

CSA PUBLIC POLICY CENTRE

Rounding the Corner:

Towards a Circular Economy in Canada

November 2022

CSA Public Policy Centre



For over 100 years, CSA Group has been working to make Canada safer and more sustainable. With a mandate of holding the future to a higher standard, we have a vested interest in the social, economic, and environmental challenges that policymakers and governments face when addressing the evolving needs of Canadians.

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The CSA Public Policy Centre is focused on four key priorities

- Promoting inclusive economic growth
- Advancing environmental sustainability and climate resilience
- Supporting public sector innovation
- Enhancing the health and wellbeing of Canadians

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The transition to a circular economy will require transformational, systems-level change. Circular economic practices are being explored in Canada and, in some instances, implemented with success.

Executive Summary

Global consumption patterns are leading to unprecedented amounts of waste. By 2050, annual global waste generation is projected to grow by 70%. Excessive waste is a hallmark of a modern, linear economy with an ethos of "take, make, and waste." The need for an alternate path forward is clear as environmental costs mount.

One promising alternate path forward is a circular economy. Circular economies minimize waste and reduce greenhouse gas emissions. They improve sustainability and tackle climate change, while also fostering economic growth and development.

The transition to a circular economy will require transformational, systems-level change. Circular economic practices are being explored in Canada and, in some instances, implemented with success. These pockets of circularity offer lessons for policymakers and businesses.

This paper explores three leading circular case studies in Canada—Smart Cities, Metal Tech Alley, and Fashion Takes Action—spanning different economic sectors—food, mining and metals, and textiles. Common success factors and obstacles to building circular value chains are highlighted for each case study.

This paper also presents eight key opportunities for governments and policymakers to explore, test, and adopt towards building a circular economy:

- Develop circularity strategies at the federal, provincial, and local government levels.
- Harmonize legislative frameworks and improve standardization across economic sectors.
- Reduce economic incentives that maintain a linear economy.
- Advance critical infrastructure to support a circular economy.
- Increase support for economic organizations that drive the adoption of circular practices across sectors and within value chains.
- Incentivize the private sector by adopting circular procurement practices and recycled content mandates.
- Improve awareness and education about the circular economy.
- Improve measurement of the circular economy.

Circular Economy in Canada

In 2021, over 100 billion tonnes of materials were consumed globally for the first time (see Figure 1).[1] Much of this material—construction, plastics, textiles, and electronics—will become waste, piling up in landfills or incinerated, taking a toll on the environment and human health.[2] Canada repeatedly ranks in the top ten waste-producing countries globally: the 2022 Global Waste Index reported that Canadians disposed of 706 kg of waste per capita, with the majority of this waste ending up in landfills.[3]

Excessive waste is a hallmark of a modern, linear economy with an ethos of "take, make, and waste." Factors such as global population growth, pervasive consumerism, and technological advancements will continue to increase the demand for raw materials and test the planet's sustainable limits.[4] By 2050, annual global waste generation is projected to grow by 70% to 3.4 billion tonnes, and global consumption demands are estimated to require the resources of three Earths.[5]

The need for an alternate path forward is clear as the environmental costs mount.[6] A circular economy minimizes waste and reduces greenhouse gas (GHG) emissions, which improves sustainability and tackles climate change, while also allowing for economic growth and development. A circular economy is a regenerative economic system that changes how goods and services are designed, manufactured, and used.[7] Circular principles can be implemented across economic sectors—from how food is produced to how homes are built.

The transition to a circular economy will require transformational, systems-level change. Thus far, progress has been modest. In 2021, only 8.6% of the world's economy was circular. While the methodology differs slightly, the Canadian economy's level of circularity in 2020 was 6.1%. (In Québec, the only province with a circularity measurement using the same methodology as the global figure, 3.5% of the economy is circular.)[8]

Circular economic practices are being explored in Canada and, in some instances, implemented with success. These pockets of circularity offer lessons for policymakers and businesses. This paper explores how policymakers can learn from proven circular practices in different economic sectors to build a circular economy.

Section 1
Provides an overview of the concept of circularity, including its benefits and examples from abroad.

