BASELINING FOR
A CIRCULAR
TORONTO

LANDSCAPE ANALYSIS

Technical
Memorandum #1

August 20th, 2020

TORONTO

CIRCLE ECONOMY

DAVID SUZUKI FOUNDATION
One nature.

FONDATION DAVID SUZUKI
Un monde. Une nature.

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Glossary

Carbon dioxide equivalent (CO2e)
A carbon dioxide equivalent or CO2 equivalent (CO2e) is a metric used to compare the emissions from various greenhouse gases (GHG) on the basis of their global-warming potential (GWP) by converting amounts of other GHGs (e.g., methane, nitrous oxide) to the equivalent amount of carbon dioxide with the same GWP.[1] This metric enables the climate change impact of disparate emissions sources to be compared on equivalent terms.

Census Metropolitan Area (CMA)
A CMA is an area consisting of one or more adjacent municipalities situated around a major urban core. As defined by the Statistics Canada, CMAs must have a total population of at least 100,000, of which 50,000 or more live in the core.[2]

In Toronto, the CMA is often called "Toronto Region." It includes the City of Toronto and over 20 neighbouring municipalities (Mississauga, Brampton, Markham, Vaughan, Richmond Hill, Oakville, Ajax, Pickering, Milton, Newmarket, Caledon, Halton Hills, Aurora, Georgina, Whitchurch-Stouffville, New Tecumseth, Bradford West Gwillimbury, Orangeville, East Gwillimbury, Uxbridge, King, Mono, Chippewas of Georgina Island First Nation).[3] These municipalities vary in geographic size, population, urban form, socio-economic characteristics and cultural/ethnic diversity. The Toronto CMA data therefore aggregates information for Canada's densest urban area with that of rural municipalities and First Nations.

Circular economy
A circular economy is an economic system that aims to reduce the need for resource extraction by enabling the use of existing resources, re-using materials, retaining value of products in use for longer, and minimizing the creation of waste, pollution and carbon emissions.

The City of Toronto is pursuing a circular economy transition based on three core principles:

1. Limiting our carbon footprint, reliance on non-renewable resources and use of toxic substances

[1] Eurostat (2017). Glossary: Carbon Dioxide Equivalent. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Carbon_dioxide_equivalent

[2] Statistics Canada (n.d.). CMA and CA: Detailed definition. Retrieved from: https://www150.statcan.gc.ca/n1/pub/92-195-x/2011001/geo/cma-rmr/def-eng.htm
Note: To form a CMA, the metropolitan area must have a population of at least 100,000, at least half within the urban core.

[3] Statistics Canada (2012). Focus on Geography Series, 2011 Census. Statistics Canada Catalogue no. 98-310-XWE2011004. Ottawa, Ontario. Analytical products, 2011 Census. Retrieved from: https://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-cma-eng.cfm?LANG=Eng&GK=CMA&GC=535

2. Maximizing resource value of materials
3. Regenerating natural systems and designing out waste and inefficiency

Consumption-based emissions: An approach to estimating greenhouse gas emissions based on what is emitted over the lifespan of a good or service. Emissions are attributed to the consumer of that good or service (e.g. an individual, household or community), rather than the producer.

Global hectare
Global hectare (gha) is a measurement unit that defines the ecological footprint of people or activities related to the biocapacity of a geographic region (e.g., a city). If a population's (e.g. in a city) Ecological Footprint exceeds its region's biocapacity, that region runs an ecological deficit. A region in ecological deficit meets its needs by importing, liquidating its own ecological assets (such as overfishing), and/or emitting carbon dioxide into the atmosphere beyond what its own natural systems can absorb. In 2014, Canada's Ecological Footprint was 8.28 gha meaning on average, each Canadian required 8.28 gha to support their average lifestyle. Globally only 2.1 gha is available per person.

Greater Toronto Area (GTA)
The Greater Toronto Area (GTA) is a Canadian metropolitan area consisting of 25 adjacent suburbs and exurbs, grouped into five municipalities: the City of Toronto, Durham, Halton, Peel and York, the latter three defined as regional municipalities composed of a number of cities, towns, rural communities and traditional First Nations territories.[4]

IC&I waste: Solid waste generated by industry, commercial activities and institutions. In the Province of Ontario, waste generated from multi-residential buildings is also included under ICI source separation programs (Reg. 103/94). However, within the City of Toronto, waste generated from multi-residential buildings that receive waste collection services from the City is recorded against the City's residential categories when reporting on waste diversion.

Industrial symbiosis
The Ellen McArthur Foundation defines industrial symbiosis as local partnerships that can make circularity more accessible via the sharing and reuse of resources (i.e., exchanges of energy, water and materials in closed loops across industries). The purpose of industrial symbiosis is to create loops of technical or biological materials that keep resources in use for longer, maximize their resource value, minimize the leakage (loss) of resources from industrial systems and processes, and minimize the generation of waste in the loops.[5]

[4] City of Toronto (n.d.). The Toronto Region. Retrieved from: https://www.toronto.ca/city-government/accountability-operations-customer-service/get-involved-how-government-works/toronto-the-toronto-region/
[5] Ellen McArthur Foundation (n.d.). Effective Industrial Symbiosis. Retrieved from: https://www.ellenmacarthurfoundation.org/case-studies/effective-industrial-symbiosis

Production-based emissions: An approach to estimating greenhouse gas emissions based on what is emitted over the lifespan of a good or service. Emissions are attributed to the producer of that good or service (e.g. a factory, company or sector), rather than the end user.

Secondary materials
Materials that may be considered a residue, by-product or waste for one industrial activity but that could be a raw resource for another.

Service-producing industries
The North American Industry Classification System (NAICS) defines the service-providing industry as the super-sector group that consists of:[6]

- Trade, transportation and utilities (NAICS 42, 44-45, 48-49, 22)
- Information (NAICS 51)
- Financial activities (NAICS 52,53)
- Professional and business services (NAICS 54-56)
- Education and health services (NAICS 61, 62)
- Leisure and hospitality (NAICS 71,72)
- Other services (except public administration) (NAICS 81)
- Government

Technical services
This sector comprises establishments that specialize in performing technical activities for others, such as specialized design, computer and technical consulting services, among other activities that require a high degree of expertise and training.[7]

Urban metabolism: A collection of complex sociotechnical and socio-ecological processes by which flows of materials, energy, people, and information shape the city, service the needs of its citizens, and impact surrounding hinterlands. Urban metabolism typically refers to flows of materials but can also be applied to energy flows.

[6] U.S. Bureau of Labor Statistics (n.d.). Service-Providing Industries. Retrieved from: https://www.bls.gov/iag/tgs/iag07.htm#about
[7] North American Industry Classification System (NAICS)

Acknowledging Indigenous heritage

It is important to acknowledge the land we are referring to as Toronto is the traditional territory of many nations, including the Mississaugas of the Credit, the Anishinabek, the Chippewa, the Haudenosaunee and the Wendat and is now home to many diverse First Nations, Inuit and Métis. The City also acknowledges that Toronto is covered by Treaty 13 signed with the Mississaugas of the Credit, and the Williams Treaties signed with multiple Mississaugas and Chippewa bands.

Indigenous Peoples are contributors of knowledge, experience and perspectives that ought to be considered in developing sustainability strategies, including those specific to enabling circular economies. It will therefore be important to ensure spaces are provided to learn from Indigenous voices as Toronto progresses on its circular economy transition.

Many Nations around the Great Lakes Basin consider TKaronto (now known as Toronto) the “Dish With One Spoon Territory”. The One Dish with One Spoon Wampum (wämpəm) Belt Covenant is a treaty between a number of Anishinabek Nations and Haudenosaunee Nations that bound them to share the territory and continue the symbiotic relationship with our collective mother Turtle Island. We can all think more deeply on this treaty in the spirit of peace, friendship and respect and what this may mean for us, our friends, families, and communities. In defining its vision for a “circular Toronto,” the City of Toronto can work to ensure that the transition respects these connections and Wampum's that have been created.

Highlights

In early 2020, the City of Toronto initiated a research project to provide a baseline assessment of the state of its circularity. The initial step in the baseline assessment is production of a landscape analysis to establish a shared understanding of the current economic, policy/legislative and social conditions that may help or hinder the transition to a circular economy in Toronto.

The analysis identified the following elements of Toronto's economic landscape as areas of particular interest to circular economy objectives:

Construction: The construction sector is important in achieving a circular economy due to its prominence throughout Toronto, its expected future growth, the sizable throughput of materials and its impact on emissions and waste. Some businesses in the sector are involved in a number of initiatives that explore circular economy approaches like design for modularity and disassembly, showing good potential for innovation.

Waste management: Not surprisingly, waste management is at the centre of many of Toronto's circular economy efforts and a number of initiatives are underway to achieve the goal of "zero waste." Although data on waste, particularly non-residential and construction waste, has gaps that need addressing, actions to innovate and transform away from linear waste cycles are proceeding. This indicates commitment and readiness for acceleration.

Consumer goods: The consumer goods sector — including personal care products, household furnishings and equipment, and textiles — represents about one quarter of average household expenditures, has relatively high environmental footprints (for example, being significant contributors to the waste stream) and has good potential for high value applications and lifetime extension. A broad range of initiatives in Toronto to divert waste and shape more sustainable consumption behaviours are ideal for amplification and scaling.

The landscape analysis also surfaced examples that highlight Toronto's overall sustainability ambitions. Many common themes covered in existing municipal plans and strategies are already supporting circular actions. Similarly, efforts undertaken by the business sectors and residents are also contributing to circularity objectives. The research highlighted examples of circular economy momentum across sectors and scales such as:

Solid Waste Management Services has embraced circular economy thinking in much of their work, including a number of ambitious waste management policies found in the Long-Term Waste Management Strategy. This stands out as a strong signal of ambition to both residents and businesses alike.

As part of its TransformTO's climate action strategy, the City of Toronto has set goals to promote a low-carbon mobility and transportation system. This provides a policy and action space for circular economy principles to be incorporated in support of a broader mobility strategy that connects resource use, individual behaviour and innovative forms of mobility 'ownership'.

Toronto (i.e. government and private sectors) has been actively focusing on transforming the construction and built environment as a pathway to catalyze significant circularity impacts, considering the embodied carbon emissions associated with extracting and manufacturing construction materials, and the fact that these materials are typically landfilled rather than reprocessed and reused. The research highlighted seven circular economy initiatives within the sector in the Greater Toronto Area, indicative of an established awareness and commitments ready to be amplified.

Residents of Toronto are key consumers of goods such as clothing, household furnishings and equipment, food and beverage, plastic packaging, and paper products, which contribute a substantial part of their environmental footprint. The largest number of circular economy initiatives that the researchers have recorded focus on these types of consumer goods, showing that there is good momentum and engagement between the City, business and communities to expand and scale even further.

These areas of existing momentum helped highlight some specific circular economy opportunities:

Waste diversion in industrial, commercial and institutional sectors: The Long-Term Waste Management Strategy (2016) aims to achieve "70% diversion of materials collected (Green Bin, Blue Bin, garbage) from Industrial, Commercial & Institutional customers that receive City of Toronto collection services by Year 10." Addressing waste generated by those who do not use City of Toronto services presents a challenge as this may be considered beyond the municipality's scope of duties or outside its authority. It may also require different approaches for catalyzing change and engagement in these sectors beyond the scope of control and influence of Solid Waste Management Services waste management planning and policy activities. However, there is potential to address these waste streams by connecting large industry players to share data, educating them on options and technologies available for resource reuse, exploring the potential for establishing zones and infrastructures that facilitate industrial symbiosis, and creating demand for reused content from local suppliers through procurement guidelines.

Non-residential food waste: The Long-Term Waste Management Strategy (2016) aims to reduce the amount of food waste going to green bins, and to process that which is collected using state-of-the-art anaerobic digestion facilities, generating both green energy and high-quality compost. The food waste reduction strategy focuses on households, as the residential sector is the City of Toronto's primary

customer base. As such, the strategy does not include specific consideration to other sources of food waste managed outside of the City of Toronto integrated system. The Toronto Food Strategy (Toronto Public Health, 2018) includes a work stream called “Food System Waste” to encompass not only food waste from consumers but also at other levels like production, supply and distribution. Food Systems Waste and the Circular Economy were identified as themes for 2019, but it appears this is still under development and has potential to form a significant part of Toronto’s circular economy efforts.

Digital industries: Few of the policy and strategy documents reviewed made mention of digital products and solutions as a means of supporting more circular resource use in Toronto. With a strong IT sector, Toronto has the potential to become a world leader in collaboration with local businesses to address resource and waste challenges in new ways; for example, gathering local data or developing new business models that facilitate resource-sharing (e.g., growing and expanding online marketplaces for secondhand goods).

An examination of how City of Toronto powers interact with provincial and federal jurisdictions yielded key intervention areas that could help accelerate and enable a circular economy for Toronto. These include:

- **Land-use powers:** The City of Toronto has planning powers that can support protection of ecological systems, efficient use and conservation of energy and water, and provision and efficient use of transportation, sewage and water services and waste-management systems. The Official Plan (OP) is one of the City’s main tools for directing land use and development within its jurisdiction.

- **Zoning bylaws:** Zoning can be a powerful tool for fostering a broad range of circular initiatives by specifying location and space, usages and density. Municipal zoning bylaws could be used to regulate uses to permit urban gardens that can provide food, greenery and commerce to Toronto communities, enabling a regenerative local economy. Also, Toronto’s Green Roof Bylaw requires green roofs on large buildings.

- **Energy regulations:** The City of Toronto can play a variety of roles when it comes to energy regulation to support a sustainable and circular economy. It can regulate conversion of municipal vehicles fleets to alternative fuels and advocate for improved efficiencies in government building standards. The City can also play a role in assisting the Province in developing building energy codes and standards.

Outside policy, governance and business spaces, the current work highlights the level of involvement of Toronto residents with respect to issues of waste, wastefulness and unsustainable behaviours. Community-driven/community-led actions and initiatives are visibly tackling specific issues — from food, organic and textile waste to enabling repair and sharing of household goods. Many of the community initiatives captured in

this analysis show a wide variety of approaches being taken to address these topics, as well as some level of coordination and cooperation with the business community. This is indicative of a community already seeking to enable change and actively trying innovative approaches through community and business engagement and participation. While the researchers have documented around 80 initiatives, they are aware that there are likely many more not captured in this analysis.

