption and shorter value-chains. To support such activities, the City has organized reuse events to raise awareness throughout the city (read more here).[58]

4. 2 CIRCULAR WASTE MANAGEMENT GOALS

1 Toronto minimizes waste generation

Minimizing waste generation is crucial to preserve existing landfill capacity and reduce the need to build more landfills, which take up limited space and are often a source of GHG emissions. Given the City's aspirational commitment to work toward a zero waste future, it is important to understand the total waste generation of each actor in the economy (i.e., waste from residential sources, as well as from IC&I and C&D sources). By understanding the total amount of waste by source it is also possible to track the impact of circular interventions as percentage waste reduction by source over time. Additionally, monitoring the impact of waste can help visualize the benefits of waste reduction. For example, it is possible to monitor the contribution of the waste management sector to the city's GHG emissions, which the City of Toronto has already estimated for 2017.[59] Food and organic waste should be given particular attention, given the significant emissions produced by its decomposition in landfills. Although the low cost of landfill disposal poses a considerable financial barrier to encouraging participation in organic waste diversion programs[60], the City of Toronto is committed to divert this type of waste from landfills. Its Green Bin Program is expanding and already shows higher capture rates for food and organic waste than in the private waste management sector.

SDG 9 - Industry, innovation and infrastructure &
SDG 12 - Responsible production and consumption

This goal focuses on reducing the amount of materials that end up in landfills and pollute surrounding ecosystems as they decompose. This goal is connected with encouraging responsible production and consumption throughout society. Important components of this goal include designing products with regenerative materials and providing infrastructure to sort and manage materials at the end of their (first) life.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Total amount of waste produced by residential, IC&I and C&D sources (tonnes/year)	High	High	Low	Medium
Percentage increase in organic waste recovery from residential and IC&I sources (%)	High	High	Low	Medium
Contribution of GHG in the waste sector (tCO2eq)	High	High	Medium	High

BEST PRACTICE EXAMPLE

FORCE Consortium

The FORCE project aims to minimize the leakage of materials from the linear economy and work towards a circular economy. It involves four city governments (Copenhagen, Hamburg, Lisbon and Genoa), enterprises, citizens and academia. The aim is to create 16 participatory value chain-based partnerships to develop eco-innovative solutions to address the issue of waste in urban systems and make sure that reuse and recycling of different materials (e.g., plastics, electronics, wood, and organics) from different waste generators is economically viable (read more here).

2 Toronto stimulates a thriving market for secondary materials

Secondary materials are all those materials that, unlike virgin materials, derive from a previous use and have been recycled and sold as new inputs for the manufacturing of other products. While most residents in Toronto are served by the Blue Bin Recycling program, monitoring recycling rates in the IC&I and C&D sectors could highlight where there is potential to recover materials in these sectors. As highlighted by this research project, increasing recycling of C&D waste is particularly difficult in Toronto. The City of Toronto, where feasible, can support the growth of a thriving market for secondary materials by stipulating minimal recycled content in procurements to drive demand and innovation as well as support the creation of secondary materials marketplaces across the city.

SDG 9 - Industry, innovation and infrastructure,
SDG 11 - Sustainable cities and communities &
SDG 12 - Responsible production and consumption

These goals relate to making sure that recyclable materials find suitable use and are used to add value to the economy. Innovation, infrastructure development and technological progress are key to implementing long-lasting solutions to manage recyclables in an economically- and environmentally-sound manner. The more recyclables that can be used as new inputs of production processes, the lower the need for virgin materials. Finally, if implemented locally, higher recycling capacity can have a positive impact on local jobs and communities.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Percentage of non-residential waste that is recycled (%)	High	Medium	Low	Medium
Percentage of C&D waste that is prepared for reuse, recycling or subject to material recovery (%)	Medium	Medium	Low	Medium
Number of City of Toronto procurements that allow or require use of secondary materials as a criterion (#)	High	High	High	High

BEST PRACTICE EXAMPLE

City of Austin materials marketplace

To support the formation of a market for secondary materials, the City of Austin has funded the creation of an online materials exchange platform. The Austin Material Marketplace enables residual streams to be matched to local businesses and organizations to support the reuse and remanufacture of materials. Since its launch in 2014, the platform's community of over 425 businesses have helped to save over 960 M tonnes of CO_2eq[61] (read more here).

3 Toronto improves the transparency, accessibility and verifiability of waste data throughout the city

Improving transparency and accountability amongst private waste collectors could be achieved through more consistent and accurate tracking of private sector waste flows, including those exported outside of Toronto and of the country. Private waste haulers in Toronto mainly manage IC&I and C&D waste, which is where major data gaps lie both in terms of waste quantities and composition. Moreover, while the City of Toronto stopped exporting waste to Michigan at the end of 2010, it is estimated that the private sector still exports 40-45% of Ontario's IC&I waste (including C&D), mostly into the states of Michigan, Ohio, and New York.[62] By disclosing data, private waste management companies hold massive potential to become key levers in the transition to a zero-waste city. Moreover, the City of Toronto provides waste services to several IC&I establishments (schools, small commercial businesses) and could require audits of the waste generated by these customers to gain information about sources, volumes, and composition. Primary data collection or waste data from private waste management companies could provide the City with useful insights on both private waste sources and waste profiles per source. With such insights, there is potential to create a more efficient and circular waste management sector.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Percentage of registered private sector waste contractors that report on the relative amount and composition of waste they manage each year (%)	Medium	High	Low	Medium
Number of waste audits conducted for IC&I establishments serviced by City of Toronto waste management system (#)	Low	Medium	Low	Low
Total amount of landfill waste from Toronto sources that is exported by private sector haulers (tonnes)	Medium	Medium	Low	Medium

SDG 11 - Sustainable cities and communities &
SDG 17 - Partnership for the goals

Globally, municipalities are often responsible for residential solid waste management, while the private sector has long been active in handling waste from big industrial and commercial solid waste generators. Collaborating and partnerships with the private sector has the potential to improve sustainability and waste management services within municipalities by complementing efforts and offering technical solutions and innovation (e.g., through fostering exchange of by-products as new inputs between manufacturing companies or new clean disposal technology).