01

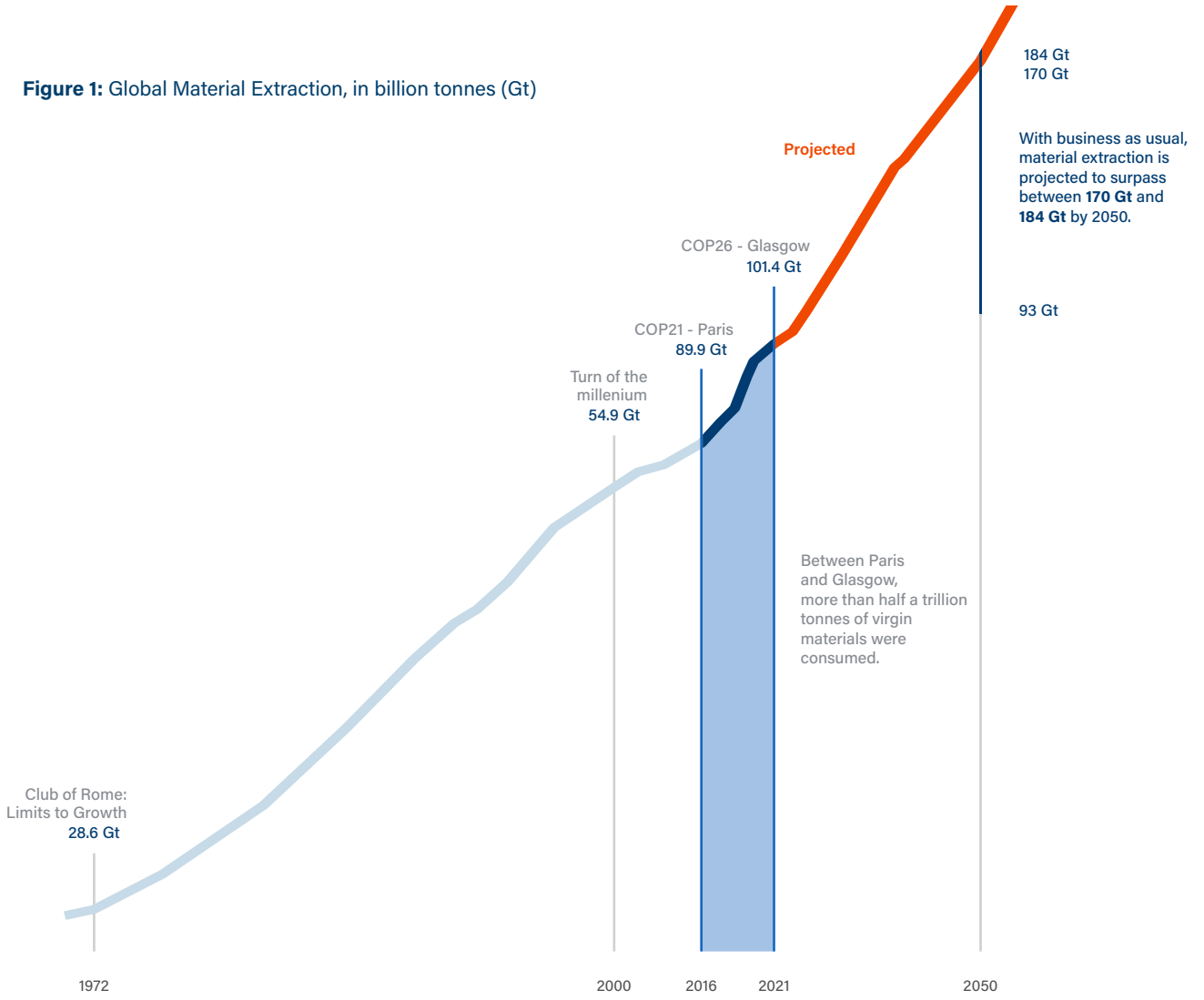
Section 2
Reviews three circular case studies in Canada with a focus on success factors and obstacles.

02

Section 3
Highlights key opportunities for policymakers and recommendations for a Canadian transition to a circular economy.

03

Figure 1: Global Material Extraction, in billion tonnes (Gt)



Source: Circle Economy. (2022). *The Circularity Gap Report*. https://www.circularity-gap.world/2022

By 2050, annual global waste generation is projected to grow by 70% to 3.4 billion tonnes.



Section 1: Overview

The circular economy is a model of production and consumption. It aims to reduce waste by extending the life cycle of products and maintaining the value of materials, thereby reducing the need to extract natural resources. The Ellen MacArthur Foundation, a leader in promoting the idea of a circular economy, highlights three key principles:

- eliminate waste and pollution;
- circulate products and materials (at their highest value); and
- regenerate nature.[9]

The principles of a circular economy can be woven throughout the value chain—from product design, lifespan, and end of use—to avoid the creation of waste and pollution. Circular principles are focused on the reuse, repair, remanufacturing, and recycling to extend the lifespan of products and materials.[10] In contrast, a linear economy is focused on extraction, production, distribution, consumption, and disposal (see Figure 2). A circular economy marks a significant departure from a linear economy's recycling practices. In a linear economy, waste is converted into reusable material at the end of a product's lifespan, whereas a circular economy is focused on design to prevent the creation of waste from the outset.[11] Extended producer responsibility (which holds manufacturers responsible for the lifespan of their products) is a policy common within linear economies that can act as an incremental step towards the transition to a circular economy.[12]

The transition to a circular economy requires a restructuring of traditional business practices and value chains. Circular business models represent fundamentally different ways of producing and consuming goods and services (see Figure 3). This revision impacts the organizational flow of value chains to reorganize material flows to reduce the extraction of natural resources and the creation of waste. Some models, like resource recovery, have been practiced in Canada for decades, while others have yet to be implemented.

There are five common circular business models:

Circular Supply replaces traditional "linear" material inputs from virgin resources with a circular alternative (e.g., renewable resource, bio-based materials, recovered materials), reducing the demand for virgin resource extraction (i.e., raw materials).

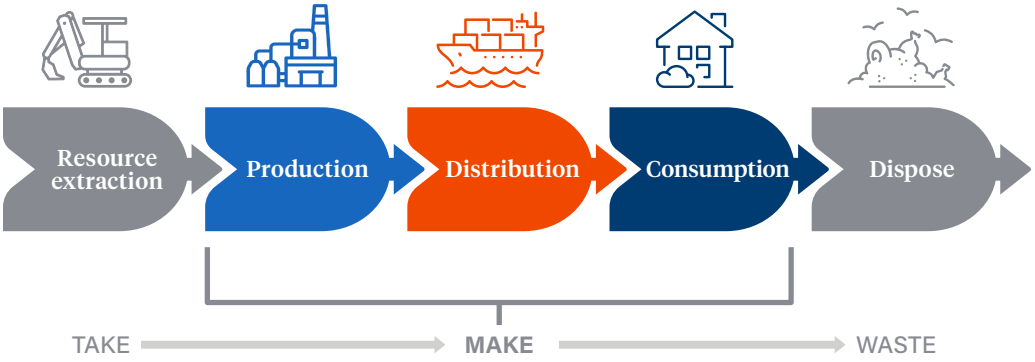
Product Service System provides services instead of products (e.g., leasing) often through pay-for-use agreements, promoting more efficient product use and less use of natural resources.