In conclusion, the research and analysis conducted as part of the current work indicates that Toronto has strong existing commitments to, and demonstrated actions in support of, a transition to a circular economy. These commitments and actions are visible in the government sector as well as in the private and non-profit sectors. They are additionally supported by significant awareness from residents already implementing community-based actions. **The potential in Toronto for key material-intense sectors and individual and household behaviours to become increasingly circular is therefore already founded on strong building blocks for change.**

1 Introduction

1.1 Outline of Technical Memorandum #1

Technical Memorandum #1 provides a snapshot of the current state of Toronto related to enabling a circular economy. An examination of relevant current economic, environmental, social and policy conditions and parameters was undertaken. From the information and data gathered, a landscape analysis (Appendix A) was completed to understand the current state of circularity in Toronto and to help identify which three sectors could be prioritized for detailed analysis of material flows. The goal of the material flow analysis, which will be documented in future phases of the project, is to inform the most beneficial actions the City of Toronto could take in alignment with other key sustainability agendas to build and promote a circular economy. To this end, the landscape analysis focused on factors and common metrics that depict the current socio-economic landscape of Toronto in reference to circularity and preparedness for accelerating circular economy actions. These include factors and metrics such as employment, gross domestic product, environmental impact, policy and existing circular economy initiatives.

Technical Memorandum #1 and its appendices cover the following topics:

- A definition of what transitioning to a circular city could mean for Toronto
- An overview of Toronto's major economic sectors (Appendix A)
- A series of infographic representations of Toronto's socio-economic landscape (Appendix A)
- A summary and analysis of the policies and legislation that currently shape Toronto's level of circularity
- An inventory of all data used for this phase of the project (Appendix B)
- A cataloguing of local business, small-scale and personal/household circularity interventions that contribute to Toronto's circularity (Appendix C)
- A detailed guide for methodologies used to produce the components of this Technical Memorandum (Appendix D)

1.2 Integrating stakeholder input

Producing this report involved consideration of diverse sources of information, knowledge and data. It is a compilation of information gathered through stakeholder consultations as well as desktop research and analysis. As part of the project kick-off process in February 2020, representatives from 16 City of Toronto divisions gathered to identify and explore the current and planned actions by the City of Toronto that support circularity and a circular economy. The group also explored what has been particularly helpful to advance circular economy principles and what obstacles need overcoming. As part of the landscape research and analysis compiled in this report, the overall input and feedback provided by the initial stakeholder consultation served to guide the directions, meaning and relevance required to produce a context-relevant overview of the current state of Toronto with respect to circularity.

1.3 Impact of COVID-19 on the landscape analysis

The landscape analysis uses data and information that predates the onset of the global COVID-19 pandemic. As such, the analysis and interpretation presented in these documents relates to pre-pandemic conditions. Although the COVID-19 pandemic will have disruptive impacts on Toronto's economic activity, thus affecting material and energy flows over the short term, this does not negate the value of this landscape analysis as a contribution to forward-looking strategic and policy planning. The landscape analysis provides a baseline of circularity based on the actions and interventions possible before the pandemic in contrast to what the City of Toronto may elect to do to a highly disrupted system as part of post-pandemic recovery planning.

2 What becoming circular could mean for Toronto

The circular economy is a solution that advocates for a fundamental change in our current economic system, aiming to enhance the generation of human well-being without unsustainably depleting natural resources or exceeding the regenerative potential of ecosystems. Macro-economic studies have indicated the significant economic potential of the circular economy,[8] and thousands of practical business and policy initiatives are happening in cities and regions worldwide.[9]

Despite occupying just two per cent of Earth's surface, cities create impacts far beyond their boundaries. Urban activities consume about 70 to 75 per cent of global resources and account for 70 per cent of global greenhouse gas emissions.[10] With global urban populations expected to increase by a further 2.5 billion by 2050, accompanied by continued improvements to living standards, it is estimated that resource consumption

[8] McKinsey. Mapping the Benefits of the Circular Economy. June, 2017. Retrieved from: https://www.mckinsey.com/business-functions/sustainability/our-insights/mapping-the-benefits-of-a-circular-economy
[9] Circle Economy. Knowledge Hub. Retrieved from: https://circle-lab.com/knowledge-hub
[10] UNEP International Resource Panel (2013). City-level decoupling: urban resource flows and the governance of infrastructure transitions. Retrieved from: https://www.resourcepanel.org/reports/city-level-decoupling

of cities will more than double by the middle of the century.[11] For cities and regions, the circular economy is a way to significantly reduce waste, improve quality of life for citizens and foster growth for companies that spur clean and sustainable innovation, all while reducing resource dependency and environmental impacts.

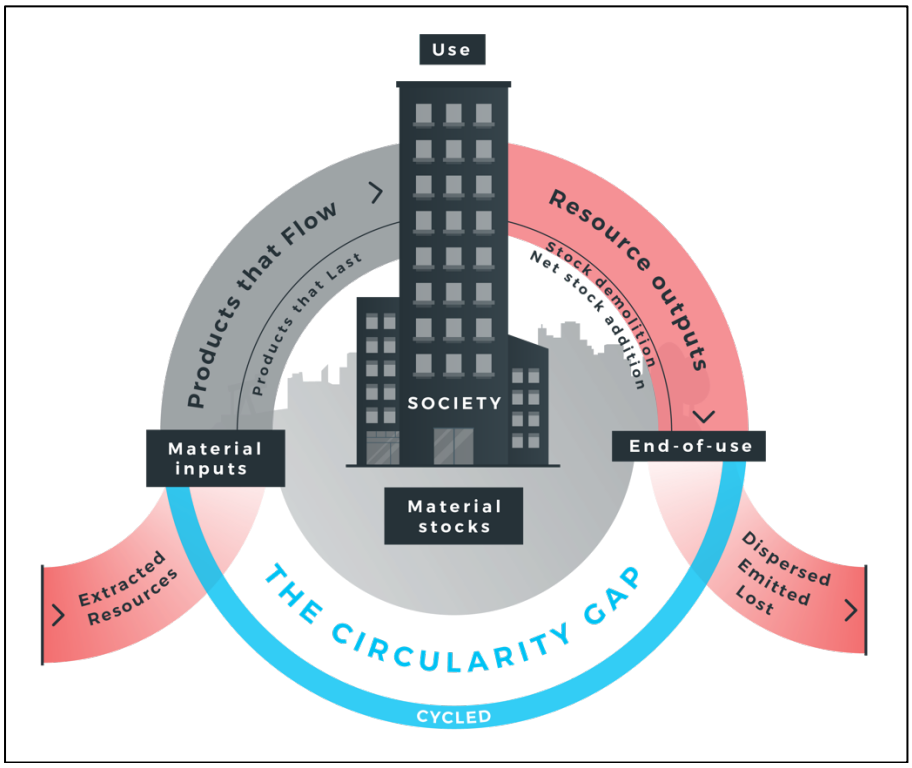

Figure 1: From take-make-waste to circularity: addressing the circularity gap.

A circular economy approach invites a variety of innovations across sectors and inspires lifestyle choices that lead to outcomes such as:

- Manufacturing sector and process industries that have designed out waste and pollution from industrial processes; keep materials in use over extended and interconnected product life cycles; extract significantly fewer primary resources from the environment; and respect, maintain, integrate and regenerate healthy natural systems.

- Governments, communities, households and citizens that have transitioned their procurement and/or purchasing practices to achieve low- and zero-waste

[11] UNEP International Resource Panel (2018). The Weight of Cities: resource requirements of future urbanization. Retrieved from: https://www.resourcepanel.org/sites/default/files/documents/document/media/the_weight_of_cities_full_report_english.pdf

consumption; and enable production trends that encourage new forms of material recycling and reuse to reduce overall dependency on raw materials.

- Cities, industries, communities, households and citizens that have adopted non-material-intensive practices and behaviours that enhance social well-being within ecological limits.

Each city is unique in terms of its local economy, ecosystem and cultures. It is therefore difficult to sketch what the ideal circular city would look like. However, taking the principles of a circular economy as a starting point, it is possible to imagine what increased circularity could mean for Toronto and its residents.

Housing and infrastructure: Buildings and infrastructure make up the vast majority of materials in cities. Toronto's built environment could be constructed from renewable, secondary and low-carbon materials. Elements of the built environment could be designed to be adaptable and easily deconstructed at the end of their life to enable reuse. This would greatly reduce new resource extraction and possible risks around commodity price volatility and import dependencies, while also significantly reducing the ecological footprint of materials Toronto uses for its built environment.

Mobility: Circular mobility could tap into new business models that enable much greater access to a variety of mobility options and dramatically reduce the need for personally owned vehicles. Ideally, all transport in Toronto, from personal to logistics, would be powered by clean and renewable energies. Such a system would generate wide environmental and health benefits such as reduced air emissions and pollutants, equitably expand accessibility to affordable transport options for residents, and allow for the design of more human-centric urban forms.

Food: All Toronto's residents could have access to healthy and nutritious food, more of which is produced locally. This could be enabled through new technologies and practices that minimize water and energy consumption. Avoidable food wastes can be eliminated, while all unavoidable food waste can be recycled or repurposed for other valuable applications, including, for example, food-production activities. A circular food system in Toronto could improve local food security, increase resilience to shocks like climate change and other emergencies, expand employment opportunities and contribute to soil and ecosystem health restoration.

Energy: A circular Toronto could be powered entirely by renewable energy sources, increasingly from smaller-scale and decentralized local production. The energy that is produced can be managed and distributed via smart systems to minimize energy losses and intelligently match supply and demand. "Waste energy" such as heat can be captured and recirculated as much as possible. The key benefits of a circular energy system for Toronto would include much greater

energy independence, minimization of emissions and wasted energy, and greater employment opportunities within the local energy system.

Water: Water use in a circular Toronto would be triaged according to quality requirements, such as using grey water for toilets, and ultimately it would flow in closed loops that minimize demand on freshwater extraction and maximize recovery of valuable resources like nutrients. A circular water cycle would generate numerous benefits for Toronto, such as reduced pollution and emissions, greater climate resilience and reduced import dependency on fossil-based chemical fertilizers for landscaping public spaces and possibly to support urban agriculture activities.

The researchers note that Toronto is a world class tourism centre. Each year millions of domestic and international tourists descend on Toronto for a variety of entertainment, vacation and conference offerings. This influx of visitors affects Toronto's annual material and waste flows and can result in longer-term impacts such as added pressure on solid waste management, energy consumption, water use, housing and accommodation and mobility/transport infrastructure. The current study (focused on circular economy readiness) does not single out the tourism sector per se, since the underlying municipal systems function whether or not visitors are present. However, tourism is an important contributor to the socio-economic landscape of Toronto and is a ubiquitous part of the strategies behind the economic activities that cater to visitors. As circular economy strategies are advanced across all sectors, those that intersect with tourism and visitor services might deserve additional attention that can help ensure the benefits of those strategies for residents includes contributions and actions done by and in support of visitors and tourists.

In conclusion, development of the City of Toronto's vision for a circular economy will greatly benefit from inclusive and participatory consultation and collaboration with Toronto residents, businesses and industry stakeholders, elected officials and neighbouring municipalities. This will help surface mutually desired outcomes expected from a circular transition and will embed a plurality of values and aspirations that reflect the diversity of Toronto. The *Baselining for a Circular Toronto* project marks the first phase of research and analysis to support development of a circular city vision for Toronto.

3 Analysis of the circularity landscape of Toronto

3.1 Introduction

The analytical portion of the current work presents an overview of key economic, environmental, social and policy information that will help establish a shared understanding of the current state of Toronto's economy and where opportunities or barriers might lie in accelerating a circular economy. This information and analysis aim

to support greater alignment between different departments within the City of Toronto in identifying priority areas for Toronto's transition to a circular economy. This section provides an overview of the socio-economic landscape as well as an analysis of the relevant policy landscape.

3.2 Summary of methodology and data implications

3.2.1 Socio-economic analysis

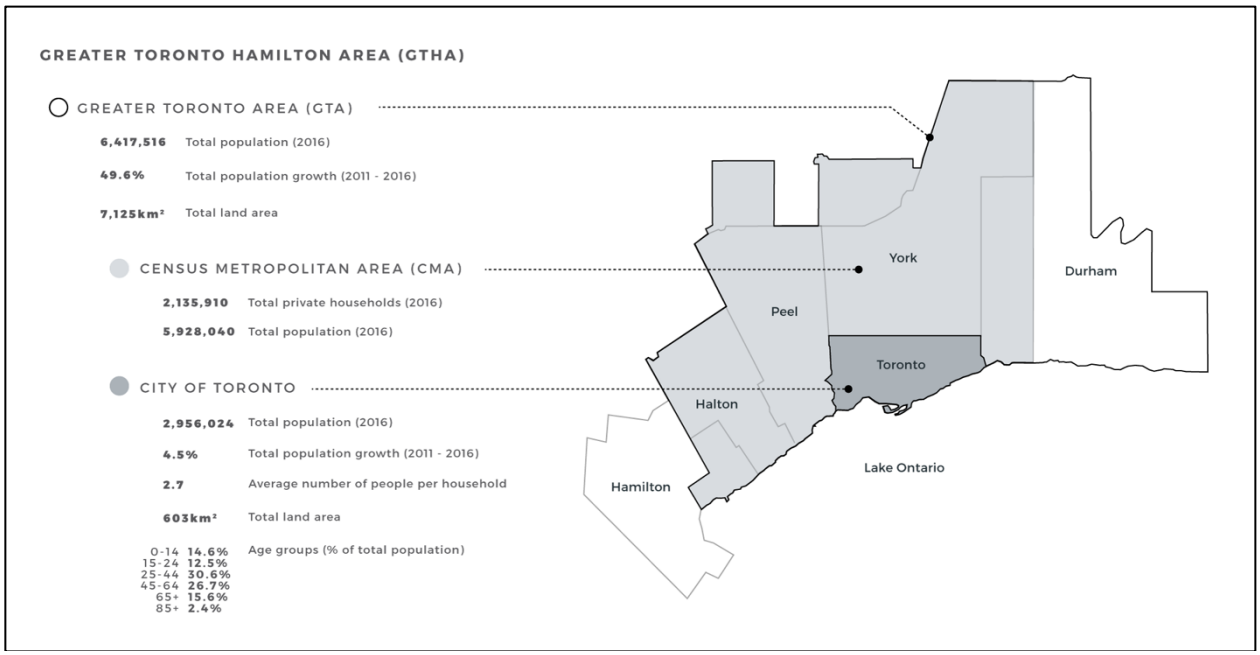

Figure 2: Map depicting geographic scope of the City of Toronto, Census Metropolitan Area (CMA) and the Greater Toronto Area (GTA) and including key demographics.