BEST PRACTICE EXAMPLE

The Netherlands Circular in 2050 - Stakeholder task forces

The program Netherlands Circular in 2050 is structured around five 'task forces' organized as multi-level governance groups in the biomass/food, remanufacturing, consumption, and building sectors. The groups coordinate initiatives that include establishing data exchange platforms, as well as discussing regulations and producer responsibility, education programs, among others. These initiatives are carried out through inter-sectoral and multi-level contracts among governments; start-ups in the product design and energy sectors; and industrial groups in the hi-tech and energy sectors (read more here).

4. 3 CIRCULAR CONSTRUCTION GOALS

1 Toronto develops a future-proof built environment aligned with circular economy principles

The construction sector is highly resource-intensive, and its material flows add to the existing stock of materials embedded in current buildings and infrastructure in Toronto, which remain in the city for decades (or even centuries). By applying circular principles, the high volume of material already present within the city can be viewed as an enormous raw materials bank for future construction projects. Moreover, establishing a circular economy in this sector is proposed by many as an essential building block of the move to zero-carbon buildings. A circular building can be net-zero to net-positive in life-cycle emissions by using renewable, sustainably managed and secondary resources which are low impact and non-toxic; by eliminating waste across the life-cycle of buildings; and by being designed for longevity, adaptability, disassembly, reuse and recoverability. Still, to change the current construction industry, it is crucial to include all stakeholders in closing the 'construction circle' (i.e., creating an integrated circular system—from design to waste management). Existing actors will have to find a new position in that circle while new actors will help accelerate the transition to a circular economy (e.g., suppliers will become service providers, demolition businesses will become suppliers). These could be start-ups using 3D printing technology or digitally-driven sharing platforms. The transition to a circular economy requires a new mindset from all parties and new forms of far-reaching cooperation.[63]

SDG 6 - Clean water and sanitation,
SDG 7 - Affordable and clean energy &
SDG 11 - Sustainable cities and communities

The construction and real estate sectors are key to sustainable development in growing cities like Toronto. 17% of the SDG targets are directly dependent, and 27% of the targets are indirectly dependent, on these sectors' activities.[64] Circular building design is one of the means to achieve sustainable construction. Applying circular principles to the operation of buildings can reduce the environmental impact of rain and wastewater, reduce their demand for fossil fuels and reduce harm to the environment. Finally, the sustainability of urban environments can be enhanced by introducing circular innovations for infrastructure and building developments.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Number of public and private construction projects that include circular criteria within procurement process (#)	High	High	Medium	High
Proportion of new construction projects that integrate principles of the circular economy within their development plans (from design to waste management plans) (%)	High	Medium	Low	Medium
Number of construction & demolition waste recovery and recycling processors in the region (including salvage and scrap yards accepting C&D waste and equipment) (#)	High	Medium	Medium	Medium

BEST PRACTICE EXAMPLE

Circl Living Lab for a Circular Built Environment

The new building known as Circl is the first example of tangible circular construction in Amsterdam. The project was born from a circular vision that centres on high-quality recycling of materials, energy-neutral consumption and a bare minimum of waste. Circular business models, such as recycling of construction materials from dismantled buildings, were used as much as possible for the construction and operation of the building, which is now used as an experimental space for companies and the community in order to put circularity into practice. While current practices of the sector have proven difficult to change, the lessons and creative solutions applied in the Circl building show that developing a future-proof built environment aligned with circular economy principles is possible (read more here and here).

2 Toronto increases the quantity and quality of data on C&D materials to recover as many materials embedded in its building stock as possible

Considering the current high level of construction activity in Toronto and its expected growth in the future, there is a great opportunity to recover materials from the existing building stock, for example from existing old buildings planned for demolition. To achieve this goal, increasing the transparency of the material stock within the built environment is key. For example, it is important to know the sheer volume of waste that can be recycled. Estimates for total C&D waste in Toronto are a major data gap. Additionally, material passports provide a digital record of the type and quality of materials used in a building's construction (based on where they are sourced from). Keeping track of these details in a central database makes it easier to reuse and reclaim these materials during demolition or disassembly, so that they can be utilized in new construction projects. Finally, estimating embodied emissions per material (e.g., through Environmental Product Declarations (EPD)) would help the construction sector to link these activities to GHG mitigation efforts, since the City of Toronto aims to have 100% of new buildings designed and built to be near-zero GHG emissions by 2030.[65] It is important to note, however, that the integration of digital technologies and monitoring must also be accompanied by effective regulatory frameworks to ensure data protection, privacy and accountability.

SDG 11 - Sustainable cities and communities &
SDG 12 - Responsible production and consumption

Accurate and actionable data on construction materials can help to shift the built environment towards sustainability. The rapid expansion of digital technologies is broadening the possibilities of what can be measured and tracked. When individual materials and components within the built environment can be monitored digitally, effective and proactive management of materials is possible, creating sustainable cities and communities, but also decreasing the need for virgin material extraction and transportation.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Total waste generation from C&D activities (tonnes)	High	Medium	Low	Medium
Percentage of buildings with a publicly accessible material passport[66] (%)	Medium	Medium	Low	Medium
Embodied carbon per building material type (kg of CO2eq / kg of material)	Medium	High	Low	Medium

BEST PRACTICE EXAMPLE

Applying material passports within Brummen's town hall

The municipality of Brummen, in the Netherlands, has taken a pioneering approach to facilitating material reuse through digital technology and data by embracing material passports within their town hall. Along with designing the building from the ground-up to be modular and easily disassembled, the municipality of Brummen conceptualized their town hall as a 'materials bank'—a temporary organization of construction materials—that can be reused again. As a result, details of the building materials are known and clearly documented, including their quality, and destination in a second life[67] (read more here).