Sharing of under-utilized products, reducing demand for new products and as a result, associated raw materials (e.g., sharing economy for vehicles or accommodation). Sharing platforms emerged in the last decade with strong uptake as technology evolved.

Product Life Extension prolongs the lifespan of an existing product through repair, reprocessing, upgrading, and resale, slowing the flow of constituent materials and reducing the rate of resource extraction and waste generation.

Resource Recovery recycles waste into secondary raw materials, diverting waste from disposal and displacing extraction and processing of virgin natural resources.[13]

Figure 2: Linear economy



Source: *Exploring the role of independent retailers in the circular economy.* Tibhaut Wautelet. 2018. https://www.researchgate.net/publication/323809440_Exploring_the_role_of_independent_retailers_in_the_circular_economy_a_case_study_approach

Figure 3: Circular economy business models



Source: Council of Canadian Academies. (2021). *Turning Point: The Expert Panel on the Circular Economy in Canada*. https://www.cca-reports.ca/wp-content/uploads/2022/01/Turning-Point_digital.pdf

Benefits

As governments emerge from the COVID-19 pandemic with a mandate to "build back better," the circular economy is a path forward that addresses two critical priorities simultaneously: reducing greenhouse gas emissions and promoting economic growth. The circular economy is a paradigm shift, aimed improving environmental outcomes while creating economic value. Many argue that the transition also provides the opportunity for enhancing social benefits such as improved wellbeing or working conditions.

Improving Environmental Outcomes

It is unlikely global greenhouse gas emission reduction targets will be met without transforming patterns of production and consumption: 45% of global emissions stem from how products are made and used and how food is produced.[14] A circular economy aligns with several international targets aimed at improving sustainability and reducing emissions, such as the United Nations' Sustainable Development Goals (SDGs) focused on the environment[15] and the Paris Climate Agreement.[16] It also aligns with the Canadian federal government's commitment to reach net-zero emissions by 2050. However, the emission reductions associated with circular practices depend on product design and will not always lead to emission reductions (e.g., transporting products a significant distance to efficiently reuse raw materials may reduce associated emission reductions).[17]

The Ellen MacArthur Foundation suggests that environmentally harmful subsidies, such as fuel subsidies, should be phased out as they inhibit a



transition to a circular economy.[18] The Organization for Economic Cooperation and Development (OECD) and International Energy Agency (IEA) noted that subsidies are "distortive, generating inefficiencies in the production and use of energy economy-wide, and skewing capital long-term investments towards fossil fuel producers or fossil fuel intensive industry, enhancing the risk of lock-in."[19] It is difficult for recycled plastics to compete with virgin plastics because the quality of virgin plastics tends to be higher; virgin plastics can also be significantly cheaper when the cost of oil is low.[20] Consequently, higher costs may be one of many factors maintaining the status quo: businesses and consumers are unlikely to change production or consumption patterns if new raw materials and waste disposal remain cheaper than circular alternatives.

Material extraction and processing accounts for over 90% of environmental impacts on biodiversity loss and water stress.[21] Circularity can help preserve ecosystems and biodiversity by lowering the demand for raw materials and resources, thus reducing land requirements. For example, a Finnish study which examined the drivers of land-use estimated that reducing global demand for textiles, food, and building material spares 280 million hectares of natural forests from deforestation.[22]

Creating Economic Value

The World Economic Forum reports that the circular economy can provide up to US$4.5 trillion in economic benefits by 2030.[25] A review of the academic literature on the circular economy found that a circular economy can be good for business: circular value chains can improve cost efficiencies, generate new revenue streams, and increase profits. Circularity also presents opportunities to drive new business development, innovation, and cross-sector collaboration.[26] Circular business practices can even reduce supply chain disruptions by reducing supply chain dependence—and unpredictable pricing—by increasing the availability of domestic resources and capabilities.[27] Estimates suggest that a more circular economy in the European Union could reduce dependence on imported raw materials and could generate up to 2 million new jobs by 2030.[28]

While the transition to a circular economy may result in labour market disruptions across sectors—an increase in some markets (e.g., renewables and waste) and a decline in others (e.g., resource extraction)—overall, an OECD review of modelling studies predict the transition will have a positive or neutral effect on employment, suggesting employment gains range from 0% to 2%.[29] However, negative impacts are possible, such as a decreased labour demand due to an increase

Circular disruption

In 2021 a global survey of executives by Bain & Company found that approximately 33% expect their industry to be disrupted by circularity start-ups and 50% expect circularity to become common practice for all companies in the next decade.[23]

Mining e-waste

A study on e-waste found it was 13 times cheaper to mine electronic waste than it was to source new minerals by extracting them from the environment.[24]



in automation and industrial restructuring. Canadian research suggests retraining will be necessary to support employment shifts across sectors.[30]

As a resource-based economy, Canada's transition to a circular economy will be distinct from Europe's. A discussion paper by Environment and Climate Change Canada and the United Nations Environment Programme, among others, suggested that the innovations in the bioeconomy, mineral, and metal recycling, and secondary manufacturing and remanufacturing offer the most promise for growth in North America.[31] More research is needed to determine how a resource-based economy like Canada's will be affected by circularity and the impacts of having more blended raw and secondary materials.