This socio-economic analysis is based on the most recent and relevant quantitative data and statistics that the researchers were able to access between January and June 2020. Where Toronto-level data were not available, the closest geographical level of data available (e.g., Toronto Census Metropolitan Area or the Greater Toronto Area) was used instead. Additional information from City of Toronto policy and strategic documents, reports from working groups and notes from the kick-off workshop in February 2020 were referenced to support the findings of the researchers. A methodology table can be found in Appendix D detailing the different research and methodological approaches applied for the production of each figure and table. The methodology table includes any assumptions made in the application of the respective methodologies.

The researchers encountered several data gaps that required the use of less optimal data to provide results. Table 1 summarizes data gaps and the solutions applied for the purposes of this analysis.

Table 1: Data gaps identified and solutions applied

Data Gaps	Solution
Gross Value Added (GVA) data for Toronto was not available.	Gross Domestic Product (GDP) was used instead of GVA.
Toronto labour data was categorized by North American Industry Classification System (NAICS) category name but not by code. Some of the category naming was inconsistent with standard category names.	NAICS category names were manually assigned to NAICS codes using the researchers' best judgement.
Emissions data categorized by NAICS category was not available.	2016 emissions data from C40 Cities was used, but it is categorized differently and is thus not comparable with NAICS categories.
Waste data categorized by NAICS category was not available.	Residential waste categorization for Toronto was used, but it was not possible to source comparable Toronto figures for other types of wastes.
The City of Toronto's waste data is limited to that pertaining to its own collection services. Private collections are estimated to be 1.5 times this,[12] but there is no data to better understand this significant portion of wastes generated.	Mention was made of the 1.5 factor in the text, but this was not used to estimate the total volume of private waste collections.

Despite data gaps that make direct sector comparisons for emissions and wastes impossible, the quality of the data available was sufficient to allow for key themes to be extracted, which is the main objective of the socio-economic analysis. However, there are important caveats to note with respect to the data used:

- GDP is not as useful to indicate which sectors generate the most value as GVA (Gross Value Added) because the numbers are influenced by trade subsidies and taxes.

- According to the source,[13] the calculation of GDP for Toronto is estimated from Ontario GDP and Labour Force Survey (LFS) employment data, and may differ from the GDP actually generated by Toronto.

- According to the source,[14] zero values for GDP represent suppressed data from Statistics Canada. The zeros for "Agriculture, forestry, fishing and hunting" and "Management of companies and enterprises" do not necessarily mean that these sectors do not generate GDP in Toronto.

[12] Ministry of the Environment, Conservation and Parks Ontario (2019). Reducing Litter and Waste in Our Communities: Discussion Paper. Retrieved from: https://prod-environmental-registry.s3.amazonaws.com/2019-03/Reducing%20Litter%20and%20Waste%20in%20Our%20Communities%20Discussion%20Paper_0.pdf
[13] City of Toronto. Real Annual GDP Estimates, Toronto City 2018. Online via https://www.toronto.ca/city-government/data-research-maps/toronto-economy-labour-force-demographics/
[14] City of Toronto. Real Annual GDP Estimates, Toronto City 2018. Online via https://www.toronto.ca/city-government/data-research-maps/toronto-economy-labour-force-demographics/

- GDP and labour contributions from the waste-management sector are difficult to identify because waste forms part of a sector called "Administrative and Support, Waste Management and Remediation Services," which has been included as part of "Other" in the GDP source dataset.

- The C40 carbon emissions data is categorized into slightly different sectors than were used for the GDP and labour analyses, and is thus not directly comparable.

- It is preferable to have all of the datasets categorized consistently to facilitate comparison. Typically, the researchers use downscaled national data to arrive at figures for emissions and wastes per sector. As Toronto is quite unique relative to the rest of the country, downscaled Canadian data was found to not be representative of Toronto and was abandoned in favour of alternative sources of emissions and waste data.

3.2.2 Policy and legislation analysis

The policy and legislative analysis consisted of a desktop review of key relevant acts, legislation, plans and strategies. The analysis examined municipal, provincial and federal levels, highlighting interactions and interdependencies. It summarizes how these interactions and interdependencies affect Toronto's current and future state, and its potential to advance circular economy-related plans, strategies and policies.

3.3 Socio-economic analysis at a glance

The detailed results of the socio-economic analysis are contained in Appendix A. At a glance, the analysis sought, gathered and analyzed key metrics on the local economy, including:

- Gross domestic product (CAD), which provides an indication of a sector's economic importance

- Total employment (number of jobs), which provides an indication of a sector's societal importance

- Total greenhouse gas emissions (tonnes CO2e), which provides an indication of a sector's contribution to climate change

- Total waste generated (tonnes), which indicates how much material the sector currently wastes that could potentially be put to better use

Based on the sectoral analysis of the sectors that contribute most to GDP, employment, greenhouse gas emissions and waste in Toronto, the following sectors have been identified as potential focus areas for more in-depth investigation:

1. **Construction:** As previously discussed in Section 2, the construction sector is important in achieving a circular economy because of its prominence throughout Toronto, its expected growth, the massive throughput of materials and its impact on emissions and waste. Some businesses in the sector are involved in a number of initiatives that explore circular economy approaches like design for modularity and disassembly, showing good potential for innovation. The researchers believe that gaining a clearer and more granular understanding of the material flows within this sector will help the City of Toronto better assess how and where the biggest steps can be taken to accelerate the circular economy.

2. **Waste management from sources not serviced by the City of Toronto:** Waste management is at the centre of many of Toronto's circular economy efforts, with a number of ways to achieve the zero-waste goal. Data on waste, however, particularly non-residential and construction waste, is not readily available or recorded. As this sector has such a pivotal role in achieving a circular economy, the researchers recommend that a material flow analysis be conducted to better understand the "metabolism" of waste from sources not serviced by the City of Toronto and what data gaps persist.

3. **Consumer goods** such as personal care products, household furnishings and equipment, and textiles together represent about one quarter of average household expenditure, have relatively high environmental footprints, are associated with a significant amount of packaging and have good potential for high value applications and lifetime extension. A broad range of initiatives exists in Toronto to divert waste and shape sustainable consumption behaviour. Further exploring the flow of consumer goods in and out of households could help build a quantitative understanding of the size of opportunities to accelerate circular business models and boost resource recovery.

3.4 Analysis of policy and legislation landscape

3.4.1 Role of municipal policy in accelerating a circular economy

An overview analysis was conducted to surface key insights into the City of Toronto's current priorities related to circular economy themes. Due to the large number of policies and strategies contributing to individual circular economy goals, the researchers identified common themes reflected in multiple documents, and connected these to the most relevant or influential sectors in Toronto's economy. This helps to generate a quick overview of where policy "blind spots" may exist, and what sectors are strategically important in driving the transition to a circular economy. Section 3 in Appendix A details the major findings of the analysis.

The analysis shows that the City of Toronto has considerable sustainability ambitions and is translating these into suitable policies and strategies that lead to action on the

ground. Many of the common themes (e.g., waste reduction and reuse) are aligned with those of a circular economy. The analysis highlighted the following areas of particular opportunity relating to circularity:

- **Waste diversion in IC&I sectors**: Addressing waste generated by actors that do not use municipal services presents a challenge for the City of Toronto, as this may be considered beyond its scope of duties or outside its authority, and may require alternative financing sources to the utility rate model that currently funds its waste management planning and policy activities. However, there is potential to influence change by connecting large industry players to share data, educating them on options and technologies available for resource reuse, establishing zones and infrastructures that facilitate industrial symbiosis, creating demand for reused content from local suppliers through procurement guidelines, etc.

- **Non-residential food waste:** The Toronto Food Strategy (Toronto Public Health, 2018) mentions that Solid Waste Management Services is developing a food waste reduction strategy that includes promotion and education efforts. A new work stream has been created called “Food System Waste” to encompass not only food waste from consumers, but also from production, supply and distribution. Food Systems Waste and the Circular Economy were identified as themes for 2019, but it appears that this is still under development and has potential to form a significant part of Toronto’s circular economy efforts.

- **Digital industries:** With a strong IT sector, Toronto has the potential to become a world leader in collaborations with local businesses to address resource and waste challenges in new ways; for example, gathering local data or developing new business models that facilitate resource sharing (e.g., online marketplaces for secondhand goods).

3.4.2 Interactions of municipal, provincial and federal policy

Circular economy is being embraced at different levels of government throughout the world. This section is intended to provide additional context by examining the policy and legislative priorities at the provincial and federal levels that relate to waste generation and management. This helps us better understand the potential synergies or tensions between municipal policies and the ambitions and frameworks being put in place by higher levels of government. Depending on the sectors selected for further study, opportunity may exist for future analyses to consider a broader range of strategies, policies, and legislation beyond waste generation and management in order to identify additional opportunities to achieve circular economy outcomes.

Table 2 lists key policies related to a circular economy for a variety of products, as well as plastics at the federal and provincial levels. The table summarizes the goals and current known status of each policy. The table indicates how the policies support Toronto’s circular economy goals and it also explores the policies’ limitations.

Table 2: Summary of federal and provincial policy and legislative directions

Federal/ provincial policy direction	Goals and current status	Supports and limitations for transitioning to a circular economy
Individual producer responsibility (IPR) transition (Provincial - Ontario)	• The rapidly evolving mix of printed paper and packaging (PPP) materials that end up in blue boxes throughout the province has challenged municipal collection programs for the past 15 years. Municipalities have found it harder to generate revenue from recycling these materials, and up to 30 per cent of what is put in the blue box can end up in a landfill.[15] • Ontario has undertaken an IPR transition to increase the amount of end-of-life recycling of PPP and other materials (including batteries, tires, electronics, etc.) by holding producers accountable for management of these materials at their end of life. The new system will provide producers with stronger incentives for design changes that improve recyclability of their packaging and products as the feedback loop is directly linked to individual producers. • The IPR transition is guided by the Waste Free Ontario Act, *2016* (WFOA), which contains two pieces of legislation: the Resource Recovery and Circular Economy Act, 2016, (RRCEA)[16] and the Waste Diversion Transition Act, 2016, (WDTA). • Regulations for tires and batteries under the RRCEA are in effect, but at the time of writing, the ministry is still at the consultation stage for blue box regulation. A	• A transition to a circular economy for PPP, as well as for other items such as tires, batteries, electronic equipment and MHSW, under the RRCEA, should improve diversion of these materials from the City of Toronto's landfill. It might allow Toronto to reinvest funds and human resources currently dedicated to diversion of these materials to its circular economy initiatives and zero waste programs (e.g., new reduction and diversion programs including litter prevention, abandoned waste or the elimination of disposal to landfill). • The province is not currently planning on an IPR transition for other materials frequently disposed by Toronto residents, such as textiles, carpets, mattresses, and construction, demolition, renovation (CRD) waste. A plan to improve the circularity of these consumer goods is also required in future years. • The IPR transition is unlikely to define collection and management targets and reporting obligations from the industrial, commercial and institutional sector for materials transitioning to IPR under the WFOA. As such, the levels of waste being diverted from landfill that result from multi-unit residential buildings not serviced by the City of Toronto, retail shopping establishments or complexes, office buildings and large demotion projects may continue to remain unknown and unchanged in the absence of such transparency. It is likely that the current state of

[15] Lindsay, D. "Reviewing the Bleu Box: Final report of the blue box mediation process." Retrieved from: https://www.ontario.ca/page/renewing-blue-box-final-report-blue-box-mediation-process

[16] Ontario (Current: December 2019). *Resource Recovery and Circular Economy Act, 2016*, S.O. 2016, c. 12, Sched. 1 ["***RRCEA***"]. Retrieved from: https://www.ontario.ca/laws/statute/16r12 .

Federal/ provincial policy direction	Goals and current status	Supports and limitations for transitioning to a circular economy
	draft regulation is expected in late summer 2020. • The RRCEA regulations on electrical and electronic equipment (EEE) and municipal hazardous or special waste (MHSW) are currently being drafted at the time of writing. • With respect to the blue box system, producers are to take full responsibility of provincial blue box programs over three years between 2023 and 2026.	regulation of this sector does not influence or incentivize the sector's transition to a circular economy.
Plastic waste reduction (federal)	• The federal government aims to designate plastics as toxic substances under the Canadian Environmental Protection Act (CEPA).[17] • The federal government indicated an intention to ban "harmful single-use plastics" but as of writing has not provided a final definition for plastics fitting in this category.[18] • Though COVID-19 is delaying the government's actions, it still aims to continue with a ban on plastics.[19] • In late January 2020, as part of the process necessary to list plastics as toxic substances under CEPA, the government released a Draft Science	• Once a substance is declared toxic under CEPA, the federal government has a variety of tools that can ensure products containing the substance are manufactured or designed[23] to reflect circular economy objectives, such as requiring post-consumer recycled content, or mandating reuse, recycling or repair instructions on labels.[24] These tools are unavailable to the City of Toronto as a municipal government. • A listing of plastics as toxic substances under CEPA could allow the federal government to include requirements similar to those under the EU Single-Use Plastics Directive[25] for manufacturing and design requirements, quantities and concentrations of post-consumer

[17] The Globe and Mail (March 2020). Ottawa Set to Declare Plastics as Toxic Substance. Retrieved from: https://www.theglobeandmail.com/canada/article-ottawa-set-to-declare-plastics-as-toxic-substance/ ; See also: *Canadian Environmental Protection Act, 1999* (S.C. 1999, c. 33) at Part 5 ["***CEPA***"]. Retrieved from: https://laws-lois.justice.gc.ca/eng/acts/c-15.31/;

[18] Global News (January 2020). Canada-wide Ban on Many Single-use Plastics on Track for 2021, minister says. Retrieved from: https://globalnews.ca/news/6484721/single-use-plastics-ban-canada-2021/ .