3 Toronto promotes high value recycling and material recovery of C&D waste

Increasing the diversion rate of C&D waste material is a valuable opportunity for Toronto, considering the volume of these materials, their associated environmental impact and the economic potential for achieving higher reuse applications. By focusing on materials that are relatively easy to recycle (e.g., clean wood, cardboard, and metals), Toronto's C&D industry could potentially divert 33% of waste from landfill.[68] This could be done in ways that support the development and upscaling of local enterprises that collect these materials from C&D sites and recycle them.

The results of the research project highlight that diversion rates for C&D waste are very low in Ontario (only 12%), and little data is available to track outcomes. Aggregates (e.g., sand, gravel, crushed stone) and excess soil are two materials with high diversion potential and are found in large quantities throughout the city. Further applications that increase the recycling of aggregate and soil while offsetting emissions from virgin materials could be more actively explored as a strategy. However, challenges persist—for example, in relation to certifying recycled aggregate at a competitive price or guaranteeing that contaminants in soils can be eliminated via treatment processes before the soil is re-used. Continuous work with industry actors is needed to better understand the local challenges and find opportunities to overcome them.

SDG 8 - Decent work and economic growth,
SDG 9 - Industry, innovation and infrastructure &
SDG 12 - Responsible production and consumption

Pursuing circular strategies that support the high value cycling of C&D wastes can create new employment and economic opportunities. Notably secondary material management, such as selective deconstruction of building components, is more labour intensive than the current linear alternative of landfilling.[69] Encouraging and nurturing new opportunities (e.g., via public procurement or infrastructure investment) can cultivate innovation and new business opportunities within the city, ultimately leading to more sustainable methods of production and consumption.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Percentage of construction waste that is utilized as a material input for new construction and/or other uses (%)	High	High	Low	Medium
Recovery rate of demolition waste as material input for new construction and/or other uses (%)	High	High	Low	Medium
Total amount of aggregate and excess soil disposed in landfill (tonnes)	High	High	Low	Medium

BEST PRACTICE EXAMPLE

Cloud Cycle

Cloud Cycle is a company based in London (UK) that monitors the location, condition and value of wet concrete and finds buyers for surplus before it reaches its usage point. The company uses digital technology on trucks to monitor the amount of concrete available at construction sites and redirects surplus by finding a buyer nearby. This boosts the company's productivity while decreasing the cost for virgin materials. The company's vision is to create an 'Internet of Materials' where every material on the planet—its location, type, condition, quantity and value—is digitized and matched to potential customers and end users in order to ensure material circularity at scale (read more here).

4. 4 CIRCULAR FOOD SYSTEM GOALS

1 Toronto promotes healthy and culturally-appropriate food for all, sourced as locally as possible, and as sustainably produced, processed, packaged and distributed as possible

Sourcing food grown regeneratively and designing and marketing healthier food products are two key opportunities of circular food systems. The circular economy offers a vision for a sustainable food system that mimics natural systems of regeneration so that waste does not exist, but instead acts as a feedstock for another cycle.[70] Food and organic waste is returned to the soil as compost and crop trimmings as fodder to avoid the use of chemical fertilizers, while food waste is minimized and diverted from landfill, avoiding harmful GHG from its decomposition. The City of Toronto recognizes that food is intimately connected to climate change and has identified food as a lever to accomplish the City's strategic goals, and sustainable diets as a means of improving ecological and public health.[71] Circular food systems could not only help the City achieve its goal but also address climate change from land use change, create healthy cities, and rebuild biodiversity. Changing the food production system towards a truly regenerative approach will require the involvement of all sectoral actors. Prioritizing locally grown, plant-based diets from regenerative agriculture within the municipality's spheres of influence (e.g., catering and food services in offices, long-term care homes, and day-cares) could be a powerful lever and educational tool to reduce the ecological footprint of food consumed in the city. Additionally, the City of Toronto could support this goal by improving equitable access to green space for food production, prioritizing high-need communities and populations.

SDG 2 - Zero Hunger,
SDG 3 - Good health and well-being &
SDG 15 - Life on land

Good health starts with nutrition. However, to guarantee good nutrition for all, a significant number of resources are needed to grow crops and livestock. Food products have short life cycles in our economy. Applying circular economy principles to food production means sourcing food grown locally and regeneratively, designing out food waste, and marketing healthier food products. In doing so, it is possible to address climate change, improve the health of citizens, and rebuild biodiversity.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Percentage of food that is farmed sustainably and within Toronto's bioregion[72] (%)	High	High	Medium	High
Percentage of low-carbon, locally sourced, seasonally and culturally-appropriate products in publicly procured food (%)	High	High	Medium	High
Total food from regenerative urban production (e.g., indoor and vertical farming, community gardens, etc.)[73] (tonnes)	High	High	Medium	High

BEST PRACTICE EXAMPLE

Sustainable local food system through Ghent en Garde

Ghent en Garde has brought significant change to the local food system in the City of Ghent, located in northwest Belgium. Through participatory governance models, including a food policy council, Ghent's food policy has moved from launching small-scale initiatives to bringing structural change to the food system. The City's strategy includes decreasing food waste, making food procurement more sustainable, scaling up short food supply chains and improving access to food. 7% of the citizens are now vegetarians, the local food economy is booming through new farmers markets and through a new logistics platform for professional buyers, 300 tonnes of food waste have been redistributed in a 10-month period to 19,000 people in poverty, and 120 stakeholders have been connected to improve access to sustainable and healthy food (read more here).

2 Toronto minimizes avoidable food waste through food rescue and redistribution to interested partners and/or residents

Increasing the amount of food that is rescued from production, processing and distribution levels of the value chain can ensure that better quality foods are available for redistribution. Then, better guidance for consumers, businesses, and retailers in the city on how they can prevent food waste, help with food recovery, and redistribute their food surplus can help complement these efforts, although foods recovered from these sectors are more difficult to monitor for food safety and quality. While there are a handful of food rescue programs across Toronto (e.g., Second Harvest, Urban Harvest Toronto, etc.), the City could aim to maximize the coverage and accessibility to such programs by supporting and promoting their activities, especially in relation to the processing and manufacturing stage, as many actors in these sectors do not typically donate edible foods.[74] By increasing the amount of food rescued and redistributed, food could become more accessible and affordable, contributing to the health of the population while increasing the circularity of food by avoiding food waste.