Enhancing Social Benefits

Some argue that a circular economy can align with SDGs focused on social sustainability (e.g., reduction of poverty and hunger, gains in good health and wellbeing).[32] Reducing the use of primary resources and shifting to renewable energy can have a positive impact on human health due to a reduction in environmental pollution. Reduced environmental pollution will also likely result in long-term health gains benefiting disadvantaged groups that are the most often affected by environmental impacts.[33]

Restructuring sectors of the economy could also present an opportunity to improve inclusiveness and address socio-economic inequalities associated with a linear economy, such as local food insecurity. A circular economy can improve the sustainability of food systems by reducing the amount of food waste generated and redistributing surplus food to people in need. Building resiliency within local food production can also help minimize the impact of disruptions in distribution.[34] For example, in Colombia, a municipal garden program provided 20 tonnes of food to local areas during the initial stages of the pandemic lockdown, which supported the most vulnerable populations.[35] When implementing circular practices, it is important for policymakers to consider how citizens can contribute and the impacts on local communities.[36]

Circular Policies Across Canadian Jurisdictions

Federal

Canada lacks an overarching federal policy on the circular economy. However, the federal government has pursued several focused initiatives related to the circular economy (e.g., Canada-wide Action Plan on Zero Waste, national Bioeconomy Strategy, and the Minerals and Metals Plan, among others).[37] These programs lag compared to countries more advanced in circularity (see Lessons from Abroad).

Provincial/Territorial

Provincial and territorial governments have focused predominantly on extended producer responsibility and waste management. Most provinces have sustainable or green procurement initiatives that require purchasers to assess the environmental consequences of a product throughout its lifecycle.[38] Québec is a leader in its application of circular principles and practices.[39] In 2022, Québec launched the 2030 Plan for a Green Economy, which includes some circular policies related to waste, agrifood, and minerals.[40] British Columbia committed to the development of a circular economy strategy in 2022, noting that the circular economy is still in early development in terms of market readiness.[41]

Municipal

Municipalities play pivotal roles in a circular economy due to their responsibility for services such as transportation, waste management, and water treatment.[42] Several municipalities across Canada have focused on waste management and sustainability initiatives to advance a circular economy.[43] For example, in 2021, 15 municipalities were selected to participate in the Canadian Circular Cities & Regions Initiative's (CCRI) Peer-to-Peer (P2P) Network, designed to promote job creation and sustainable practices in the post-pandemic economy.[44]

Waste Across Canadian Economic Sectors

Excessive waste is generated across economic sectors in Canada. The following sectors are some of the most promising areas to reduce waste.



Plastics



Only 9% of plastic waste is recycled; 86% is dumped in landfills, 4% is incinerated, and 1% is leaked into the environment, resulting in a loss of C$7.8 billion based on value of raw materials in 2016.[45]

86% of plastics end up in landfills

Built Environment



Canada's construction sector generates one-third of Canada's total solid waste (more than 4 million tonnes of waste annually).[46] Only 16% of construction and demolition waste was reused or recycled; the remaining 84% is discarded.[47]

84% of demolition waste is discarded

Food

Nearly 60% of food produced in Canada is lost and wasted annually, a value of C$49.46 billion.[48]

60% of food in Canada is lost or wasted



$49.46 billion value

Textiles



Textile waste has increased dramatically largely due to "fast fashion." Synthetic textiles in Canada account for

7% of all plastics in Canadian landfills,

comprising the third-largest category of plastic waste in absolute numbers after packaging and automotive.[49]



Lessons from Abroad

Despite decades of established recycling practices, strategies focused on the transition to a circular economy are relatively recent, even among leading jurisdictions. The regions and countries profiled below are among the most advanced in implementing circular economy practices and are roughly 5 to 10 years ahead of Canada's progress. Best practices across leading jurisdictions include adopting a circular economy roadmap, providing extensive support for circular innovation, and monitoring progress and evaluation.

Despite progress, even leading jurisdictions are still functioning in predominantly linear economic models. While circular strategies have helped to reduce waste, material consumption patterns are increasing—albeit at a reduced rate—likely due to patterns of consumerism, growing GDP, and population growth.

European Union

The European Union (EU) adopted one of the first major pieces of legislation advancing a circular economy in 2015. The EU's Circular Economy Action Plan (CEAP) identified 54 actions and 4 legislative proposals relating to waste, landfill targets, reuse, and recycling by 2035.[50] From 2012 to 2016, employment in circular economic sectors increased by 6% (4 million workers) and circular activities generated €147 billion in value.[51] More than €10 billion in public funding was provided between 2016 and 2020.[52]

The EU's leadership was significant: since 2016, 14 member states, 8 regions, and 11 cities have implemented circular economy strategies. In 2020, the EU introduced a new CEAP that proposes an integrated product policy framework throughout the lifecycle of products, fosters an internal market for secondary raw materials, and addresses high-impact sectors (e.g., textiles, construction, electronics).[53]

The EU monitors key circular economy indicators, including waste management, use of secondary raw materials, and competitiveness and innovation.[54] Initial findings highlight some progress: the circular material use-rate and trade in recycled raw materials, among others, increased from 2016 to 2020. However, there is still significant room for improvement in the reduction of waste and recycling specific types of packaging (e.g., plastic, wooden).[55]

Netherlands

The Netherlands has been a recycling leader for decades and has a 24.5% circularity rate. Its target is to reduce the use of primary raw materials (minerals, metals, and fossil fuels) by 50% before 2030 and become completely circular by 2050.[56] In 2018, the Netherlands created transition agendas for five sectors and value chains with a significant environmental impact (plastics, consumer goods, manufacturing, construction, and biomass/food).[57] From 2019 to 2023, it targeted a set of specific projects to improve circularity, for example, requiring that all government buildings constructed after 2018 be energy neutral and use as many recycled or recyclable materials as possible.[58]