[19] CBC (May 2020). Canada's new climate targets, plastics ban likely to be delayed due to pandemic. Retrieved from: https://www.cbc.ca/news/technology/climate-plastics-covid-1.5574981?fbclid=IwAR1rqBSQLqN2_9RMIn-wanpXOtHEjnjplvES45XwIBGmML4L-5YiBLeRKGY&cmp=newsletter_Marketplace%20Watchdog_1284_29647 .

[23] See *CEPA, supra* at s. 93(1).

[24] *Ibid* at s. 93(1)q).

[25] EU. Directive 2019/904 on the reduction of the impact of certain plastic products on the environment. Retrieved from: https://eur-lex.europa.eu/eli/dir/2019/904/oj .

Federal/ provincial policy direction	Goals and current status	Supports and limitations for transitioning to a circular economy
	Assessment (DSA)[20] that determined "macroplastics" are harmful.[21] The DSA does not make a similar finding for microplastics. • The DSA also found that there was no significant evidence that biodegradable plastics fully degrade in the natural environment and no conclusive evidence as to the beneficial effects of biodegradable plastics on the environment.[22]	recycled content in products or packaging and labelling of products.[26] This directive is part of the EU's Circular Economy Action Plan[27] and presents an example of a possible pathway to a circular economy for Canada.
Ocean Plastics Charter (OPC) (federal/international)	• The OPC "lays the groundwork to ensure plastics are designed for reuse and recycling" by bringing together leading governments, businesses and civil society organizations to support its objectives and commit to taking action to move to a more resource-efficient and sustainable approach to the plastics management.	• The OPC presents the opportunity for international collaboration involving a variety of actors to achieve the goals of a circular economy. • Though it might be able to generate great action toward a circular economy at an international level, the OPC is non-binding on any of its signatories and does not guarantee they will take the necessary steps to achieve the OPC goals.
Canadian Council of Ministers of the Environment (CCME) harmonization (federal/provincial)	• Lays out a vision for plastics in a circular economy and defines areas of work to achieve the OPC ambitions. • Priority actions included extended producer responsibility, single-use and disposable products, infrastructure and innovation, public procurement and green operations, and incentives for a	• Harmonization of provincial waste management or zero waste policies on issues such as product design, collection systems, markets, recycling capacity, consumer awareness, research and monitoring is important to accelerating and streamlining action toward a circular economy. • Harmonized standards across cities, provinces and territories minimize

[20] Environment and Climate Change Canada & Health Canada (January 2020). Draft Science Assessment of Plastic Pollution. Retrieved from: https://www.canada.ca/content/dam/eccc/documents/pdf/pded/plastic-pollution/Science%20Assessment%20Plastic%20Pollution.pdf .
[21] *Ibid* at p. 8, 10 and 78
[22] *Ibid* at p. 27.
[26] *CEPA, supra* at s. 93.
[27] EU. First Circular Economy Action Plan: implementation of the first Circular Economy Action Plan. Retrieved from: https://ec.europa.eu/environment/circular-economy/first_circular_economy_action_plan.html .

Federal/ provincial policy direction	Goals and current status	Supports and limitations for transitioning to a circular economy
	circular economy, among others.[28] • Phase 2 consultations wrapped up in late January 2020, following the CCME's Phase 1 report.[29]	confusion and increase compliance with zero waste and circular economy policies.

Table 2 shows that the circular economy concept is already informing many facets of federal and provincial regulation, such as regulations that affect manufacturing, trading and distribution of products, and extraction of natural resources. The City of Toronto's actions to accelerate a circular economy should aim to maximize alignment with provincial and federal regulations.

3.4.3 Limitations on Toronto powers toward circular economy goals

The circular economy requires policies and laws that affect a variety of sectors, including natural resource extraction, manufacturing (e.g., product design, labelling, material compositions, etc.), supply chains associated with importing and exporting consumer goods, energy, construction and building standards, waste management and others. As a creature of its governing statute, the City of Toronto Act, 2006[30] (COTA), the City is restricted to exercising only those powers granted to it by the COTA, and it is unable to regulate with respect to many of the areas relevant to a circular economy that may be under federal or provincial jurisdiction under Canada's Constitution.

The power to regulate the flow of trade generally in Canada, as well as across provincial or international boundaries, remains with the federal government.[31] It also has jurisdiction over other areas relevant to a circular economy, such as commerce, bankruptcy, banking, patents and copyrights. Other areas relevant to a circular economy, such as natural resources, property and civil rights within the province, fall under the jurisdiction of the provinces under Canada's Constitution.[32]

[28]Canadian Councils of Ministers of the Environment. Canada-wide Action Plan on Zero Waste: Phase 1, 2019. Source: http://www.ccme.ca/files/Resources/waste/plastics/1289_CCME%20Canada-wide%20Action%20Plan%20on%20Zero%20Plastic%20Waste_EN_June%2027-19.pdf .
[29] *Ibid*.
[30] Ontario (current: March 2020). *The City of Toronto Act, 2006,* S.O. 2006, c. 11, Sched. A. Retrieved from: https://www.ontario.ca/laws/statute/06c11 ["***COTA***"].
[31] *Ibid* at s. 91(2).
[32] *The Constitution Act, 1867*, 1867 c. 3. Retrieved from: https://laws-lois.justice.gc.ca/eng/const/page-1.html; see s. 92(13).

Although the City of Toronto has broad powers to regulate to "provide any service or thing that the City of Toronto considers necessary or desirable for the public,"[33] the matters over which it can exercise its powers are limited. The City of Toronto can regulate, for example, with respect to public assets as well as services and things it is authorized to provide (including waste management). It can also regulate with respect to the economic, social and environmental well-being of Toronto, including respecting climate change, for the protection of persons or property, including consumer protection. It can also license businesses.[34]

Toronto also faces limits in its revenue-raising powers,[35] which must be considered in its decisions to allocate financial resources. These restrictions may result in the City of Toronto providing certain circular economy innovations in partnership with other orders of government or with the private or non-profit sectors.

These restrictions must be considered when determining Toronto's actions toward a circular economy in order to focus Toronto's work on regulating those areas over which it has statutory powers. For example, Toronto's licensing powers explicitly restrict it from licensing manufacturing or industrial business, the sale of goods by wholesale and the generation, exploitation, extraction, harvesting, processing, renewal or transportation of natural resources.[36] This limitation means for example, that Toronto cannot use its licensing powers to require that new products be manufactured so as to contain circular features such as modules that can be reassembled into new products at later dates.

On the other hand, despite federal regulation in the area of competition, courts have held that Toronto can consider and regulate competition within the City if it is acting to further a genuine municipal objective, such as minimizing nuisances, noise or to ensure the health and safety of its residents.[37] For example, courts have upheld Toronto by-laws that placed criteria on the registration of limousine licenses, including limiting the age of vehicles eligible for licensing, prescribing minimum fare requirements, and regulating pick-up times and locations. This regulation had the effect of preventing the limo industry from being flooded with additional operators, which could have had potentially detrimental effects on the public and the municipality.[38]

Therefore, the extent of Toronto's powers to regulate the activities of business and in areas related to the circular economy are not obvious and must be studied carefully to determine the best use of Toronto's powers regarding its circular objectives. A variety of policy initiatives and legislative enactments influence the extent of these powers. They include the EPA, RRCEA, Planning Act, Building Code Act and others.

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[33] *COTA, supra* at s. 8(1).
[34] *Ibid* at s. 8(2).
[35] A Discussion of Public Policy Revenue Tools under the City of Toronto Act, 2006," City of Toronto Corporate Finance Division at 1, March 2007.
[36] *COTA, supra* at s. 89(1).
[37] *Toronto Livery Association v. Toronto (City),* 2009 ONCA 535, 2009 Carswell Ont 3714 at para. 84 (Ont. C.A.).
[38] *Ibid* at para. 46.

3.4.4 Possible tools to accelerate Toronto action toward a circular economy

Although a more in-depth study would be required to determine all the legal and policy tools available to the City of Toronto in its transition to a circular economy in light of the federal and provincial policy directions, and in light of the limitations on Toronto's powers under the COTA, there are areas within Toronto's powers that may assist it in its circular economy transition:

- **Land-use powers:** A key municipal power is over land use. The provincial Planning Act[39] and City of Toronto Act[40] grant the City some planning powers that support protection of ecological systems, efficient use and conservation of energy and water, and provision and efficient use of transportation, sewage and water services and waste management systems. The Official Plan is one of the main tools at the City's disposal for directing land use and development within its jurisdiction.[41] Circular economy goals could be further advanced in this plan, which currently directs that public and private city-building activities will be environmentally friendly based on addressing environmental stresses caused by the consumption of natural resources. For example, by reducing: the amount of solid waste requiring disposal in landfill and by promoting programs for reducing, reusing, recycling and composting; consumption of water and generation of wastewater; energy consumption and greenhouse gas emissions; and reliance on carbon-based fuels for energy.[42] These measures reduce Toronto's reliance on natural resources and can be expanded on to facilitate a transition to a circular economy.

- **Zoning by-laws:** Zoning by-laws are authorized by Section 34 of the Ontario Planning Act. Zoning can be a powerful tool for permitting and regulating land uses, as well as establishing standards for buildings and structures. Zoning by-laws may comprehensively regulate land use and development across the entire municipality or within a specific area of the municipality. Zoning by-laws may facilitate a broad range of circular initiatives by regulating the type of construction and the height, bulk, location, size, floor area, spacing, character and use of buildings. Municipal zoning by-laws could also be used to regulate uses to permit urban gardens that can provide food, greenery and commerce to Toronto communities. Toronto's Green Roof Bylaw requires green roofs on large buildings. Cities could also include regulations setting separation distances, as is common with respect to the regulation of agricultural activities. Together, permissive zoning regulations would facilitate shorter supply chains for

[39] Ontario (current: April 14, 2020). *Planning Act*, R.S.O. 1990, c. P.13. Retrieved from: https://www.ontario.ca/laws/statute/90p13 ["***Planning Act***"].
[40] Ontario (current: July 3, 2020). *City of Toronto Act*, 2006, S.O. 2006, c. 11, Sched. A. Retrieved from: https://www.ontario.ca/laws/statute/06c11
[41] City of Toronto (February 2019). Official Plan: Consolidated. Retrieved from: https://www.toronto.ca/wp-content/uploads/2019/06/8f06-OfficialPlanAODA_Compiled-3.0.pdf .
[42] *Ibid* at chap. 3.4.1.

sustainably farmed produce and animal products for Toronto residents therefore increasing circularity.

- **Other planning tools:** In certain cases, municipalities can enter into development agreements with developers over a range of aspects of a proposed development.[43] Site plan controls can be used for a number of sustainability purposes, including requiring sustainable design features on the façade and roofs of buildings.[44] Toronto currently requires Toronto Green Standard sustainable performance measures through the planning process, which includes measures for storage and collection of recycling and organic waste, building reuse, construction waste management, and sustainable building materials. Future studies should explore additional mechanisms that may be available to the City of Toronto, including the development permit system to impose criteria and conditions.

- **Energy regulations:** Toronto can play a variety of roles when it comes to energy regulation, such as conversion of its vehicles fleets to alternative fuels, advocating for improved efficiencies in provincial building standards, and in assisting the Province in developing building energy codes and standards.[45] Through the planning process, Toronto requires a number of sustainable performance measures as part of Toronto Green Standard Tier 1 requirements, including the submission of an energy model to demonstrate higher level of energy performance for new construction.

4 Local initiatives contributing to Toronto's circularity

4.1 Introduction

As part of the landscape analysis detailed in Section 1.2 Appendix A, researchers identified a number of efforts by residents, local businesses, non-profits and social enterprises that contribute to circularity in various ways. Assessing actions and contributions of local companies/non-profits/social enterprise and initiatives by residents provides important insights into the degree to which non-government-led activities are already underway, which sectors they are most active in and how well they have established themselves. It also provides insights into how local businesses are innovating, what (positive) effects they have had and where there could be potential for further action. Appendix A details the results of a scan of local businesses and community initiatives and insights into how they contribute to accelerating a transition to a circular economy.

[43] *Planning Act, supra* at s. 37.
[44] *Ibid* at s. 41.
[45] Northey, R. "The Role of Municipalities in Canada's Energy Strategies", 25 J. Env. L. & Prac. 135.

Complementary to the analytics contained in Appendix A, this section provides:

a) A reference catalogue of the initiatives that were identified. The catalogue includes primarily efforts, initiatives and business and community actions that have an effect on Toronto's circularity even if some of listings represent efforts and actions that service or have impact beyond Toronto's municipal borders.
b) A reference catalogue of some notable groups and organizations focused on awareness-raising, education and advocacy in support of Toronto's circularity.
c) A profile table of type of individual actions anecdotally known to be undertaken by Toronto residents and how those contribute to Toronto's circularity.

The catalogues listed in this section were intended to provide a snapshot of the current state within the community to inform future planning and strategy. The City of Toronto could consider a more comprehensive approach to capture a more holistic picture of initiatives and communicate them to the public and businesses in order to amplify circular economy actions and encourage development of more circular initiatives.

4.1.1 Catalogue of local businesses, not-for-profits, social enterprises and community-led efforts contributing to Toronto's circularity

Appendix C, tables 1a, 1b, 1c and 1d, are a catalogue of local businesses, not-for-profits, social enterprises and community-led efforts that have implemented actions that contribute to Toronto's circularity. The catalogue describes in general terms the qualitative effects of each listing.

The listings included clearly depict trends of actions that promote waste reduction and diversion strategies across all forms of initiatives identified (i.e., business, non-profit, community action). For the most part, local initiatives tend to focus on changing individual behaviour by offering alternative choices, guidance and education. Food waste stands out as a recurring theme and often touches on the single-use packaging issue associated with food. There is a clear drive to eliminate food waste, which is likely amplified by social drivers such as poverty alleviation and nutrition security. Efforts to reduce food packaging have likely benefited from heightened awareness about the environmental impacts of unnecessary and single-use plastics. Additionally, local initiatives (especially community and volunteer-driven) that focus on repairing, repurposing and sharing are often connected with participatory initiatives that seek to bring people together for social connection and interaction. Some business-to-business listings aim to promote the business benefits of improved energy efficiency and circularity and sustainability in design and building.

4.1.2 Overview of advocacy organizations and volunteer-based groups promoting a circular Toronto

Transitioning to a circular economy involves the support of organizations that can advocate for change, provide education and support and serve to enhance awareness and motivation of different audiences. The researchers identified a number of Toronto-focused organizations and volunteer-based groups providing specific actions and support that contribute to the necessary shifts from individual behavioural and mindset scales to systemic and policy levels. Appendix C, Table 2 presents a list of Toronto-focused organizations and volunteer-based groups and the types of actions and support they provide.