SDG 10 - Inequality &
SDG 12 - Sustainable production and consumption

Reducing food waste and loss is an inherent part of this goal. One of the targets for SDG 12 (i.e., target 12.3) states that "by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses". Circular food systems design out waste at all steps of the value chain and promote food rescue and redistribution in line with the food waste hierarchy framework, helping reduce inequalities by redistributing surplus food to those who need it most.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Percentage of food retail and food service businesses participating in food rescue and redistribution programs (%)	High	High	Low	Medium
Number of food rescue and redistribution initiatives in Toronto (#)	High	Medium	Medium	Medium
Number of households making food donations (#)	High	Medium	Low	Medium

BEST PRACTICE EXAMPLE

PARKnSHOP

PARKnSHOP is a supermarket chain that operates nearly 300 supermarkets in Hong Kong and has been working to reduce food waste while providing food for underprivileged citizens. The chain also partnered with Food Rescue for the Needy, a local non-governmental organization which redistributes surplus food that would otherwise be wasted to individuals or families in need. From 2012 to 2018, PARKnSHOP donated more than 800 metric tonnes of food that would otherwise have been landfilled (read more here).

3 Toronto promotes food waste avoidance

Understanding the food waste problem in Toronto is crucial to achieve a circular economy. Data on total food waste is scarce and constituted a major data gap during the research project. More insights on total quantities and sources of food waste could help future efforts towards circular food systems.

Conservative date codes (e.g., “best before” dates) are one of the main causes of avoidable food waste. Clearer and more realistic date labelling on perishable foods (e.g., wording, placement of text, legibility, etc.) will help significantly to reduce the amount of edible food being wasted. Canada's Food Loss and Waste Strategy of 2018 mentions ongoing initiatives by the Canadian Food Inspection Agency (CFIA) to modernize food labelling.[75] Initiatives like the CFIA need to be complemented by education on how to handle avoidable food waste. This could be done, for example, by enabling use of City space (e.g., community centre kitchens, public libraries, etc.) for circular food challenges that engage with low-income residents, as well as with existing youth programs, after-school programs, academic partners and others.

On the other hand, in a circular economy unavoidable food waste, such as banana peels and apple cores, should be captured in residual waste flows and transformed into regenerative products such as compost, which support soil health; or other useful products such as biofuels and bioplastics which help reduce fossil fuel dependency. The City of Toronto is putting great effort into food and organic waste diversion via its Green Bin Program. Other actors should follow the City's lead and start valorizing food waste flows for those waste generators that are not covered by City services. For example, the IC&I sector is a big contributor to the food waste problem, but often shows lower capture rates for food and organic waste because landfill is still a more cost effective option.[76] Measuring the total coverage of organic diversion programs across IC&I establishments and multi-residential buildings (other significant sources of food waste in the city) can provide a key benchmark for improvement in the future.

SDG 9 - Industry, innovation and infrastructure &
SDG 12 - Sustainable production and consumption

Reduction of food waste and loss along production and supply chains, combined with high-value processing systems of food by-products and unavoidable waste, can be achieved through knowledge and research about quantities, composition and mapping of food waste and losses along the food supply chain, as well as cutting-edge infrastructure, technology and innovation.

INDICATOR (UNIT)	COMMUNICATION POWER	PROXY POWER	DATA POWER	OVERALL PRIORITY
Total annual amount of food waste generated by all economic actors (tonnes)	High	High	Low	Medium
Percentage of food perishable products in compliance with CFIA's food labelling modernization initiative (%)	Low	Medium	Medium	Medium
Percentage of total IC&I establishments and residential dwellings participating in organic waste diversion programs (%)	High	High	Low	Medium

BEST PRACTICE EXAMPLE

City of Guelph circular food economy

The City of Guelph is striving to create Canada's first circular food economy.[77] Recognizing its strategic position within the heart of Ontario's Innovation Corridor, Guelph aims to transform the region into a connected 'living lab', forging new rural-urban partnerships between researchers, social innovators, entrepreneurs and other stakeholders to promote local resource loops and solve complex food problems. Through the leveraging of technology and local expertise, Guelph is developing solutions to cycle nutrients from food waste, such as Oreka Solutions,[78] which uses black soldier flies to transform food waste into organic feedstock and biofertilizer. Taken together, Guelph's circular food economy could generate economic savings of CAD50 million[79] and CO2eq reductions of 7,200 tonnes[80] (read more here).

5

NEXT STEPS IN THE TRANSITION

 Photo by Harishan Kobalasingam

Transitioning to a circular city is challenging and requires system-wide collaboration across stakeholders. But who can collaborate to achieve a Circular Toronto and how? Which next steps can be taken by the City of Toronto to advance circularity?

Local governments cannot create a circular economy on their own. Key stakeholder groups have an important role to play and need to be aligned toward common goals. Businesses need to adapt their business models and implement circular innovations; local, provincial and federal governments need to create the right incentives, regulatory environments and guidance; other public institutions and non-profit organizations need to collaborate and create a supporting environment; markets need to provide consumers with the options and incentives to make more sustainable choices; and consumers need shift their mindset and consumption patterns.

In line with the RBA framework, this section identifies key partners that could play a role in moving towards the community-wide and sector-specific circular goals described above. The RBA framework helps to identify where accountability for outcomes cannot be held by a single actor alone, and therefore it encourages thinking about key partners that can collectively deliver outcomes that support the broader objective. Accountability of other actors will depend on specific policies and programs designed to foster stakeholder contributions to circular goals—to be determined based on the results of this research project together with performance measures to understand contributions toward population-level outcomes.