Impact of COVID-19

COVID-19 decreased global circularity from 9.1% in 2018 to 8.6% in 2020.[68] The pandemic increased the use of disposable items such as plastic bags, take-out containers, home test kits, and personal protective equipment. More than 8 billion vaccine doses produced an additional 144,000 tonnes of waste worldwide including glass vials, needles, and safe disposal boxes.[69] To address these issues, the World Health Organization has recommended improvements in eco-friendly packaging and shipping, safe and reusable personal protective equipment, use of recyclable or biodegradable materials, and reverse logistics to support the recycling of plastics.[70]



From 2016 to 2018, the Netherlands improved resource efficiency by 5%, the use of secondary materials by 6%, and circular employment by 2%. However, waste disposal increased by 14% and the incineration of waste increased by 6%.[59] The current state of progress suggests that while the Netherlands' economy is among the most advanced in circular practices, it is still predominately linear.[60] A recent implementation report argued that voluntary measures will be insufficient to reach current targets and urged increased incentives, support, and more coercive measures to improve circularity.[61]

Finland

In 2016, Finland created the world's first national roadmap to a circular economy. The roadmap, updated in 2019, highlights how government, cities, businesses, and citizens can work together to build a circular economy by 2025. The plan focuses on the need for cooperation between ministries and departments and calls for parliamentary cooperation beyond a government's parliamentary term.[62] Finland provides extensive support for circular innovation through the Finnish Innovation Fund Sitra. Fund managers collaborate with partners from different sectors to research, test, and implement circular practices, among other innovations.[63]

Finland, a pioneer in circular economy education, established education initiatives for students—from primary schools to universities and vocational schools—to study the circular economy. In the 2018/19 school year, more than 70,000 children and young people studied the circular economy, including 75% of 12-year-olds and 40% of 15-year-olds.[64]

Finland monitors several indicators, including domestic material consumption, circular material use rate, net sales, number of companies in circular sectors, and sustainable and innovative public procurements.[65]

From 2004 to 2020, Finland significantly reduced the amount of municipal waste designated for landfill, from just under 1500 tonnes to nearly nothing in 2020, as waste was redirected to material or energy recovery. However, the amount of waste grew to 596 kg per capita from under 500 kg in 2004, suggesting Finns are getting better at reusing their waste but can still make improvements to reduce consumption.[66] Between 2010 and 2018, domestic material consumption fluctuated from 170 to 200 million tonnes, with a slight uptick in later years. The circular material use rate grew slightly from 5% in 2015 to 7% in 2018.[67]





Section 2: Innovative Approaches Across Canada

While the need to transition to a circular economy is evident, the path to circularity, for both governments and businesses, is less clear. Though Canada lacks widespread circularity, some sectors and regions have overcome obstacles and implemented circular practices with success. These pockets of progress demonstrate the importance of taking first steps towards implementing a fully integrated circular economy. The case studies below provide pragmatic, scalable, and proven examples that can be applied in other settings.

01 Case Study



Guelph-Wellington Smart Cities

In 2019, the City of Guelph and County of Wellington won Infrastructure Canada's Smart Cities Challenge with the goal of building a regional circular food system. The program was designed in close collaboration with community partners and focused on two main initiatives: Our Food Future, aimed at building a regional circular food economy, and Circular Opportunity Innovation Launchpad (COIL) focused on facilitating circular business innovation and growth.[71]

COIL, funded by FedDev Ontario, is an incubator and accelerator that helps businesses develop solutions to supply chain challenges and provides funding to businesses to scale circular products and services.[72] It administers a series of programs focused on innovation, development, commercialization, and acceleration of circular businesses.[73] It also works with researchers and national experts to identify practices, strategies, and infrastructure that can help scale circular solutions in other communities.[74]

Our Food Future aims to create a circular food system, taking a place-based, systems-based approach. The initiative has launched over 60 projects across the region, including developing new AI systems for municipal waste collection vehicles to supporting new social enterprise initiatives to capture surplus food before landfill. Our Food Future increased access to affordable and nutritious foods for thousands of community members in 2020–21.[75]

Our Food Future has a distributed governance and community capacity building model to co-create solutions with social, economic, and environmental benefits. It places emphasis on leveraging data and technology to advance circular practices.

As a result of its circular initiatives, organizations are collaborating in new, innovative ways, businesses are generating more value and resources and less waste, and the Guelph-Wellington region is more effectively serving the community thanks to improved cooperation across the food system.

Success Factors

The region identified three success factors that are integral to its successful testing and scaling of circularity.

1. **Help enterprises collaborate and take risks**: COIL administers Circulate CoLab, an innovation program that helps small and medium-sized enterprises (SMEs) in a supply chain collaborate to design and test transformative circular approaches that reduce waste and increase material reuse and recycling in the food and environment sectors. This program provides teams of at least three SMEs with $20,000 in funding to develop a prototype of their idea in 16 weeks.[76] The two factors that have been critical in permitting SMEs to take risks are reducing the financial burden of implementing new circular approaches and providing a manageable timeline with clear start and end dates. The program has also helped businesses consider their role as one link in the lifespan of materials they use and collaborate with those who can use or reuse them before and after to generate new value. Similar strategies have been used in Our Food Future to help businesses divert food waste and create new links with food relief organizations.
2. **Promote education:** The region educates entrepreneurs through its Circular Accelerator Program, which helps businesses rethink waste and reach new markets through applying circular practices. It provides entrepreneurs with financing through 10C, mentorship, and training on the circular economy through Innovation Guelph. The program improves entrepreneurs' knowledge and understanding of the circular economy and helps set up new entrepreneurs as future leaders in Canada's growing circular economy business movement. Improved knowledge about the circular economy can have the added benefit of creating market demand and improving visibility of food products that support the circular economy.
3. **Build networks and system resources:** The sheer number of circular organizations and programs in Guelph-Wellington builds the region's system of resources and strengthens its place-based circular infrastructure. This ecosystem strengthens collaboration among government, industry, investors, researchers, and the incubator community. Business and other organizations are provided with support to learn and connect with the broader circular movement and benefit directly from these resources since many are too small to take up this type of systems thinking individually.