Toronto's circularity journey also benefits from provincially and nationally focused advocacy as well as private sector–focused efforts involving large companies. Groups like the Circular Economy Action Lab, UN Global Compact Canada, Canada Green Building Council, National Zero Waste Council, Ontario Waste Management Association and many more advocate for high-level systemic changes that can benefit Toronto's circularity. However, for the purposes of this analysis, Appendix C, Table 2 includes listings that are known to include some Toronto-specific actions.

4.1.3 Profile of personal/household actions that contribute to Toronto's circularity

In parallel with the actions that local businesses, not-for-profits, community organizations and organized partnerships are taking to contribute Toronto's circularity, the actions individual residents can take will play an equally significant role. Enabling a circular economy requires changes in how a city provides for the material needs of its residents as well as how residents choose to have those needs met — how they consume. Table 3 below outlines the kind of individual and household actions that affect the amount of waste generated by our lifestyles. Waste in this context is defined as any form of material, solid waste, as well as energy, water and broader carbon waste.

For each listed action, a description of the qualitative effects of those actions is provided, along with a link to a local resource that can provide initial information. The actions listed in Table 3 are the product of a desktop search of actions Toronto residents are already taking, including some actions directly supported by City of Toronto through funding grants. Although examples of such actions can be found throughout Toronto, their cumulative impact on the overall circularity of Toronto remains limited. Determining best pathways to amplify the cumulative impact of such personal and household actions would be of significant value as the City of Toronto defines its circularity strategy.

Effects of individual actions on circularity can be broken down in different ways. From a reuse perspective, effects on circularity can be described in terms of how long people choose to keep certain goods instead of discarding them to purchase the latest version. From a nature-based perspective, the effects on circularity can be described in terms of

the potential of action to reduce ecological footprint and/or to regenerate natural systems. For example, many people committed to zero/low-waste lifestyles refer to their desire to get rid of packaging waste when they buy goods or food. We therefore focused on capturing circularity effects in terms people relate to the most when it comes to inspiring action.

The list below does not imply that every resident is able to undertake such actions in the same manner or even at all. Equity, accessibility, gender and racial biases are some of the barriers that can prevent well-intentioned people from being able to adopt circular practices. Although anecdotally the actions listed are exemplified by Toronto residents, it is important to note that future work contemplated by the City of Toronto to enhance and expand such actions will greatly depend on applying an equity lens that can ensure broad participation opportunities and help fairly and collectively distribute the benefits of a circular economy.

Table 3: An overview of effective personal/household actions that contribute to Toronto's circularity.

Type of action	Description	Qualitative effect of action	Local information resource
Backyard composting/ Condo composting	Compost is a natural fertilizer and soil conditioner. It can be made at home from organic materials such as kitchen scraps and garden waste.	Reduces the amount of garden and food waste put at curbside (and ending up in waste stream).	https://www.evergreen.ca/downloads/pdfs/Backyard-Composting-Guide.pdf https://www.highrises.com/guide-to-apartment-and-condo-composting.php
Zero-waste shopping/ consuming	From package-free groceries to package-free goods, zero-waste shopping empowers individuals to reduce waste through their consumption behaviours, pressuring producers and sellers to change their practices as well.	Significantly reduces the amount of solid waste generated from unnecessary, single-use packaging material.	https://environmentaldefence.ca/2019/05/17/nine-tips-zero-waste-grocery-shopping/
Buy less	Unnecessary material consumption is one of the biggest contributors to solid waste. Transition from disposable consumption to responsible, durable consumption can transform deep-rooted behaviours.	Reduces every form of solid waste material in the waste stream. For locally produced unnecessary and single-use products, reduces the energy waste in their production.	http://zerowastetoronto.org/ https://www.storyofstuff.org/movies/story-of-stuff/
DIY household and hygiene products	Torontonians can safely produce non-toxic household and basic hygiene products with ingredients derived from sustainable, low-waste,	Reduces waste generated from single-use packaging.	https://www.cbc.ca/life/the goods/get-a-chemical-free-clean-with-these-all-natural-diy-cleaners-1.4015291

Type of action	Description	Qualitative effect of action	Local information resource
	sometimes closed-loop sources.		https://davidsuzuki.org/wp-content/uploads/2017/10/queen-of-green-green-cleaning-recipes.pdf https://davidsuzuki.org/queen-of-green/how-to-make-non-toxic-deodorant-and-lip-balm/
Refusing unnecessary printed media	From printed bills and banking statements to printed advertisement flyers in our mailboxes, much printed material in our daily lives is now unnecessary. Going responsibly digital affects the amount of household waste we generate.	Significantly reduces amount of paper entering the recycling and waste streams.	N/A
Implementing repair, reuse, repurpose in the home	Many things around the home can be repaired or repurposed. And as part of the sharing economy, what is no longer useful to one person can be of use to another.	Reduces waste from disposal of still useable products or materials that can be repurposed or upcycled.	https://repaircafetoronto.ca/
People- and community-focused sharing economy	From getting a library card to joining a tool library to exchanging services in a timebank to donating or exchanging household items and goods, participating in the share economy is on the rise.	Sharing instead of buying comes in many different forms and covers many different goods and services. As a result of increased sharing, waste generated by disposal of either single-use or still useable products is reduced.	https://sharingdepot.ca/ https://torontotoollibrary.com/
Installing a green roof	Homeowners can convert their rooftops to green, living roofs.	In addition to human and environmental health benefits, green roofs reduce energy use (act as an insulator) and can reduce water use (if connected to a rainwater-harvesting scheme).	https://www.c40.org/case_studies/city-of-toronto-s-eco-roof-incentive-program-and-green-roof-bylaw
Household solar installation	Solar PV systems convert sunlight into electrical energy.	Reduces the amount of carbon-intensive electricity consumption, thus helping to reduce carbon footprint and air pollution.	https://www.torontohydro.com/grid-connections/solar-pv
Household energy-efficiency retrofits	A significant portion of our individual carbon footprint is related to our homes; the need to heat and cool; lost energy due to poor insulation.	Reduces carbon footprint by reducing electricity consumption.	https://www.torontoenvironment.org/retrofits_video https://www.toronto.ca/services-payments/water-

Type of action	Description	Qualitative effect of action	Local information resource
	Retrofitting older homes and/or designing newer homes with responsibly sourced materials significantly affects energy use.		environment/live-green-toronto/lets-transformto-together/
Rewilding lawns	In Toronto, the main "lawn rewilding" actions have been for food and/or pollinator-friendly gardens. Xeriscapes (water-wise gardens) and meadowscapes are other options that can contribute to reduced water use.	Reduces water consumption that depends on city infrastructure – less pressure on watershed source. Reduces food waste (if "food forest" option selected and when combined with backyard composting.	https://davidsuzuki.org/queen-of-green/get-yard-off-grass/
Buying local	Buying local covers food, fashion, household goods and any other necessity that can and is being designed and produced locally.	Reduces carbon footprint; reduces waste from packaging (if paired with zero- to low-packaging options); enhances social and cultural values and resilience.	https://www.toronto.ca/services-payments/water-environment/live-green-toronto/rethink-food/local-food/
Active mobility	The choices people make with respect to getting around the city have a big impact on local carbon emissions and air quality. Walking, cycling, skateboarding and pedal scooters are all modes of active transport that can transform how we get around, providing clear health and circularity benefits.	Reduces personal carbon footprint; reduces air pollution; enhances health.	https://www.cycleto.ca/ http://canadawalks.ca/about/benefits/
Local banking	How people bank has a direct effect on the macro trends that incentivize the linear economy. Local not-for-profit banks and cooperative credit unions are more aligned to personal needs and local norms.	Can disincentivize linear economic activity and incentivize low-waste, low-carbon, circular and local economic activities.	https://vancitycommunityinvestmentbank.ca/ https://www.independent.co.uk/money/spend-save/earth-day-environment-fossil-fuels-banks-switch-banking-a9475681.html
Political action and civic engagement	Expressing views that promote circularity by reaching out to decision- and policy-makers at every level has the biggest potential for long-term and more permanent change.	Can lead to long-term structural changes needed to permanently shift to low-waste, circular economies.	N/A

4.2 Observations and insights on local initiatives

The Toronto circularity landscape is well populated with a variety of initiatives seeking to help transform business and enterprise, personal and household choices and behaviours as well as the more systemic changes needed at the governance level. The listings provided in this section demonstrate clear motivation and intent across sectors and at the community and individual level. Such actions and initiatives are indicators that Toronto, as a community, is already on a transition journey with government, business and residents already clearly recognizing the wastefulness of a linear, throw-away economy. It also demonstrates that Toronto, as a community, is realizing that a transformation to a collectively beneficial circular economy is possible and happening. The presence of such a variety of actions and initiatives already in progress (and with many already supported by the City of Toronto) indicates that although the incubation of innovative and transformative ideas will always be of value, Toronto and Torontonians are poised for an acceleration of the change already started.

5 Reflections on the state of Toronto's readiness for circular economy

The landscape analysis presented in this document was conducted to provide a shared understanding of Toronto's current landscape, including the character of its local economy, policy and legislative landscape, household consumption patterns and existing circular economy initiatives. When brought together, this information helps guide an informed discussion about the opportunities and barriers in the transition toward a circular economy. This section summarizes the key take-aways with respect to the state of Toronto's readiness for a circular economy transition.

The most salient observation is a recognition of the City of Toronto's commitment to circular economy thinking and principles. This is exemplified by a number of ambitious waste management goals and objectives found in the Long-Term Waste Management Strategy and TransformTO. At a city governance level, these stand as a strong signal of ambition to residents and businesses. This alone creates a key enabling environment for Toronto. However, achieving the goals of waste avoidance and diversion requires accurate monitoring of the flow of resources. The researchers have found that very little data is available about waste flows within the IC&I sector, yet it is estimated that, in Ontario, IC&I waste (including construction and demolition waste) is approximately 1.5 times the volume of residential waste, and about 83 per cent of the IC&I portion ends up in landfills[46]. This lack of data availability is a barrier to the critical steps needed for a transition to a circular economy. Better monitoring and data could provide a notable opportunity for Toronto's path toward a circular economy.

[46] Ministry of the Environment, Conservation and Parks Ontario (2019). Reducing Litter and Waste in Our Communities: Discussion Paper. Retrieved from: https://prod-environmental-registry.s3.amazonaws.com/2019-03/Reducing%20Litter%20and%20Waste%20in%20Our%20Communities%20Discussion%20Paper_0.pdf

From a city-economy lens, material-intense sectors such as construction and real estate, as well as consumer goods and retail, stood out as not only being important from a waste-generation perspective, but also as sectors already active in attempting to find circular solutions. The construction and real estate sectors are by all measures a significant presence in the city-scape. The City of Toronto's ability to incentivize actions that contribute to circularity and penalize uncircular actions offers a natural intervention point around how, in collaboration with developers, the future of Toronto's construction and real estate sectors might evolve. Some developers are already involved in a number of initiatives that explore circular economy approaches, like design for modularity and disassembly, creating important potential for innovation.

The retail sector, which manages the distribution and sale of consumer goods, including personal care products, household furnishings and equipment, and textiles, represents about one quarter of average household expenditure, has relatively high environmental footprints (for example, being significant contributors to the waste stream) and has good potential for high-value applications and lifetime extension. At an individual and household scale, Torontonians have increasingly voiced concerns about wasteful personal consumption and how change needs to be accelerated. Over 70 initiatives were identified that demonstrate how local businesses, non-profits and community-led efforts are enabling circularity in Toronto in areas such as food waste, unnecessary packaging, and repairing, making, repurposing and sharing/exchanging household goods. The intersection between manufacturing, retailing and purchasing of wasteful products (e.g., products with unnecessary packaging) seems poised for solution-oriented transformation. Consumer pressure on retailers can push up to producers, creating a virtuous cycle of change leading to desirable, circular outcomes. At the provincial level, Ontario is home to the highest concentration of manufacturing activity in Canada. Production of consumer goods (i.e., clothing, household furnishings and equipment, food and beverages, etc.), plastic packaging, paper, and metal for the automotive industry stand out.[47&48] Toronto residents are key consumers of these products, which make up a substantial part of their environmental footprint. The largest number of circular economy initiatives illustrated by the current research focuses on consumer goods, showing good momentum and engagement between businesses and communities to expand and scale much further.

The prevalence of local actions by businesses, community groups, residents and Toronto-focused education and advocacy organizations is another strong indication that critical building blocks and a strong foundation for amplified and accelerated action is present. A successful circular economy transition cannot be a unilateral, top-down action. It depends on participation, co-creating and instilling a common and collective sense of ownership. Toronto's culture of engagement, diversity, inclusivity and civic action with respect to decision-making that that affects the well-being of its residents

[47] The Canadian Encyclopedia (2006). Manufacturing in Canada. Retrieved from: https://www.thecanadianencyclopedia.ca/en/article/manufacturing
[48] Government of Canada (2020). Summary – Canadian Industries Statistics: Manufacturing. Retrieved from: https://www.ic.gc.ca/app/scr/app/cis/summary-sommaire/31-33

offers a strong starting point for a circular economy transition. Though much work needs to be done to address issues of equity and justice, the relative awareness of such disparities may allow Toronto to shape early on how its circular transition can be designed in a way that addresses the well-being of all residents.

In summary, the level of effort relevant to circularity already progressing in the Toronto landscape indicates a solid state of readiness with respect to enabling and accelerating a circular economy transition. With commitments and engagement visible across all sectors and scales, Toronto is well-positioned to take significant steps away from a wasteful and linear economy toward one that delivers real well-being within the limits of natural systems. Key economic sectors are already taking action and are clearly motivated to take more, in partnership and collaboration. Amplifying current actions and aspirations will provide strong building blocks for a circular Toronto.

Although beyond the scope of the current work, the researchers note that efforts to advance waste management, circularity and other sustainability strategies should amplify efforts that aim to improve collective economic prosperity, social justice and environmental resilience for all residents. This landscape analysis, representing a key step in developing a circularity baseline, examines information, models and a mix of qualitative, semi-quantitative and quantitative data to provide a snapshot of Toronto in relation to circularity. The lived reality of Toronto residents is, of course, much more nuanced and complex. The transition to a circular Toronto will benefit from an acknowledgement and consideration of the Indigenous ancestors' wisdom, and what has been passed down through the blood lines and storytelling to Urban Indigenous Nations, persons, and communities.