5.1 THE ROLE OF THE CITY OF TORONTO IN THE TRANSITION

Municipalities like the City of Toronto can play a leading role in catalyzing a transition towards a more circular economy. Building on the community wide and sector-specific circular goals outlined in this report, the City of Toronto possesses a set of policy instruments that can support the transition towards a city-wide circular economy; for example, from setting supportive regulatory conditions for closing resource loops, and financially incentivizing circular innovations, to bringing together diverse stakeholders throughout the city, and expanding the knowledge base around circularity. The following section outlines a set of high-level next steps to support the city-wide transition towards a circular economy, based on Circle Economy's Urban Policy Framework.[81]

1 Mobilize resources around Toronto's circular goals

The City of Toronto can utilize its strategic position within the urban ecosystem to bring together local stakeholders around a set of priorities to influence the use and function of physical and material elements within the urban environment.

- **Build a local and global coalition for action:** Achieving circular ambitions will require local collaboration between various public and private stakeholders. Locally, leveraging existing front-running citizen's initiatives, actors like municipal governments, businesses, and academics can together provide input and convene authoritative reports on the circular state of the local economy. Internationally, collaborations between public and private actors can then help cities share best practices and define common priorities towards a more circular economy. Further, the City can strengthen connections with government partners (neighbouring municipalities, provincial and federal government) to deploy a mix of measures to facilitate and encourage the development of a circular economy at scale, defining which elements need to be organized locally, regionally or nationally. Provinces, regions and neighbouring municipalities can make the transition towards a circular economy a policy pillar and formulate a shared circular vision. They can then use it as the basis to create goals and leverage the inherent strengths of each institutional actor and the understanding of the local context to meet them.
- **Develop concrete circular targets and a circular action agenda to meet local and global sustainability targets:** By leveraging existing local assets and expertise, and enhancing coordination across municipal, national and international governments, the City of Toronto can translate global targets to local and regional actions. A circular economy roadmap helps to align local priorities with global sustainability commitments and national climate pledges, translating these to city-wide actions related to specific sectors, supply chains, and regions. The City is already planning for the development of a Circular Economy Road Map to support the circular transition. The project *Baselining for a Circular Toronto* has set the foundation for a shared understanding of the current circular state, while the Long Term Waste Management Strategy has set the framework for a sustainable waste management system. The Circular Economy Road Map will set out clear targets and actions for Toronto's circular transition.

2 Educate and improve the understanding of local opportunities for circularity

Municipalities can increase overall levels of awareness and build the necessary knowledge around the circular economy to foster long-term change.

- **Improve data quality and quantity and increase standardized data collection:** In a circular city, data can be used to determine potential solutions, change behaviour, and guide and monitor policy decisions. The project *Baselining for a Circular Toronto* has provided the foundation for understanding the current state of the circular economy in Toronto and has offered a 'snapshot' of material inputs and outputs within three key sectors in Toronto. However, many data gap challenges arose during the project and assumptions had to be made to overcome the scarcity and uncertainty of data. Different stakeholders were approached to help validate assumptions and fill data gaps (e.g., waste experts, academia, experts from other cities, and from the provincial government). Building on the stakeholder engagement processes during this project, the City of Toronto has the opportunity to improve cooperation and coordination of stakeholders and establish a city-wide ecosystem for data, knowledge and information sharing to support the transition to a more circular economy. Moreover, complementary approaches could further enhance the insights generated from the project and improve the quality and robustness of data. For example, geospatial mapping can provide greater insight into opportunities for urban mining, possible industrial symbiosis, or higher value channels for reuse or recycling. Life Cycle Assessments or Ecological Footprints can provide much greater detail and insight into the environmental impacts associated with material flows, thus helping to prioritize mitigation strategies or reduce the impact of local products or projects over their lifetime.
- **Involve the local community:** Given the high level of engagement of citizens and business in circular initiatives across Toronto, projects aiming for the betterment of a community should also be designed, in part, in collaboration with the community. It is crucial for the City of Toronto to build on the momentum created by existing initiatives and achieve higher engagement efforts. The City can do this by developing knowledge sharing platforms, hosting awareness-raising events, launching community networks and marketing campaigns. This can showcase the progress and innovations within Toronto's circular economy to the business community and educate it about the kinds of opportunities needed for consumers to be able to make more sustainable choices. Then, it can introduce residents to their role in consumption and waste-related issues. Workshops and surveys can then be used to incorporate feedback and opinion from the community to better inform ongoing City programs, and circular economy principles could be integrated into public education and curricula. Local circular opportunities can be very specific and need a shared understanding of the on-the-ground context. For example, redefining networks and relationships both within the city, and with peri-urban/rural and global surroundings is especially important to transition towards a circular food system.[82] Circular food systems can rearrange linear and globalized supply chains to nurture more localized loops. Local businesses and community initiatives across the food value chain are key—from farmers (ranging from large scale to community gardens) to food and beverage producers, and food service organizations (such as cafés, restaurants, and catering). Engaging with the community is therefore crucial to learn and identify how the unique local economy could benefit from those opportunities.

3 Manage the City's assets in a circular way

The City of Toronto has direct control over the management of a range of physical assets within the city itself, from buildings and vehicles, to parks, open spaces and other public infrastructure. One of the most significant ways in which the municipality can directly influence the cycling of resources within Toronto is by ensuring the circular management of its own assets.