Obstacles

A pervasive challenge in the region, and Canada generally, remains a **lack of education** among businesses as well as consumers on the opportunities of the circular economy. For businesses, much of COIL's work is focused on inspiring businesses to see how circular principles can help them reach their goals. On the consumer side, a lack of knowledge of the circular economy limits consumer demand. For example, most consumers are unaware of the concept of upcycling and are unlikely to support products with upcycling certification. Upcycled foods use ingredients that otherwise would not have been consumed and are procured and produced using verifiable supply chains.[77]



Metal Tech Alley

Metal Tech Alley (MTA) is an industrial association and marketing strategy for a regional economic development agency, the Lower Columbia Initiatives Corporation, based in Trail, British Columbia. The region includes several industrial facilities focused on resource extraction, manufacturing, and recycling. Products mined and manufactured in the area are recycled and reused through smelting and refining complexes and battery recycling facilities.

MTA provides a support network for local businesses to facilitate the adoption of circular practices and increase its benefits. Its network spans business, academia, government, and non-profit sectors, with the goal of sustainable development through the regional adoption of circular economy principles in all local economic sectors.[78] MTA's success has driven the economic development of the once-unknown rural region into a sought-after hub of innovation and investment, creating new jobs and companies as well as attracting over a dozen businesses to relocate to the region.

Success Factors

The region identified three key success factors that are integral to building a successful industrial circular economy in the region.

1. **Promote education**: MTA promotes education to increase knowledge of the circular economy and provides training to improve foundational skills. For example, MTA works with partners to host youth workshops focused on engaging high school girls in science, engineering, trades, and technology. It has partnered with Selkirk College to design two new Digital Technologies programs focused on advanced manufacturing in the region: 3D Printing and CNC Machining.
2. **Provide tailored support to businesses**: MTA collaborates with businesses to determine what support they require to build circular value chains and tailors its support as needed. MTA has helped businesses apply for funding and incorporated businesses' needs within its own funding requests when applicable (e.g., MTA has added business-related requests to government funding applications to help reduce business-related barriers and provide a lift to businesses that are otherwise too strapped for resources to explore circular models). MTA also applies for group funding, collaborating with multiple businesses, and, if the funding is secured, MTA provides communication support across the group. MTA is able to provide tailored support by leveraging its reputation and connections within the region.
3. **Build relationships and stakeholder engagement**: MTA acts as a representative for the region, promoting the region to political stakeholders and attracting business investment to the area, building on the region's strengths and unique assets. MTA also facilitates connections among businesses in the region to support the circular economy. For example, MTA facilitated relationship building between two companies at opposite ends of a product's lifespan, bringing together a manufacturing facility and a recycling plant to incorporate circular design, with end-of-life in mind, during the beginning of product development. This type of collaborative exchange is easier to facilitate in the region because of the industries' proximity to one another. MTA hosted the Industrial Circular Economy Conference in 2021 with attendees from around the globe, increasing the region's prominence as a leader in the circular economy.

Obstacles

A common challenge faced by circular economy organizers, including Metal Tech Alley, is **minimal awareness and knowledge** about the circular economy. Even within an industrial value chain, many businesses and consumers are still unaware of the principles and benefits of circularity.

MTA also grapples with **a lack of standardization** across product design and composition, which subsequently makes the disassembly and reintegration/repurposing of resources and materials back into supply chains much more difficult. Charging ports for electric vehicles differ among manufacturers, as does the composition of electric vehicle batteries' black mass (the product remaining after a battery has been recycled). This increases the challenge and workload for battery recycling facilities, which must adapt the recycling process for each type of charging port as well as the chemical process to extract the minerals from a battery's black mass.

Another barrier is an **inconsistent legislative and regulatory framework** across Canadian provinces that affects the transportation of products for end-of-life processing. The provinces differ on the classification of batteries as hazardous goods, causing one company in MTA's network to ship materials through the United States to avoid this problem, circumventing the Canadian economy entirely.



Fashion Takes Action

Fashion Takes Action (FTA) is a non-profit fashion industry organization focused on sustainability, ethics, and circularity. It partners with fashion industry stakeholders and consumers to shift their behaviour to generate more positive social and environmental impacts. FTA operates across the fashion ecosystem, connecting NGOs with brands and retailers to build capacity throughout the entire fashion value chain.

In 2021, FTA launched a mechanical textile recycling pilot to create a product comprised of post-consumer textiles and rPET (recycled polyethylene terephthalate plastic from recycled bottles). With support from Environment and Climate Change Canada, FTA created a circular value chain spanning six industries in Ontario and Québec, including a collection point for unwanted clothing, a collection partner to sort and clean garments, an industrial shredder to reduce fibers in the fabric, a mill to create a nonwoven fabric from recycled polyester fibers, a product designer, and a manufacturer. FTA designed and produced a laundry hamper from the recycled materials. The pilot project is ongoing until early 2023 when the product enters the market. It is still unclear how consumers and the market will respond to the final product.