Tkaronto's unique cultural diversity and the effects of different social disparities and gender inequalities should inform and provide a lens for this work. For instance, through its efforts to define and achieve its circular economy objectives, the City of Toronto can embed in its transition actions that are named in the recommendations of the Truth and Reconciliation Commission[49] and the City of Toronto's statements of commitment to Indigenous Peoples.[50] A circular economy approach for Toronto must not come at a cost of persons and communities who are disproportionately disadvantaged and marginalized by current systems and conditions. The City should also recognize that many of these persons and communities face challenges participating in City work and accessing City resources which are structurally designed to benefit some over others.

A transition to a circular economy can, when well-informed and intentionally designed and implemented, be a vector for increased inclusivity, accessibility, participation, actions, and collective prosperity and opportunity. The current work strives to ensure that a circular economy approach for Toronto is applied in a way that amplifies the

[49] The Truth and Reconciliation Commission of Canada (2015). Calls to Action. Retrieved from: http://trc.ca/assets/pdf/Calls_to_Action_English2.pdf

[50] City of Toronto (2015). Commitments to Indigenous Peoples. Retrieved from: https://www.toronto.ca/citygovernment/accessibility-human-rights/indigenous-affairs-office/commitments-to-indigenous-peoples/

aspirations of all residents and reflects the values outlined in the City of Toronto's various statements, commitments, and declarations on accessibility, excellence, anti-racism, and human rights.[51]

[51] City of Toronto (2017): 2015-2018 Strategic Plan Equity, Diversity and Human Rights. Retrieved from: https://www.toronto.ca/wp-content/uploads/2017/07/976f-A1503399_Strat_Plan_web.pdf

Appendix A – Detailed Landscape Analysis

Appendix B – Data inventory

1 - Reference table for all data used for the landscape analysis (Appendix A).

Name	Source Institution	Source Description	Data Unit / Format	Source Link	Citation	Location of Raw Data in project file
Appendix A Figure 2: Key demographics of Toronto at a glance	Statistics Canada	Census Data (2016)	(Multiple)	https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=PR&Code1=35&Geo2=PR&Code2=01&Data=Count&SearchText=35&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=3	Statistics Canada. Census Profile, Toronto CMA 2016. Online via: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=PR&Code1=35&Geo2=PR&Code2=01&Data=Count&SearchText=35&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=3	N/A
Appendix A Figure 3: Real annual GDP estimates for Toronto (2018)	City of Toronto	Real annual GDP estimates per 2-digit NAICS category for 2018 (at basic prices, millions $ in chained 2012 dollars)	2012 dollars	https://www.toronto.ca/city-government/data-research-maps/toronto-economy-labour-force-demographics/	City of Toronto. Real Annual GDP Estimates, Toronto City 2018. Online via https://www.toronto.ca/city-government/data-research-maps/toronto-economy-labour-force-demographics/	Data Sheet 1, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx
Appendix A Figure 4: Labour force profile for Toronto (2019)	Statistics Canada	Labour Force Survey (2019)	Number of people employed	https://www.toronto.ca/wp-content/uploads/2020/01/9453-Toronto-Employment-Survey-2019-Bulletin.pdf	City of Toronto. Toronto Employment Survey 2019. Page 37. Online via https://www.toronto.ca/wp-content/uploads/2020/01/9453-Toronto-Employment-Survey-2019-Bulletin.pdf	Data Sheet 2, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx
Appendix A Figure 5: Breakdown of CO2 equivalent emissions per sector for Toronto in tCO2e (2016)	C40	C40 Knowledge Hub	Tons of CO2 equivalent	https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard?language=en_US	C40 Cities. Knowledge Hub - City Overview for Toronto 2016. Online via https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard?language=en_US	Data Sheet 3, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx

Name	Source Institution	Source Description	Data Unit / Format	Source Link	Citation	Location of Raw Data in project file
Appendix A Figure 6: Characterization of residential wastes collected by public sector in Toronto (2018)	City of Toronto	Tonnes of waste collected by public sector that go to each "sink"	Tonnes	https://www.toronto.ca/services-payments/recycling-organics-garbage/solid-waste-reports/	City of Toronto. Summary of waste diversion rates in tonnes (2014-2018). Online via https://www.toronto.ca/services-payments/recycling-organics-garbage/solid-waste-reports/	Data Sheet 4, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx
Appendix A Table 2: Scan of business and community initiatives in the Greater Toronto Area (GTA), categorized by the seven key elements of the DISRUPT framework	City of Toronto, Dillon, Circle Economy	Total number of initiatives per category	Number of initiatives	1) "Local Circular Economy Case Studies" provided by the City of Toronto https://www.toronto.ca/wp-content/uploads/2019/09/8fb6-Toronto-Circular-Economy-Case-Studies-FINAL-for-web-AODA.pdf 2) Excel document "Dillon Consulting Circular Initiatives" 3) Minutes of Circular Economy Working Group: Meeting 1 [Friday March 22, 2019]	City of Toronto (2019). Local Circular Economy Case Studies. Retrieved from: https://www.toronto.ca/wp-content/uploads/2019/09/8fb6-Toronto-Circular-Economy-Case-Studies-FINAL-for-web-AODA.pdf	Data Sheet 5, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx
Appendix A Figure 7: Average expenditure of Toronto (CMA) households across functional consumption categories (2017)	Statistics Canada	Average Ontarian household expenditure figures ($CAD) grouped into 12 consumption categories	$ CAD consumption / household	Shared data folder: https://drive.google.com/file/d/1ACCEAt765GzGOlPA5gtHU41g3USKh1W5/view?usp=sharing	Statistics Canada (2017). Household Expenditure across consumption categories – Toronto CMA	Data Sheet 6, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx
Appendix A Figure 8: Carbon footprint of Toronto CMA households across functional consumption categories (2015)	Global Footprint Network	Carbon footprint (gha/household) grouped by 12 consumption categories	global hectares / average household	https://www.researchgate.net/publication/320571512_Ecological_Footprint_assessment_for_targeting_climate_change_mitigation_in_cities_A_case_study_of_15_Canadian_cities_according_to_census_metropolitan_areas_CMA	Isman et al. (2018). Ecological Footprint assessment for targeting climate change mitigation in cities: A case study of 15 Canadian cities according to census metropolitan areas. *Journal of cleaner production*, *174*, 1032-1043. Retrieved from: https://doi.org/10.1016/j.jclepro.2017.10.189	Data Sheet 7, file: RawDataSheets_LandscapeAnalysis_06.08.2020.xlsx

Name	Source Institution	Source Description	Data Unit / Format	Source Link	Citation	Location of Raw Data in project file
(Appendix A Section 3): Summary of Toronto's policies that contribute to circular economy goals.	City of Toronto	N/A	N/A	https://www.toronto.ca/wp-content/uploads/2017/10/9803-Final-Long-Term-Waste-Management-Strategy.pdf	N/A	N/A
	City of Toronto	N/A	N/A	https://www.toronto.ca/wp-content/uploads/2019/06/98c7-TransformTO-Implementation-Update.pdf	City of Toronto (2019). TransformTO: Climate Action for a Healthy, Equitable & Prosperous Toronto [Implementation Update 2017 and 2018]. Retrieved from: https://www.toronto.ca/wp-content/uploads/2019/06/98c7-TransformTO-Implementation-Update.pdf	N/A
	City of Toronto	N/A	N/A	https://www.toronto.ca/wp-content/uploads/2017/11/9875-Zero-Emissions-Buildings-Framework-Report.pdf	City of Toronto (2017). Zero Emissions Building Framework. Retrieved from: https://www.toronto.ca/wp-content/uploads/2017/11/9875-Zero-Emissions-Buildings-Framework-Report.pdf	N/A
	City of Toronto	N/A	N/A	https://www.toronto.ca/legdocs/mmis/2018/hl/bgrd/backgroundfile-118079.pdf	City of Toronto. (2018). *Toronto Food Strategy*. Retrieved from https://www.toronto.ca/legdocs/mmis/2018/hl/bgrd/backgroundfile-118079.pdf	N/A
	City of Toronto	N/A	N/A	https://www.toronto.ca/ext/digital_comm/pdfs/resilience-office/toronto-resilience-strategy.pdf	City of Toronto. (2019b). *Toronto Resilience Strategy*. Retrieved from https://www.toronto.ca/ext/digital_comm/pdfs/resilience-office/toronto-resilience-strategy.pdf	N/A
	City of Toronto	N/A	N/A	https://www.toronto.ca/wp-content/uploads/2019/09/9064-CityPlanning_TGSv3_UpdatesSeptember2019.pdf	City of Toronto (2019). Bulletin 1: Toronto Green Standard (TGS) V3 Revisions. Retrieved from: https://www.toronto.ca/wp-content/uploads/2019/09/9064-CityPlanning_TGSv3_UpdatesSeptember2019.pdf	N/A

2 - Description and clustering of North American Industry Classification System (NAICS) codes

Cluster	Sector	NAICS Classification Codes (and number)	Description NAICS	NACE Classification Codes (and letters)
COMMERCIAL SERVICES	Information and financial services	Information and cultural industries (51)	This sector comprises establishments primarily engaged in producing and distributing (except by wholesale and retail methods) information and cultural products. Establishments providing the means to transmit or distribute these products or providing access to equipment and expertise for processing data are also included.	Information and Communication (J)
		Finance and insurance (52)	This sector comprises establishments primarily engaged in financial transactions (that is, transactions involving the creation, liquidation or change in ownership of financial assets) or in facilitating financial transactions.	Financial and Insurance Activities (K)
		Real estate and rental and leasing (53)	This sector comprises establishments primarily engaged in renting, leasing or otherwise allowing the use of tangible or intangible assets.	Real Estate Activities (L)
	Professional, scientific and administrative services	Professional, scientific and technical services (54)	This sector comprises establishments primarily engaged in activities in which human capital is the major input. These establishments make available the knowledge and skills of their employees, often on an assignment basis. The individual industries of this sector are defined on the basis of the particular expertise and training of the service provider.	Professional, Scientific and Technical Activities (M)

Cluster	Sector	NAICS Classification Codes (and number)	Description NAICS	NACE Classification Codes (and letters)
		Other services (except public administration) (81)	This sector comprises establishments, not classified to any other sector, primarily engaged in repairing, or performing general or routine maintenance, on motor vehicles, machinery, equipment and other products to ensure that they work efficiently; providing personal care services, funeral services, laundry services and other services to individuals, such as pet care services and photo-finishing services; organizing and promoting religious activities; supporting various causes through grant-making, advocating (promoting) various social and political causes, and promoting and defending the interests of their members. Private households are also included.	Administrative and Support Service Activities (N)
	Trade	Wholesale trade (41)	This sector comprises establishments primarily engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (G)
		Retail trade (44-45)	This sector comprises establishments primarily engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The retailing process is the final step in the distribution of merchandise; retailers are therefore organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers, store and non-store retailers.	
	Transport and warehousing	Transportation and warehousing (48-49)	This sector comprises establishments primarily engaged in transporting passengers and goods, warehousing and storing goods, and providing services to these establishments. The modes of transportation are road (trucking, transit and ground passenger), rail, water, air and pipeline.	Transportation and Storage (H)

Cluster	Sector	NAICS Classification Codes (and number)	Description NAICS	NACE Classification Codes (and letters)
	Tourism	Arts, entertainment and recreation (71)	This sector comprises establishments primarily engaged in operating facilities or providing services to meet the cultural, entertainment and recreational interests of their patrons.	Arts, Entertainment and Recreation (R)
		Accommodation and food services (72)	This sector comprises establishments primarily engaged in providing short-term lodging and complementary services to travellers, vacationers and others.	Accommodation and Food Service Activities (I)
PUBLIC SERVICES	Public administration	Public administration (91)	This sector comprises establishments primarily engaged in activities of a governmental nature; that is, the enactment and judicial interpretation of laws and their pursuant regulations, and the administration of programs based on them.	Public Administration and Defence; Compulsory Social Security (O)
	Education	Educational services (61)	This sector comprises establishments primarily engaged in providing instruction and training in a wide variety of subjects. This instruction and training is provided by specialized establishments, such as schools, colleges, universities and training centres (privately or publicly owned).	Education (P)
	Human health and social services	Health care and social assistance (62)	This sector comprises establishments primarily engaged in providing health care by diagnosis and treatment, providing residential care for medical and social reasons, and providing social assistance to those requiring it.	Human Health and Social Work Activities (Q)

Cluster	Sector	NAICS Classification Codes (and number)	Description NAICS	NACE Classification Codes (and letters)
INDUSTRY	Construction and real estate	Construction (23)	This sector comprises establishments primarily engaged in constructing, repairing and renovating buildings and engineering works, and in subdividing and developing land. These establishments may operate on their own account or under contract to other establishments or property owners.	Construction (F)
	Agriculture, and material extraction	Agriculture, forestry, fishing and hunting (11)	This sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber, harvesting fish and other animals from their natural habitats and providing related support activities.	Agriculture, Forestry and Fishing (A)
		Mining, quarrying, and oil and gas extraction (21)	This sector comprises establishments primarily engaged in extracting naturally occurring minerals. The term mining is used in the broad sense to include quarrying, well operations, milling and other preparation customarily done at the mine site, or as a part of mining activity.	Mining and Quarrying (B)
	Energy and water management	Utilities (22)	This sector comprises establishments primarily engaged in operating electric, gas and water utilities. These establishments generate, transmit, control and distribute electric power; distribute natural gas; treat and distribute water; operate sewer systems and sewage-treatment facilities; and provide related services, generally through a permanent infrastructure of lines, pipes and treatment and processing facilities.	Electricity, Gas, Steam and Air Conditioning Supply (D) + Water Supply; Sewerage, Waste Management and Remediation Activities (E)

Cluster	Sector	NAICS Classification Codes (and number)	Description NAICS	NACE Classification Codes (and letters)
	Manufacturing	Manufacturing (31-33)	This sector comprises establishments primarily engaged in the chemical, mechanical or physical transformation of materials or substances into new products. These products may be finished, in the sense that they are ready to be used or consumed, or semi-finished, in the sense of becoming a raw material for an establishment to use in further manufacturing.	Manufacturing (C)

3 – Raw data file

All raw data used for the Landscape Analysis in Appendix A is preserved in the following accompanying data file: ***Appendix B - RawDataSheet_LandscapeAnalysis_06.08.2020.xlsx***

4 – Full detailed catalogue of initiatives used as part of the DISRUPT methodology of the Landscape Analysis in Appendix A.