- **Leverage circular public procurement:** Public procurement is a key lever to enable cities to take on a leadership role in the circular economy transition by setting an example and promoting the circular economy by directing municipal spending towards sustainable, circular public goods and services.[83] The City of Toronto has already recognized the potential of circular public procurement by developing a Circular Procurement Implementation Plan and Framework.[84] The aim of the framework is to develop an evidence-based and measurable circular procurement policy, and enable the City to increase the amount of goods and services that are regenerative by design, have lower life-cycle GHG emissions, are less toxic and rely less on raw material consumption. Through public procurement, the City can integrate preferences for product-as-a-service or the purchase of used and/or reusable and refurbishable products to meet community-wide goals. In waste and wastewater treatment, circular procurement could mean better allocation and processing of resources and the development of related technology and business concepts through enabling the purchasing party to ensure that, at the end of their service life or useful life, products or materials will be re-used effectively in a new cycle (see circular waste management goals). In construction, circular procurement could mean stipulating in public tenders requirements such as minimum recycled material standards, utilizing secondary materials from nearby sites, integrating adaptive and modular construction principles, or including material passports in new building developments (see circular construction goals). In food, circular procurement could support sustainable, locally produced and culturally-appropriate food for public catering services (see circular food system goals). Current programs at the City that align equitable procurement practices with local, plant-based food choices include the Cool Food Pledge (2019), the Black Food Sovereignty Action Plan (2021) and the Social Procurement Policy (2015), as well as the City's Local Food Procurement Policy[85] (2011). Establishing local demand for more circular products and services allows space for innovation, and over time can spur the growth of a circular economy-based business culture. In order to fully benefit from such interventions, the City's Circular Procurement Framework should align with the findings of this study.
- **Support the development of circular infrastructure:** The cycling of resources often requires the presence of specific infrastructure.[86] Such infrastructures can range from physical processing facilities (such as to transform organic wastes into compost and biofuels) and waste collection services (such as the provision of separate collection bins) to digital infrastructure (such as an online materials marketplace to exchange secondary materials).[87] The City of Toronto is already investing in upgrading its physical infrastructure. For instance, the two City-owned organic processing facilities will soon convert biogas from Toronto's Green Bin waste into renewable natural gas (RNG) and add it to the energy grid. Wastewater treatment facilities have been upgraded to process almost all biosolids into fertilizers and/or biogas,[88] and the City is planning for the development of its third anaerobic digestion facility, which includes the production of RNG.[89] By providing data, sharing experiences and creating an enabling regulatory and legislative framework for existing initiatives to formalize, the City can complement its own efforts by supporting other actors in the economy to develop privately-owned physical and digital infrastructure to stimulate a thriving market for secondary materials and sustain a robust ecosystem of reuse, repair and donation.

4 Incentivize and regulate Toronto's circular ecosystem

The City of Toronto can establish new market signals and support to businesses, citizens and other levels of government to promote certain activities, as well as change the rules of the systems within the city's jurisdiction and ensure that they are enforced.

- **Support innovation and incentivize the implementation of circular business models:** For circular initiatives to be effective, there must be broad participation from economic and societal stakeholders. To make Toronto a leader in attracting and supporting businesses that contribute to the circular economy, the City can explore incentives (e.g., tax benefits, grant funding, user fees, etc.), provide in kind and financial business support for the development of new circular products and services, and establish initial demand for them through procurement. Incubator and investment programs can also encourage entrepreneurs, businesses, and organizations to help cities find the answers to create more circular urban systems. The City of Toronto has joined forces with other cities like New York City, Amsterdam, Glasgow, and Copenhagen to look for innovative digital and data-driven solutions from around the world.[90] Future investments in innovation by the City and partner funding from other levels of government will help shape circular cities and urban sustainable living.
- **Measure impact and progress towards circularity:** The indicators outlined in this document, in addition to other sustainability metrics, can be used to address a wide range of environmental, economic and social sustainability issues. Metrics help to understand the current state of circularity, monitor progress over time and provide evidence of performance and impacts. The City of Toronto can then use metrics to make decisions about where to allocate resources, which policies to develop, where to change or stop a program, which services to offer citizens and where to lend support. The indicators will be a key element of Toronto's Circular Economy Road Map.
- **Develop an enabling institutional environment:** A supportive, cross-sectoral, multi-level regulatory framework will be essential for the delivery of a Circular Toronto. Coordinated performance- and population-based targets to meet the goals outlined in this report across all sectors, legally enforced or guided by incentives, will also be required. Legal frameworks that support the new models emerging from the circular, sharing and service-based economy will be necessary. For example, by-laws and regulations within the City's competence can help shape the environment to apply circular principles to topics related to waste management (e.g., bans on single-use products, implementation of extended producer responsibility models, etc.) or construction (e.g., enforcement of environmental assessments and building permits, introducing relevant environmental taxes and charges, etc.), among others. The City of Toronto has already started setting up institutional structures to support the circular economy, such as creating a dedicated unit, the Circular Economy and Innovation unit (CEI), to help the City of Toronto determine how to practically operationalize circular economy goals through partnerships and other actions. The development of a Circular Economy Road Map will serve to set the direction for all these actions.

5.2 PARTNERS IN THE CIRCULAR TRANSITION

The ability of the City of Toronto to catalyze a transition towards a more circular economy relies on the contributions of a variety of partners to ensure success. Individuals, the private sector, governments, civil society and other actors must all work together towards circular ambitions. For example, Toronto's circular transition could be informed by Indigenous Ways of Knowing, while public-private partnerships and public-civil partnerships are often useful for experimenting with new regulatory structures and coordinating various economic activities. Not only that, other actors could also play a key role in advancing the circular economy via advocacy, knowledge development, transforming business models, and encouraging enabling regulatory frameworks.

The following outlines several groups who ought to be given the opportunity to be a partner in the circular transition. This list is not exhaustive, nor is it an attempt to prescribe a role, or define specific contributions or actions. In the spirit of participatory and inclusive innovation, engagement and decision-making, more work needs to be done to explore with various groups the ways in which the City could work with and learn from them in the circular transition.