Success Factors

The association identified two key success factors to building and developing a circular value chain:

1. **Promote education among consumers:** FTA engages in several initiatives aimed at educating consumers about the social and environmental impacts of the fashion industry. For example, it delivers a youth education program, My Clothes My World, to students in grades 4 to 12 across Canada and Europe, to educate youth on the social and environmental impacts of fashion. It also hosts an annual conference called World Ethical Apparel Roundtable (WEAR) to connect circular economy leaders in the fashion industry.
2. **Collaborate across economic sectors and industries:** The development of the pilot project required a high level of collaboration across various industries and sectors. FTA worked with six industries spanning collection, manufacturing, and design. To share the pilot's findings, FTA convened a National Stakeholder Learning Group comprised of apparel brands, retailers, textile collectors, municipalities, and exporters. The group's objective was to exchange information about building and scaling circular textile value chains in Canada while cultivating business relationships. The project had the added benefit of spurring economic development: some participating businesses generated new business opportunities because of interactions with other participants.

Obstacles

FTA encountered a series of barriers to building and scaling a circular textile value chain. While some municipalities have textile diversion programs in place, there is a lack of **textile collection infrastructure**, which required FTA to build its own collection bins with partnering retailers. (Some cities, like Toronto, have expressed concerns about associating the term recycling with textiles as it may add confusion to the blue box program and cause contamination).[79] As a result, FTA had to create consumer awareness of the collection bins in a retail setting and motivate consumers to return to the store with unwanted garments.

Technical limitations are a significant challenge to recycling textile materials in Canada. FTA sorted the garments manually as opposed to using an automated conveyor belt, which slowed down production. (This technical capacity exists in other jurisdictions such as the United States and European Union but not Canada.) This limited the amount and type of post-consumer textiles that could be recycled. There are also limitations to how post-consumer textiles can be used, which resulted in having to add 10% of virgin material to produce the final product.

Ambiguous labelling requirements make it difficult to producers to market the final product. There is no clear labelling format for different types of recycled products. Recycled polyester from rPET (most common in the market) results in a uniform fabric finish, whereas recycled products produced with post-consumer textiles have a nubby or textured finish (which could be less desirable aesthetically for a consumer). However, both products will be labeled as 100% recycled post-consumer polyester, despite the latter being from recycled textiles versus water bottles. This could impact consumer demand as the benefits of the two fabrics are unclear from a consumer perspective.

Section 3: Building a Circular Economy

Below are eight key opportunities that governments and policymakers can explore, test, and adopt as strategies for building a circular economy.



01 Develop circularity strategies at the federal, provincial, and local government levels.

While Canada's federal government has adopted strategies related to the circular economy (e.g., a ban on single-use plastics), it lacks a roadmap or action plan focused on a transition to a circular economy. All levels of government need to consider how the circular economy can help them achieve climate targets and support economic growth over the long term. The federal government could facilitate the development of circular economy roadmaps at the provincial and local levels as well as sector-specific transition plans (e.g., construction).

Canada lags significantly behind European countries, many of which have circular economy roadmaps in place. A roadmap has actionable ideas that reinforce a vision for circularity with specific and measurable goals, while incorporating implementation plans and ongoing evaluation. And its development should include collaborative stakeholder participation spanning business and civil society.[80] In particular, building in collaborative, inclusive consultation with Indigenous communities that employ regenerative practices should be a priority.

In a country as decentralized as Canada, it is equally important for provinces to develop plans to transition to the circular economy, given their jurisdiction over natural resources, waste management, education and skills training, and relationship with municipalities. Circular economy strategies must consider what circularity will mean for Canada's resource-based economy.

02 Federal and provincial governments should harmonize legislative frameworks and improve standardization across economic sectors.

Canada does not have a national definition of the circular economy or its key elements (i.e., materials, reuse, remanufacturing, recycling, extended producer responsibility, classification of raw and secondary materials). Inconsistent legislative and regulatory frameworks across the country can act as a barrier and inhibit the development and implementation of circular strategies because of different practices in each province. Governments at all levels should work together to define definitions, standards, and objectives, to facilitate internal trade amongst provinces and spur innovation across value chains.

03 Reduce economic incentives that maintain a linear economy.

Current economic incentives perpetuate a system that favours the extraction of primary materials and the production of waste simply because it is cheaper to do so. In Canada, the true economic and environmental costs of linear practices are distorted by the subsidized costs of virgin materials, waste, and fossil fuel-based energy. One study found that recycled plastics cost an extra US$72 per tonne compared to virgin plastics.[81] Further, Canada ranked last among 11 OECD countries on progress to end support for fossil fuels.[82] Consumption patterns and business investment are unlikely to drastically change if linear economy options remain inexpensive.

Canada has been slow to use environmental pricing instruments, with the exceptions of carbon pricing and plastic bag fees. Governments should incentivize the circular economy by supporting efforts that reduce impact on the environment (e.g., subsidies for secondary materials) and adequately pricing impacts to the environment (e.g., higher costs for carbon, waste, and virgin materials).[83] For example, Belgium's regulatory environment incentivizes the use of secondary materials by making them economically competitive with virgin materials, resulting in a recycling rate of 55% of municipal waste. It also sets a €996 fee per tonne on non-recycled plastic packaging—among the highest in Europe.[84]

04 Advance critical infrastructure to support a circular economy.

Governments at all levels should advance critical infrastructure to support the circular economy, including tools and practices such as reverse logistics, reuse and repair, and collection, sorting, and recycling facilities. Increased uptake of circular practices will test current infrastructure. For example, Fashion Takes Action's circular supply chain was slowed due to a lack of adequate technical equipment to sort the used textiles. The federal government could work with provincial and municipal governments to ensure Canada has the collection and recycling infrastructure to support the demand from an increase in circular practices.