A full detailed catalogue of all identified local business, not-for-profit, social enterprise and community-organized initiatives can be found in accompanying data file: ***Appendix B - TorontoScan_CircularInitiatives_06.08.2020.xls***

Appendix C – Catalogues of local businesses, not-for-profits, social enterprises and community-led efforts contributing to Toronto's circularity

Table 1a Catalogue of local businesses that have implemented actions that contribute to Toronto's circularity.

Local business	Type of action taken	Qualitative effect on Toronto's circularity	Link
Bare Market	Package-free food and household items store.	Reduces waste from single-use packaging.	https://baremarket.ca/
Biomass Recycle Canada Inc. (Biomass)	Biomass collects waste wood and lumber from manufacturers, recycling plants, waste transfer and sorting stations and landfill sites, as well as waste materials from the care and maintenance operations of urban green spaces, and forwards them to processors for conversion to energy, wood pellets, horticultural mulch, particleboard or compost.	Diverts organic waste and transforms it into reusable products.	http://biomassrecycle.ca/en/
Bruized	Repurposes imperfect produce destined to be thrown out into healthy plant-based products.	Reduces food and organic waste from entering waste stream.	https://www.bruized.com/
Bunz Inc.	Offers an online trading platform where users can post and search for used goods and services to trade and earn rewards that can be redeemed at participating local businesses.	By encouraging reuse and repurposing, reduces waste generated from disposal of still useable products; extends life cycle of products.	https://bunz.com/
Buro	Peer-to-peer app allowing rental of items, goods and services to reduce waste.	Reduces waste by helping shift from disposable culture to sharing culture.	https://justburo.com/
Comfy Cotton	Cloth diaper delivery service.	Reusable cloths eliminate the use of single-use diapers that are disposed of in landfills.	http://comfycotton.ca/

Local business	Type of action taken	Qualitative effect on Toronto's circularity	Link
Commercial Laser Technology Inc.	Offers laser toner cartridge refills and remanufactures the cartridges locally. Any parts that cannot be used are recycled at a local facility.	Reduces amount of solid waste generated. Extended life cycle of products.	https://www.comlaser.ca/
Coolearth	Full-service architecture firm that offers comprehensive architectural services, including the design of new net-zero or low-carbon structures, major renovations, energy models and analysis. Includes the design of new net-zero or low-carbon structures, major renovations, energy models and analysis.	Reduces energy consumption of buildings; reduces embodied carbon; reduce sGHG emissions of buildings.	http://www.coolearth.ca/
East Harbour Eco-District	Largest commercial project of its kind currently planned in Canada (60 acres). It will be a cultural, commercial, employment, retail and transit hub. East Harbour is a registered EcoDistrict, addressing equity, resilience and climate protection. A Community Energy Plan will establish a low-carbon footprint across the project.	Reduction in energy waste and carbon footprint.	https://eastharbour.ca/
Electrefy	Provides reliable, clean, noiseless energy storage for temporary on-demand power. Applications range from portable power for outdoor events to off-grid residences to emergency backup power for traffic signals.	Reduces waste generated from battery disposal by recycling and repurposing; reduces energy consumption by allowing for storage; reduces GHG emissions by displacing portable diesel-powered electricity production.	https://electrefy.com/
Envirotech	Build work spaces using a mix of high-end new and remanufactured / refurbished office furniture	Reduces amount of unrecycled waste generated from offices across GTA	https://www.envirotechoffice.com/

Local business	Type of action taken	Qualitative effect on Toronto's circularity	Link
Enwave	Delivers district energy solutions.	Reduces energy consumption and related GHG emissions.	https://www.enwave.com/
Ethos Assets	Social purpose resource development initiative that creates resource solutions that support the needs of different community groups through the proper management of still useful products, materials and equipment that would unnecessarily end up in landfill.	By providing circular economy advice and guidance to companies, they help reduce solid waste and extend product life cycle.	https://www.ethosassets.com/
Frogbox	Provides eco-friendly reusable plastic boxes and supplies for customers that require them for services such as moving.	Reduces amount of single-use waste generated from moving.	https://www.frogbox.com/
Henderson Brewing Company	Brewing company that started piloting a reusable milk crate home delivery program.	Reduce waste from single-use packaging and delivery containers.	https://hendersonbrewing.com/
Ice River Springs	Closed-loop plastic bottle recycling.	Diverts plastic from landfill by becoming a resource for making the next bottles and for other durable products (i.e., Muskoka chairs in this case).	https://iceriversprings.com/index.php
Maizal	A Mexican restaurant/tortilleria that diverts all food waste to a farm co-operative of which they are a member. It is then used to make rich organic compost.	Reduces food and organic waste entering waste stream.	http://maizal.ca/
Materials exchange	Facilitates the transfer of surplus materials between businesses and non-profit organizations.	Diverts waste from landfill and supports local communities.	https://partnersinprojectgreen.com/your-needs/waste-management/material-exchange/

Local business	Type of action taken	Qualitative effect on Toronto's circularity	Link
Neoteny Apparel	Apparel company that sources sustainable fabric suppliers and utilizes upcycled materials in its clothing.	Reduce textile waste and waste generated from items that can be repurposed, upcycled or recycled.	https://neotenyapparel.com/
Nudnik	Children's clothing brand that makes clothing from entirely pre-consumer textile waste (off-cut fabrics). Additionally, every garment sold is compostable and all the tags, labels and packaging are all zero-waste.	Reduces amount of textile waste; reduces amount of waste generated from single-use packaging.	https://nudniklife.com/
Partners in Project Green	Helps businesses surrounding Pearson Airport reduce resource costs, uncover new business opportunities and address everyday operational challenges in a green and cost-effective manner.	Helps businesses reduce water and energy consumption and reduce the amount of waste in City of Toronto and GTA waste streams.	https://partnersinprojectgreen.com/
Pretty Clean Shop	Large selection of zero-waste, refillable products for body, skin, hair and home. Plastic-free, minimal packaging alternatives.	Reduces waste from single-use packaging and products.	https://www.prettycleanshop.com/
Saponetti Inc.	Promotes the reuse of containers from hygiene products, and minimizes the amount of additional plastic bottles required.	Reduces amount of single-use plastics waste; reduces amount of packaging waste.	https://www.saponetti.ca/
Skyspace Green Roofs	Full-service architectural studio specializing in the creation of living roofs for the environmentally conscious home or building owner.	Reduces urban heat island effect; reduces energy consumption (for cooling).	http://skyspacegreenroofs.com/
The Fitzroy Dress Rental	Fashion rental service that promotes sharing and reusing clothing.	Reduce textile waste and waste generated from items that can be repurposed, upcycled or recycled.	https://www.fitzroyrentals.com/

Local business	Type of action taken	Qualitative effect on Toronto's circularity	Link
The Green Jar Shop	Small grocer focused on sustainability, uses refillable containers.	Reduces waste from single-use packaging and products.	https://www.thegreenjarshop.com/
Toronto Green Roof Inc.	Provides green roof installation and maintenance services.	Reduces urban heat island effect; reduces energy consumption (for cooling).	https://www.torontogreenroof.ca/
Unboxed Market	Focused on minimizing single-use packaging and buying only the food you need.	Reduces waste from single-use packaging; reduces food waste. Reduces GHG emissions by sourcing from local producers.	https://unboxedmarket.com/
Viking Recycling	Specializes in diverting heavy, durable materials from landfill, including carpet, luxury vinyl tile (LVT), vinyl composition tile (VCT), ceiling tile and other difficult-to-recycle materials.	Reduces solid waste generated from construction, renovation, real estate.	https://www.vikingrecycling.ca/
Wastenot Farms	Diverts food waste from Toronto business offices, and feeds that food waste to worms, which convert the waste to a reusable soil-amendment product.	Reduces food and organic waste entering the waste stream.	http://wastenotfarms.com

Table 1b Catalogue of local non-profits that have implemented actions that contribute to Toronto's circularity.

Local non-profit	Type of action taken	Qualitative effect on Toronto's circularity	Link
AquaGro Farms	Aquaponic urban farm that grows and distributes thousands of servings of fresh produce and protein every year to feed hungry neighbours.	Reduces food waste and enhances food and nutrition security.	https://aquagrowfarms.ca/
B12 Give	Redistributes unused food from restaurants and grocers and donates to local food banks and community centres.	Reduces food waste and enhances food and nutrition security.	https://www.b12give.ca/
Bikes Without Borders	Collects and repairs donated bikes and provides them to people in need.	Enhances life cycle of typical bicycle; reduces waste from bicycles that are still useable.	https://bikeswithoutborders.org/
Black Creek Community Farm/Urban Harvest	Platform for residents and community gardeners to share their surplus produce with the community.	Reduces food waste and enhances food and nutrition security.	https://www.blackcreekfarm.ca/supporters/urban-harvest/
Brands for Canada	Receives donations of new and used clothing and reuses them to help those living in poverty. Also works with donations of personal care items and small household goods.	Reduces amount of textile waste and waste from household goods that are still useable.	https://www.brandsforcanada.com/
Creative Reuse Toronto/Sewing for Change	Supports donation of materials and products that can then be purchased and exhibited.	Reduces the amount of materials going into the waste stream.	https://www.sewingforchange.ca/
Feed It Forward	Rescues food destined for landfill and diverts it to its food-redistribution programs.	Reduces food waste; ensures food/nutrition security in the community.	https://feeditforward.ca/
FoodShare/Composting Program	FoodShare operates the largest mid-scale compost program in Toronto. Folks can bring their kitchen scraps to be added to the compost and in return are given vouchers they can use to purchase fresh produce grown at the farm.	Reduces organic waste in the waste stream.	https://foodshare.net/program/compost/

Local non-profit	Type of action taken	Qualitative effect on Toronto's circularity	Link
Greenest City	Builds healthy, inclusive neighbourhoods through education and empowerment. Offers programs for urban agriculture, community engagement, sewing repair hub, and engages kids and youth.	Changes behaviour through education to encourage low- to zero-waste lifestyles; reduces food waste; reduces waste from household goods.	https://greenestcity.ca/
Habitat for Humanity Toronto/ReStore	Non-profit home-improvement retail stores across the GTA called Habitat ReStore, which sell donated home furnishings, appliances and other renovation materials at a fraction of the original price.	Reduces waste by diverting useable items and extending life cycle of products.	https://habitatgta.ca/restore/donate-stuff-to-restore/
Junction Farmer's Market	Provides local, sustainably produced fresh foods.	Reduces food waste; promotes local consumption and production.	https://junctionmarket.ca/sustainability/
Karma Co-op	Grocer specializing in organic, local, fair trade and zero-waste products.	Reduces waste from single-use packaging and products; reduces carbon footprint through promotion of local production and consumption.	https://www.karmacoop.org/
North York Harvest Food Bank	Provides dignified food assistance, education, focused advocacy and long-term food solutions.	Reduces food waste; promotes food and nutrition security.	https://northyorkharvest.com/
Not Far From The Tree	Toronto-based, resident-powered urban fruit-picking initiative. They work to connect tree owners with excess fruit to volunteers in their community who are willing to pick and share it.	Enhances food and nutrition security; reduces food waste.	https://notfarfromthetree.org/
Repair Café Toronto	Organization that offers free repair events in communities across Toronto.	Extends life cycle of products and reduces waste from disposal of products that are still useable.	https://repaircafetoronto.ca/

Local non-profit	Type of action taken	Qualitative effect on Toronto's circularity	Link
Road to Zero Waste	Collects surplus produce, non-perishable and cooked meals from food vendors and distributes them to community fridges in Toronto neighbourhoods that need it most.	Reduces food waste; promotes food and nutrition security.	http://roadtozerowaste.org/
Second Harvest	Works across the supply chain from farmer to retail to capture surplus food before it ends up in the landfill and negatively impacts the environment.	Reduces food and organic waste in waste stream.	https://secondharvest.ca/
Sharing Depot	Lends tools to communities within the GTA, aiming to minimize the number of tools that are required and introduced into the system.	Sharing of same tool reduces energy consumption of making more tools; reduces waste generated by disposal of still useable tools.	https://sharingdepot.ca/
SMDC/Dream Zero	Enables reusable dishware programs for events, retail (restaurants, cafes), corporate offices and institutions.	Reduces waste from single-use materials.	https://dreamzero.ca/
The Stop	Works to increase access to healthy food in a manner that maintains dignity, builds health and community and challenges inequality.	Reduces food and organic waste in waste stream. Enhances food and nutrition security.	https://www.thestop.org/
Zero Waste Hub	Grassroots not-for-profit that works with local organizations to help promote waste reduction in Toronto through reuse, education and awareness.	Raises awareness and encourages actions by residents and local businesses that reduce amount of waste generated.	http://zerowastetoronto.org/
ZooShare	Canada's first zoo-based biogas plant; recycles manure from the Toronto Zoo and local food waste into renewable power for the Ontario grid.	Reduces organic material entering waste stream; reduced GHG emission related to organic waste.	https://www.zooshare.ca/

Table 1c Catalogue of self-identified social enterprises that have implemented actions that contribute to Toronto's circularity.