Civil society

Civil society groups represent those who will be actively advocating for the circular economy on the ground—individuals and organizations in a society which are independent of the government (e.g., non-governmental organizations, charitable organizations, non-profits organizations, interest groups, multilateral organizations, social partners, etc.). Civil society actors can be key to supporting the transition to a circular economy by increasing awareness of circular economy best practices, promoting initiatives, setting standards, and creating market opportunities. For example:

- **Individual citizens:** The behaviour of Torontonians is key to reducing excessive consumption and shaping demand for circular products and services. By shifting their mindset and consumption patterns, choosing to consume less and in a more efficient way, and opting for repairing, second-hand or sharing alternatives, individuals can support local and sustainable businesses. Moreover, households significantly contribute to waste generation in Toronto (~40%). Diverting household waste plays an important role in minimizing the environmental impact of consumer habits. Individuals can opt for zero waste, packaging free, reusable or recyclable products and contribute to Toronto's secondary materials market, both supplying and demanding secondary materials. Then, by effectively separating materials and collaborating with neighbours in multi-residential buildings, households can proactively collaborate to reduce waste generation and decrease contamination rates in recycling waste streams. Households can also contribute to a more circular built environment by embracing circular principles in the design, construction and renovation of homes, as well as to a more circular food system by changing their diets and consumption habits (e.g., influencing demand for more local and sustainably produced, culturally-appropriate foods, adopting best practices to minimize and divert food waste, contributing to food rescue and redistribution programs, etc.).
- **Equity-deserving communities:** The contemporary linear economic model that has been operating since the mid the 20th century has been particularly disadvantageous to communities facing racial and gender discrimination, persons with disabilities, the precariously housed and homeless and families and individuals affected by chronic low-income conditions. Ill-conceived circular economy strategies could exacerbate negative impacts on the quality of life of equity deserving individuals, groups and communities. The City of Toronto must make every effort to ensure meaningful engagement of equity deserving groups by removing barriers that have historically prevented their participation in the development of government regulations, policies and programs; and, by inviting the co-creation of equitable solutions and innovations that recognize lived experiences and knowledge. Successful circularity solution pathways for Toronto will be tangibly amplified if the City ensures an innovation process that is meaningfully inclusive of communities sidelined by current linear and economic development strategies. Improving the circularity of material flows at the whole city level must remedy and not exacerbate historical inequities.

Photo by Alexandru Gogan

- **Civil Society Organizations (CSOs):** Civil society organizations (CSOs) are key in reaching crucial actors within cities and nations and using their knowledge of local economies and labour issues to support a more equitable transition by sharing their knowledge and best practices and flagging obstacles hampering the development of the circular economy. They can support policy development by providing recommendations and solutions to problems using political models of public participation. They can raise awareness about circular principles and other related issues such as climate change, material depletion, etc. They can help achieve a just circular transition by linking the transition to transversal topics such as promoting social justice, including marginalized communities, providing health services, protecting the environment and providing skills training.
- **Social partners:** Social partners representing the interests of workers and employers, such as trade and labour unions, are key to ensuring a just transition to the circular economy. As connectors between workers, businesses and governments, they can bring the social dimension to the circular economy agenda and increase awareness about the circular economy across employees and employers; facilitate access to training and upskilling opportunities that will promote employment opportunities; act as a redistributive power to ensure that workers are not negatively impacted by circular and green policies; and connect stakeholders through social dialogue.[91]
- **Standards authorities:** Circular economy standards can create a common understanding of the circular economy across stakeholders and measure progress towards the circular economy transition. Metrics and standards help understand what to measure to see what works, what does not and why. Local and global agencies for standardization are working on specific metrics to evaluate a circular project or provide guidance on key circular elements that should be featured in new initiatives.[92] However, circular economy standards are only now starting to develop. More work will need to be done to create standards that enable businesses, procurers, government and other actors to implement projects in a more circular way.

Indigenous communities

Toronto is the traditional territory of many nations, including the Mississaugas of the Credit, the Anishinabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples. Toronto is covered by Treaty 13 with the Mississaugas of the Credit. Indigenous Peoples are holders of knowledge, experience and perspectives that span the pre-colonial times of Turtle Island and Inuit Nunangat. Sections 25 and 35 of the Charter of Rights and Freedoms recognize treaty rights and outline specific constitutional rights of all First Nation, Inuit and Métis communities and nations. Efforts by the City of Toronto to transition to a circular economy must embed the recommendations of the Truth and Reconciliation Commission and the City's statements of commitment to Indigenous Peoples. The City of Toronto should make every effort to create conversation spaces that invite Indigenous voices on their terms and in a manner of their choosing.[93]

Businesses

Business actors can unlock the potential of circular business models through innovative design and production, and finding new ways in which to access, use, and reuse materials.

- To meet proposed community-wide circular goals, businesses can develop new products and services that support the reduction of material consumption and that facilitate reuse and sharing (e.g., sharing platforms, product-as-a-service business models, etc.). Through designing and testing circular business models, companies can not only contribute to transforming and correcting the current linear economy but can also profit from transitioning to circular models and offer new job opportunities.
- When it comes to waste reduction and proposed circular waste management goals, businesses work on the front lines of the challenge. Local companies manage the majority of waste flows and produce many of the materials and consumer goods that contribute to waste generation. Businesses can develop products (e.g., products designed for repair and modularity, made of recyclable materials, etc.) and services (e.g., materials matchmaking platforms) that minimize waste generation. Moreover, private waste management companies can play a key role in sharing waste data and proactively collaborating with other public and private stakeholders to align data insights and priorities. This could help address current data gaps in the sector and build a more robust evidence-base to inform future waste management efforts.
- Across the construction value chain, there is a diversity of businesses that can play a role in influencing the circularity of Toronto's built environment, from real estate managers, and property developers, to material engineers, C&D companies. Involving these actors can help meet proposed circular construction goals for a future-proof and circular built environment. Examples for action in this sector could be: adopting material passports for new development projects and supporting online “libraries” of material passports both financially and physically; integrating deconstruction methods that maintain material and component value and quality; and prioritizing secondary C&D materials over virgin resources.
- The business community is also pivotal to meet proposed circular food system goals. Companies can develop and adopt innovative regenerative agricultural practices, business models that support rescue and redistribution of food surplus, and new products and services that cycle organic materials and nutrients at their highest value. In the future, measuring circular impact and integrating it in reporting and accounting will be crucial to bolster profitability of businesses, while limiting negative environmental and social externalities.[94]
- Collaboration and partnerships across value chains will be crucial to support actions by the business community and meet all circular goals. Forming new partnerships, joining networks and consulting with public sector actors at all government levels can help businesses overcome challenges and barriers and contribute to scaling up circularity.