Canada extracts or imports new material to meet almost 94% of its manufacturing needs; only 6.1% of materials entering the Canadian economy are from recycled sources.[85]



05 Increase support for economic organizations that drive the adoption of circular practices across sectors and within value chains.

Economic organizations, based in a region or industrial sector, provide expertise and resources to SMEs exploring circular practices. This support helps SMEs overcome barriers, such as high investment costs or a lack of experience, that hinder their transition.[86] SMEs particularly need this support in the wake of the pandemic: in 2022, less than three years after the onset of the pandemic, many are still in recovery and lack the capital to explore new ventures.[87] In Guelph-Wellington, financial support from economic organizations encourages businesses to take risks, spurring innovation and economic development in the region.

Economic organizations can also facilitate collaboration across sectors (e.g., government, business, civil society) and within value chains—a critical aspect of the circular economy. Many businesses lack the capacity or expertise to do this work in isolation, highlighting the importance of economic organizations as powerful collaborators. This is a marked departure from traditional linear models that predominately treat businesses as autonomous. Cooperation among businesses opens value chains and provides cohesion to fragmented markets by helping business tackle obstacles together, with the added benefit of driving mutual trust.

06 Spur demand and incentivize the private sector by adopting circular procurement practices and recycled content mandates.

Pursuing circular procurement is another tool at governments' disposal to incentivize circularity. Circular procurement is a goods and services purchasing process that prioritizes circular practices within value chains to reduce waste and environmental impacts. Governments across Canada spend C$200 billion annually on goods and services (15% of GDP).[88] Governments can leverage their buying power to spur demand for circular goods and recycled materials and incentivize the private sector. In Québec, estimates suggest circular procurement could reduce its material footprint by 7.9% and increase the provincial economy's circularity from 3.5% to 4%.[89]

Another tool to spur market demand for recycled plastics is recycled content targets. In 2022, Canada's federal government was consulting on mandates for post-consumer recycled content of packaging to include 50% recycled content by 2030.[90] In this case, the federal government should learn from jurisdictions that have implemented similar targets. The EU recently mandated 25% recycled content (which is much higher in some member states), increasing the demand for post-consumer polyethylene terephthalate (PET) as well as the price—January 2021 to 2022 the price increased by 103%.[91] As previously noted, the federal government will need to work with provincial and municipal governments to ensure Canada has the collection and recycling infrastructure to support an increase in demand following the adoption of circular practices.

Circular economy awareness

All three of the case studies explored in this paper experienced a lack of awareness or education about the circular economy as an obstacle to building and scaling circular value chains.



07 Improve awareness and education about the circular economy.

There is a widespread lack of knowledge about the circular economy and how it differs from the recycling practices of linear economies, even within sectors and businesses that could benefit from the transition. This poses a challenge to spurring systems-wide change and the adoption of widespread circularity. Education can equip individuals with the skills and knowledge necessary to carry out a fundamental revision of Canada's economy from a linear to circular model. Educating the public on the circular economy could have the added benefit of improving consumer demand for circular products, for example, by raising awareness on the meaning of the upcycle certification that prevents food waste and supports circular businesses.

Provincial and territorial governments should consider adding lessons about the circular economy to elementary and secondary curriculums; Finland's initiatives could be a useful model to explore. The federal government should support knowledge acquisition indirectly by continuing to provide support for organizations carrying out education and training initiatives within the private sector.

08 Improve measurement of the circular economy, build a plan for evaluation to track progress, and make the data publicly accessible.

Measurement and evaluation are critical aspects of the transition to a circular economy. Governments at all levels should explore best practices on measurement and evaluation. The European Environment Agency's (EEA) Bellagio Declaration includes seven principles to measure the transition to a circular economy, including the importance of regular monitoring, clear definitions of indicators, following the indicator selection criteria, use of a wide range of data sources, ensure multilevel monitoring, the ability to track progress towards targets, and transparency.[92]

Governments should explore what circular-related metrics are the best suited to monitor progress given Canada's unique characteristics. The EEA monitors material footprints, consumption footprints, circular material use rate, waste generation and decoupling, diversion of waste from landfill, and waste recycling.[93] Canada should also consider what socio-economic indicators are best suited to measure overall impacts on wellbeing and the economy, such as employment or quality of life.

Policymakers should improve the use of existing data sources (e.g., using monetary flows to track historical material flows) and create a comprehensive account of the circularity rate by investing in the data collection of material flows and quantities within economic sectors.

Conclusion

The transition towards a circular economy will require transformative change and participation from all sectors, including governments, business, and civil society. The promises—addressing climate change by reducing emissions and contributing to economic development—are worth overcoming the barriers and obstacles to its implementation. A circular economy will require a fundamentally different mindset, shifting away from the practice of consumerism and waste common in linear economies towards sustainability.

Despite progress on the circular economy, linear economic practices remain prevalent. The case studies reviewed in this paper are leading examples of success in the circular economy in Canada. And yet, the efforts are insufficient without further concerted action aimed at accelerating the circular transition. Policymakers can play a pivotal role in advancing the circular economy by adopting eight key tools: developing national, provincial, and local circular strategies, harmonizing legislative frameworks and improving standardization, reducing economic barriers, advancing critical infrastructure, supporting economic organizations focused on driving circular practices, exploring measures to spur demand for circular products, and improving awareness and measurement.

Methodology

The research process for this policy paper included a literature review as well as a series of key informant interviews with several circular economy practitioners and thought leaders. The paper was reviewed by two external experts who provided comments on an earlier draft.

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