Social enterprise	Type of action taken	Qualitative effect on Toronto's circularity	Link
Anares Natural Health	Body care, DIY supplies and housewares store.	Reduces waste from single-use packaging and products.	http://www.anarreshealth.ca/
Annex Market	Local grocery store that uses refillable packaging and containers that are cleaned and reused once returned.	Reduces waste from single-use packaging and products.	https://www.annexmarket.com/
Encircled	Encircled designs clothing with the idea of doing more with less.	Through use of upcycled and recycled textiles, reduces textile waste.	https://www.encircled.ca/
Free Geek Electronics	Collects and refurbishes used electronics that are destined for recycling or disposal and offers them for resale at an affordable price.	Reduces amount of e-waste that enters Toronto's waste streams.	https://www.freegeektoronto.org/
Fresh Fashion Library	Gateway to lend, borrow and repurpose underutilized fashion items with other members of the community.	Reduce textile waste and waste generated from items that can be repurposed, upcycled or recycled.	https://freshfashionlibrary.com/
Furniture Bank	Redistributes gently used furniture and housewares from donors in the community to families and individuals experiencing furniture poverty.	Extends the life cycle of useable furniture. Reduces waste generated from disposal of useable furniture; addresses furniture poverty.	https://www.furniturebank.org/
GoJava	Recycles coffee pods to keep them from the waste stream.	Reduces waste generated from single-use coffee pods.	https://gojava.ca/
Reego	Toronto's first reusable takeout cup and lid program.	Reduces waste generated from single-use items.	https://www.reego.ca/
Ripple Farms	Grows fresh greens and seafood 365 days of the year. Aquaponic farm that	Reduces food waste and enhances food and nutrition security.	http://ripplefarms.ca/

Social enterprise	Type of action taken	Qualitative effect on Toronto's circularity	Link
	balances sustainability and innovation to produce high-quality crops.		
Sustainable	Full-service architecture firm that designs simple, high-performance buildings driven by Passive House principles.	Reduces carbon footprint of buildings; reduces waste by incorporating recycled materials for construction.	https://www.sustainable.to/
The Spent Goods Company	Food-transforming company that reduces food waste by taking spent grain from the craft brewing industry to use as an ingredient for bread and crackers.	Reduces food waste; diverts organic waste.	https://spentgoods.ca/
Tiny Toy Company	Diverts toy waste from the landfill by repurposing small toys and parts of toys that are no longer wanted into activities for play-based learning.	Reduces toy waste going to landfill.	https://tinytoyco.com/
Wisebox	Wisebox is a reusable takeout container program for Toronto's restaurants and cafes that gives consumers a waste-free option when they get takeout.	Reduces amount of package and food-container waste generated.	https://www.wisebox.ca/

Table 1d Catalogue of community-led, volunteer-based groups that have implemented actions that contribute to Toronto's circularity.

Community-led/Volunteer Initiative	Type of action taken	Qualitative effect on Toronto's circularity	Link
Block Party Supply	Toronto's first lending library for neighbourhood parties.	Reduces waste from single-use materials.	https://blockpartysupply.ca/
Boomerang Bags Toronto	Works to reduce the use of plastic bags by engaging local communities in the making of Boomerang Bags – using upcycled material.	Reduces amount of single-use packaging waste.	https://boomerangbags.org/
Palz	Online bartering groups that use social media platforms like Facebook. Users can post and search for used goods and services to trade and earn rewards that can be redeemed at participating local businesses.	By encouraging reuse and repurposing, reduces waste generated from disposal of still useable products; extends life cycle of products.	https://www.facebook.com/groups/1726189694265224/
Really Really Free Market	Provides a collectively organized, non-monetary alternative to the current mainstream economic system. A marketplace for donated items including housewares, kitchen utensils, dishes, small appliances, clothing, toys, craft supplies, bedding, etc.	Reduces waste through repurposing, redistribution of household items.	https://www.facebook.com/ReallyReallyFreeMarketToronto/
Secondhand Sunday	A community event for households to exchange items.	Reduces household waste.	http://www.secondhandsunday.ca/

Table 2 Catalogue of advocacy organizations and volunteer groups promoting a circular Toronto.

Name	Website	Supporting actions
C40 Thriving Cities Initiative	https://www.c40knowledgehub.org/s/article/Thriving-Cities-and-the-Amsterdam-City-Doughnut?language=en_US	As a C40 founding city, Toronto benefits from and helps direct supporting initiatives developed by C40. The Thriving Cities Initiative combines circular economy and well-being economies approaches in support of municipal government.
Circular Toronto	https://www.circulartoronto.com/	Online knowledge platform maintaining a listing of different cross-sectoral examples of entities and organizations supporting circular economy efforts throughout Toronto and the region.
David Suzuki Foundation (Toronto office)	https://davidsuzuki.org/	Conducts public engagement campaigns and activities at the city and neighbourhood levels to raise awareness about enabling sustainable lifestyles. Also works to advocate for policies at provincial and federal levels to support circularity and sustainability.
Ecojustice	https://ecojustice.ca/	Supports advocacy and legal actions in support of a diverse range of sustainability and environmental issues including actions in support of a circular economy.
Environmental Defence	https://environmentaldefence.ca/	Environmental Defence is a leading Canadian advocacy organization that works with government, industry and individuals to defend clean water, a safe climate and healthy communities. Leads Toronto-focused zero-waste campaigns and advocates with city government for actions that support a circular transition.
Evergreen	https://www.evergreen.ca/our-projects/	Through projects, campaigns, activities and public mobilization, Evergreen actively engages Canadians in creating and sustaining healthy and dynamic urban environments in our schools, public spaces, housing and transit systems, and communities at large.
Fashion Takes Action	https://fashiontakesaction.com/	Works with industry and consumers, to shift behaviours toward more positive social and environmental impacts. Fashion Takes Action runs a number of Toronto-based trainings and awareness-raising campaigns targeting change in the Toronto fashion landscape.
HEJ Support	https://hej-support.org/circular-economy-framework-promotes-increase-recycling-fails-prevent-contaminants-new-products-banned-toxic-chemicals-detected-childrens-toys/	HEJ Support provides long-term technical, policy and awareness-raising support for vulnerable and affected communities facing chemicals contamination and associated environmental degradation and helps make their problems heard and strives for solutions.
ICLEI Canada: Local Governments for Sustainability	https://icleicanada.org/	ICLEI Canada provides a wide range of services for local, provincial and federal governments in support of developing sustainable, climate-ready communities. The City of Toronto is a member of ICLEI Canada.
Impact Zero	https://impactzero.ca/	Impact Zero's mission is to help build a circular economy in Toronto.

Name	Website	Supporting actions
		Works to enable impact projects, by working with local organizations and businesses, and making it easy for individuals to take meaningful climate action.
Stonegate Community Association	https://www.stonegatechc.org/	Runs interactive repair, reuse, food-waste reduction and textile-diversion workshops. With grants from the City of Toronto, Stonegate Community Association organized a sewing repair clinic, a quilting program, a drop-in "sew-it-yourself" clinic and various textile workshops.
The Green Up Initiative	https://greenupinitiative.wixsite.com/website	A University of Toronto, student-run environmental sustainability club aimed at promoting an environmentally sustainable lifestyle. The club conducts DIY workshops, events and talks.
Toronto Environment Alliance (TEA)	https://www.torontoenvironment.org/zerowaste	TEA pushed for a zero-waste goal in Toronto's Long-Term Waste Strategy, helped shape and continues to advocate for zero waste in the Waste Free Ontario Act and works with zero waste community groups and businesses in Toronto.
Toronto Sustainability Speaker Series	https://tsss.ca/	The Toronto Sustainability Speaker Series was created in 2008 to share stories of companies that have found economic advantages by integrating sustainability into their corporate strategies. More recently, it has provided online educational material and multimedia pieces focused on a circular economy.
Toronto's Business Improvement Areas	https://www.toronto.ca/business-economy/business-operation-growth/business-improvement-areas/bia-list/	Toronto's Business Improvement Areas continue to innovate was of implementing zero waste and other circular strategies that are not always explicitly labelled as such. Business Improvement Areas are one of the most potent change pathways involving small, local business and how these can be engaged in as pro-active actors for Toronto's circular transition.
Zero Waste Hub	http://zerowastetoronto.org/	Raises awareness and encourages actions by residents and local businesses that reduce amount of waste generated. Offers waste reduction and reuse opportunities, DIY skill building and education and awareness, through zero-waste fairs, community action planning, interactive group learning.

Appendix D – Methodology guide

This table outlines the methodological approach that was used to develop all figures and tables contained in the Landscape Analysis (Appendix A).

Name	Methodology	Assumptions
Appendix A: Table 1: Description and clustering of North American Industry Classification System (NAICS) codes	NAICS category descriptions were manually matched to the sectors used by Circle Economy.	
Appendix A Figure 3: Real annual GDP estimates for Toronto (2018)	1) Downloaded data to Excel sheet 2) Manually matched GDP figures for 2-digit NAICS codes to 12 sectors (using Table 2) 3) Calculated GDP per sector by adding GDP from the constituent sub-sectors (as shown in column 3 of Table 2) 4) Calculated "Other" by deducting the sum of the 12 sectors from the total GDP for Toronto.	1) Sub-sectors have been correctly allocated to 12 sectors. This was based on best judgement in the absence of standardized conversion tables. See Assumptions in Table 2. 2) "Toronto (City)" is assumed to represent Toronto, as this was the most local level available. 3) "2012 dollars" refers to CAD, not USD.
Appendix A Figure 4: Labour force profile for Toronto (2019)	1) Manually transferred the data from the total column of the table on Page 37 of source PDF to Excel sheet 2) Manually matched sector descriptions to NAICS codes 3) Manually matched jobs figures for 2-digit NAICS codes to 12 sectors (using Table 2) 4) Calculated jobs per sector by adding jobs from the constituent sub-sectors (as shown in column 3 of Table 2) 5) Calculated "Other" by deducting the sum of the 12 sectors from the total jobs in Toronto.	1) Sub-sectors have been correctly allocated to NAICS codes (see assumptions on Data Sheet) 2) Sub-sectors have been correctly allocated to 12 sectors. This was based on best judgement in the absence of standardized conversion tables. See Assumptions in Table 2. 2) The NAICS category described as "Technical services" is assumed to equate to "Professional, scientific and technical services" (NAICS code 54) as there were no other categories covering the same services.
Appendix A Figure 5: Breakdown of CO2 equivalent emissions per sector for Toronto in tCO2e (2016)	1) Scrolled to the bottom of the C40 Knowledge Hub page (https://www.c40knowledgehub.org/s/?language=en_US) 2) Set up account to access data 3) Selected "Toronto" as city and "2016" as year 4) Manually transferred data from "Scope 1" column to Excel sheet 5) Removed total rows and sorted sectors in order of magnitude	1) 2016 data is still largely relevant in 2020 (this was the most recent year available) 2) Scope 1 is of relevance to Toronto (no explanation of the difference between Scope 1, 2 and 3 was provided, but Scope 1 was the most detailed)

Name	Methodology	Assumptions
Appendix A Figure 6: Characterisation of residential wastes collected by public sector in Toronto (2018)	1) Clicked on "Summary of waste diversion rates in tons (2014-2018)" tab 2) Manually transferred data from 2018 column to Excel sheet 3) Removed total rows and sorted waste streams in order of magnitude	
Appendix A Table 2: Scan of business and community initiatives in the Greater Toronto Area (GTA), categorized by the seven key elements of the DISRUPT framework.	A "circular economy initiative" was defined by the researchers as any GTA-based business or community effort that explicitly uses circular economy principles at the core of the concept to advance the circular economy locally. The researchers have excluded large-scale R&D programs by multinational corporations, as these initiatives would not be designed to advance circular economy in Toronto itself. Conversely, individual actions were not recorded as there is no clear methodological solution to record the scope of individual actions in the GTA within the scope of the current project. To collect the initiatives, the researchers conducted an internet search using keywords related to the circular economy using the DISRUPT framework as a guide (i.e., repair, remanufacture, product-as-a-service, waste as a resource, etc.) and representative sectors (construction, retail, etc.). Relevant results from the search were recorded and categorized in one Excel spreadsheet. The main approach of each initiative was defined using the best match to the DISRUPT framework. Further desk research included literature review of previous studies and documentation efforts. These initiatives were logged using the same methods described above.	1) Only 1 relevant element of the DISRUPT framework was used per initiative. In many cases this was an accurate description; however, in some instances the initiative's activities included multiple elements. In this scenario, the researcher used their expert knowledge to assess what was the most suitable element from the DISRUPT framework. 2) Plans for expansion and/or growth were evaluated on YES/NO basis. The decision was based on written information on a website or document. When the answer was YES the raw data on which the decision was based on was reported in the raw data excel sheet.
Appendix A Figure 7: Average expenditure of Toronto (CMA) households across functional consumption categories (2017)	Average Toronto household expenditure (measured in $CAD) are recorded at the Census Metropolitan Area level, which is the closest geographical scope to the City of Toronto that the researchers could find. This dataset was obtained from the StatsCan website, and formatted according to 12 standard consumption categories as defined by the UN Classification of Individual Consumption by Purpose (COICOP) framework. Because the household expenditure data from StatsCan included more than consumption categories, the researchers aggregated some categories from StatsCan to fit the standard COICOP classification. These aggregations include: (1) "Transportation" includes "private transportation" and "public transportation" (2) Recreation includes: "recreation equipment and related services," "home entertainment equipment and services," "recreation services," "recreational vehicles and associate services" and "reading materials	None

Name	Methodology	Assumptions
	and other printed matter," and (3) Miscellaneous expenditures include: "games of chance."	
Appendix A Figure 8: Carbon footprint of Toronto CMA households across functional consumption categories (2015)	Carbon footprint (measured in global hectares per capita) values for Toronto CMA were drawn from a comparative study of ecological footprint for 15 Canadian cities between 2010 and 2015. The data presented in the report is the average taken across the five years. Because the carbon footprint data was presented using a smaller number of categories than the 12 used in Figure 5 (Household expenditure), the researchers have noted where categories have been aggregated. These include: “Food” contains “Tobacco and alcoholic beverages,” “Housing” includes “Household operation,” “Goods” contains “household furnishings and equipment,” “Clothing,” “personal care” and “miscellaneous expenditures,” and “services” contain “healthcare,” “recreation” and “education”. The aggregated carbon footprint values were multiplied by 2.71 to translate an average per capita footprint score to an average Toronto CMA household footprint score.	Raw data tables were not retrievable; however, researchers visually estimated numbers using detailed box and whisker plots for each of the five categories. These graphs have been included as stand-alone data sheets (refer to Data Sheet 6). As the data measures the average values between 2010 and 2015, each category contains an upper and lower bound (whisker), which varies per category. The variances per category are: Food = 0.025gha; Housing = 0.25, Transport = 0.3gha, Goods=0.025, Services =0.04.
Appendix A Section 3 – Policy Analysis visuals: Summary of Toronto’s policies that contribute to circular economy goals	1) The policy and strategy documents were briefly reviewed, and a table cross-referencing these documents with key themes/terms that they contain was prepared. 2) Themes/terms appearing in more than one document were inputted into the table, and the sectors (as per Table 2) to which they are relevant were identified.	