Provincial and federal governments

Finally, achieving the structural changes needed for the adoption of the circular economy will largely be driven by **provincial and federal government policies**, as a result of their broader mandate to influence regulatory and economic policy when compared to municipal governments.

- Provincial and federal governments can pursue and implement circular economy policy to create the enabling conditions throughout the region and country at large. Setting regulatory and economic policy instruments for a circular economy can be particularly important for such orders of government and can alleviate the barriers that municipal governments may not have authority to influence. Additionally, given the resources available to this level of governmental institution, provincial and federal governments can also contribute toward creating the right systems of financial and in-kind support for innovation and development of new circular products and services.
- For a largely administrative organization, such as provincial and federal governments, circular public procurement can also be leveraged to make sure that purchasing budgets contribute toward sustainability goals. Integrating a preference for product-as-a-service or used and/or reusable and refurbishable products within higher level public procurement practices can complement efforts by the City of Toronto and set the example for more municipalities to follow.
- Although the City of Toronto has taken on a leading role among Canadian cities in recent years by actively pursuing the topic of circular economy, provincial and federal governments are also endorsing circularity.
    - In recent years, the Canadian government has developed a few initiatives to develop a sustainable recycling economy for the future in which there is no waste, together with the business community and knowledge institutions. The contribution of federal institutions to meet proposed circular waste management goals might take more time to materialize at federal and provincial level, since municipalities are still the front-line governments responsible for waste in Canada. Provinces, however, can help cities track whether successful policies are achieving the desired outcomes, identify potential compliance risks, assist in establishing waste management infrastructure needs, and provide helpful information to waste generators in managing their wastes.
    - At the federal level, Canada is showing significant interest in contributing to meet proposed circular construction goals. A circular approach to buildings is being investigated through international cooperation and sharing of best practices with other countries like the Netherlands.[95] The Dutch-Canadian cooperation is connecting interested parties for inspiration, networking or business opportunities, showcasing the importance of collaboration with construction business owners, investors and managers is to develop the right financial and commercial instruments to stimulate circular developments.
    - Ontario is actively pursuing circular economy strategies to meet proposed circular food system goals. An action plan to reduce the amount of food and organic waste entering landfills became an integral part of the commitment in Ontario's *Climate Change Action Plan and Strategy for a Waste-Free Ontario: Building a Circular Economy*. This includes a commitment to impose a disposal ban on food and organic waste as included in Ontario's Food and Organic Waste Framework, released in April 2018.[96]
- Collaboration between local, provincial and federal governments is necessary to align priorities and goals and build on synergies rather than creating uncertainty and risks within the policy landscape. Regulatory and legislative changes at the provincial and federal level can have an impact on municipal government responsibilities. As highlighted in the case of the City of Toronto, new provincial regulations will need to be transitioned and implemented which may change elements of the City's waste management responsibility, consequentially posing uncertainty in the larger role of the City in supporting an innovation economy for circularity. For example, the new Blue Box regulation (Ontario Regulation 391/21) that transitions the financial and operational responsibility of managing Blue Box materials from municipalities to producers may reduce the City's ability to support circular economies of scale by limiting the City's role in the development of recycling markets. Toronto should continue to engage and share efforts, data and pilot partnerships to help scale up government efforts towards a circular economy and ensure that those efforts align with those of the City.

Education and research institutes

Making the transition to a circular economy will require new skills, competencies and mindsets. **Education and research institutes** can help to create the necessary knowledge and skills required for a just circular transition, as well as provide evidence and insights into the environmental impacts associated with material flows.

- Integrating the circular economy within the agenda of education and research institutions can help to identify future infrastructure, technology and skills needs, identify the conditions that will allow for a just circular transition, ensure exchange of knowledge and present scalable and replicable circular solutions that deliver outcomes and long-term impact. For example, to support a healthy, equitable and sustainable food system, the City is collaborating with the EAT-Lancet Commission on Food, Planet, Health. The collaboration is aimed at mapping opportunities to change consumption habits based on the commission's scientific review of what constitutes a healthy diet from a sustainable food system, and which actions can support and speed up food system transformation.[97]
- Professional associations and accreditation bodies have a critical role to play in the transition, especially in relation to education, initial and continuous vocational training and non-vocational learning (or “lifelong learning”). They can help implement concepts of the circular economy within such programmes and support the development of the necessary skills and knowledge. Additionally, certificates help identify circular economy experts in the field.

6 CONCLUSIONS

The project *Baselining for a Circular Toronto* has tried to envision what Toronto's aspirational circular economy goal could mean in practice and what types of programs, policies, partnerships, and investments may be necessary to operationalize circular economy goals. This document concludes the project by reflecting on the findings of the previous analyses and identifying positive and negative factors in Toronto's context that help or hinder progress towards circularity in three focus sectors, but also for the community as a whole. This has been translated into proposed circular goals that could be measured and tracked via indicators.

There are a range of possible contributions all actors in the economy could make to support Toronto in attaining its circular goals. This highlights the systemic nature of the changes required to achieve a Circular Toronto and underscores the importance of collaboration to achieve impact. Cities hold the greatest potential to shift global consumption patterns from linear to circular, but municipal governments cannot achieve the transition alone. Coordinated effort of a diverse group of stakeholders is required across Toronto to meet circular goals. City efforts will have to be matched with a willingness to collaborate with non-government partners to break the inertia of dominant resource management systems.

The future of Toronto's circular economy will rely on each key stakeholder playing a part in the transition. Still, through circular action strategies, leading by example through public procurement, and connecting with key stakeholders, the City of Toronto can leverage its influence to take the next steps in accelerating the change towards circularity.

Photo by Marcin Skalij

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